

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: Neoen Australia Pty. Ltd.

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
Fast tracking the proposed Rules changes - ADDED by NEOEN	Fast tracking of this set of proposed Rule changes is not appropriate. It is our understanding that fast tracking is reserved for non-controversial/editorial types of changes. The changes proposed for S5.2 are not immaterial and many of them could introduce significant risk to the future generation projects. They should be carefully considered and discussed with the industry before implementation.
NER S5.2.1 – Outline of requirements	
Application of Schedule 5.2 based on plant type instead of registration category and extension to synchronous condensers	
NER S5.2.5.1 – Reactive power capability	
Voltage range for full reactive power requirement	<p>There needs to be alignment on the different voltage levels referred to in the NER. To maintain consistency with the practical operation of the NEM and avoid introducing another extraneous term, the "target voltage" which should be recorded in the connection agreement should be utilised here. It is not efficient or effective to introduce another definition such as "voltage centre point".</p> <p>If the new quantity is introduced it should be considered what mechanisms are in place for setting and potentially revising it. Refer to the provisions in 5.3.13 – similar would be required here.</p> <p>Proposed change to limit the requirement for full reactive power capability to a 10% voltage band around a centre point nominated by the NSP (in the range 95% to 105%) could mean that the capability of the plant needs to be maintained down to the 85% of the nominal voltage, if the nominated centre point is the lower boundary of the range, i.e. 95%. This could require further plant oversizing that must be supported by additional funding and considered in design. Clarification on this expectation is required from AEMO in a guideline or report prior to the Rule being amended.</p> <p>The nomination of voltage centre point must have a sound basis and be received from the NSP sufficiently early to enable connection studies to be accurate and commence in a timely manner. Neoen therefore recommends the voltage centre point, if introduced to the NER, to be determined from the connection point's voltage profile, which the NSP should be required to share at Connection Enquiry stage.</p>

NER Schedule 5.2 issue	Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments
Treatment of reactive power capability considering temperature derating	Proposal to consider temperature derating is unnecessarily complicating the standard – temperature impacts on active power capability. Each generating system bids to the market with accordance to their current capability which already takes temperature derating into consideration. It is unnecessary to add this to the Rules and will only prolong the discussions related to this standard. Recording additional irrelevant material under the Rule will mean more testing and modelling needs to be conducted initially and through project life to "prove" the statement extending and complicating the negotiations.
Definition of “active power capability”	What is proposed? Need to careful that the definition does not become circular. Consider using the term “maximum operating level” as defined in S5.2.5.11 rather than introduce another term.
Negotiation criteria	<p>Regarding S5.2.5.1 – in many instances a NSP will require the AAS to be achieved without being able to justify the required limits. Numerous areas of the grid are not suited to requiring the AAS levels for S5.2.5.1 - e.g. for a weak part of the grid, the impact of full reactive power capability can push the network beyond the normal limits of S5.1a.4. In these situations, negotiation of the reactive power capability must be conducted to avoid over-building capacity – the inefficiency of which is contrary to NEO. (This is acknowledged somewhat by proposal relating to small generating systems. The same principle would apply to large systems).</p> <p>There should be a clear requirement for the NSP and AEMO to justify the need to meet AS under this and any other clause – NSPs and AEMO should have to provide evidence to support their decision (e.g. by presenting results of the studies) when rejecting negotiated standards. The proponents are required to do so under 5.3.4A(b2) however AEMO and NSPs don't have the same obligation making the negotiation process uneven from the start.</p> <p>At the moment typically AEMO and NSPs reject negotiated standards as a starting point in all negotiations and only agree to them towards the end of the process if the proponent can show via extensive studies that they can't in any way or shouldn't (e.g. due to a detrimental impact on the network) meet the automatic standard. We don't think this was the intent of the framework established under 5.3.4A.</p>
Compensation of reactive power when units are out of service	
S5.2.5.7, S5.2.5.8, S5.2.5.13	
Simplifying small connections	
NER S5.2.5.2 – Quality of electricity generated	
Reference to plant standard	
NER S5.2.5.4 – Generating system response to voltage disturbances	
Overvoltage requirements for medium voltage and lower connections	Suggest that correct application for the negotiation framework to sensibly deal with a situation is preferable to a Rule change.
Requirements for overvoltages above 130%	<p>This standard needs to introduce a RMS voltage limit for remaining connected to the network. The way the existing standard and recent proposal from AEMO are worded implies there is no RMS voltage limit for remaining connected to the network (voltage “greater than 130%”). Further changes proposed to this standard should avoid specifying values “above” or “greater than” without introducing the limit – it leads to ambiguity and implies there is no limit of voltage for which the plant must be connected.</p> <p>Note that the existing limit is derived from the system standard of S5.1a.4 which relates to power frequency voltage - i.e. voltage across a 20 ms cycle. Introducing limits for voltage of less than 20ms duration relates to transients or impulse voltages. It is essential to ensure that any changes with respect to this requirement are consistent with the agreements made between a Generator and an NSP under S5.2.3(a) and according to the design of S5.2.3(b). These include matters regarding insulation coordination and voltage impulse levels.</p> <p>The requirement for CUO during impulse events needs to be justified and defined. What is being sought with respect to this provision. Certainly, remaining connected for the duration of a transient event is essential, however, it needs to be recognised that plant must protect itself from externally induced events and continuing to operate under such conditions must be managed within the reasonable capability of plant. The correct coordination of insulation including operation of surge arrester devices during such transient events will impact what might be considered “CUO”. Need to ensure that in this context merely not disconnecting is sufficient.</p>

