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Submission for consultation of the Draft Determination and Report - System Strength Impact Assessment Guidelines

Dear Sir or Madam,

Senvion welcomes the opportunity to make a submission to AEMO's Draft Determination and Report - System Strength Impact Assessment Guidelines within the 2nd consultation stage. Senvion is a leading global manufacturer of onshore and offshore wind turbines. The company develops, produces and markets wind turbines for almost any location – with rated outputs of 2 MW to 6.33 MW and rotor diameters of 82 metres to 152 metres.

We have considered the document "Draft System Strength Impact Assessment Guidelines" and the "SSIAG Draft Determination Report".

National Electricity Objectives

The NEO requires that the price of electricity be optimized, as well as the reliability and security of supply. The system strength guidelines impose additional costs on participants by requiring additional modelling, and potentially additional mitigation measures. There is no special provision made for projects which are under construction or in the later stages of the connection process.

Risk of delay caused by NSPs' not having full system models

Pacific Hydro has pointed out that projects may be delayed if the NSP cannot provide full system model in PSCAD. In section 4.2.34 of the Draft Determination AEMO suggests that "it is possible for Connection Applicants and NSPs to manage the risk of delay to a connection application process caused by a failure, or delay, in the availability of up-to-date PSCAD / EMTDC models contractually". This is not a reasonable suggestion because proponents do not have the negotiating power to make the NSP compensate them for losses caused by lack of provision of models.

Cost Benefit analysis and weak grid

As mentioned in the Cigre TR 671 reference, a weak grid is caused by long transmission lines and designing close to maximum transfer limits. While this sometimes is unavoidable, when

interconnecting systems or connect wind farms remotely, it can be avoided within a meshed grid.
The draft guidelines mention mitigation measures which may include new transmission lines. The cost benefit analysis of investing in additional equipment vs transmission upgrade or alternative connection points should be provided to market participants. Additional investments needed to actively support stability requires a clear remuneration system to avoid discrimination of different technologies.

SCR terminology
The Short Circuit Ratio (SCR) for wind farms or wind turbines is currently understood as the ratio of the fault level (MVA) divided by the nominal rating of the connecting power (MW). Cigre Technical Report 671 introduced new terminology and definitions of that ratio and interpretations.
These two significantly different interpretations of the SCR ratio is not clearly stated or identifiable.
The first most common use for SCR is for Protection design. Fault level at a particular place will increase as more fault contributing generators or machines are connected. Full inverter connected technologies are, due to their design and cost benefit analysis, contributing less fault to fault current than synchronous machines. This impact can be changed, if a market for fault contribution is created justifying investments in design.
The second interpretation relates to control stability of the generator. This is very different consideration to the to the fault contribution. As indicated in the Cigre TR 671, it relates to sharing of the grid strength. Thereby the key point is the 50Hz grid impedance seen from the control system. This can be derived from the fault level.
To prevent confusion between these two meanings they must have different names. Senvion requests that the guidelines consistently use the phrases “Aggregate Short Circuit Ratio”, and ASCR as the acronym when discussing control stability.

Aggregate Short Circuit Ratio Method
The system strength guidelines do not specify a single method for calculating the aggregate SCR. Thus different TNSPs may use different methods. This is unreasonable; there should be a single method to calculate this, rather than different methods used in different states. These are National Electricity Rules, not state based rules. The assessment should provide consistent results no matter where it is applied in the network.

The Weighed SCR (WSCR, Method 3 from Cigre 671) is currently being used in some assessment work. This seem to treat all asynchronous generators as if they were connected to the same bus, with no separation between them. It also give values which are much lower than the traditional SCR calculations.

The Equivalent short circuit ratio (ESCR Method 1) seems to be preferable, since it puts a reduced weight on generators which are far from the generator under consideration and thus have a low effect on the connection point.

Different SCR methods (WSCR/CSCR/ESCR) and boundaries
The methods do not provide clear guidance as to what boundary should be used to determine the limits of generators which should be included in the calculation and which are excluded. For clarity it is preferable to limit the consideration to generators connected within three

busses of the proposed generator. This threshold is commonly used in harmonic studies, and is equally applicable here.

Committed Generation and weak grid and EMT/PSCAD models
Independent of EMT/PSCAD studies, it can be assessed, which generator connection capacity would cause the system become weak and requires specific assessment. Independent of an EMT/PSCAD model it can be further assessed identified, when non-discriminative a further connection would lead to a security risk for the network operation. In absence of clear validation methods and dependency of tuning on acceptance of the PSCAD model the condition of proceeding with detailed design for a connection application is causing unduly delay. Part of the connection process is the submission of controller limitations. This give sufficient insights into the capability of the plant during initial connection process to assess their capability to operate within different grid connections. Initial tuning in a lumped model may not represent the individual wind turbines behavior.

System strength framework and flowchart
The non-aligned grid strength methods and boundaries is exposing the process to high possibility of disputes. Additionally, if there is a dispute, there seems to be the possibility to end up in an endless loop. Some thoughts about an escalation method towards an independent third party should be given to settle the dispute.

Requirement for EMTP models
Section 2.4.1 states that EMTP models are required for “Full Assessment as these are the only types of models that will result in an accurate assessment.” This is not necessarily correct,

Please feel free to contact us in case you require further information.

Yours sincerely,

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