

23 August 2023

Australia Energy Market Operator

Submitted via email: [contact.connections@aemo.com.au](mailto:contact.connections@aemo.com.au)

Dear Sir/Madam

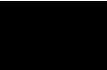
**Re: AEMO review of technical requirements for connection**

SA Power Networks, as sole distribution network service provider in South Australia, welcomes the opportunity to provide comment in response to the Draft Recommendations Update Report (Part 1) on Australia Energy Market Operator (AEMO) review of technical requirements for connection.

Feedback on the revised recommendations for the technical requirements in the National Electricity Rules (NER) Schedules 5.2 and 5.3a are included in the attached response.

If you have any questions regarding this response, please contact Andrew Lim, Connections Planning Manager on [REDACTED].

Yours sincerely



Elisia Reed  
*Head of Network Planning*

# Update report Stakeholder feedback template:

## AEMO Review of technical requirements for connection

Stakeholders making a submission on the recommendations set out in the AEMO draft report may use the below template to provide feedback. Please consider the confidentiality disclaimer at the end of this document.

### Stakeholder: SA Power Networks

#### Schedule 5.2 Conditions for Connection of Generators

NER Schedule 5.2 issue	Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments
<b>NER S5.2.1 – Outline of requirements</b>	
<b>Application of Schedule 5.2 based on plant type instead of registration category and extension to synchronous condensers</b>	
<b>NER S5.2.5.1 – Reactive power capability</b>	
<b>Voltage range for full reactive power requirement</b>	
<b>Treatment of reactive power capability considering temperature derating</b>	
<b>Compensation of reactive power when units are out of service</b>	<ul style="list-style-type: none"> <li>We recommend that both active power and reactive power requirement to scale down linearly as a proportion of the number of generating units still in service and leave freedom for each NSP to determine whether the voltage impact on the connection point is acceptable as part of the due diligence assessment. Given that each NSP applies different planning criteria to meet the unique requirements of each connection point with different network characteristics, it may not be advisable to develop an automatically accepted voltage impact limit as this could trigger the NSPs to invest significant amount of capital to resolve voltage constraints which goes against the principles of the NEO. In the scenario where a significant portion of the plant's reactive power requirements are met by a pure reactive plant such as SVCs and STATCOMs, the NSP and the generating system should have the freedom to negotiate on an appropriate active power and reactive power requirement / limitations when the reactive plant is out of service, and document it as part of the agreed performance standards for the generating system.</li> </ul>
<b>S5.2.5.7, S5.2.5.8, S5.2.5.13</b>	
<b>Simplifying small connections</b>	<ul style="list-style-type: none"> <li>We strongly oppose AEMO's recommendation to exclude connections less than 30MW for AEMO Advisory Matters.               <ol style="list-style-type: none"> <li>This will have a material impact on the consistency of connection assessments across the NEM and places the onus solely on the NSPs to ensure appropriate minimum performance standards are met by 5-30MW Generators to maintain system security without regulatory oversight from AEMO. Considering the influx of more IBR generators in the network and distribution network connected BESS proposals with grid-forming capabilities, to</li> </ol> </li> </ul>

NER Schedule 5.2 issue	Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments
	<p>ensure consistency across the NEM, we strongly believe that it is most appropriate for AEMO to provide the regulatory oversight to ensure all Registered Generators have appropriate, consistent level of performance standards.</p> <p>b. Aggregated smaller connections on the network can cause a wider power system impact at both transmission and distribution levels and a working group initiated by AEMO was formed to increase visibility and a uniformed assessment approach for Chapter 5A connections. AEMO’s proposed recommendation is inconsistent with that initiative and may hinder their function in maintaining wider power system security. Concerning S5.2.5.7 and S5.2.5.13, we advise that a re-evaluation of this threshold is necessary, particularly considering the impending decommissioning of a significant portion of synchronous generators and increase uptake in Inverter Based Resources (IBR). As a result, the size of the largest credible contingency event in SA is diminishing. Moreover, the collective impact of numerous generators below 30MW, lacking thorough investigation into their voltage and reactive power control, could pose system stability issues.</p> <p>c. Majority of Generators under 30MW (above 5MW) in SA are registered Market Participants (therefore subject to the technical requirements in Schedule 5.2) and have not applied for exemptions from registration due to financial incentives in participating in AEMO markets. We have received an increase of applications for BESS with a nameplate rating of 5MW which must be registered as Generators. Assuming AEMO’s function in managing GPS non-compliances for Registered Generators remain unchanged due to this recommendation, it may be more resource intensive to deal with potentially increase of non-compliances from generators due to influx of &lt;30MW generating systems (e.g. BESS with grid-forming capabilities).</p>
<b>NER S5.2.5.2 – Quality of electricity generated</b>	
Reference to plant standard	
<b>NER S5.2.5.4 – Generating system response to voltage disturbances</b>	
<b>Overvoltage requirements for medium voltage and lower connections</b>	<ul style="list-style-type: none"> <li>The revised approach would imply that the point of application of overvoltage for S5.2.5.4 would be at the nearest 132kV or 275kV transmission connection point which could be very electrically distant, potentially up to 100 kms away from the connection point for a Chapter 5 connected Generator connected to a DNSP’s distribution system. Has AEMO completed any studies or publish evidence to confirm overvoltage conditions are non-credible in the sub-transmission and distribution networks and HVRT capabilities from DNSP connected generation are not required for overvoltage conditions in the sub-transmission and distribution networks? This would also imply that S5.2.5.4 for distribution connected generation would need to be assessed on a SMIB model up to the nearest 132kV/275kV connection points through sub-transmission mesh networks, adding unnecessary complexities to the SMIB modelling. In our experience, S5.2.5.4 compliance has not been an issue for distribution or sub-transmission connected Chapter 5 Generators and therefore we suggest re-considering the proposal.</li> </ul>
Requirements for overvoltages above 130%	
Clarification of continuous uninterrupted operation (CUO) in the range 90% to 110% of normal voltage	
<b>NER S5.2.5.5 – Generating system response to disturbances following contingency events</b>	
Definition of end of a disturbance for multiple fault ride through	
Form of multiple fault ride through clause	
Number of faults with 200 ms between them	
Reduction of fault level below minimum level for which the plant has been tuned	