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	<p>The peak voltage of 184% must be well defined within the Rules and the OEMs should be well consulted on selection of this level – high voltages will damage IBR’s equipment and different technologies will require a different level of protection. Defining unreasonably high voltage withstand level is not beneficial to operation of the network as damaged generation will not be able to return to service after fault clearance. Suggestion to record the peak voltage for which the generator will disconnect to protect its equipment instead of imposing an arbitrary level.</p> <p>“Blocking” should also be defined within the Rules – many inverters must disconnect within milliseconds (e.g. 3 ms) to protect equipment from physical and irreversible damage and the use of external devices diverting or “blocking” the voltage or current in any way will not provide sufficient level of protection.</p> <p>General comments:</p> <ul style="list-style-type: none"> • Proposal refers to matters that are related to primary plant design (e.g. protection and insulation coordination) and are already agreed between the connecting plant and the NSP and recorded in the Connection Agreement. Addition of these in the standard will again further complicate and prolong GPS negotiations without a tangible benefit to network operator/owner. • When NER refers to an AS or IEC document it places an obligation on a potential participant to purchase that standard – these are not open documents accessible to everyone the same way as the NER. With numerous references, it can become expensive to maintain a library.
Clarification of continuous uninterrupted operation (CUO) in the range 90% to 110% of normal voltage	
NER S5.2.5.5 – Generating system response to disturbances following contingency events	
Definition of end of a disturbance for multiple fault ride through	
Form of multiple fault ride through clause	<p>Allowing the NSP to require additional MFRT studies – the introduction of MFRT requirement was to ensure that the generating plants have clear obligation in terms of remaining connected should multiple, consecutive faults occur. Increasing number of MFRT studies provides no clear benefits to the network owner.</p> <p>Comment from AEMO in the recent presentation that the NSP will only have a right to require additional studies if they suspect the proponent did not disclose all information about performance of their facility – if the information has not been made available it will also not be included in the models. Additional studies will not increase clarity.</p> <p>Regardless the standard should not introduce ambiguity – if the requirements are expanded for MFRT it should be clearly stated under what conditions NSPs can request additional studies.</p>
Number of faults with 200 ms between them	
Reduction of fault level below minimum level for which the plant has been tuned	<p>This should be covered by S5.2.5.5(d)(7) and S5.2.5.5(l)(6).</p> <p>“provided that none of the events would result in:</p> <p>... the islanding of the <i>generating system</i> or cause a material reduction in <i>power transfer capability</i> by removing <i>network elements</i> from service”</p>
“Active power recovery after a fault	
Rise time and settling time for reactive current injection	<p>The benefit of shortening the response commencement time to 10 ms and how will this be assessed is unclear. The current injection is measured in response to % voltage reduction – the NER specification of voltage refers to power frequency voltage, which must be measured across a 20 ms cycle. How will the voltage</p>

