

1 June 2022

Australian Energy Market Operator

Lodged via email: [planning@aemo.com.au](mailto:planning@aemo.com.au)

Dear Sir/Madam,

**System Strength Requirements Methodology and System Strength Impact  
Assessment Guidelines amendments consultation**

The Clean Energy Council (**CEC**) is the peak body for the clean energy industry in Australia. We represent over 1,000 of the leading businesses operating in renewable energy, energy storage and renewable hydrogen. We are committed to accelerating Australia's clean energy transformation.

The CEC welcomes the opportunity to comment on the proposed amendments to the system strength instruments following the AEMC's rule change on the *Efficient Management of System Strength* in 2021. Broadly, we consider the consultation paper sets out a pragmatic and transparent approach meeting the new system strength requirements, and we look forward to working closely with AEMO in the coming months to further refine this work.

The planning undertaken by AEMO is key to the efficient implementation of system strength across the network. To achieve this, the System Strength Requirements Methodology (SSRM) must adopt a transparent and forward-looking approach to the modelling of the future system's system strength needs, the setting of nodes and determination of fault levels. As the future system needs become more complex, it will become increasingly important to effectively draw upon all available sources of information to ensure that this planning is sufficiently dynamic to account for a rapidly changing system. This includes utilising 'top down' processes and information sources, such as jurisdictional REZ planning frameworks, the Integrated System Plan (ISP) and Electricity Statement of Opportunities (ESOO). We also encourage AEMO to consider how it can better utilise 'bottom up' information from investment markets, such as current and forecast levels of new developments and connection enquiries, to further inform these elements of system strength planning.

We are broadly supportive of the approach taken to the System Strength Impact Assessment Guidelines (SSIAG), however further work is required to ensure that modelling obligations placed on generators through this process are proportionate and in accordance with the underlying policy intent of the framework – namely to reduce complexity and speed up the connection process.

The CEC also recognises the need to update the Power System Stability Guidelines (PSSG) to better reflect the new system strength frameworks. This update must be limited in scope and focussed on addressing the issues identified through the *Efficient Management of System Strength* rule change. In particular, changes should be limited to incorporating the defined elements of system strength, including minimum fault levels and IBR related instability, as discussed in the final rule. Broader questions of system stability and how this is managed should be subject to an appropriately scoped review of the PSSG and should be addressed separately to this process.

The remainder of this submission outlines our consideration around:

- The system strength definition and processes for node identification
- Preliminary and final impact modelling
- Implications for system and connections now and in the future

### **System strength definition and node identification**

We consider the general approach taken by AEMO in the Issues Paper to be sensible. While recognising that the paper sets out approaches at a high level, we encourage AEMO to provide additional detail as to how these processes will work in operation. Provision of this additional detail will enable the market to respond to identified needs for system strength, whether at the minimum or efficient level, by offering services to either AEMO and/or NSPs to help meet overall system requirements.

For example, AEMO notes that when determining minimum fault level requirements, it will “incorporate prudent planning margins where appropriate to acknowledge technological and market uncertainty”. We welcome further information from AEMO as to how and what volumes of system strength services will need to be procured in accordance with meeting this prudent planning margin. To be clear, we consider that including such a margin is a sensible approach; further detail as to its magnitude and qualities will enable participants to invest in assets that can help meet this prudent planning margin.

In relation to protection equipment functionality, we support the proactive approach identified of accounting for minimum fault levels needed for the continued operation of protection equipment, well in advance of synchronous thermal retirement. As above, any unavoidable need for fault current provision should be advised to the market well in advance, so that market participants can offer services to AEMO and NSPs where needed, to help meet these system demands. Equally however, we welcome further analysis from AEMO as to how to reduce systemic reliance on fault current for safe operation of protection equipment, such as by working with NSPs to install differential / distance type protection instead of overcurrent-based protection.

Further work should be undertaken to assess the implications of using Available Fault Level (AFL) as a metric for assessing the efficient level of system strength. While we appreciate this is a relatively well understood metric, there is a risk that it is overly focussed on the capabilities and characteristics of synchronous machines. The CEC appreciates that the framework acts as a guideline to how AEMO will undertake its analysis. However, care must be taken to ensure that any use of AFL in AEMO’s minimum fault level planning processes does not translate into restrictions on how NSPs model and then deliver on their requirements as system strength service providers for the efficient level. Our concern is that a reliance on AFL metrics in this case could reduce the use of non-synchronous sources of system strength, given it is (historically, at least) been a metric based around the provision of synchronous fault current. We welcome further advice from AEMO as to how this outcome could be avoided.

The CEC notes AEMO’s discussion regarding how to account for future location of generation and load. This is an unarguably complex assessment. In a general sense, we encourage AEMO to acknowledge the asymmetry of risks associated with this uncertainty – that is, the costs of underestimating likely future IBR volumes at a given location will far outweigh the costs of overestimating these volumes. In the latter case, assets may be underutilised for a short time before generation connects; in the former, the already significant delays in connecting new generation will be further exacerbated, driving up investment and operational costs.

The CEC also notes AEMO’s comment that “NSPs may have additional information about the locations of connection interest, which can supplement the inputs to AEMO forecasting processes. This information can be, and is, shared through existing joint planning processes.” We agree that

while the ISP forms a sensible starting point for this analysis, we also strongly encourage AEMO to develop formal processes to take advantage of bottom-up investment market information and feed it into its planning processes. This could include more formal processes for taking account of connection enquiry or development information, to ensure that planning can be sufficiently proactive and account for volumes of expected IBR generation.

