

20 April 2023  
Andrea Marinelli  
Principal Project Manager – Regulatory Change  
Australian Energy Market Operator (AEMO)

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

Dear Ms Marinelli

## **Draft report on the review of technical requirements for connection**

AusNet welcomes the opportunity to make this submission in response to the Draft Report on the review of technical requirements for connection (the Draft Report).

AusNet is the largest diversified energy network business in Victoria with over \$11 billion of regulated and contracted assets. It owns and operates three core regulated networks: electricity distribution, gas distribution and the state-wide electricity transmission network, as well as a significant portfolio of contracted energy infrastructure. It also owns and operates energy and technical services businesses (which trade under the name "Mondo").

As a provider of both transmission and distribution services, AusNet is actively involved in the application of technical requirements that govern a wide variety of new connections. We recognise the importance of this review to facilitating the high volume of renewable generation and load connections required for the energy transition while protecting the power system. We also recognise the complexity of matters considered in the Draft Report and significant effort AEMO has taken to put forward the proposed changes.

AusNet is broadly supportive of the proposed objectives and amendments outlined in the Draft Report. At the highest level, the attachment below:

- **Supports the characterisation of issues identified in the Draft Report.** Note, in some cases we have identified circumstances where relaxing requirements may adversely impact the distribution network.
- **Provides our perspective on the best available solution(s) considering relevant objectives, engineering rigour and practical implementation constraints.**
- **Suggests AEMO consult further on issues where alternative solutions have been identified to that proposed** (e.g. Clarity on reactive current injection quantity, location and consideration of unbalanced faults).

If you have any questions regarding this submission, please contact Jason Jina, Energy Policy Lead by email at [jason.jina@ausnetservices.com.au](mailto:jason.jina@ausnetservices.com.au).

Sincerely,



Rod Jones  
General Manager, Network Strategy & Planning

**AusNet**

## Attachment: Response to Draft report on the review of technical requirements for connection

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Australian Energy Market Operator (AEMO)

Thursday, 20 April 2023



# Draft report Stakeholder feedback template:

## AEMO Review of technical requirements for connection (NER 5.2.6A)

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: **AusNet**

### Schedule 5.2 Conditions for Connection of Generators

Issue	Schedule 5.2 Generator Recommendation feedback
<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>	<p>Part A: AusNet supports the proposed option 3.</p> <p>Part B: S5.2 standards extension should not just be limited to synchronous condensers only. Any power electronics based flexible alternating current transmission system (FACTS) technology like grid forming/following Static VAR Compensators (SVCs), Static Compensators (STATCOMs) and Static Synchronous Series Compensator should also be applied with appropriate thresholds. Strengthening the technical standards, monitoring and compliance requirements could potentially lead to a more efficient and effective process for connecting network auxiliary service devices to the NEM power system, which could benefit both generators and consumers.</p>
<b>NER S5.2.5.1 – Reactive power capability</b>	
<b>Voltage range for full reactive power requirement</b>	AusNet supports the proposed Option 3 but notes the wording in the draft report may need further refinement before inclusion in the Rules (e.g., use of “a voltage band of ±5% normal voltage”, as opposed to “10% voltage band around a centre-point ...” Ideally the example diagram would be included, if permissible.
<b>Treatment of reactive power capability considering temperature derating</b>	AusNet supports AEMO’s proposed Options 2 & 3. AusNet would like to know if as part of this change AEMO would be capturing and hosting generator capability curve data files for different temperatures within OPDMS to aid with load flow studies.
<b>Compensation of reactive power when units are out of service</b>	AusNet supports AEMO’s proposed Options 2, 5 and 6, noting that option 5 should also include the ability to consider the switching of any reactive power plant within the generating systems to maintain the steady state voltage (e.g., removing partial or all harmonic filter plant from service during such periods).
<b>S5.2.5.1, S5.2.5.3, S5.2.5.5, S5.2.5.7, S5.2.5.8</b>	
<b>Simplifying standards for small connections</b>	
<b>S5.2.5.1</b>	AusNet does not support the relaxation of the AAS of S5.2.5.1 for generators less than 30 MW. There are circumstances where full reactive capability for smaller generator is desirable in the distribution network. There is always the option to negotiate in circumstances where this is not possible for the generator, and there are already pragmatic reductions to the S5.2.5.1 AAS considered in this review.
<b>S5.2.5.3</b>	AusNet supports AEMO’s proposal to do nothing.