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	<p>reduction be measured under this clause to allow a response within half the cycle? For similar reasons it is also questionable whether existing technologies can meet this requirement.</p> <p>Currently network wide studies can only be run in PSS/e which is not suitable to analyse transient phenomena that occurs in very short timeframes – the 10 ms requirement will not be possible to verify prolonging and complicating discussions under this clause without a clear benefit to the network.</p> <p>The proposed definition for “adequately controlled” is required.</p>
Commencement of reactive current injection	
Clarity on reactive current injection volume and location and consideration of unbalanced voltages	
Metallic conducting path	The original reason for including this term must be considered. It was originally intended to indicate a low impedance fault may practically evolve.
Reclassified contingency events	<p>Generating systems can’t be re-designed as network events are re-classified – the Rules must be clear what events are credible before the design is underway. NSP should provide a list of credible contingencies in the response to the connection enquiry, credible contingency events must be consistent with the rule definitions and the planning and design of the NSP network. The project can’t respond to re-classification once the work on application package preparation commences – this would introduce significant re-design and re-work which would have direct impact on level of funding required for the project.</p> <p>Should this change be introduced there needs to be a clear obligation on NSP/AEMO to outline the events that may be re-classified in near future and the risk this may introduce to the project.</p> <p>Note that a reclassified credible contingency event is a non-credible contingency event that AEMO has determined is now reasonable possible given abnormal system conditions. The system cannot be designed to always operate such that potentially reclassified events are always possible and the same goes for generating plant. Note that the event types defined in S5.2.5.5 already cover a number of non-credible contingency events there is no need to expand these conditions. The cost of doing so would be prohibitive and must be understood that a non-defined list of event withstand conditions imposes inefficient costs onto new connections that are passed on to consumers, with no benefit.</p>
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	<p>Coordinated and consistent approach to oscillation monitoring and detection is needed. Clear definition on what should be classified as an “oscillation” and how it should be detected and flagged is needed from AEMO – with the introduction of the detection mechanism in the MAS and lack of definitions on monitoring and detection algorithms for oscillations there is a potential for many different systems to operate in the future network. Variety of different mechanisms will provide information on a state of the network that will be difficult to interpret and will not aid in operation of the network.</p> <p>Comment from AEMO that it is impossible to establish a single definition of “oscillations” – if AEMO with full access to network information is unable to do so how can this be established and designed by others? Without a clear guideline this has a high potential for implementation of systems that will not provide any benefits.</p> <p>Under no conditions should automatic disconnection for IBRs be required as this could lead to unwanted and unexpected loss of generation/load leading to unnecessary network events. Neoen therefore recommends removing from this standard any requirement for this capability, and to change the name of the</p>

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		<p>standard from “Protection to trip plant for unstable operation” to “Unstable plant operation” or similar, provided that clear definitions of “unstable” and “oscillation” are also provided in the Rules.</p> <p>Furthermore, our understanding is that there will be a requirement for the plant to automatically establish its contribution to the oscillations – we are not aware of any technology that would be capable of doing that and suggest the Rules should only require capabilities which are proven sufficiently reliable and readily available on the market from a range of suppliers.</p>
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		<p>It should be considered how rise time and settling time integrate together. The speed of response should be tuned with consideration of nearby machines and the state (e.g. strength) of the network. Much like the tuning of PI controllers – fast tuning of control systems in weak network can increase network instability. The rise time of reactive power should be matched with the system’s strength not tuned to be as fast as possible or compliant with an arbitrary number of seconds. The response of all plant connected in proximity needs to be coordinated to ensure correct, stable and appropriate sharing of response. There should be no hunting due to significantly different response characteristics.</p>
Materiality threshold on settling time error band and voltage settling time for reactive power and power factor setpoints		<p>Why has a materiality threshold of 5 MW not been proposed?</p>
Clarification of when multiple modes of operation are required		
Impact of a generating system on power system oscillation modes		
Definition – continuous uninterrupted operation		
Recognition of frequency response mode, inertial response and active power response to an angle jump		<ol style="list-style-type: none"> 1. Is inertial response not adequately addressed in S5.2.5.11? 2. How is active power response and voltage phase angle response assessed in practice - i.e. for an operational facility? It is important to understand the difference between models and physical plant when looking at sub-cycle performance.

