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Thursday, 6 February 2025

Ms Anna Collyer
Chair
Australian Energy Market Commission

Lodged online: www.aemc.gov.au

Project Ref: ERC0393

Dear Anna,

AEMC Improving the NEM access standards - Package 1

Transgrid welcomes the opportunity to respond to the Australian Energy Market Commission's (**AEMC**) draft decision on Improving the NEM access standards - Package 1. The AEMC's draft decision is in response to a rule change request submitted by the Australian Energy Market Operator (**AEMO**). This request is to give effect to AEMO's final recommendations in its review of technical requirements for connection, which AEMO is required to conduct at least once every five years, pursuant to clause 5.2.6A of the National Electricity Rules (**NER**).

Transgrid supports review of the technical requirements for connections and appreciates the AEMC's intent to provide clarity through amendments that ensure the standards are fit for the evolving generation mix. However, we strongly believe that this rule change requires further consultation to ensure any changes do not have unintended consequences on the power system, Network Service Providers (**NSP**s) and connecting parties. While we acknowledge that AEMO has engaged with stakeholders (including Transgrid), prior to submitting the rule change request to the AEMC, given the extensive scope and the significance of the amendments proposed, we do not believe this rule change should be progressed under a fast-track process. The following are several key outstanding issues that we believe warrant further consideration, including:

- Application of access standards to new NSP owned equipment – we support the draft determination proposal that NSPs would have the ability to determine and establish appropriate performance standards for their own synchronous condensers without the need for any negotiation process. However, this is not reflected in the draft Rules. We believe that new NSP assets should be able to establish performance standards without going through a negotiated process with AEMO. This will minimise delays and costs and would be consistent with Section 3.2.1 of the draft determination.
- Application of access standards to existing NSP owned equipment – Existing plant that is operated and owned by NSPs should have grandfathering provisions. This will minimise delays and costs as it will take several years to meet the new standards for existing synchronous condensers. For some assets it will not be possible at all.
- Application of penalties – NSPs could be subject to new penalties for not following a process designed for a third party to negotiate and agree with the NSP with consultation with AEMO. We do not believe the additional penalty outlined in Appendices C.5 should apply to NSP given their role in the connections process and their obligations to maintain power security and relatability.

- Commencement of final Rule – we do not believe that a commencement date for the draft rule of 10 April 2025 would provide market participant with sufficient time to have the necessary resources in place to compile with the new standards. We urge the AEMC to consider a longer timeframe i.e. 6 to 12 months.
- Voltage range for full reactive power requirement – we urge the AEMC to provide further clarity and consider additional risks of the proposed changes. This includes issues that may arise such as projects unnecessarily limiting their reactive power capability, management of variations in mid-point voltage during the generator's operation and maintaining the network voltages in operation of the power system with the proposed changes.
- Clarification of continuous uninterrupted operation – amendment to S5.2.5.4(e2) proposes to permit tap-changing transformer operation to allow plant to maintain active and reactive power levels for voltage variations up to 10% of nominal voltage. Permitting this could lead to substantial variations in active and reactive power output and could result in exacerbating or prolonging the voltage disturbance. This is inconsistent with the intended expectation of continuous uninterrupted operation of the plant within the normal operating range.
- Exclusion of load rejection requirements for asynchronous plant – we do not support the draft rule to limit application of S5.2.5.7 to synchronous generators only, noting that:
    - Discrete assessment of voltage and frequency disturbances does not adequately cover the potential impacts of simultaneous voltage and frequency disturbances that may arise from a major load rejection event.
    - Applying clause S5.2.5.7 based on the distinction between synchronous and asynchronous production units does not adequately consider emerging plant technologies such as grid forming and the criticality of load rejection performance during islanded operation.

The fast-track process risks the AEMC making unintended errors given there are also inconsistencies between the draft determination and the draft rule, inconsistencies within the draft rule (between different schedule or within clauses) and additional amendments that are not discussed in the draft determination nor consulted on by AEMO. These will have significant impacts on NSPs and connection applicants.

Our attached submission provides further commentary on the above-mentioned points and highlights key items of support.

We appreciate the opportunity to provide a submission to the draft decision and look forward to continuing to work with the AEMC to continue to ensure that the proposed changes to the NEM access standards are fit-for-purpose and have no unintended consequences. If you or your staff require any further information or clarification on this submission, please contact Zainab Dirani, Policy and Advocacy Manager at zainab.dirani@transgrid.com.au.

Yours faithfully

Kasia Kulbacka

General Manager of Network Planning

Transgrid's attached submission to AEMC's Improving the NEM access standards - Package 1

Schedule 5.1 Network Performance Requirements to be Provided or Co-ordinated by Network Service Providers

Relevant section of draft determination	NER Schedule 5.1 Issue	Transgrid feedback
Slow front overvoltage		
N/A	Introduction of new slow front overvoltage requirement under S5.1.4	• Transgrid notes that S5.1.4A includes new obligations on NSPs regarding network design to ensure switching of network elements does not cause connected plant to experience slow front overvoltage above a certain level. Issues with this requirement include: - This is introduced without any discussion or specific reasoning in the draft determination. - The requirement relies on the switching surge (a traveling wave) and the resulting transient overvoltage at the connected plant being directly related. This is not the case, the transient overvoltage at the connected plant is highly dependent on the design of the connected plant, most notably surge arrester specification and placement at the connected plant - Transgrid presently designs network elements in accordance with the relevant international standards (including the IEC 60071 series of standards for insulation coordination). Connected plant must also be designed to IEC 60071 to meet the requirements of S5.2.3 under the current version of the Rules. In Transgrid's opinion, this issue is adequately handled by the existing rules and relevant international standards. The specific requirements in S5.1.4A (NSP) and S5.2.3(b)(4A) (Schedule 5.2 Participant) of the draft rule are not necessary.

