By e-Submission
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Dear James

ERC03000 - Efficient management of system strength on the power system

Engevity Advisory is an Australian consultancy and has an overall interest in the efficient and effective management of the Australian power system during the energy transition. We believe our firsthand engineering experience with the System Strength Frameworks having connected generators both prior and post the fault level rule change would be of benefit to the AEMC and the wider industry.

We welcome the Commission's investigation into system strength frameworks in the NEM in 2020 and this TransGrid rule change which we believe would allow for a proactive approach to managing system strength by the parties best placed to manage the associated risks.

Our response to the feedback requested by the AEMC is provided in the dot points below and the following table.

Consideration should be given to:

- Network's obligation to remain transparent and responsive to alternative options to overcome the Capex bias.
- Possibly explore third parties (i.e. synchronous generators & BESS) providing system strength for multiple generators in a region on a bilateral contracted basis which could become a market in the future.
- The economies of scale e.g. a smaller number of larger assets may be cheaper than a larger number of smaller assets. In theory, the most efficient outcome would be to deliver exactly the right amount of system strength, at precisely the right time and locations, to satisfy demand. However, the provision of system strength is lumpy and this is unlikely to occur. The AEMC has justified the benefit for prescribed investment in system strength solutions by TNSPs based on the observation that the risk profile for investment in system strength is asymmetrical; the cost of overinvestment is less than the cost of underinvestment, because of the additional generation that investment can unlock.
- Overall the changes to the approvals process for new entrants should promote faster connections and take advantage of increasing renewables in the system putting downward pressure on prices.

Table 1 Response to Draft Determination (Demand Side)

Item	Reference	Comments	Recommendation
SCR definition at IBR terminals	Draft rule glossary	SCR being defined at the connection point will penalise IBRs part of a larger generating system as these would have a much higher (balance of plant) impedance between the connection point and IBR terminals (regardless of the IBR OEM and inverter model. Selection of IBR to operate down to low levels of system strength should be based on the IBR capability alone and not the balance of plant impedances.	Change reference to connection point to IBR terminal in the definition of Short Circuit Ratio.
SCR of 3.0 at the connection point is not workable	S5.2.5.15 (b)	Draft rule clause S5.2.5.15 (b) states a Minimum Access Standard (MAS) for SCR of 3.0 at the connection point. Where this SCR cannot be met, the generator would be prevented from connecting due to inability to meet the MAS. The draft rule as it stands is not workable as the actual SCR at the IBR terminal (and hence ability to operate stably) is a function of the balance of plant impedance which is directly related to the MW size of the Generating System. Refer Figure 1 below where the SCR at the IBR terminal (even if the same OEM and IBR model), would be vastly different across projects due to the different Balance of Plant impedances. On large projects connecting to weak networks, the only solution would be to install a synchronous condenser (electrically) close to the IBR terminals (withing the generating system) and the draft rule would preclude this from occurring.	1. It is recommended that the SCR of 3 (or a lower reasonable number) be applied at the IBR terminals. 2. To the extent the SCR is defined at the connection point, the use of synchronous condensers within the generating system (or similar) should not preclude compliance with this new access standard. For large projects, this would be the only way to operate the IBR stably. Refer Figure 1 and the associated reference for further information. Note that this is based on actual NEM connected project information.
SCR	S5.2.5.15 (b)-(d)	The wording in the draft rule relating to 'capability' to operate down to an SCR of 3 and 'steady state operation' is unclear and likely to result in misinterpretation of the requirements.	Proposed wording as follows: **Minimum access standard** (b) The minimum access standard is a generating system comprised of

			asynchronous generating units must have plant capability sufficient to meet its performance standards at a short circuit ratio of 3.0 ~~and design capability to remain stable during steady state operation~~. **General requirements** (c) The agreed value of the short circuit ratio for any negotiated access standard and the rated active power used to calculate the value must be recorded in the performance standards. (d) ~~The control system and protection system settings for the plant must be set at a level such that the plant meets its other performance standards suitable for the technical performance requirements needed for the location of the connection point in the power system, regardless of the control system and protection system settings that are required to demonstrate compliance~~ Demonstration of capability with suitable control and/or protection settings is not subject to ensuring compliance with any other performance standard established under clause S5.2.5 for capability consistent with paragraph (b), or where a negotiated access standard applies, paragraph (c).
Vector shift	S5.2.5.16	This appears to be related to the use of voltage vector shift protection which is used primarily for anti-islanding protection. It is well understood that using this type of	Remove requirement or capture requirements within S5.2.5.8 (c) (disconnection when islanded) and/or