Schedule 5.3a Conditions for connection of MNSPs

Issue		Schedule 5.3a (HVDC links) – feedback on revised recommendations and relevant draft NER amendments
NER S5.3a.1a Introduction to the schedule		
Alignment of schedule with plant-type rather than registration category		
NER S5.3a.8 – Reactive power capability		
Reactive power		

Issue	Schedule 5.3a (HVDC links) – feedback on revised recommendations and relevant draft NER amendments
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NER S5.3a.13 – Market network service response to disturbances in the power system

Voltage disturbances	
Frequency disturbances	
Fault ride through requirements	

NER S5.3a.4 – Monitoring and control requirements

Remote monitoring and protection against instability	
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New standards

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	We would like AEMO to consider the use of guidelines in the negotiation process in this review of the Rules. AEMO and various NSPs issue guidelines which have no legal standing in the NER, and insist these guidelines be met to the letter as soon as they are published and in some cases even before that with guideline provided in a draft format. This is effectively bypassing the negotiated standard pathway. Only the guidelines referenced by the NER (e.g. Power System Modelling Guideline) should have any impact on the connection process.

Issue	NER structural amendments – feedback on revised recommendations and relevant draft NER amendments
	<p>The process for establishing the guidelines that the Rules currently reference must be reviewed – very little (if any) consultation appears to take place with the wider industry before the guidelines are issued/revise and there is no time allowed for projects to react to the new requirements.</p> <p>Rules are silent on notice that must be given before guidelines are amended, the consultation period and the transitional arrangements when updated guidelines are published. The NER should describe the consultation and application process in detail.</p> <p>Additionally, many matters for which AEMO has applied guidelines are matters for which the Generator has direct and sole responsibility – and bears all risks – under the NER. While we appreciate that AEMO is expressing "care" that other Participants operate according to AEMO's (perceived) ideal, this is not part of AEMO's role under the NER or the NEL. We are concerned that these matters hinder the ability of Participants to deliver efficient outcomes according to the NER and the NEO.</p> <p>We would also like to make a general note on the negotiation of standards – there should be a clear requirement for the NSP and AEMO to justify the need to meet ASS under any clause. NSPs and AEMO should have to provide evidence to support their decision (e.g. by presenting results of the studies) when rejecting negotiated standards. The proponents are required to do so under 5.3.4A(b2) however AEMO and NSPs don't have the same obligation making the negotiation process uneven from the start.</p> <p>At the moment typically AEMO and NSPs reject negotiated standards as a starting point in all negotiations and only agree to them towards the end of the process if the proponent can show via extensive studies that they can't in any way or shouldn't (e.g. due to a detrimental impact on the network) meet the automatic standard. We don't think this was the intent of the framework established under 5.3.4A.</p>

Consequential amendments

Issue	Consequential amendments – feedback on revised recommendations and relevant draft NER amendments
Definitions	
Definitions changes	Settling time definition change – the proposed change appears to be halving the band for settling time. What is the benefit of tightening this band by so much and how will it be assessed? This is typically assessed in PSS/e which cannot provide this level of accuracy. The accuracy of the models (PSS/e or PSCAD) has its limits as well – halving the band will again prolong and complicate the S5.2.5.13 discussions without a clear benefit to network operation.
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	
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	

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