07 May 2020

Mr John Pierce
Chairman
Australian Energy Market Commission (AEMC)
PO Box A2449
Sydney South NSW 1235

Dear Mr Pierce,

RE: Investigation into System Strength Frameworks in the NEM – Discussion Paper (EPR0076)

Hydro Tasmania welcomes the opportunity to respond to the AEMC's Discussion Paper as part of the *Investigation into System Strength Frameworks in the NEM* review.

Hydro Tasmania is Australia's largest producer of renewable energy, and is an active participant and contributor to the energy market reform agenda. Through this review, the AEMC intend to assess the appropriateness of system strength frameworks in the NEM, including: issues associated with current frameworks; opportunities to more explicitly define 'system strength' in the current market context; and potential future frameworks for the provision of system strength services.

The Tasmanian power system can experience high-levels of system non-synchronous penetration (SNSP) and therefore requires careful coordination with Tasmanian hydropower and gas synchronous generators (during standard operation, as well as operating in synchronous condenser mode) to ensure that system strength is maintained. Over a decade of practise in collaboration with TasNetworks and the Australian Energy Market Operator, Hydro Tasmania has gained extensive experience in the provision of fault current to support system strength in the Tasmanian energy system.

Further, Hydro Tasmania has also developed system strength solutions in small-scale energy systems. As the operator of the hybrid energy systems on both major Bass Strait Islands, we have achieved several prolonged periods of 100% renewable energy generation, whilst maintaining system strength. This has been achieved through the use of "off-the-shelf" products such as batteries, fly-wheels, resistors, and integration software. This demonstrates that our energy market has a variety of options at its disposal to underpin system strength, while continuing to support a deeper decarbonisation of our sector.

As a result of our experience, Hydro Tasmania has a strong appreciation for the importance of ensuring sufficient system strength services are available when required to underpin the safe and secure

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operation of the energy system. On this basis, we are supportive of the AEMC's intention to review system strength frameworks in the NEM to ensure they are fit-for-purpose, especially considering the rate of transition in our market to lower-emissions technologies, and the need to accommodate increasing levels of variability within our system.

Related to system strength issues, Hydro Tasmania has provided the AEMC with our proposed *Synchronous Services Market* rule change. We believe this would be an effective component of the solution that could be implemented at relatively short notice and with minimal disruption, to address key issues and support positive system strength outcomes in the NEM. We encourage the AEMC to consider this rule change proposal in conjunction with the System Strength Framework review, ensuring coordination with the Energy Security Board's work stream on Essential System Services as part of the Post-2025 Market Design process.

Hydro Tasmania encourages the AEMC to clearly identify the timeline for implementation of potential future system strength frameworks. In particular, Hydro Tasmania notes the value of identifying reform options that could be implemented in a short timeframe to quickly address system security concerns, and those more material reforms that might need to be implemented over a longer timeframe. On the assumption that this review is seeking to develop an enduring framework for system strength in the NEM, Hydro Tasmania would like to offer the following 'principles-based' observations for the AEMC's consideration. Any future approach to system strength in the NEM should:

- **Deliver efficient, least-cost outcomes** across both short-term (operational) and long-term (investment) periods;

- **Maximise the utility of existing assets to deliver system strength services** (where their continued operation benefits the NEM broadly), before supporting investment in new assets to underpin system strength (i.e. adding new regulated network assets should be considered as complementary, but only after the potential of existing assets, for example latent or potential synchronous condenser operation, has been uncovered through the creation of appropriate investment and operational incentives);

- **Support the efficient transition of the electricity market** to lower-emissions technologies by removing barriers to entry for new generation assets by maintaining appropriate system strength support mechanisms, and **support resource sharing between market participants** to facilitate least-cost approaches;

- Be calibrated to **deliver system strength under normal operating conditions**, as well as ensure sufficient system strength services are available to **enhance grid resilience following disturbances**; and

- **Utilise existing planning and forecasting processes** in the NEM to assist in identifying system strength shortfalls and signposting these to the market, to allow sufficient time for the market to respond.

Hydro Tasmania has provided some responses to questions listed in the AEMC's stakeholder feedback template. We have not completed all questions, but focussed our responses on questions where we consider we can add most value/insight for this consultation process.

If you would like any further information on any aspect of this submission, please contact John Cooper (john.cooper@hydro.com.au or (03) 6240 2261).

Yours sincerely,

Gerard Flack
Chief Operations Officer

AEMC

Investigation into system strength frameworks in the NEM

STAKEHOLDER SUBMISSION TEMPLATE

The template below has been developed to enable stakeholders to provide their feedback on specific questions that the Commission is interested in due to the discussion paper. It is designed to assist stakeholders provide valuable input on those questions the Commission is interested in. However, it is not meant to restrict any other issues that strakeholders would like to provide feedback on.