		protection for anti-islanding is neither sensitive nor secure and is often not used due to the inability to select a suitable phase angle for a trip. Hence a dedicated access standard seems unnecessary given existing provisions in the rules.	S5.2.8.8 (d) of the rules (conditions for which the generator must or must not trip).
HVDC Links	S3.1 of determination	It is not clear of the "Demand side" access standards for generators and MSNPs also apply to interconnectors and/or HVDC links	Clarify obligations for IBR based interconnectors and/or HVDC links
SSS in Distribution Networks	-	The draft rule highlights the need for SSS Providers to coordinate with DNSPs, however isn't clear on responsibilities for provision of SSS in the distribution network. Would the SSS Provider (TNSP) be responsible for connecting and operating SSS to the DNSP networks? System strength related issues are localised, and this is more so in the distribution network where solutions at the transmission level have little to no impact on the localised distribution network.	Allow DNSPs to be SSS providers where the SSS is most efficiently and effectively located in the DNSP network.

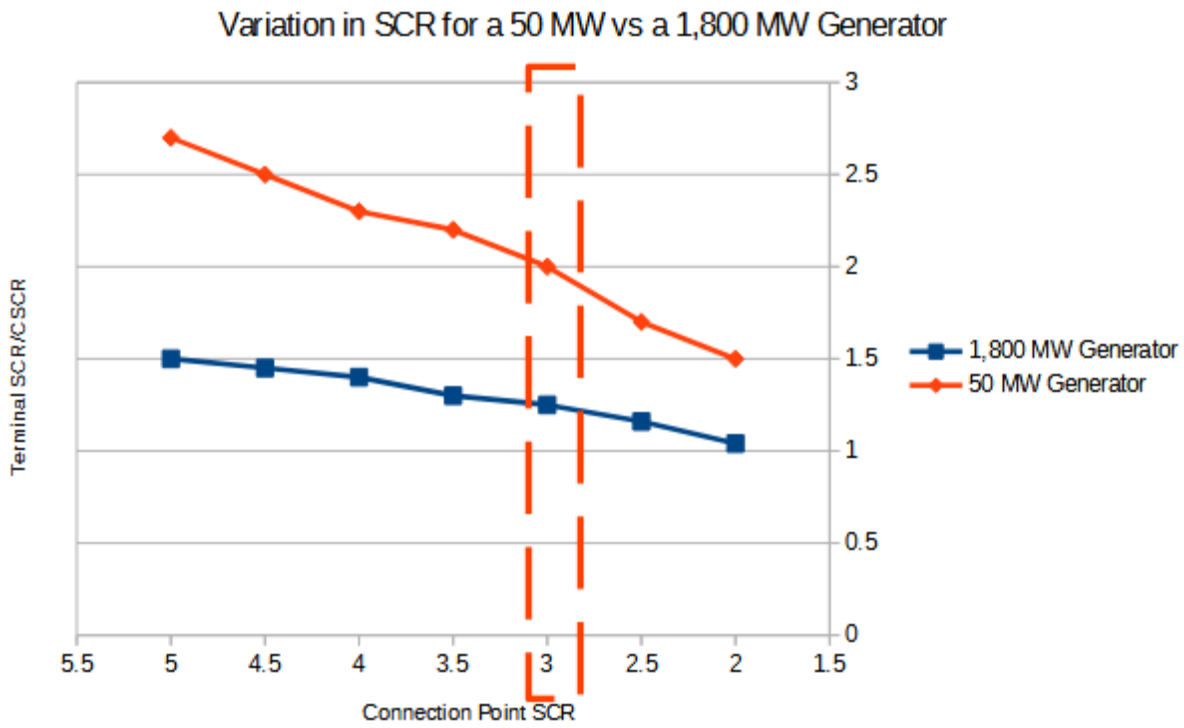

Figure 1 Variation in SCR at POC vs Terminals for two different Generating Systems[1]

We welcome the opportunity to discuss any of the mentioned items in further detail with the Commission.

Yours faithfully
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Winodh Jayewardene

Director

Date: 17/06/21

[1] https://www.linkedin.com/pulse/considerations-use-short-circuit-ratio-scr-winodh-jayewardene/