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10 February 2023

Australian Energy Market Operator

Lodged electronically.

Subject: Draft System Strength Impact Assessment Guidelines (SSIAG)

Dear AEMO SSIAG Team,

Goldwind Australia welcomes the opportunity to provide feedback on the draft System Strength Impact Assessment Guidelines. We would like to take this opportunity to commend AEMO efforts at developing a practical approach to the assessment guidelines in line with the limitations imposed in the rule change "Effective Management of System Strength".

Our feedback is summarised with direct reference to different sections of the draft SSIAG document in the table below and is ordered according to the references to the various sections of the SSIAG document.

Section 2.5.3 – "*AEMO considers a submission under NER 5.3.9(b) or NER 5.3.12(b) to be equivalent to an application to connect*"

We would like to express our concerns with the proposed approach. The nature of how AEMO and NSPs tend to assess changes to the generating system mean that there would be a potentially significant risk to the existing generators when considering even simple things like firmware updates (even if they are unrelated to the key control systems of the generator). This would create a disincentive in the industry to continue improving generator software over time or introduce new operational features. The disincentive may even deter owners from looking to upgrade the control systems of existing generators (e.g. grid following inverters to grid forming inverters which Goldwind is trialling in China and only involves a software update) as the regulatory risk would be too great and the generator could expose themselves to potential system strength related charges depending on how the guideline is interpreted. That would result in a poor outcome for the power system overall.

Our view is that the equivalence of the 5.3.9 process to an application to connect is not appropriate. We instead suggest AEMO consider the 5.3.9 process separately. Some 5.3.9 requests could be considered to be very similar to an application to connect (e.g. increasing the generator size or replacing generator units with a different type). However, we suggest that most 5.3.9 changes involve updates to software of the generating system and do not represent significant plant changes. On that basis, we consider that the NSP and AEMO should have the flexibility to apply their engineering judgement as to whether a 5.3.9 request should be taken down a path equivalent to an application to connect. AEMO and the NSP should be able to choose to not conduct a System Strength Assessment if it would not be relevant.

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Section 3.4.2 – AEMO introduces a "Stability Coefficient": "*reflecting limitations in the network immediately beyond the 4.6.6 Connection, for which the lowest value must not be less than 1.2*"

While we understand and support the premise behind introducing a stability coefficient, there was no clarification from AEMO on how the lower bound value of 1.2 was determined. In our view this lower bound of 1.2 has potentially significant ramifications for future connections as it will directly influence the system strength charges a generator would have to pay, but there was no supporting documentation provided to help participants understand the reasons behind the proposed lower bound. The CIGRE technical brochure 671 which AEMO referenced does not make a reference to such a coefficient. Practically speaking, for an asynchronous generator (grid forming or otherwise) to be considered to have no general system strength impact or a positive impact, the "Withstand SCR" needs to be lower than the proposed "Stability Coefficient" value of 1.2.

We encourage AEMO to consider potential network limitations at especially at very low fault level conditions. There may be some cases where physical network limitations (e.g. a P-V or Q-V analysis could provide indicative network limitations) would prevent operation rather than a particular generator causing adverse system strength impact.

We would further suggest that, if practical, AEMO could define a methodology for calculating the "Stability Coefficient" based on the connection point characteristics (e.g. using PSSE OPDMS studies either in a steady state of dynamic context). One suggestion we would like to put forward, noting we have not had the time to explore this option due to time constraints, is to use a "reference synchronous generator" and calculate the "Withstand SCR" using the methodology already proposed in the SSIAG to determine a "neutral" value of the "Stability Coefficient"

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At this point, we are usure if a coefficient of 1.2 realistically models network limitations. We encourage AEMO to consider cases where physical network limitations (e.g. P-V or Q-V analysis could provide indicative network limitations) would prevent operation rather than a particular generator causing adverse system strength impact.

In an effort to maintain the simplistic approach for calculating ΔAFL, we propose the use a "reference synchronous generator" to calculate the "Withstand SCR" using the methodology already proposed in the SSIAG and determine the value of the "Stability Coefficient" that should be used for the ΔAFL calculations (please note we have not had the time to explore this option due to time constraints – in any case, we suspect even such a reference machine may not be able to achieve a "Withstand SCR" as low as 1.2).

We would further suggest that, if practical, AEMO could define a methodology for calculating the "Stability Coefficient" based on the connection point characteristics (e.g. using PSSE OPDMS studies either in a steady state of dynamic context).