SUBMITTER DETAILS

ORGANISATION:		Hydro Tasmania
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CHAPTER 2 – KEY ISSUES WITH THE CURRENT SYSTEM STRENGTH FRAMEWORKS

Section 2.3 – Key issues of the minimum system strength framework	
1. Do stakeholders agree with the AEMC's assessment of the issues of the minimum system strength framework?	Hydro Tasmania are broadly supportive of the issues identified by the AEMC. In particular, we consider the issue of unit commitment, and the value of system strength above minimum levels as key challenges to address throughout this process.
2. Have stakeholders identified any other significant issues as a result of the minimum system strength framework?	Hydro Tasmania are generally supportive of the issues identified by the AEMC with the current minimum system strength framework. We consider that it is also integral that frameworks evolve to incentivise the provision of system strength services from existing and new/future development assets (and support upgrade of assets to deliver these services), where this delivers an optimal, least-cost outcome for the maintenance of system strength.
Section 2.4 – Key issues of the "do no harm" framework	
3. Do stakeholders agree with this assessment of the issues of "do no harm" framework?	

4. Have stakeholders identified any other significant issues as a result of the "do no harm" framework?	The existing 'do no harm framework' and 'minimal system strength framework' are both present perspective oriented. These frameworks are not effective in managing the successful integration of large-scale renewables at the speed at which the current energy market is transforming.
Section 2.7 – Conclusion	
5. What are stakeholders views on the Commission's proposal to consider evolving the framework to a more integrated approach for system strength in the NEM?	We support the intent to have a better integrated approach to system strength. The unit commitment issue (visibility) is a key matter to address. In this regard, co-optimisation with energy may play an important function. This is a key feature of Hydro Tasmania's Synchronous Services Market rule change.

CHAPTER 3 – CONSIDERATIONS FOR PROVISION OF SYSTEM STRENGTH

Section 3.1 - What is system strength?	
6. Do stakeholders agree with the Commission's characterisation of system strength?	
7. Has the Commission set out all the necessary considerations for defining a system strength service? If not, what additional considerations could be included?	As noted in the Discussion paper, the concept of system strength is not explicitly defined in the NER, and has recently been used to describe a variety of services in our market (fault current, inertia, dynamic stability etc.) Hydro Tasmania's proposed Synchronous Services Market rule change would be beneficial in that this will give AEMO (through NEMDE), the capability to determine system requirements and prioritise dispatch, rather than create the need for rigid definitions, the suitability of which, may vary significantly based upon various factors across different regions of our market. In the event that a more formal definition is required, it will be important that the definition considers: (1) the physical definition of system strength (what electromagnetic characteristics of the system does the definition include and exclude); (2) the significance of system strength for grid stability (why do we require these services/what issue(s) are we trying to resolve); (3) the process for engineering measurement and evaluation (how do we measure the contribution); and (4) the incentive mechanism to be used (how do we recognise and reward participants for the provision of these services).
8. Do stakeholders consider the regulatory definition of system strength should be updated/changed? If not, why not? If so, how could this be done?	
9. Do stakeholders consider that the system strength definition should recognise active and passive system strength procurement? If not, why not? If so, how could this be done?	

10. Do stakeholders agree that clarifying the NER system strength service definition is likely to contribute to more/broader options for the system strength provision?	
11. Are there any additional sources of fault current in the NEM that can contribute to meeting system strength needs?	
12. Are there any other technologies in the NEM that can contribute to meeting system strength needs that should be consideredi?	
Section 3.2 - Why is system strength needed?	
13. Do stakeholders agree with why system strength is needed?	A secure power system requires adequate levels of inertia, fault level and voltage control. The increasing scarcity of these services is leading AEMO to implement constraints and issue directions more frequently in order to maintain system security. Hydro Tasmania agree that system strength provision needs to be strengthened in the NEM.
14. Are there any additional reasons for why system strength is needed in a power system?	
15. Do stakeholders agree with the characterisation of the impact of inverter-based generation on system strength?	
16. Are there any additional impacts on system strength that should be taken into account?	
Section 3.3 - The provision of system strength in the NEM	
17. Do stakeholders agree that with the characterisation of system strength thresholds?	Hydro Tasmania is broadly supportive of the AEMC's characterisation of system strength thresholds. It is important to note that the necessity and requirement of these system strength services are not static, and will need to adjust as our sector transitions to new energy technologies. On this basis, any future system strength framework will need to be sufficiently adaptable to support our changing energy mix, and not create barriers to further decarbonisation throughout the NEM.
18. Are there any additional thresholds or alternative characterisations that might be included in the investigation?	
Section 3.4 - The provision of system strength in the NEM	
19. Do stakeholders agree with the system strength attributes?	