Schedule 5.2 Conditions for Connection of Generators

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
Amendments to apply access standards by plant type		
Section 3	Align the standards and obligations with the type of plant to which they apply.	• Transgrid supports the draft rule to align the standards and obligations with the type of plant to which they apply.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
	Broaden the application of Schedule 5.2 to include synchronous condenser systems.	We believe there is a fundamental difference in the planning process of NSP investments and associated projects and a generator's planning and investment process. Applying Schedule 5.2 to NSP synchronous condenser could lead to delays in delivering infrastructure projects. Therefore, we encourage the AEMC to exclude NSP synchronous condensers from Schedule 5.2. If the AEMC was minded in pursing this change, we strongly recommend the AEMC to consider the following: • Transgrid encourages the AEMC to include grandfathering provisions are applied to the existing plant owned and operated by NSPs. This is consistent with the approach taken by the AEMC on transitional provisions when new rules come into effect which are not applied to the existing generators noting that most of synchronous condensers currently in service or under consideration will be financially closed. It will take several years for existing synchronous condensers to meet the proposed new standards. This may result in considerable costs that are not currently factored into budgets or revenue proposals. • Section 3.2.1 of the Draft Determination states that *"NSPs would have the ability to determine and establish appropriate performance standards for their own synchronous condensers without the need for any negotiation process"*, however the S5.2.1(b1)) of the Draft Rule requires the NSP to consult with AEMO and follow AEMO's advice in determining a matter that is an AEMO advisory matter. - Transgrid supports the Draft Determination that allows NSPs to determine and establish appropriate performance standards without the need for any negotiation process and amend them as needed, including in urgent circumstances. - The Draft Determination notes that the NSPs do not have to negotiate the performance standard while it notes that NSP owned synchronous condensers must meet a negotiated access standard. Transgrid interpretation is that if NSP synchronous condenser performance standards meet the MAS, this rule has been satisfied and no further negotiation framework including with AEMO would apply to them. - Transgrid strongly encourages the AEMC to ensure that the Final Rule drafting is consistent with the draft determination i.e., the Rule wording should explicitly state that NSPs do not have to consult with AEMO on AEMO advisory matters or negotiate any Access Standards with AEMO on NSP owned/operated plant.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		• Transgrid encourages the AEMC to provide clarity on the application of the 5.3.9 process to the synchronous condensers owned and operated by the NSP.
NER S5.2.5.1 – Reactive power capability		
Section 4.1	Voltage range for full reactive power requirement	• As outlined in our feedback to AEMO during the consultation process, Transgrid prefers that the existing AAS requirements remain in effect and that the negotiating framework is reinforced with the proposed amendments considering the voltage-dependent requirement for reactive power. While acknowledging the additional financial implications in meeting the current AAS for some projects, there are some projects which can meet the full reactive power capability without requiring additional equipment and associated financial implications. With the proposed amendments to the AAS, projects may unnecessarily limit their reactive power capability that can be provided at no cost to the proponent using the latent capability of the plant. In particular, inclusion of voltage dependant reactive power limits, which is also proposed under the new clause S5.2.5.13(2B)(iv) can restrict reactive power response under transient events. • The maximum active power for an Integrated Resource System (IRS) is defined as both its active power capability and the maximum demand of its bidirectional units in the Draft Rule. It is not very clear if the maximum active power is intended to be the largest of IRS's active power capability and the maximum demand of its bidirectional units. If the AAS requirement for reactive power capability is interpreted as the product of 0.395 and active power capability when the plant is producing and the product of 0.395 and maximum demand when the plant is consuming, this would result in asymmetrical reactive power capability between the two modes of operation. An asymmetrical reactive power capability between production and consumption (enforced by reactive power limits) can lead to significant step changes in plant's reactive power response, when the IRS moves from production to consumption (or vice versa) in response to a frequency disturbance. This can exacerbate network disturbances and lead to significant step-changes in voltage. To avoid any misinterpretation of the requirement, Transgrid suggest amending S5.2.5.1(a00)(1)(ii) to "for an *integrated resource system*, **largest of** the *active power capability* and the *maximum demand* with all its *production units* in service;" • Network voltages may change over the generator's life. In NSW network Transgrid expects significant changes to network voltages due to the planned major network augmentations and accelerated transition to renewables. Therefore, if the mid-point voltage is set during the initial connection based on historical voltage profile under typical operating conditions, it may require future modifications to the GPS throughout the generator's life. If the AEMC intend to proceed with the draft rule and defining a mid-point voltage, Transgrid

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		suggest providing clarity in the final determination on how variations in mid-point voltage during the generator's life is to be managed. It is also unclear to Transgrid if the mid-point voltage defined to in S5.2.5.1 is the same as the "target voltage" mentioned in S5.2.5.13. Transgrid suggest using the same terminology if it is referring to the same concept or clarifying the distinction between the two terminologies for avoidance of doubt. • According to S5.2.5.1(e1) of the Draft Rule, when there are reduced number of production units in-service, the maximum active power and reactive power capability can be reduced in a manner consistent with the topology of the plant, provided that the reactive power performance of any individual production unit is not lower than its performance when all production units are in-service. - As per the current NER, the reactive power capability at the Connection Point is defined based on "*rated active power*" and the definition of "*rated active power*" refers to the number of in-service production units. Accordingly, when there are reduced number of production units in-service, the current requirement is to provide a proportionally reduced reactive power capability (compared to the capability with all units in-service) at the Connection Point. With the introduction of the new Clause S5.2.5.1(e1) in the Draft Rule, the requirement for the reactive power capability at the Connection Point is undefined. Provision of an equivalent amount of reactive power capability at the production unit level, may not be sufficient to compensate for the impact on network voltages due to balance of plant. Transgrid believes that this will lead to issues in maintaining the network voltages in operation of the power system. As an example, when there are one third of production units in-service, as there is no requirement on the reactive power capability at the Connection Point, the plant may choose to keep the harmonic filters in-service. This could lead to only having capacitive reactive power capability at the Connection Point (i.e., no absorption capability at the Connection Point) and the network will have to compensate for the voltage impact due to the generator. - It is unclear what is meant by the phrase "in a manner consistent with the topology of the plant". - Transgrid suggests updating this clause to require proportionally reduced reactive power capability at the Connection Point (compared to the capability with all units in-service). This would be consistent with the current requirement and set clear expectations on the reactive power capability