Issue	Schedule 5.2 Generator Recommendation feedback
<b>S5.2.5.5</b>	<p>AusNet does not support AEMO’s proposal as written but agrees there may be some pragmatic changes to consider for smaller plant.</p> <p>Optimization of reactive current injection distribution-connected generators is critical to maintain the resilience of the distribution network, therefore IGBT blocking during faults should not be allowed. A general exemption of reactive current injection requirements will encourage inverter based generating systems to block the current injection controls during disturbances, which AusNet cannot agree with.</p> <p>However, the quantity of current injection, location of assessment, reactive current rise time, post fault active power recovery time and MFRT requirements could be relaxed for generators less than 30 MW, and a bottom-up approach to the negotiation framework may be suitable.</p> <p>The main objective for distribution-connected generators is to optimize post-fault voltage stability. To achieve this, it may be acceptable to reduce the current injection gradient (K factor), increase the rise time to improve the post-fault voltage stability (as a rule, we expect the rise time to be less than one-third of the fault clearance time). Similarly, extending the duration of post-fault active power recovery may improve the overall stability of the control system, and can be considered if necessary. MRFT requirements under AAS (15 faults in 5 mins) are extremely unlikely in the distribution network, and therefore, the AAS should not be mandated for distribution network connected projects.</p>
<b>S5.2.5.7</b>	<p>AusNet supports AEMO’s proposal.</p>
<b>S5.2.5.8</b>	<p>AusNet supports AEMO’s proposal.</p>
<b>AEMO proposes to exclude from AEMO advisory matters and generation or load connection to the LV or MV network of a distribution less than [30 MW]</b>	<p>If the technical standards for generators or GPS are mutually agreed upon by the hosting NSP and the Sub 30 MW generators/load, does this imply that connections with generation or load below 30 MW will be exempted from technical requirements during the NEM application process, knowing that each connection’s requirement is up to the relevant Distribution Network Service Provider’s discretion?</p> <p>What is the process for managing generators that want to participate in the AGC and FCAS markets?</p> <p>In the case of a generator seeking to upgrade their system through the 5.3.9 process, what happens if there is no PSMG compliant models as a result of relaxed connection requirements from relevant Distribution Network Service Provider?</p>
<b>NER S5.2.5.2 – Quality of electricity generated</b>	
<b>Reference to plant standard</b>	<p>No comment.</p>
<b>NER S5.2.5.4 – Generating system response to voltage disturbances</b>	
<b>Overvoltage requirements for medium voltage and lower connections</b>	<p>Regarding Option 2, AusNet agrees that it would add additional complexity when assessing a connection, which should be avoided. That is, how to accurately determine the contributions of multiple generators or IRPs from downstream MV/LV level connections to the voltage profile at the HV point and assess the potential impacts from its individual source if moving the Point of Connection (PoC) to the nearest HV side for all the downstream connections.</p> <p>Hence, AusNet supports the proposed Option 3 only.</p>
<b>Requirements for overvoltage above 130%</b>	<p>Of the options put forward, AusNet supports Option 8 (2+4+6), with the following notes:</p> <p><b>Sub-option 2:</b> AusNet agrees that there should be greater scope to negotiate where the AAS may be overly onerous or unreasonable for a given point in the network. This is especially relevant in distribution networks.</p> <p><b>Sub-option 4:</b> While AusNet agrees that greater clarity should be given in the form of either a ceiling (option 4) or a floor (option 3), given the commentary AEMO provided on page 43 regarding the source of &gt;130% TOV, is there a possibility that there has been a conflation of ideas between voltage impulse withstand levels (i.e., a negotiable matter under S5.2.3) and power frequency voltage matters (i.e., S5.2.5.4 and S5.1a.4)? Should such short-term impulses really be considered in a standard which is operating within the umbrella of <i>power frequency</i> (i.e., 50 Hz)? If so, perhaps consideration should be given to clearer requirements under S5.2.3 instead, and the proposed simple modification added to the AAS in S5.2.5.4 as described in Option 3 (i.e., CUO for at least 130% TOV).</p>