20. Are there any additional attributes of system strength that the Commission should be aware of?	

CHAPTER 4 – EVOLVING SYSTEM STRENGTH FRAMEWORKS

Section 4.1 - Approach to developing a new framework	
21. Do stakeholders agree with approach (Plan, Procure, Price, Pay) to developing a new framework for system strength? Are there additional steps/concepts that should be explored?	The proposed 4P approach (planning, procurement, pricing, payment) is reasonable from the implementation point of view. However, an additional framework would be needed to 'check and balance' the services deemed to be required. This could occur in the 'plan' stage. The 'check and balance' function should consider what the time frame to review the plan should be, who should be involved in the plan and how the outcome will be carried out and based on what engineering procedures. The procurement stage of any future framework should ensure that all potential solutions are given a 'level playing field' in order to achieve least-cost solutions for consumers.
Section 4.2 - Models for delivering system strength	
22. Do stakeholders agree with the summary of the potential capabilities of each system strength model in Table 4.1?	
Section 4.3 - Model 1: Centrally Coordinated	
23. Do stakeholders agree with the characterisation and assessment of a centrally coordinated model? Are there any other advantages and/or challenges?	Hydro Tasmania considers that this approach may fail to appropriately incentivise the provision of system strength from pre-existing assets in the NEM. Due to the 'lumpy' nature of these services, it will likely be challenging to appropriately set a regulated price for the provision of these services. As such, we support further consideration of a market-based approach. Only in the event that the market fails to deliver the necessary services, should new regulated investments be considered to deliver system strength services. This will ensure that all reasonable effort is made to identify and pursue least-cost options.
Section 4.4 - Model 2: Market based decentralised	
24. Do stakeholders agree with the characterisation and assessment of a market based decentralised model? Are there any other advantages and/or challenges?	Hydro Tasmania considers a market-based approach should be treated as preferable, such as that proposed in our Synchronous Services Market rule change proposal. We would like to highlight, however, that a decentralised planning approach could be risky, and could cause the price to be highly exposed to the step-change nature of threshold pricing.
Section 4.5 - Model 3: Mandatroy service provision	
25. Do stakeholders agree with the characterisation and assessment of a mandatory service provision model? Are there any other advantages and/or challenges?	Hydro Tasmania is broadly in agreement with the AEMC's characterisation and assessment of the mandatory service provision model. Hydro Tasmania considers it unlikely that this approach will deliver least-cost system strength outcomes, in the interest of consumers. On this basis, we are not supportive of a mandatory service provision model as described in the AEMC's consultation paper.
Section 4.6 - Model 4: Access standard	

26. Do stakeholders agree with the characterisation and assessment of an access standard model? Are there any other advantages and/or challenges?	Hydro Tasmania is broadly in agreement with the AEMC's characterisation and assessment of access standard model. Hydro Tasmania considers it unlikely that this approach will deliver least-cost system strength outcomes, in the interest of consumers. On this basis, we are not supportive of an access standard model as described in the AEMC's consultation paper.
Chapter 4 - General	
27. Are there other model(s) stakeholders think should be explored?	Hydro Tasmania encourage the AEMC to consider our Synchronous Services Market rule change proposal in this review process.
28. What combiantions of models (i.e. hybrids) should be explored further?	Hydro Tasmania considers that our proposed approach as outlined in our recently lodged Synchronous Services Market rule change could prove effective in addressing a number of key issues identified with our current system strength frameworks. Of the options presented in the Discussion Paper, we consider there may also be merit in considering a model that borrows aspects from model 1 and 2 as identified in the AEMC's discussion paper. For instance: Plan: The amount of services required, and likely location of these services to be determined through a central planning process, utilising insights from existing processes; Procure: A market-based approach set to achieve a certain 'target' amount required on an operational basis. Price: Prices could be set by the marginal provider of the service, with regulation to ensure least-cost provision and sufficient value in the market to meet the planned volume. There may also be benefit in co-optimisation with the energy market. Pay: Recovery through network charges and/or a model that draws on analysis of causers and net-contributors/suppliers to/of system strength issues.
29. Do stakeholders have any suggestions as to how any/all the models set out could be implemented or modified? Please comment on any and all models possible.	Hydro Tasmania considers that the proposed models are likely well suited under normal operating conditions, but may be ill-designed to underpin system strength following a disturbance such as a network outage or contingency event. It is important to consider how the model could be designed to deliver enough system strength to ride-through periods of disturbance, rather than just meeting the 'minimum'. Please refer to our rule change to consider how this could be achieved.

CHAPTER 5 – SYSTEM STRENGTH IN DISTRIBUTION NETWORKS

30. What factors make system strength provision in distribution networks unique from transmission networks?	
31. What are the key issues for system strength in distribution networks, including the magnitude and urgency of system strength issues in distribution networks?	

32. How should any system strength issues in distribution networks be addressed? Are any model(s) from Chapter 4 appropriate to address system strength provision in distribution networks?	