The proposed arrangements must be compatible with jurisdictional schemes such as the New South Wales REZ scheme and associated approach to system strength. It is important for this framework to have transparent responsibilities for the jurisdictional planners / network operators across jurisdictional and REZ boundaries, through joint planning processes. This will also ensure consistency in definition and measurement of system strength shortfalls across regions. The CEC supports the flexibility around this outlined in the Issues Paper as well as the flexibility of the jurisdictional planner / network operator as System Strength Service Provider (SSSP) to address system strength needs.

In terms of the location of nodes, AEMO's approach appears to be sensible. However, there remains a degree of further detail needed in terms of how node identification will be aligned with state based REZ declaration. We are confident that AEMO will take a pragmatic approach to node identification and align this with the development of REZs under the various state-based schemes, wherever this is possible. Such a proactive application of the national frameworks will reduce the extent of jurisdictional duplication necessary in REZ buildout.

We also believe it is critical for further work to be undertaken by AEMO before the methodology for setting System Strength Locational Factors (SSLF). This methodology must ensure it encourages system strength procurement at an acceptable cost and avoid situations where connection location away from the node results in excessive cost. This could result in generators electing to self-remediate and therefore reduce the scale and scope efficiencies associated with the system strength frameworks.

We understand this issue has been discussed in AEMO's system strength working group and request further engagement before the proposed amendments to the instruments are finalised. A workshop with relevant stakeholders, including CEC representatives, network businesses and generation / storage developers will assist in the resolution of any issues arising with the development of the SSLF.

The CEC supports the use of existing forecasts (including the ISP and ESOO) to inform forecasts of system strength demand and node location. While this framework is focused on the transmission network due to the current regulatory architecture around system strength, it will become increasingly relevant to consider the impacts from and on the distribution network. We look forward to working further with AEMO, DNSPs and SSSPs to understand how system strength provision across transmission and distribution networks can be effectively coordinated.

We also encourage AEMO (working with SSSPs through joint planning) to carefully consider how node identification and the provision of system strength can be coordinated with other system requirements. In particular, we consider it likely that general power system stability can be enhanced as a positive externality from provision of system strength services. For example, AEMO and SSSPs should consider how synchronous condensers built for the provision of system strength might be 'right sized' to also maximise available inertia or reactive capability, and therefore take advantage of scale and scope economies to deliver a broader system benefit.

We also encourage AEMO to consider other system needs, such as system restart and restoration, when planning for the location of system strength nodes. Carefully located system strength nodes with rightsized assets to meet system strength needs at those nodes, can likely provide a material

additional benefit in the event of a major supply disruption or black system event, primarily as system restoration support services. Again, we consider that storage assets or synchronous condensers located for system strength provision can also provide these services.

### **Preliminary and final impact modelling**

AEMO has set out the requirement of a full 'general system strength impact' assessment if the preliminary modelling (an EMT-type SMIB model) indicates adverse system impacts.

The CEC recognises the importance of the modelling process at connection for the generator's performance and system impacts. However, this preliminary modelling is a source of material cost and time spent in the connection process. AEMO must ensure that changes to this process align with the principles and objectives of the system strength rule change and hasten this process.

The proposed preliminary modelling requirements may require additional resourcing by connecting proponents given the use of PSCAD modelling rather than PSSE. Given the more onerous process, the CEC encourages AEMO to consider its use through the entire connection study and modelling process where appropriate. That is, as the preliminary modelling will be more comprehensive, we expect it should be adequate to provide a basis for later full impact assessment and connection study modelling in order to minimise re-work at these later stages; this process should encourage streamlining across the broader connection studies and modelling process.

Following the initial assessment which should indicate the system strength impact, it is likely this will decrease through the connection process as a proponent finalises design and tuning. We consider this is an efficient solution and is an ideal outcome for system strength.

We also note and appreciate AEMO's pragmatic approach in terms of demonstrating compliance with the new system strength access standard, reflecting actual SCR at PoC. It would be preferable to codify this kind of assessment, so that all AEMO connection engineers can make these assessments with equal confidence.

### **Implications for system and connections now and in the future**

It is important for AEMO to consider the implications of the amendments on connections now and in the future. It is important to ensure longevity of the proposed amendments and provide investment certainty to the market. Appropriate grandfathering arrangements should be in place to minimise the extent existing connections must reconsider GPS through the 5.3.9 provisions.

The CEC acknowledges AEMO's consideration of how technology capability will improve in the future. It is important to consider the implications to IBR which are increasingly using grid-forming inverters and any impacts on existing contracts for these proponents. We note the importance of separate work conducted by AEMO through the grid-forming inverter white paper and Engineering Framework. Given grid-forming technology is an emerging consideration within regulatory frameworks, it is important for a definition to be clearly identified to provide certainty to OEMs and proponents in the market. We support AEMO progressing work in this area through the Engineering Framework and encourage this work to be expedited, as this will lead to more efficient solutions to be reached sooner.

Finally, the proposed arrangements must consider the changing regulatory environment of the NEM and the current processes, namely the access reform work being undertaken by the ESB. Given several different locational frameworks exist, it is important to provide clarity and alignment where needed to ensure investment certainty.

Thank you for the opportunity to comment on the Issues Paper. If you would like to discuss any of the issues raised in this submission, please contact Jordan Ferrari, Policy Officer, [jferrari@cleanenergycouncil.org.au](mailto:jferrari@cleanenergycouncil.org.au) or myself, as outlined below.

Kind regards,

Christiaan Zuur  
Policy Director – Energy Transformation