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		required at the Connection Point, when a plant is operating with reduced number of units in-service.
	Treatment of reactive power capability considering temperature derating	• While Transgrid supports AEMC's intent in setting a temperature derating requirement, setting an AAS with an ambient temperature of 50 deg may not be appropriate for all geographical locations within the NEM. Based on historical data for ambient temperatures within NSW, Transgrid suggests lowering the proposed ambient temperature of 50 deg specified in the AAS to no less than 45 deg. • Transgrid also suggests recording the performance of the plant when the ambient temperature increases above the upper threshold of the ambient temperature in the final Rule. This is to ensure plant performance above the upper limit of the ambient temperature does not have a detrimental impact on the power system. As an example, during a heat wave, if all plants in the affected geographical area are tripped or shutdown during a very short period of time when the ambient temperature exceed a certain threshold, it would have a detrimental impact on the power system Typically ramping down to 0 MW/ 0 MVAr over an agreed period is preferred over an instantaneous trip/shutdown.
	Compensation of reactive power when units are out of service	• Transgrid supports the AEMC's intent in establishing clear performance requirements for schedule 5.2 plants that are electrically connected but not otherwise in service, considering their network impact and the frequency of occurrence. Transgrid understands that this performance requirement applies to plant under two scenarios – (1) when the production units are not in-service (while the plant is electrically connected to the network); and (2) when the production units are in-service but not producing (for example solar farms at night-time). In the latter scenario Transgrid approach to-date has been for the plant to provide reactive power compensation by having sufficient number of production units in-service to minimise the voltage impact to the network. However, in the former scenario, if all production units are not in-service, then to meet the AAS requirement proposed in the Draft Rule the plant will need to be electrically disconnected at the connection point. This may not be desirable from plant's perspective nor required on an on-going basis by the network. Transgrid suggests having flexibility within the Rules to achieve the AAS requirement by taking operational measures when required (similar to the provisions provided under the General requirement in S5.3.5). I.e., if the voltage impact at the Connection Point falls outside the AAS requirement that applies when the production units are not connected, the schedule 5.2 must, where required by the NSP in order to maintain satisfactory voltage levels at the Connection Point or to restore intra-regional or inter-regional power transfer capability, take action to ensure that the 0% voltage variation requirement is satisfied within 30 minutes.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		• Proposed clause S5.2.5.1(h) specifies the requirements applicable when one of more production units are in-service for reactive power compensation to meet the clauses S5.2.5.1 (a2) or (b2). This includes scenarios such as night time operation of solar farms or below cut-in speed operation of wind farms. As this is not explicitly stated in the new proposed Rule, it could be confusing, therefore Transgrid suggests providing more clarity on this in the Draft Rule Determination. Transgrid also suggests inclusion of minimum access standard requirements of Clauses S5.2.5.4 and S5.2.5.5 (at least some aspects) under clause S5.2.5.1 (h)(2), to prevent abrupt disconnection of full or part of the connected plant.
Simplifying small connections		
Section 4.2	Simplifying small connections - S5.2.5.7, S5.2.5.8, S5.2.5.13	• Transgrid does not have any concerns with the proposed amendments for small connections.
NER S5.2.5.2 – Quality of electricity generated		
Section 4.3	Deletion of S5.2.5.2(d) negotiated access standard	• Transgrid notes that S5.2.5.2(d) requirement on NAS has been deleted in the Draft rule markup, though this has not been discussed in the final determination. In Transgrid view, paragraph (d) provides clear guidance on negotiating an appropriate access standard that will allow NSPs to maintain system standards. On that basis, Transgrid does not support this deletion.
NER S5.2.5.4 – Generating system response to voltage disturbances		
Section 4.4	Overvoltage requirements for medium voltage and lower connections	• Transgrid supports the amendment to the negotiated access standard where the point of measurement for voltage variations under S5.2.5.4 can be the nearest network location (≥66 kV) for connection points below 66 kV and the plant does not include a tap-changing transformer.
	Requirements for overvoltages above 130%	• Transgrid supports inclusion of the words “at least marginally exceeding 130%” in defining the upper limit for temporary overvoltage. • Transgrid supports the change to S5.2.5.4(a0)(3) to clarify that references to voltages are root-mean-square voltages

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
	Clarification of continuous uninterrupted operation (CUO) in the range 90% to 110% of normal voltage	• Transgrid strongly disagrees with the amendment in S5.2.5.4(e2), permitting tap-changing transformer operation to allow plant to maintain active and reactive power levels for voltage variations up to 10% of nominal voltage (within 90% to 110% of nominal voltage). - The amendment deviates significantly from current standard practice, including advice provided by AEMO, where transformer tap-changing cannot be considered as a method for maintaining power levels for voltage variations up to 10% (within the range 90% to 110% of nominal voltage), due to long time constants associated with tap-changing operation. Contingency or switching events in the network can cause rapid voltage changes, while tap-changing operations typically take tens of seconds to minutes to respond. - Allowing this could result in substantial reductions in both active and reactive power output from schedule 5.2 plants during voltage variations (up to 10%) within the normal operating range. Such reductions could exacerbate or prolong the voltage disturbance, which is inconsistent with the intent behind the definition of continuous uninterrupted operation. Under the Draft Rule, continuous uninterrupted operation would not be achieved in actual power system conditions. • Regarding S5.2.5.4(e3), whilst Transgrid supports the amendment for reasonable temporary reductions in active power output and reactive power capability, which are corrected by a tap-changing transformer, for voltage variations greater than 10% within the range 90% to 110% of nominal voltage, the performance expectation isn't clear for plant which do not include a tap-changing transformer.
NER S5.2.5.5 – Disturbance ride-through capability		
	Definition of end of a disturbance for multiple fault ride through (MFRT)	• In general, Transgrid supports AEMC's intent in providing clarity on "end of a disturbance". However, given that end of a disturbance is now defined as "when the voltage at the connection point recovers to within 90% to 110% of nominal voltage and remains within that range for at least 20 milliseconds", the multiple fault ride-through (MFRT) requirement under Draft rule S5.2.5.5(d)(5) on "the time between the end of one disturbance and the commencement of the next disturbance may be zero milliseconds" may no longer be assessed by applying two successive faults with a 0 ms delay. Based on the new definition, the earliest that a second fault can occur is 20 milliseconds after the voltage recovers within the 90% to 110% range for AAS. • Transgrid notes that it is possible to have multiple fault events to occur at the same time or with 0 ms delay (for example, lightning strikes causing multiple transmission line outages) and should be considered