Issue	Schedule 5.2 Generator Recommendation feedback
	<p><b>Sub-option 6:</b> While AusNet agrees in principle, there may be challenges in correctly wording the short-term blocking allowance given that the overvoltage would be at the point of connection but the decision to block would need to be made on a unit-by-unit basis at its terminals (i.e., what is the TOV that each <i>unit</i> needs to meet for such a connection point TOV? And how is compliance assessed? Should standards include voltage at unit terminals?)</p> <p><b>Generally:</b> AusNet agrees that there are nuances and difficulties in correctly implementing this clause and would be willing participants in any further discussions.</p>
<p><b>Clarification of continuous uninterrupted operation in the range 90% to 110% of normal voltage</b></p>	<p>AusNet supports the proposed Option 2, with the following comments.</p> <p>AusNet notes that the precise value of the (linear?) ramp time should be as short as practically possible (e.g., the 2 seconds as mentioned in AEMO’s discussion section as opposed to the 5 seconds in the suggested drafting). The inclusion of the word ‘substantially’ within “...and active power not substantially reduced...” may introduce ambiguity and contention. AusNet recommends either to quantify what is meant by ‘substantially’ or omit the term.</p>
<p><b>NER S5.2.5.5 – Generating system response to disturbances following contingency events</b></p>	
<p><b>Definition of end of a disturbance for multiple fault ride through</b></p>	<p>AusNet supports Option 3. This is based on the idea that once the voltage recovers to the nominal level, the voltage hysteresis points would have been cleared earlier in the recovery and the controller is likely to immediately switch back to its normal operating mode even if the broader event has not yet concluded. This also aids in consistency when calculating the active power recovery time.</p>
<p><b>Form of multiple fault ride through clause</b></p>	<p>AusNet supports both Option 2 and Option 5 as suggested by AEMO.</p> <p><b>Option 2:</b> It is valuable to know the limitations not only that can be captured by power system models but also those are not able to be captured. However, AusNet notes that:</p> <ol style="list-style-type: none"> <li>1. These limitations are deep embedded in inverter design, and which cannot be used by AEMO/NSP or developers to improve the MFRT performance. The key role for AEMO and the NSP is to define the minimum sets of requirements for OEM to achieve. The MFRT requirements set by AEMO should not be considered as an exhaustive list of all possible requirements for inverter MFRT design. Instead, these requirements represent a minimum set of performance criteria that OEMs should aim to achieve and exceed to ensure that their systems can maintain grid stability and reliability during times of multiple faults.</li> <li>2. If relevant, AusNet recommends AEMO to mandate minimum standards on cooling system requirement, and it may direct OEM to increase cost to improve the reliability during times of multiple faults.</li> </ol> <p><b>Option 5:</b> AusNet notes and recommends that:</p> <ol style="list-style-type: none"> <li>1. If the suite of tests established by AEMO becomes the primary focus of inverter design, there is a risk that OEMs will prioritize meeting the test requirements over addressing the challenges of real-world operating conditions. Therefore, the diversity and typicality of the design tests, as well as adaptivity and robustness, need to be considered.</li> <li>2. The NSP must be consulted when providing the suggested fault level, X/R ratio ranges as well as the critical fault clearance time for nominated set of contingencies to aid in plant MFRT design/configurations.</li> <li>3. It is practical to impose a requirement on the proponent to declare in proposed performance standards any impediment to MFRT and provide evidence to support the declaration. Additionally, it might have additional benefits if AEMO can design a generic check list/questionnaire based on experience accumulated via past project experience on modelled and non-modelled MFRT limitations which may set up a baseline for OEMs. Moreover, mandating the MFRT protection details to be provided is of importance.</li> <li>4. AusNet supports establishing ongoing compliance obligations for proponent to maintain the MFRT performance standard throughout the life of the plant.</li> </ol>
<p><b>Number of faults with 200 ms between them</b></p>	<p>AusNet supports the proposed Option 2 as a technology and risk profile-based approach.</p>

