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Australian Energy Market Operator

By email: planning@aemo.com.au

Dear Sir/Madam

System Strength Requirements Methodology and System Strength Impact Assessment Guidelines amendments

Transgrid welcomes the opportunity to respond to the Australian Energy Market Operator's (**AEMO**) proposed amendments to AEMO system strength instruments following the Australian Energy Market Commission's (**AEMC**) final rule on the *Efficient Management of System Strength on the Power System* released in October 2021. As the jurisdictional planner, operator and manager of the transmission network in NSW and the ACT, Transgrid is eager to assist AEMO in ensuring the new system strength framework is workable, clear and reasonable.

Transgrid is broadly supportive of AEMO's amendments to the System Strength Requirements Methodology (**SSRM**). We support the approach AEMO has taken to meet its power system security responsibilities in operational timeframes based on the minimum three phase fault level requirements. AEMO's proposes to take the existing minimum fault level requirements as the starting point to ensure Network Service providers have a secure operating system during the transition period.

However there a number of key aspects to the suggested amendments that warrant further consideration.

Remediation charges and selection of System Strength Nodes

We understand that AEMO has proposed a system strength locational factor (**SSLF**) in section 4.6 that will be used to determine the system strength remediation charge. In our view, the calculation may result in skewed outcomes due to the non-linearities of the physical network and therefore lead to inflated charges.

Transgrid has undertaken analysis on the Darlington Point 330 kV system strength node (**SSN**) based on the proposed SSLF calculation methodology which AEMO has outlined in section 4.6, the results of which are represented in Table 1.1. The analysis concludes that the system strength remediation charge for connections that are not directly located at a defined SSN will be excessive. The results show greater implications for Distributed Network Service Provider (**DNSP**) connected generators. This is due to the long electrical distance to a defined SSN. As SSNs can only be defined in the transmission network, most of the inverter-based resource (**IBR)** connections on the DNSP network will have excessive system strength charge that will drive those generators to remediate their system strength impact locally, which may be financially unviable for some small generators.

Table 1.1

	SSLF	Distance from Darlington Point SSN
Darlington Point 132 kV	2	N/A
Coleambally 132 kV	3	13.3 km
Deniliquin 132 kV	28	166 km
DNSP Gen 1 132 kV	33	116 km
DNSP Gen 2 132 kV	59	163 km

The least cost centralized system strength remediation may have network augmentations at one or multiple locations that differ from the SSNs. Therefore, we suggest that the system strength charge should reflect the impact based on the electrical distance to the actual remediation locations, not just the SSNs. Furthermore, the remediation work to increase system strength at one SSN may have an impact to other SSNs located in close proximity. This particular factor would need to be considered in the SSLF methodology.

Given the above, we recommend AEMO to undertake further analysis and refine the SSLF methodology in order for it to be workable and fair.

Transgrid broadly supports the system strength node selection process outlined in section 3.4. However, SSNs should:

- Be well defined
- Be carefully located and identified
- Have appropriately defined Electrical distance. The electrical distance threshold between SSNs needs to take into consideration the topology of the network and the locations of the available renewable generation resources in the region
- Align with renewable zones developed under state-based schemes.

Well-defined SSNs will avoid excessive system strength remediation charges and prevent small to medium sized renewable generators connecting to DNSP networks to be unfairly disadvantages. New SSNs and new system strength remediation locations will also need to be carefully selected and identified to avoid excessive system strength charges being required for multiple IBRs in the network.

IBL definition

In order to assess the impact of large IBR loads, the term 'inverter based loads' contained in the System Strength Requirements Methodology must be clearly defined to include the type and size of the load. This will allow for clear interpretation and application of the new performance standard that will eliminate ambiguity.

This would also include the definition contained in the system strength impact assessment requirements for inverter based loads (**IBL**). We suggest clearly outlining the requirements for a Preliminary Impact Assessment and a Full Impact Assessment and clear guidance on the requirements to provide short circuit ratio withstand capability of IBLs from original equipment manufacturers.

Impact modelling

We understand that the methodology for system strength impact assessments will include loads that have large IBR under NER 5.3.4B. As such, appropriate Electromagnetic transient (**EMT**) modelling will also need to be incorporated into the framework. Transgrid has witnessed rapid load growth in Sydney West fault level node driven by large data centre connections. Given there is limited EMT models for large data centres, assessing the impact of these types of IBL for system strength requirements will be difficult. EMT modelling requirements of different type of IBLs (mine loads, data centres and other large industrial facilities) including key control system models and model aggregation techniques must be clearly identified to avoid any ambiguity.

We look forward to working with AEMO to further refine the amendments to AEMO system strength instruments. If you require any further information or clarification, please feel free to contact Kevin Hinkley, Manager System Planning and Analysis, at kevin.hinkley@transgrid.com.au.

Yours faithfully

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