20 April 2023

Merryn York
Executive General Manager, System Design

Lodged via the AEMO website

Dear Merryn,

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with hundreds of leading businesses operating in renewable energy and energy storage along with more than 7,000 solar and battery installers.

The CEC is committed to accelerating the decarbonisation of Australia's energy system as rapidly as possible, while maintaining a secure and reliable supply of electricity for customers.

We welcome the opportunity to comment on the draft determination for AEMO's review of the technical standards for connection.

This review represents an opportunity to update the generator access standards, which are a key technical foundation of the successful transition to a decarbonised NEM.

We have provided detailed comment on the specific changes proposed by AEMO to S5.2.5 of the NER. We recommend AEMO also consider the interactions of this work with the many other reform areas currently underway that are central to the transition. In particular, AEMO should actively consider how its proposed changes in this process can help accelerate the rollout of new technologies to support overall grid stability, such as grid forming inverter capability.

We also encourage AEMO to begin the process of reconsidering the broader requirements in NER clause 5.3.4A, particularly the current requirement for connection applicants to propose negotatiated access standards that are as close to practicable to the automatic access standard. This requirement represents a fundamental error in the structure of the NAS negotiation process, which has resulted in inefficient outcomes in the NEM.

We understand that the AEMC will consider these issues in a subsequent rule change. However we consider AEMO should begin this process at this stage of the development of the new access standards, to ensure that the full suite of system security and efficiency implications of this element of the NER can be unpacked with industry as soon as possible.

As always, the CEC will work with AEMO to support the development of this critical element of NEM reform. We appreciate the openness of approach taken by AEMO in the review of these standards, and look forward to further engagement in next steps.

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NER S5.2.5.1 – Reactive power capability	
Need to meet the AAS	The 2018 rule change required generators to meet the AAS irrespective of the GPS clause. Meeting the AAS for this clause can require the installation of additional plant resulting in increased CapEx for projects. Where there is no system need for additional reactive power, then the need to meet the AAS should be relaxed or the onus of proof placed upon the NSP to prove a system need and nominate the required level of reactive power.
Voltage range for full reactive power requirement	The reduced reactive power capability requirement at high and low voltages is generally welcome. However introducing a voltage 'centre point' that is determined by the NSP will only introduce uncertainty in the absence of a methodology to determine what this centre point is. Furthermore, if this centre point is not the normal voltage, then it would require primarily plant to be rated higher than +/- 10 % of the normal voltage (which is generally the nominal voltage).
Treatment of reactive power capability considering temperature derating	To the extent what is proposed is simply capturing what the plant can inherently deliver, this is not expected to be problematic. It isn't clear how this wording would provide any real value if this cannot be tested from a compliance perspective and/or is not considered in any planning and/or operational analysis undertaken by AEMO or the NSP. Alternatively it could be captured in the PSDS.
Compensation of reactive power when units are out of service	The proposal for the voltage threshold associated with the reactive power range is subject to being able to come up with a suitable voltage threshold. This should be communicated at the connection enquiry stage to allow generators to plan for and design their generating systems. It might not be possible to come up with a consistent threshold across the NEM, thus impacting the feasibility of the approach. Alternatively, a limit which is a percentage of the reactive power capability can be defined which would provide more certainty to generators (eg limited to 5 % of the AAS under S5.2.5.1).
NER S5.2.5.4 – Generating system response to voltage disturbances	
Overvoltage requirements for medium voltage and lower connections	
Requirements for overvoltages above 130%	The CEC welcomes inclusion of an upper limit for voltages greater than 130 %.

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	Guidance by international standards such as IEC 60071.1, as proposed in Option 5, may allow for easier coordination within a context of global equipment sourcing, where there is significant dependence upon IEC and other international standards.
Clarification of continuous uninterrupted operation in the range 90% to 110% of normal voltage	Inconsistent interpretations of this clause across the NEM have caused uncertainty, risk and the need to install additional equipment (CapEx) to meet requirements and hence plans to address this are welcome. Further clarity is required however on 'not substantially reduced' for active power, allowance for losses within the reticulation system, allowance for the reduction in reactive power due to voltage and confirm that the intent is for a linear ramping of voltage over five seconds. Consideration of a voltage ramp is welcome and it is noted that the intent is to capture sustained reductions in power (typically due to current or MVA limiters) hence an overarching statement is required such that transient variations in active or reactive power are not interpreted to imply a failure to meet CUO. .
NER S5.2.5.5 – Generating system response to disturbances following contingency events	
Definition of end of a disturbance for multiple fault ride through	-
Form of multiple fault ride through clause	Has AEMO considered putting these requirements in separate guidelines? It isn't also clear how the common suite of tests will be developed and how the alignment between the model and tests results be assessed (aside from HIL).
Number of faults with 200 ms between them	-
Reduction of fault level below minimum level for which the plant has been tuned	The enablement of an NSP to require retuning of plant would require significant time and cost to generators over the life of the plant. Will there be a cost recovery mechanism for this? Noting there is work under the CRI looking at the 5.3.9 and S5.2.2 process and the concept of retuning more generally, so it will be critical to coordinate any developments here with that workstream. How this is actually assessed also requires due consideration - at what point is the plant expected to enter unstable operation? If Options 4 and 6 are progressed, noting that a fault level range is not captured within the NER, and considering that changes to fault level settings (gains) would be required, is AEMO's position that a 5.3.9 alteration would not be required, only an S5.2.2 setting change request? A potential solution is for minimum fault level that the plant has been tuned should be documented in the GPS and RUG, and S5.2.2 setting change request will apply if the future fault level dropped below the minimum. However this should not be deemed as generators' obligation solely as the future fault level decreasing is systematic matter, and the responsibility and obligations should be stated clearly.