Issue	Schedule 5.2 Generator Recommendation feedback
<b>Reduction of fault level below minimum level for which the plant has been tuned</b>	<p>The solutions described in this section appear to be addressing two different aspects; one on valid SCR limits within an MFRT assessment, another on a need to allow for the alteration of plant settings should the SCR shift below limits during the plant’s life. AusNet feels these two matters should be separated rather than attempting to address them as a single issue.</p> <p>Regarding the SCR falling below an acceptable limit during MFRT studies, AusNet agrees with the concept of a minimum valid SCR disclosure, be it within the GPS or within the RUG (i.e., option 3 or 4).</p> <p>Regarding potentially requiring plant settings to be altered due to a lower SCR manifesting later in the plant’s life (i.e., Option 6), this should be evaluated as a separate matter outside of this MFRT context. Furthermore, AusNet has concern that the setting changes that may be necessary to maintain stability under low SCR conditions may affect the agreed performance standards, which would trigger a 5.3.9 process anyway. For example, if lower k-factors are required to maintain stability following a fault, this may result in fault recovery times or reactive injection amounts not consistent with the current GPS. In any case, SCR values which change over time and the plants need to cater for such changes should not form part of this MFRT issue.</p>
<b>Active power recovery after a fault</b>	<p>AusNet agrees with Option 2, but for the equivalent wording relating to connection point voltage and frequency disturbance only. That is, it is not appropriate to include “a period agreed by the connection applicant, AEMO and NSP” for the AAS, similar to MAS under ERC0272</p>
<b>Rise time and settling time for reactive current injection</b>	<p>Whilst generally supportive of Options 2, 4, 5 and 6, AusNet notes that the wording will need to be carefully considered. As it stands, there are elements of the current wording in the AEMO proposal which may be interpreted to make the AAS more permissive than the MAS proposed under ERC0272. For example, whether the commencement time should be measured at the connection point (as the ERC0272 MAS offers a choice of connection point or inverter terminal) and whether the ERC0272 MAS should also include the “step-like” qualification to the rise-time criteria.</p>
<b>Commencement of reactive current injection</b>	<p>AusNet supports the proposed Option 2.</p>
<b>Clarity on reactive current injection volume and location and consideration of unbalanced voltages</b>	<p>AusNet invites AEMO to consider whether a broader change to the standard should be made to allow control schemes implemented in ABC stationary frame with ideal balanced reference voltage for <u>individual</u> phase control assessment. Adopting per-phase compliance standards would mean healthy phase voltages would not be under/overcompensated to have unexpected voltage issues. This mechanism will inherently remove the unbalance, and where the appropriate plant can perform this function, would be a more reasonable standard for IBR equipment with which to comply.</p> <p>However, regarding AEMO’s proposal as it stands, AusNet generally supports changes with the following comments:</p> <ol style="list-style-type: none"> <li>1. <b>Option 2:</b> Regarding the term ‘system impedances’, acknowledge that the term encompasses varying X/R ratios. Add a recognition that the requirement is bounded by applicable current limits and any relevant priority modes (e.g., <math>I_a</math> vs. <math>I_b</math>).</li> <li>2. <b>Option 3:</b> Revise the general requirements to include the selection of positive and negative sequence currents to mitigate the impact on healthy phase voltages. It would also be advantageous to set a limit for the maximum deviation on individual phase voltage (% change from the pre-disturbance phase voltage) and specify that the voltage of healthy phases must not exceed 110% under any circumstances. In addition, AusNet suggests to include the negative sequence currents definition in the NER, currently there are only definitions of negative sequence voltage and negative sequence to positive sequence components of reactive current contribution are included.</li> <li>3. <b>Option 4:</b> Suggest defining for positive sequence <i>current</i> and voltage.</li> <li>4. <b>Option 5:</b> The negative sequence control should not be overly prescriptive due to the X/R ratio being dictated by angle of the fault impedance.</li> </ol>
<b>Metallic conducting path</b>	<p>AusNet cautions on the removal of this term without an appropriate replacement, as on occasion it has been (reasonably) interpreted to mean for GPS and modelling purposes, the residual voltage caused by the applied fault is a constant, as opposed to a variable value (e.g., due to arcing). This aids in setting a reasonable and consistent baseline for assessments to be performed. AusNet recommends replacing the term with a clearer definition of the intent rather than its omission entirely.</p>
<b>Reclassified contingency events</b>	<p>While AusNet understands the issue raised surrounding this item, AusNet has concerns with AEMO’s recommendation.</p> <p>AEMO is responsible for reclassifying credible contingency events under 4.2.3(b). The NSP then uses the AEMO-defined credible contingency event list for the planning, designing, maintaining and operation of the transmission and distribution network. Given that a credible contingency under S5.1.2.1 does not</p>