Notice of consultation document Appendix C.2 (page 88) – "*In this instance, the value of α is to be established on a case-by-case basis by the Applicant. It will be the Applicant's responsibility to specify the residual risk, limitations and stability margins of the connecting network. This could result in a prolonged engineering exercise but could also result in more opportunistic treatment of risks and opportunities.*"

We note that AEMO have indicated that the applicant can propose a value of α that is higher than 1.2 in the notice of consultation document. However, no such references have been made in the draft SSIAG document. We believe it would be beneficial for AEMO to include this in the SSIAG document along with some additional commentary/guidance on considerations that can be made when deciding if a proposed stability coefficient is reasonable. We note that the hypothetical examples included in Appendix C.3 of the notice of consultation document is a good starting point for this, however this was not included in the draft SSIAG document.

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Section 3.4.3 (a) (B) – "*includes taking generating systems and IBLs out of service where they are not expected to provide system strength.*"

We note that AEMO has not provided any guidance on how NSPs should consider whether a generating system can be deemed to provide system strength. Specifically, this is likely to impact how grid forming technology is built into the AFL forecast at each SSN. If the proposed approach would be based on the ΔAFL, likely this would exclude most grid forming installations in the NEM. This has the potential negative outcome that the NSPs will not be able to procure system strength solutions other than those which provide high levels of fault currents that counter act the AFL shortfalls (e.g. synchronous condenser). We do not believe continuous addition of synchronous condensers to be essential to maintain system stability. It would certainly not be an economical solution.

Our suggestion to address this gap is the revision of the stability coefficient lower bound (to a higher value) which would provide a less onerous starting point for grid forming technology.

Section 5.2.2 and Notice of consultation document section 4.8.3 (page 69) – "*AEMO proposes to amend the existing list of potentially acceptable SSCW by deleting the use of grid-forming technology and amending the use of lower impedance transformers so that they must be situated within a network*"

We note that AEMO have indicated that more time is needed to ascertain the potential of grid forming technology. We also understand that not all grid forming technology can provide the same level of system support.

In this instance, we propose that it would be better in the longer term to include Grid Forming technology in the list of potential SSCW rather than exclude it. We believe that while AEMO and NSPs explore the options around grid forming technology, there is the option of taking conservative approach in the short term. As the understanding of grid forming technology improves, having this as an option in the SSCW would allow all parties to consider grid forming technology as part of SSCW without the need of further modifications to the SSIAG document.

Section 7.4.3 – "*Where a Preliminary Assessment is being carried out using vendor specific PSCAD™/EMTDC™*"

We are seeking clarification on what AEMO means with the term "vendor specific". For some projects we may have OEM models specific to the inverter that is to be used for the project. Would that count as "vendor specific" in this case?

Does AEMO expect that the "vendor specific" model also include details such as proposed reticulation, auxiliary equipment and grid transformers that would be applicable to the project? If this is the case then we propose the use of the term "site specific" to avoid confusion.

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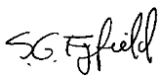
Section 8.2 and Notice of consultation document section 4.5.2 (page 49) – "*to reach the conclusion that a 4.6.6 Connection can operate stably requires, effectively, the same analysis required to undertake a Full Assessment*" Although there may be no technical alternative that is less onerous than a Full Impact Assessment, if the generator has paid for a SSC, we believe the applicant should not be further exposed. The Stability Assessment should be completed by AEMO and the NSP independent of the generator and any shortfall would need to be met by the NSP and covered under the SSC. The generator is already incentivized to optimally tune its generator to minimize its Withstand SCR. After that, AEMO and the NSP should be responsible for ensuring appropriate System Strength mitigation with no further recall to the generator.
Table 4 – "*For Tests 1 to 3: change from pre fault Withstand SCR of 10 to the postfault Withstand SCR (SCR of 3.0 (minimum access standard) or negotiated access standard)*" There is a reference to Tests 2 and 3, however it is not immediately clear what tests 2 and 3 entail. We assume this is a typing error.
Notice of consultation document section 4.5.2 (page 53) – "*A matter that AEMO has not addressed is the consequences of a 4.6.6 Connection not operating stably due to issues within the Connecting NSP's network and invites submissions on how that might be addressed*." The NSP should be responsible for the impact of its network on System Strength and Stability

We understand there is limited time to action any changes prior to the 15th March 2023 rule commencement date. In any case, we would like to extend our support to work collaboratively for this and future amendments to the guidelines. Thank you for the opportunity to provide response to the draft SSIAG. Please do not hesitate to contact me via the details below if you would like to discuss this submission further.

Sincerely,



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