	We welcome further clarification on this from AEMO.
Active power recovery after a fault	-
Rise time and settling time for reactive current injection	Removal of adequately damped is welcome, however some clarity is required on what is 'adequately controlled', else it is likely to be interpreted inconsistently.
Commencement of reactive current injection	-
Clarity on reactive current injection volume and location and consideration of unbalanced voltages	-
Metallic conducting path	This wording should be retained in that the intent is to capture non high impedance faults. Removal of this would likely require the number of assessments to increase.
Reclassified contingency events	Changes to NSP planning / operating philosophy over time could present uncertainty for connecting parties.
NER S5.2.5.7 – Partial load rejection	
Application of minimum generation to energy storage systems	-
Clarification of meaning of continuous uninterrupted operation for NER S5.2.5.7	-
NER S5.2.5.8 – Protection of generating systems from power system disturbances	
Emergency over-frequency response	The recommendations to remove paragraph (2) are on the premise that PFR implementation will meet the requirements of this clause. However the PFR implementation would only cover the magnitude of the change (provided a suitable droop setting) and not speed of response as the PFR rate of change is substantially slower than what is required under this clause. Where a generating system implements different (slower) ramp rates for PFR versus S5.2.5.8 (faster), removal of obligations under S5.2.5.8 would not allow for a rapid reduction in active power. Option 5 – Noting that the current Rules only have a MAS, rather than having a carve-out, suggest an AAS with the 3 second / 50 % reduction and a MAS that doesn't preclude slower units (such as hydro units) from connecting. A NAS would capture performance of units that cannot meet 3 seconds.

NER S5.2.5.10 – Protection to trip plant for unstable operation	
Requirements for stability protection on asynchronous generating systems	This particular access standard was the one that created most uncertainty amongst members for the following reasons. Caution is urged against automatic disconnection of units until such a scheme is proven as this risks tripping multiple generators and impacting security. An alarm should be raised followed by manual operator disconnection until such a system is proven. Identifying whether a unit is contributing to an instability or not is not a simple exercise and there isn't an accepted solution in the NEM (although some are currently being trialled for certain types of oscillations). The nature of data (quantify and frequency of) to be accepted from the central system should be clarified. Trip requirements from AEMO/NSP – speed of trip and what to trip should be clarified. Provision of timestamped data to AEMO – it is not clear whether this is in real time or offline (or both). The resolution (and hence quantity) should be clarified as excessive data transfer requirements could adversely affect communications systems, especially if real time data is required. The 20MW threshold sounds arbitrary, in the context of widespread allocation of 5MW and 30MW thresholds. What is the reasoning behind this threshold? Option 3: If a reference is made to the PSSG, is there a risk that subsequent changes to the PSSG risk placing generators/IRSs in noncompliance as the reference remains within their GPSs? Despite there being more flexibility, there may be unintended consequences for both new and legacy plant.
NER S5.2.5.13 – Voltage and reactive power control	
Voltage control at unit level and slow setpoint change	Unit level voltage control is seen as beneficial and overcomes some of the challenges associated with plant level control. However it isn't clear how much of an impediment the current Rules actually are given there are generating systems from different OEMs already connected. Hybrid plant (ie wind, solar PV and /or STATCOMs) can also be present and any changes to the rules should not preclude connection of this type of plant. Slow setpoint change is implemented by some plant and makes practical sense from an operational perspective, however may require additional testing if it is codified.
Realignment of performance requirements to optimise power system performance over expected fault level (system impedance) range – Voltage control	The proposed approach of tuning for the highest system impedance makes sense. However it should be noted that an adjacent generator that normally operates in voltage control mode being taken offline (or changing control modes) can have a similar effect to reducing the system impedance. Similar to a new plant connecting adjacent to an existing plant in voltage control which can reduce the rise time of the existing plant. It isn't clear how changes to other plant / addition of new generating systems will be managed.

	A focus away from the need to meet the AAS (speed of response) and towards stability of response should be considered for this clause.
Materiality threshold \ settling time error voltage settling time reactive power and factor setpoints	Note that PF step tests can also require steps to P (not only PF), in which case settling time for P may require assessment.
Clarification of when multiple modes of operation are required	Limitation of control modes to one or two, a primary and secondary is generally welcome. It isn't clear what AEMO is proposing in terms of assessment requirements (simulations and/or testing) and this should be clarified. Some members also raised the point that most NSPs will require voltage control as the primary mode, power factor control mode for operation, reactive control mode for testing and commissioning. In which case it was it does not appear much will change with this rule – in most cases, three control modes may still invariably be required. Members also raised that in some cases it may not be possible to stably tune a secondary control mode and that this should be considered.
Impact of a generating system on power system oscillation modes	More clarity and certainty should be provided on the need for system strength-sensitive oscillation damping and developing controls to damp such oscillations. As mentioned by AEMO, this area is still evolving. However the concern is when such a requirement is mandated for the sake of it (as per the NER) with no proper assessment or testing of the damping controls. Either during the modelling phase or during commissioning. Hence resulting in costs to OEMs, generators and consumers for a function that is not utilised resulting in 'gold plating' of the network.
Definition – continuous uninterrupted operation	
Recognition of frequency response mode, inertial response and active power response to an angle jump	The CEC welcomes AEMO's review of the CUO definition and looks forward to reviewing the approaches to S5.2.5.1 & S5.2.5.4 in particular.

As always, the CEC welcomes further engagement from the AEMO on this reform. Further queries can be directed to Paul Beaton at the CEC on pbeaton@cleanenergycouncil.org.au

Kind regards

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