Issue	Schedule 5.2 Generator Recommendation feedback
	<p>include any additional contingencies (reclassified non-credible events), how can NSPs include any additional reclassified non-credible events for planning, designing, maintaining and operation purposes? We note amendments to Chapter 4 are outside of the scope of this Review.</p> <p>Instead of potentially having an exhaustive list of events captured in its GPS, it may be more expedient to “time-stamp” the agreed credible contingences. For example, if a reclassification of a credible contingency event occurs after the connection agreement has been agreed, and that reclassified credible contingency event is more challenging for the plant to reasonably withstand compared to any other credible contingency event analysed during the connection process, the plant will not be held accountable for being unable to withstand the new reclassified contingency event.</p>
<b>NER S5.2.5.7 – Partial load rejection</b>	
<b>Application of minimum generation to energy storage systems</b>	AusNet supports the proposed Option 2.
<b>Clarification of meaning of continuous uninterrupted operation for NER S5.2.5.7</b>	AusNet supports the proposed Options 2 and 4.
<b>NER S5.2.5.8 – Protection of generating systems from power system disturbances</b>	
<b>Emergency over-frequency response</b>	<p>AusNet agrees with AEMO’s recommendations with the following comments.</p> <ol style="list-style-type: none"> <li>1. <b>Option 2:</b> The PFR deadband and droop are defined for operational requirements but not as an over-frequency protection. It is also not clear generator’s PFRR obligation beyond the <math>\pm 0.15</math> Hz threshold where market ancillary services provide the service. AusNet believes that the PFRR is not fully replacing the S5.2.5.8(a)(2) requirements.</li> <li>2. <b>Option 3:</b> AusNet supports change of threshold to 0.5 Hz less than the upper limit of the extreme frequency excursion tolerance limits.</li> <li>3. <b>Option 4:</b> AusNet supports removal of reference not less than the upper limit of the operational frequency tolerance band.</li> <li>4. <b>Option 5:</b> AusNet supports carve out for the 3 sec requirement due to physical limitations (e.g. hydro units to manage penstock pressure).</li> <li>5. <b>Option 6:</b> AusNet agrees.</li> </ol> <p>Please confirm AEMO’s consideration to apply S5.2.5.8 (a)(2) to a distribution connected generator over 30 MW. Currently this sub clause only applies for transmission connection projects over 30 MW.</p>
<b>NER S5.2.5.10 – Protection to trip plant for unstable operation</b>	
<b>Requirements for stability protection on asynchronous generating systems</b>	<p>AusNet agrees with AEMO’s proposed Option 3, noting the value of being able to alter definition of stability to be monitored / acted upon outside of a Rule change as the system evolves.</p> <p>AusNet offers the following comments in regard to issues raised in this section.</p> <p><b>Issue 1:</b> AusNet supports to have monitoring facilities identifying oscillations. However, it is important to have accurate measurements with phase correction and magnitude readjustment to reflect the true values of the HV voltage and current across a full range of frequencies.</p> <ol style="list-style-type: none"> <li>1. Appropriate VTs and CTs with accuracy over the range from DC at least up to more than 10 kHz and enough bandwidth should be mandated to ensure data accuracy.</li> <li>2. There is a need to make sure the selection of monitoring device satisfies the secondary voltage requirement. For example, the minimum secondary nominal voltage for a given meter may be 500 V. However, the typical secondary voltage in Australian power system is 63.5 V / 57.73 V</li> </ol>