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		specifically in the assessment of MFRT capability. While it is a low probability event, given the material impact of such an event to system security, it is important to understand and record the plant capability to ride-through a localised multiple disturbance event. For the AAS of MFRT requirement, Transgrid suggest explicitly including the requirement to ride-through at least two successive faults, where the second fault commences immediately after the voltage at the Connection Point recovers to within 90%-110% of the nominal voltage (without waiting for 20 ms period), within the 15-disturbance sequence. • Transgrid also notes that, the post fault voltage recovery behaviour in some instances may be heavily impacted by the generator response. For example, post-fault voltage dips, spikes or oscillatory behaviour may be caused or exacerbated due to poorly tuned controllers causing the voltage to move beyond the specified 90%-110% range, even though the original disturbance has been cleared (i.e., plant response prolonging the disturbance or causing subsequent disturbances). Transgrid's understanding is that if a disturbance is prolonged or exacerbated due to poorly tuned plant response, that will be considered as a non-compliance to the CUO requirement. Transgrid suggest clarifying this in the final determination, to prevent any misinterpretation of the requirement.
	Compliance requirement for MFRT	• Transgrid is in favour of AEMC's recommendation on disclosure of MFRT limitations, supported by evidence (preferably supported by laboratory tests or hardware-in-loop (HIL) tests). However, the proposed S5.2.5.5(r2) in the draft rule may not effectively direct OEMs to provide a detailed description of any limitations for NSPs to assess their validity, nor does it explicitly require evidence to support such limitations. This could result in plants just declaring any observed adverse effects in simulations as limitations. Therefore, more emphasis should be placed on requiring connection Applicants to provide evidence of plant limitations. Although it may be challenging in practice for OEMs to provide field test evidence due to practical limitations (such as long waiting times for access to specialised test sites, the inability to test extreme conditions in the field and the time and cost implications of conducting numerous tests) these challenges generally do not apply to HIL or emulator tests. Therefore, Transgrid suggest including an explicit requirement under S5.2.5.5(r2) to provide evidence of the specified plant limitation in the form of HIL or emulator tests. • The capability of asynchronous production units to ride through multiple faults is constrained by thermal limits, which can be exacerbated by a series of successive faults (with three-phase faults being the worst case, as they drive higher fault currents through production units) without allowing sufficient time for cooling. The current standard permits any combination of 15 different faults over a 5-minute period, with a 0 ms gap between just two successive faults, and any gap between the remaining faults. This variability in the sequence of faults

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		makes it challenging to establish a consistent benchmark across plants connecting to the network. Therefore, Transgrid strongly recommends that AEMC consider defining a standard suite of distinct tests for the AAS and MAS that is applicable across the NEM, with the option to supplement these tests with additional MFRT scenarios if deemed necessary by the connecting NSP, based on the specific location.
	Fault levels and tuning for MFRT	• Transgrid agrees that assessment of MFRT capability in a SMIB environment without considering the reduction of the system fault level due to multiple outages could lead to overtly optimistic results for MFRT assessments. Transgrid notes that a non-credible multiple disturbance event due to a severe weather event (severe storms, bushfire etc.) could lead to loss of multiple elements of the network. The resulting faut level at the Connection Point would be much lower than the minimum three phase fault level with a single element outage (N-1). From a system security point of view, establishing plant capability to operate stably and remain connected during these multiple disturbance events is critical. Therefore, it would be inappropriate to provide an exemption to the MFRT requirement based on the three-phase fault level at the Connection Point being lower than the minimum fault level for which the plant is tuned to achieve overall GPS compliance. - Typically, the requirement is for plant to be tuned to achieve GPS compliance for the fault level range at the Connection Point between maximum anticipated three phase fault level and the minimum anticipated three phase fault level considering a single element outage (N-1). Transgrid suggests recording the lowest fault level that the plant has the capability to operate stably and remain connected (with the plant settings used to demonstrate the GPS compliance). It is understood that GPS compliance across others performance standards as well as the full CUO requirement may not be achievable at this lowest fault level; the requirement is only to operate stably and remain connected (i.e., relaxing the CUO requirement at the lowest fault level to remain connected and operate stably). - If the AEMC intend to proceed with the exemption under S5.2.5.5(l)(9), Transgrid propose that this should be amended to: "(l)(9) the three phase fault level at the connection point being lower than the minimum level for which the plant must be tuned, determined as the three phase fault level derived from the agreed short circuit ratio value recorded in the performance standard for clause S5.2.5.15;"
NER S5.2.5.5A – Response to disturbances following contingency events		

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
Section 4.6	Active power recovery after a fault	• Transgrid support the amendments proposed in the draft rule to clarify the active power recovery requirement.
	Rise time, settling time and commencement time for reactive current injection	• Transgrid acknowledges that the settling time is not a comprehensive measure as to the adequacy and stability of the reactive current response for complex network disturbances. However, the settling time requirement provides a reasonable and quantifiable assessment criterion for stability when applied to plant response due to a step-like voltage disturbances. Transgrid prefers to retain the performance criterion for settling time in the AAS with similar amendments as proposed by the AEMC for the definition of rise time (with specific test conditions such as assessed under step-like voltage disturbances). Transgrid also notes that with the removal of the settling time requirement from the MAS, the rules are more flexible to negotiating this performance (particularly for technologies such as grid forming when the settling time can be in excess of 100 ms). On that basis, Transgrid suggest retaining the requirement for the reactive current settling time in the AAS with the proposed modification to assess under a step-like voltage disturbance. • Transgrid supports the inclusion of “adequately controlled” definition in the NER. However, Transgrid notes that proposed amendment S5.2.5.5A (b)(1) refers to plant response for transient over-voltage and transient under-voltage in defining “adequately controlled” response. Transgrid notes that “transient overvoltage” is defined in IEC 60071-1 as “short-duration overvoltage of few milliseconds or less, oscillatory or non-oscillatory, usually highly damped”. The requirement under clause S5.2.5.5A is for the plants to provide an adequately controlled stable response for **power frequency overvoltage or undervoltage disturbances** that are typically cleared within 80 ms to few seconds and is not limited to short duration (in the order of milliseconds) transient events. Further consideration needs to be given to consistent use of appropriate terminology in the Draft Rule, considering defined terms in relevant IEC standards. • Clause S5.2.5.5A(b)(1)(v) requirement “voltage oscillations that could adversely affect the ability of other Schedule 5.2 plant to remain in operation during the disturbance” in its current form lacks clarity and is open to interpretation. This may imply that any voltage oscillation, including but not limited to sustained and/or underdamped oscillations, are permissible and would be considered as adequately controlled subject to the response not adversely impacting the ability of other generating plants to remain in-service. Regardless of whether an individual plant response does not cause/exacerbate voltage oscillation to a level that would cause disconnection of nearby plant, poorly-tuned underdamped plant response should not be permissible due to the cumulative adverse impacts on network stability. Transgrid suggests that AEMC define clear