NER Schedule 5.2 issue	Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments
Active power recovery after a fault	
Rise time and settling time for reactive current injection	
Commencement of reactive current injection	
Clarity on reactive current injection volume and location and consideration of unbalanced voltages	
Metallic conducting path	
Reclassified contingency events	
NER S5.2.5.7 – Partial load rejection	
Application of minimum generation to energy storage systems	
Clarification of meaning of CUO for NER S5.2.5.7	
NER S5.2.5.8 – Protection of generating systems from power system disturbances	
Emergency over-frequency response	
NER S5.2.5.10 – Protection to trip plant for unstable operation	
Requirements for stability protection on asynchronous generating systems	
NER S5.2.5.13 – Voltage and reactive power control	
Voltage control at unit level and slow setpoint change	
Realignment of performance requirements to optimise power system performance over expected fault level (system impedance) range – Voltage control	<ul style="list-style-type: none"> <li>It is unclear how “apparent system impedance” is to be practically calculated under what dispatch conditions as this differs from the standard calculation of fault levels and Thevenin equivalents. We would like to also understand what constitutes as “electrically close to the connection point”.</li> </ul>
Materiality threshold on settling time error band and voltage settling time for reactive power and power factor setpoints	
Clarification of when multiple modes of operation are required	<ul style="list-style-type: none"> <li>We would like more clarity on the level of tuning and assessment AEMO would deem as being required for any secondary mode considering this is an advisory matter.</li> </ul>
Impact of a generating system on power system oscillation modes	

NER Schedule 5.2 issue		Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments	
<b>Definition – continuous uninterrupted operation</b>			
Recognition of frequency response mode, inertial response and active power response to an angle jump			

### Schedule 5.3a Conditions for connection of MNSPs

Issue		Schedule 5.3a (HVDC links) – feedback on revised recommendations and relevant draft NER amendments	
<b>NER S5.3a.1a Introduction to the schedule</b>			
Alignment of schedule with plant-type rather than registration category			
<b>NER S5.3a.8 – Reactive power capability</b>			
Reactive power			
<b>NER S5.3a.13 – Market network service response to disturbances in the power system</b>			
Voltage disturbances			
Frequency disturbances			
Fault ride through requirements			
<b>NER S5.3a.4 – Monitoring and control requirements</b>			
Remote monitoring and protection against instability			
<b>New standards</b>			
Voltage control			
Active power dispatch			

## Multiple Schedules

Issue	Multiple schedules – feedback on revised recommendations and relevant draft NER amendments
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### NER Multiple clauses

References to superseded standards	
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## NER structural amendments

Issue	NER structural amendments – feedback on revised recommendations and relevant draft NER amendments
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### NER structural amendments

Drafting principles	
Proposed approach	<ul style="list-style-type: none"> <li>We strongly advise for AEMO to be involved and provide an advisory role if the technical requirements in Schedule 5.2 are applied for a 'Schedule 5.2 plant' under 30MW/MVA the NSP considers to have material impact on the wider network.</li> </ul>

## Consequential amendments

Issue	Consequential amendments – feedback on revised recommendations and relevant draft NER amendments
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### Definitions

Definitions changes	
Technical changes	
Incorporating synchronous condensers	
Additions to information provision	
Relevant system – in relation to small plants exempt from some requirements	
S5.2.5.8 Over-frequency emergency generation reduction requirements	
S5.2.5.8 Protection settings and relationship to ride through clauses	

Issue	Consequential amendments – feedback on revised recommendations and relevant draft NER amendments
S5.2.5.8 Conditions for which the plant may trip and recording of conditions	
S5.2.5.8 Network Service Provider liability	
S5.2.5.11 Minimum operating level	
S5.2.5.11 Response direction for bidirectional units taking power from the system	
Drafting changes	
Drafting changes	

### Confidentiality disclaimer

Under clause 5.2.6A(d)(2), AEMO is required to publish all submissions received about this Review on its website. Please identify any part of your submission that is confidential, which you do not wish to be published. Please note that if material identified as confidential cannot be shared and validated with other interested persons, then it may be accorded less weight in AEMO’s decision-making process than published material. AEMO prefers that submissions be forwarded in electronic format.