Issue	Schedule 5.2 Generator Recommendation feedback
	<p>Ph-G voltage (i.e., 110 V / 100 V line to line voltage). As a result, the full Analogue to Digital converter range accuracy can't be fully achieved, and the accuracy specification may not be achievable.</p> <ol style="list-style-type: none"> <li>3. Specify quantities to be monitored (e.g., instantaneous individual phase voltage and phase current, RMS P/Q/V/f, PST/PLT).</li> <li>4. A detailed ongoing maintenance plan for equipment calibration should be an additional requirement.</li> <li>5. AusNet does not support a simple 20 MW threshold to be applied. For smaller plant (above 5 MW), it should be up to the NSP to determine on a case-by-case basis.</li> </ol> <p><b>Issue 2:</b> AusNet supports to take corrective action before tripping. Any such action needs to be supported by clear, unambiguous evidence.</p> <p><b>Source of the oscillation:</b> If magnitude of the oscillation observed is the greatest within a grid region, there is high possibility that plant is the source of the oscillation. However, there is also a great chance that the plant itself is not the causer and it is unfortunately locating at the weakest part of the network with the highest observability. Further actions should be taken, (e.g., If available, enable the use of a Power Operated Device (POD) or, if necessary, gradually reduce the output of the relevant generator using a pre-defined ramping rate that has been agreed upon with AEMO/NSP before switching it off as a last resort)</p> <ol style="list-style-type: none"> <li>1. If oscillation is caused by firmware bug/mal control function. This can be identified by monitoring grid stability with/without plant being connected.</li> <li>2. If plant provide negative damping at a certain frequency which is the resonant frequency of the connected grid under some operating conditions and that mode is excited with oscillation observed. – SSR.</li> <li>3. Main contributor of an oscillation via online state estimation, dynamic frequency scan, curve fitting to achieve transfer function (derive order of the transfer function by AI learning from enough operating data), participation factor analysis to learn the contribution factor for any potential intra or inter area modes. – SSCI.</li> </ol>

#### NER S5.2.5.13 – Voltage and reactive power control

<p><b>Voltage control at unit level and slow setpoint change</b></p>	<p>AusNet agrees with the proposal to allow slow setpoint changes for operational purposes but having ramp limiters disabled during compliance testing (Option 3).</p> <p>AusNet tentatively agrees with the proposal in Option 2 to allow voltage control for units at their terminals, provided that if the generating system comprises of many smaller generation units, there is sufficient impedance (such as reticulation impedance or step-up transformers) between the unit and a common connection point such that a voltage droop effect can be developed; To prevent interference between the plant/park voltage controller and the unit voltage controllers, it is important to decouple their bandwidths.</p> <p>AusNet's concern is that in distributed generating system, having two or more units in local voltage control mode with insufficient impedance between them may result in potential fighting of units to establish the local voltage. This could occur with both asynchronous and synchronous devices. AusNet has also not analysed this option in the time available so while open to the idea, is not able to definitively provide its support.</p> <p>AusNet would welcome further analysis, examples and details on the technology types for which this proposal is intended to be applicable. AusNet believes that unit-level voltage control is acceptable, but whether unit-level current control is appropriate depends on the technology being used.</p>
<p><b>Realignment of performance requirements to optimise power system performance over expected fault level (system impedance) range – Voltage control</b></p>	<p>Several of the options presented focus on establishing tuning around higher system impedance. AusNet's view is that tuning to meet timeframes in a high impedance environment equates to a net slowing down of reactive power support overall, and that instead, targeting typical system impedances (as far as practical) and applying 'reasonableness' on assessing plant responses as network impedances vary will yield a better balance between speed and stability (e.g., if the unit has been tuned for typical impedances, we expect to see a faster but more undamped response for high impedances, and a slower but overdamped response for lower impedances). Of course, some wordsmithing would be required to express such 'reasonableness' in the Rules effectively.</p> <p>Ideally, AusNet would like to see implemented a version of Option 7 but with tuning centred around typical impedances rather than high impedances as currently written. If this is not possible, the need to vary the target impedance for tuning (i.e., low, typical, high) should be determinable on a case-by-case</p>