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		acceptance criteria for the voltage oscillations to satisfy the term 'adequately controlled. If the AEMC were to proceed with defining adequately controlled under (b)(1) Transgrid suggest amending it to: "(b)(1) …and does not cause or exacerbate: (iv) voltages beyond the levels or durations specified in the system standards or (if more restrictive) agreed under clause S5.2.5.4; or (v) voltages that could adversely affect the ability of other Schedule 5.2 plant to remain in operation during the disturbance; or (vi) sustained or underdamped voltage oscillations;"
	Commencement of reactive current injection	• Transgrid generally supports the amendment to S5.2.5.5 regarding the commencement time for a reactive current response. Though in Transgrid's experience, plant can exhibit relatively small initial transient variations in reactive current upon application of a fault, some of which oppose the voltage disturbance. Such transients do not indicate that a reactive current response has adequately commenced and can be below any reasonable materiality threshold. Transgrid suggests amending the requirements such that for a reactive current to be considered as having commenced (based on the initiating condition) the reactive current must be 'consistently' opposing the voltage disturbance or has reached an agreed threshold (such as the 10% threshold used for the reactive current risetime calculation).
	Clarity on response requirements for balanced and unbalanced faults, and recognise negative sequence current responses	• Transgrid supports AEMC's proposal to extend the rules to include reactive current response for both balanced and unbalanced faults, along with specifying the requirement for a negative sequence response to oppose unbalanced voltages during disturbances. • However, some inconsistencies were noted in the Draft NER amendments for S5.2.5.5A(f) and S5.2.5.5A(m) (i.e., between the AAS and the MAS for reactive current response). The AAS refers to positive sequence voltage deviations, while the MAS refers to voltage.
	Metallic conducting path	• Transgrid supports the deletion of this subclause.
	Conditions where reactive response is not required	• As per S5.2.5.5A (e), (h), (l) and (o) of the Draft Rule, a schedule 5.2 plant is not required to provide a response under paragraphs (d), (f), (k) and (m) respectively, to the extent it is prevented from doing so by changed power system conditions or energy source availability beyond the Schedule 5.2 Participant's reasonable control;.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		- The relevance of limitations on reactive current response in relation to energy source availability is not entirely clear. Transgrid seeks clarifications from AEMC on the scenarios in which limitations on reactive power response might be influenced by energy source availability. - It is unclear what kind of "changed power system conditions" that could prevent a plant from providing a response. The wording in its current form could be interpreted to mean that lower fault levels as a result of a contingency event is a changed power system condition, and the response requirement for disturbances may not apply. Transgrid seeks clarification from AEMC on the definition of "changed power system conditions" that may prevent plant from providing a response for a network disturbance.
	Recommendations for Improved Clarity on *maximum continuous current* in S5.2.5.5A	• The Draft Rule requirement under S5.2.5.5A (d)(1) and (f)(1) stating that "capacitive/inductive reactive current in addition to its pre-disturbance level of at least 4%/6% of the *maximum continuous current* of all operating *synchronous/asynchronous production units…..*," could be misinterpreted as referring to the maximum continuous current of the production units rather than the defined term under Chapter 10 of the NER. It is important to clarify that there's a distinction between the defined term *maximum continuous current* and the maximum current capability of the production units it the unit terminal. To improve clarity, Transgrid recommends removing the reference to "all operating *synchronous/asynchronous production units"* from S5.2.5.5A (d)(1) and (f)(1) as well as the corresponding MAS, and any other relevant instances. • S5.2.5.5A(s)(1)(i) of the Draft Rule specifies that "the reactive current contribution may be limited to the maximum continuous current of all its operating asynchronous production units," explicitly using the defined term maximum continuous current to refer to the total current capability of production units. As mentioned above, the actual total current capability of the production units is distinct from the defined term maximum continuous current. In practice, the total current capability at the terminals of the production units is often significantly higher than the defined maximum continuous current. Consequently, using the term "maximum continuous current" to describe the actual current limitation of the plant is not appropriate. Transgrid strongly recommend that the AEMC reconsider and revise the terminology used in this context.
NER S5.2.5.7 – Partial load rejection		
Section 4.7	Apply S5.2.5.7 only to synchronous generation	• Transgrid does not support the draft rule to limit application of S5.2.5.7 to synchronous generators only noting:

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		- AEMO's rule change proposal (page 46 of the overview document) noted that *"Experience of the assessment of this rule over the five years since it was extended to asynchronous plant indicates little has been gained from that change"*. While not specifically stated by AEMO, Transgrid assumes that this statement is a reference to the inherent capability of recent asynchronous connections to remain connected during load rejection events, and therefore improved performance was not noted by extending the rule to asynchronous generators. While it is also Transgrid's experience that asynchronous generators typically have no issue meeting the technical requirements of S5.2.5.7, we do not believe that a particular technology type should be excluded from a technical requirement on the basis that the desired performance is typically met. It is equally important that all generating systems (particularly those providing primary frequency response and voltage control) remain in continuous uninterrupted operation during a load rejection event. - Given asynchronous generators typically have no issue meeting this requirement, Transgrid considers that the compliance burden and associated cost implications are minimal. - AEMO's rule change proposal notes that asynchronous plant *"must meet other schedule 5.2 access standards for voltage and frequency disturbances and contingencies"*, implying that these assess standards adequately cover the types of disturbances observed during a load rejection event. However, as noted in Section 10.7.1 of the Commission's final determination for the 2018 generator technical performance standards rule change, partial load rejection may lead to simultaneous voltage and frequency disturbances. It is Transgrid's view that the discrete assessment of voltage and frequency disturbances in accordance with other schedule 5.2 access standards does not adequately cover the potential impacts of simultaneous voltage and frequency disturbances that may arise from a major load rejection event. - Transgrid considers that applying clause S5.2.5.7 based on the distinction between synchronous and asynchronous production units does not adequately consider emerging plant technologies and the criticality of load rejection performance during islanded operation. With the emergence of grid forming (GFM) inverter-based resources (IBRs), it is becoming more likely that islanded operation of GFM IBRs with load and grid following (GFL) IBRs will occur. In this future scenario, the load rejection performance of these asynchronous generators (GFM and GFL) is critical and if not