Schedule 5.2 Generator Recommendation feedback	
	basis. Noting that the GPS compliance on settling and rising time should be focus on the system impedance being selected as the basis for control system design.
<b>Materiality threshold on settling time error band and voltage settling time for reactive power and power factor setpoints</b>	AusNet supports AEMO's recommendations on Options 2 and 3.
<b>Clarification of when multiple modes of operation are required</b>	AusNet agrees that three reactive control modes are seldom used for major connections, if at all, and that having a primary and secondary control mode is sufficient. AusNet supports AEMO's proposed Option 2.
<b>Impact of a generating system on power system oscillation modes</b>	<p>While AusNet agrees that it is necessary to consider additional damping requirements for contemporary or emerging oscillation types due to high IBR penetration, AusNet is concerned that the proposed changes may be too vague to be adequately set and enforced. Moreover, it is worth noting that electromechanical and intra-regional oscillations may not be entirely absent from the system even with an IBR-dominated generation fleet, given that many synchronous condensers have already been deployed in the grid for system strength purposes. If this trend continues, potentially undamped electromechanical oscillations will also continue to occur.</p> <p>AusNet acknowledges that it is challenging to get the balance right, but in general would support a bolstering/addition to the standards to capture the oscillations that an IBR-dominated system may experience, rather than a replacement of existing wording with less specific requirements.</p>

#### Definition – continuous uninterrupted operation

<b>Recognition of frequency response mode, inertial response and active power response to an angle jump</b>	AusNet supports AEMO's proposal for either Option 2 or 3, whichever is more expedient.
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#### Schedule 5.3a Conditions for connection of MNSPs

Schedule 5.3a HVDC Recommendation feedback	
<b>NER S5.3a.1a Introduction to the schedule</b>	
<b>Alignment of schedule with plant-type rather than registration category</b>	No comment.
<b>NER S5.3a.8 – Reactive power capability</b>	
<b>Reactive power</b>	No comment.
<b>NER S5.3a.13 – Market network service response to disturbances in the power system</b>	
<b>Voltage disturbances</b>	No comment.
<b>Frequency disturbances</b>	No comment.
<b>Fault ride through requirements</b>	No comment.

<b>Issue</b>	<b>Schedule 5.3a HVDC Recommendation feedback</b>
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<b>NER S5.3a.4 – Monitoring and control requirements</b>	
<b>Remote monitoring and protection against instability</b>	No comment.
<b>New standards</b>	
<b>Voltage control</b>	No comment.
<b>Active power dispatch</b>	No comment.

### Multiple Schedules

<b>Issue</b>	<b>Multiple schedule Recommendation feedback</b>
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<b>NER Multiple clauses</b>	
<b>References to superseded standards</b>	<p>The Draft Report recommends that the references to technical standards (or technical reports, as the case may be) in clauses S5.1.5, S5.1.6 S5.1a.5 and S5.1a.6 of the NER be updated to refer to the latest versions of those standards (or reports), but that the date of those documents be removed.</p> <p>The Draft Report appears to be concerned with two issues:</p> <ul style="list-style-type: none"> <li>- Industry uncertainty about whether an IEC technical report (which is informative) can or should replace an approved AS/NZS standard (which is normative)</li> <li>- Confusion caused by the application of clause 1.7.1(i) of the NER in determining which version of standard applies.</li> </ul> <p>In respect of the first issue, we agree with AEMO that further consideration should be given to whether informative technical reports should form the basis of binding obligations on Registered Participants, particularly in circumstances where non-compliance with those obligations can lead to compliance and enforcement action.</p> <p>In respect of the second issue, we do not see how the effect of clause 1.7.1(i) is impacted by whether or not the date of a standard or technical report is included, or how omitting the date operates to alleviate any such confusion. Therefore, we invite AEMO to reconsider the need for this proposed amendment.</p>




### 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.

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