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		available would limit the NSP's ability to fully capitalise on the capability presently being offered by some proponents of GFM IBR. - On this basis, Transgrid strongly recommends re-instating the requirement for asynchronous generation to meet S5.2.5.7. • Transgrid notes that one of the original objectives of AEMO's review of S5.2.5.7 was to clarify the application of minimum generation to energy storage systems. If the draft rule is changed to reinstate the requirement for asynchronous generation to meet S5.2.5.7, this item will need to be revisited.
	General requirements	• Transgrid supports the addition of paragraph (h) "A relevant system is permitted to vary its active power and reactive power to the extent required to oppose a voltage variation or frequency variation" as it makes the performance requirement clearer.
	Clarification of meaning of CUO for NER S5.2.5.7	• Transgrid supports the amendment to the definition of CUO in Chapter 10, relevant to S5.2.5.7.
NER S5.2.5.8 – Protection of generating systems from power system disturbances		
Section 4.8	Emergency over-frequency response	• Transgrid supports the prioritisation of response being: 1) continuous frequency droop control, 2) fast ramping, 3) disconnection, as well as changes to the wording on protection settings. • Specific feedback on Draft Rule – - The Negotiated clause states that "A reduction in active power output should generally be achieved by fast ramping in preference to disconnection of production units." This does not make it clear that that "frequency droop" response is preferred over "fast ramping". Transgrid recommend including "frequency droop" in (b4) of the Negotiated standard to make this clear. - All references to section (a)(1) in the Draft Rule need to be updated to (a1). - "Maximum credible contingency" is written in italics but does not appear to be defined in the glossary. - Transgrid propose to change "before the expiry of 3 seconds after the frequency reaches" to "within 3 seconds after the frequency reaches" for consistency with other sections of the NER.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
NER S5.2.5.10 – Detection and response to unstable operation		
Section 4.9	Requirements for stability protection on asynchronous generating systems	• Transgrid supports AEMC's proposed recommendations on clause S5.2.5.10 and, providing flexibility in the access standards for actions other than tripping to address the issue, and to allow triggers, thresholds and actions to be agreed with the relevant NSP and AEMO. In regard to the proposed NER amendments, Transgrid has following comments: - Instability can have broad definitions and this has led to numerous debates between stakeholders. Therefore, Transgrid strongly suggests that the new Rules mandate AEMO to update section 4.3.4(h) of Power System Stability Guidelines to provide a clearer definition of "instability" in the context of S5.2.5.10. To Transgrid's knowledge, it is impractical for the AAS to require a protection system to cover all types of instability, whether large or small, short-term or long term. This could result in none of the asynchronous generators meeting the AAS. However, with clearer Rule requirements, the technology will evolve over the time to meet the AAS. - Where the Draft Rule wording refers to "disconnecting the plant for unstable behaviour", Transgrid suggests revising it to "disconnecting via a trip or having the capability to disconnect via a trip of the entire generating system at once or in a controlled sequential manner for large generators, as agreed with AEMO and the NSP" - Regarding S5.2.5.10(a)(2)(i), current Rule uses the phrase "**promptly** detection/disconnect". The detection time is critical for instability monitoring; therefore, Transgrid requests that the AEMC retain the existing wording: "have facilities to **promptly** detect instability in voltage, reactive power and active power at the connection point; - Regarding S5.2.5.10(a)(2)(ii), instead of "have **facilities** capable of disconnecting units…", Transgrid recommends replacing it with "have a **protection system** capable of disconnecting units…". - Regarding S5.2.5.10(b)(2), Transgrid would like to highlight those synchronous condensers below 100 MVA (that is likely to be connected to weaker parts of the network for system strength remediation) can have a greater impact than larger generators connected to stronger parts of the network. Therefore, Transgrid suggests that a smaller size threshold than 100 MVA be chosen for

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		the MAS. Transgrid recommends 30 MW, consistent with the semi-schedule market participation threshold. - Should the 100 MW/100 MVA threshold remain unchanged in the final Rule determination, Transgrid requests that the AEMC clarify the Rule application to hybrid generators (i.e., solar or wind farms with synchronous condensers behind their connection points) in relation to S5.2.5.10(b)(2). Specifically, does the 100 MW/100 MVA threshold apply to each individual component or the collective MVA size of the plant? Additionally, for the hybrid plants which have IBR aggregates of larger than 100 MW and synchronous condensers of 100 MVA (or smaller), is the proponent required to provide one PMU for the synchronous condenser and one for the IBR aggregate? - Transgrid would also like to seek clarification from the AEMC whether the 100 MVA syncon size threshold is applied on the basis of the connection point capacity (i.e., HV side of the MV/HV transformer) or the actual machine size at its terminal. - Usually pole slipping protection will operate in the first or the second pole slipping unstable swing. Is sustained pole slipping referred to in S5.2.5.10(b)(1)(iii), when the generator does not have pole slip protection? Transgrid suggest clarifying this in the Rule determination. - Regarding S5.2.5.10(b)(1), Transgrid recommends the detail of voltage impacts is left with the NSP as 1% can have a significant impact in some areas of the network. Additionally, the assessment of 1% could require some details which needs to be discussed and agreed between different parties. For example, is this 1% voltage change without interference of other nearby generators and in Single Machine Infinite Bus (SMIB) assessment? - Transgrid proposes the minimum threshold as “0.5% voltage change at min fault level (N-1 or system normal minimum fault level) based on the plant MVA rating. We have observed generators can swing P/Q up to the MVA rating when there is an instability as PPC (S5.2.5.1) limits may not work during certain conditions. - Transgrid recommends that General Requirement (f) be updated to include “remote enablement and disablement signals” in addition to the remote tripping signal.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		• Transgrid believes there is an error in the drafting of the minimum access standard for S5.2.5.10. While the automatic access standard requirement for S5.2.5.10 regarding "facilities to detect instability" is limited to asynchronous production units (as this wording appears only in S5.2.5.10(a)(2)), the draft minimum access standard clause S5.2.5.10(b)(1)(i) includes a requirement for all schedule 5.2 plant to have "facilities to detect instability". As drafted, this applies an additional requirement (over and above the automatic access standard) to synchronous production units. Transgrid believes that S5.2.5.10(b)(1)(i) and (ii) should apply to asynchronous production units and S5.2.5.10(b)(1)((iii) should apply to synchronous production units. • In addition to the error noted above, the drafting of the minimum access standard for S5.2.5.10 would be improved if it was restructured to align with the associated clauses under the automatic access standard. i.e.: - (b)(1) should include the synchronous production unit requirements presently detailed in (b)(1)(iii) to align with (a)(1) - (b)(2) should include the asynchronous production unit requirements presently detailed in (b)(1)(i) and (ii) to align with (a)(2) - (b)(3) should include the production system requirements presently detailed in (b)(2) to align with (a)(3). • Any implementation of tripping for instability in asynchronous generators should be considered with caution. It should only be applied in cases of significant instability (the equivalent of pole slipping) and must require: - The agreement of both AEMO and the connecting NSP. - A comprehensive analysis of the potential for cascading failures. - The establishment of clear and explicit guidelines on instability attribution and response actions. - A measured implementation timeline that allows thorough industry consultation and testing before enforcement. The proposed hierarchy of response actions must be rigorously tested to ensure that it does not inadvertently compromise system security. Any amendments to the NER should balance the need for system stability with the risks associated with premature or unnecessary generator disconnections.

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
NER S5.2.5.13 – Voltage and reactive power control		
Section 4.10	Voltage control at unit level and slow setpoint change	• Transgrid supports the amendment to S5.2.5.13(n) to facilitate rate of change setpoint limits being enabled under normal operating conditions. Including allowing these limits to be disabled for testing purposes.
	Voltage setpoint and disturbance requirements for primary control	• Transgrid supports increasing the rise time for reactive power to 3 seconds and specifying a minimum voltage step magnitude in Table S5.2.1.
	System impedances for tuning of controls	• Transgrid supports the guidance provided in negotiated access standard under S5.2.5.13(f), specifying that in instances where a plant cannot achieve the AAS, the performance should be as close to the AAS as practicable though the stability of the response is to be prioritised. Transgrid disagrees with the concept of a typical system impedance for the purposes of specifying a performance standard and believes the concept is misleading: - The variability of nearby generation can have a significant impact on the "voltage stiffness" of the network for a given plant. The concept of what a typical network scenario would be for these surrounding generators is too vague, especially when the surrounding plant consist of different fuel sources. - As the performance requirements have been relaxed for a number of related criterion in the draft Rule for S5.2.5.13 (e.g. rise time has increased to 3 seconds, clarity on limiter activation requirements, materiality thresholds, rise and settling time definitions), Transgrid believes that it is more appropriate to assess compliance against the range of lowest to highest system impedance, rather than attempting to define a typical impedance somewhere in between. - The clarity provided in the amended NAS under S5.2.5.13(f) provides guidance on how to prioritise tuning the control systems when the AAS cannot be achieved for the range of system impedances, therefore the requirement to attempt to define a typical system impedance is not deemed necessary nor useful. - The draft rule that a plant would need to be compliant between the nominated highest and typical system impedance is effectively the current negotiated access standard without the specification of

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		what that typical system impedance is. To minimise of risk of non-compliance for a given plant, an NSP would likely have to nominate a more conservative value (i.e. lower system impedance) to represent a range what might be considered a typical system impedance to cover the variability of what could be considered typical. This is of key important noting the speed of transition in the power system and the variability in plant dispatch. - It is unclear if the intent of recording the system impedances in the RUG is that they can be updated with revised system impedance values in the future for which the plant will be required to remain compliant with. Noting the speed of transition of the power system, Transgrid does not believe that future generation and/or network augmentations should absolve plant from compliance obligations with their performance standards. - Transgrid recommends that the other amendments to clause S5.2.5.13 provide sufficient flexibility and guidance to tune the control system without the need for defining a typical system impedance.
	Materiality threshold on settling time error band and voltage settling time for reactive power and power factor setpoints	• Transgrid agrees with the introduction of a materiality threshold in S5.2.5.13(l) for active power settling time in response to a voltage step in any mode or voltage setpoint.
	Clarification of when multiple modes of operation are required	• Transgrid agrees with the amendment to S5.2.5.13(b)(2A) clarifying the primary and secondary control modes and allowing discretion from the NSP for nominating the primary control mode.
	Rise time requirement for voltage setpoints	• Transgrid strongly disagrees that the reactive power rise time requirement in Table S5.2.1 for voltage control as the primary control mode should only be applicable to voltage disturbances. Noting that the AAS rise time requirement has increased from 2 to 3 seconds, the definition of rise time has been amended which reduces the burden on the plant, and improved guidance has been provided for the negotiating framework under S5.2.5.13(f), Transgrid recommends extending the requirement to be for both voltage disturbances and setpoint changes (or as agreed with AEMO and the NSP). It should also be noted that S5.2.5.13(b)(3)(vii)

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		and S5.2.5.13(b)(4)(v) refer to a step change of voltage setpoint or step-like change in voltage at the agreed location, therefore there is a discrepancy with the explicit requirements in Table S5.2.1.
	Secondary control mode settling time requirements	• Transgrid recommends including secondary control mode settling time requirements for the automatic access standard requirements under Table S5.2.1. • The controlled quantities for the respective modes should have a settling time requirement in response to a setpoint change and not leave the requirements undefined. The requirements can be more relaxed than if it were the primary control mode. • The secondary control model should be appropriately tested during commissioning. Reference setpoint tests are important to verify that the plant has been tuned appropriately for the mode. This is particularly important as secondary control mode is likely to be enabled under abnormal power system or plant operation conditions. Verifying the plant's ability to operate stably in this mode ensures confidence that it can switch to secondary control when required by the NSP or AEMO.
	Reactive power and Power factor as primary modes	• For reactive power and power factor as primary operating modes, Transgrid recommends reducing the automatic access standard settling time requirement in Table S5.2.1 for a setpoint change when operating into a limiting device. It is unclear why there is a large disparity in settling time requirements between limiter and non-limiter activation.
	Impact of a generating system on power system oscillation modes	• Transgrid supports the revised recommendation requiring the assessments to consider the required performance from the system strength service provider at the relevant system strength node. However, we note that paying system strength charge should not preclude the connecting plant from requiring to optimise plant design and control system tuning if stability issues are noted at the connecting location. • Transgrid recommends that this is clarified in the final determination and the final rule.
	The MAS does not reference Table S5.2.2 for asynchronous plant	• Table S5.2.2 specifies the minimum access standard for rise and settling times in response to a voltage disturbance. Though only S5.2.5.13(d)(5), which refers to plant with an excitation control system, references the requirements in Table S5.2.2. Transgrid believes that asynchronous plant should be subject to the

Relevant section of draft determination	NER Schedule 5.2 issue	Transgrid feedback
		requirements as well and recommends explicitly stating the requirement for both asynchronous and synchronous plant.
	Rise time definition	• Transgrid supports the amended definition of rise time, for the purposes of S5.2.5.13. Noting that there is ambiguity in what constitutes an 'external influence'. It is recommended that clarity is needed as to whether an 'external influence' is separate to the Schedule 5.2 plant entirely or can be a separate control system within the Schedule 5.2 plant (separate to the main control system controlling the change output quantity).
	Format of Table S5.2.1	• Transgrid recommends improving the formatting and readability of Table S5.2.1: - There is a reference to a footnote '1' for the 'voltage as primary – not synchronised control' mode. - The limiting device condition in the table is referred to as 'limiting device condition' and 'If limiting device does not operate'. Transgrid believes the latter should be rephrased. - Poor indentation and text alignment is used in the table.
	Consistent reference to "*reactive power capability* range"	• The term "*reactive power* response range" is referenced in 4 occurrences within S5.2.5.13 (b)(2)(2B), (b)(2)(2B)(iv)(A), (d)(2)(2B), and (d)(3), while the term "*reactive power capability* range" is used throughout the remainder of the draft rule. Transgrid believes that "*reactive power* response range" is same as "*reactive power capability* range". To align with the definition and terminology of S5.2.5.1, Transgrid suggest replacing "response" with "capability" in the term "*reactive power* response range", for the consistency.

Schedule 5.7.2 Right of Testing

Relevant section of draft determination	Issue	Transgrid feedback
Right of testing		

Relevant section of draft determination	Issue	Transgrid feedback
Section C.5	Right of testing under 5.7.2	• Table C.2 in Section C.5 provides the reason for the amendment in 5.7.2(i) as "the proposed amendment (in conjunction with proposed changes to other paragraphs in clause 5.7.2) would allow registered participants to request an assessment of equipment owned or operated by another registered participant if it believes that the equipment may not comply with the NER or a connection agreement". Transgrid support the decision of the AEMC allowing parties to request an assessment (such as a simulation study) provides a more cost-effective and simpler option to discover the root causes of any equipment behaviours that could be causing issues for the network or network users. However, the amendment did not clearly provide the rights to choose between testing or assessment for cost-effective purposes. • If the test is required, Transgrid understands that the notice will be submitted to AEMO as per 5.7.2(b). However, if only assessment required, and there is no disagreement from the requesting Register Participant, AEMO's involvement may not be required. Clause 5.7.2(b) do not mention the requirement of notifying AEMO for assessments. Therefore, the amendment in clause 5.7.2(i) should be revised to promote the cost-effective approach.

Consequential amendments

Issue	Consequential amendments - Transgrid feedback
Removing references to superseded standards	• AEMO may have a view that references should be changed to the latest versions of standards, however, it should be noted that the power quality standards and responsibilities do not apply to AEMO and are an NSP responsibility. • Some of the present power quality standards and planning by NSPs has been based on the application of the old standards and careful consideration of the consequences of changing to a new standard (noting that the change is away from a standard to a technical report).

Issue	Consequential amendments - Transgrid feedback
	• The present interface between the power quality standards and the NER are tenuous at best. • Changing the reference to the latest version of standards increases the potential of conflict between the existing network and future requirements and lead the rules to become out of step with the standards. It brings the sovereignty of the NER to risk. The NER would be subject to external changes (direct international influence). This conflicts with the established rules change process with requires industry consultation before change. • Transgrid recommends separate consideration and consolation on the application of power quality standards in the NEM.
Definitions changes	• Active power capability: - The definition refers to the term "bid-validation data" for scheduled plants. Transgrid suggests to use a term that refers to the physical status of the plant, for example the number of "in-service generating units". Bid validation data is also not available to plants that are in the connection process, and not yet connected. In Transgrid view a term that refers to the 'in -service generating units' is more relevant throughout the connection process as well as during full operation. - This term has been referred in multiple clauses such as S5.2.5.1, S5.2.5.10, S5.2.5.11, S5.2.5.13 and S5.2.5.15. Further consideration should be given to how this term is used across various clauses; it appears that in some clauses the term is used as a reference to the maximum amount of active power at the connection point with all generating units in-service, while in other clauses it appear to refer to a level of active power below the maximum active power. • Continuous uninterrupted operation: - Transgrid supports the amendments proposed to the CUO definition. - Transgrid would like to raise that there are issues with application of CUO requirement as per paragraph (d), when considering inadvertent disconnection scenarios (classified as credible contingency events under S5.1.2.1) for assessing feasibility of transfer trip schemes under clause S5.2.5.8(d). This issue is exacerbated by the lack of clarity in the

Issue	Consequential amendments - Transgrid feedback
	system standards under clause S5.1a.4 on the allowable reduction in voltage of supply at a connection point due to a contingency event. In Transgrid's view, there should be flexibility for the NSP to allow transient voltage variations below 90% of normal voltage for a limited period due to inadvertent disconnection of transmission plant, provided that there are no material adverse impacts to other connected plant. • Rise time: As per commentary for S5.2.5.13 above, AEMO has proposed to amend the definition of rise time, such that longer-term dynamics and external influences following the step change are disregarded. Transgrid agrees with this in principle noting that there is ambiguity in what constitutes 'longer term dynamics'. In addition, AEMO should clarify whether an 'external influence' is separate to the Schedule 5.2 plant entirely or can be a separate control system within the Schedule 5.2 plant (separate to the main control system controlling the change output quantity). For example, the unit level voltage control response might be subject to slower dynamics of the plant controller. • Voltage: the Commission should exercise caution in changing or removing the definition to voltage. The present definition of voltage could be extended, but it needs to align with its engineering interpretation. It would be helpful to be explicit in the use of voltage as to whether it is in root-mean-square voltage, the peak-to-peak voltage, the average voltage or the positive sequence voltage, rather than leave it open to contextual interpretation.
Clause 5.1.2	• The amendment in clause 5.1.2 of the Draft Rule is aimed to cover more comprehensively different types of connection or access sought. The wording clause 5.1.2(d) (1) "*any plant*" in the requirement could be misinterpreted that clause 5.3 will be applied to any network equipment, such as Static Var Compensator (SVC) or reactive plant. For clarity, Transgrid recommend removing "any *plant*" from clause 5.1.2 (d)(1).

New civil penalty provision recommendation	
Clause 5.2.2(e)	• We do not support the proposed penalty provision being applied to NSPs. We believe NSP's should be excluded from this penalty as it is not proper for a government regulator to impose a penalty for an agreement between two parties which has its own penalty regime. Particularly where the GPS element of connections is subject to penalties. This It means the parties can form a view as to the right way forward to deal with an issue and then a regulator can essentially try to force everyone to a different outcome. • This will also be inconsistent with 5.2.2(d), which broadly states that says parties should comply with the rules if the connection agreement is inconsistent.