

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 stakeholders would like to provide feedback on.

SUBMITTER DETAILS

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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?	<p>Agree that the three issues identified are important.</p> <p>The first issue "Magnitude and definition of minimum system strength" notes that current framework does not cater for non-credible contingencies. This is true, but it is not clear why the framework needs to be expanded to cater for non-credible events. The principle of a secure power system being based on catering for credible and protected contingency events (only) is fundamental to power system management in the NEM. If an exception is created for system strength, then it will potentially have a number of unintended consequences.</p> <p>Regarding the efficient allocation of responsibility, Mondo agrees that there is a theoretical possibility that protected events and credible contingency events may be accounted for twice as outlined in section 2.3.2.</p>
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	<p>Regarding the question of how to manage unplanned outages as outlined in figure 2.1 of the discussion paper, Mondo agrees that it may be reasonable that these are addressed through AEMO's powers of direction, rather than impose the cost of maintaining this additional capacity in reserve.</p>
<p>2. Have stakeholders identified any other significant issues as a result of the minimum system strength framework?</p>	<p>Another issue that should be included is the tension between accurately modelling system strength requirements into the future, versus the need to forecast a system strength shortfall sufficiently in advance to allow for a remedy to be implemented. Mondo well appreciates the difficulty that AEMO face in attempting to accurately model system strength shortfalls into the future, and the high variability of results depending on input assumptions etc. Despite this difficulty, if we are to allow sufficient time for stakeholders to respond to forecast shortfalls, it will be necessary to provide advance notice, probably of at least one year, preferably more.</p> <p>Perhaps a compromise approach could be found where AEMO are not expected to forecast and model a large number of scenarios and simulations (which inevitably yield complex results). An alternative approach might be for industry to agree to a manageable set of scenarios that AEMO would then use in its system strength modelling.</p> <p>Whilst this pragmatic approach may fail to identify some shortfall situations, these should be relatively rare events which could then be managed by AEMO direction.</p>
Section 2.4 – Key issues of the “do no harm” framework	
<p>3. Do stakeholders agree with this assessment of the issues of "do no harm" framework?</p>	<p>Mondo agrees with the outline of the issues associated with the current “do no harm” framework in the Rules. Coming up with a more workable solution to this issue will be a key step in improving the overall framework for system strength.</p> <p>One point that was not discussed in detail in the paper is that inverter technology is now available that can effectively provide system strength service. Whilst this would no doubt involve higher inverter cost, it may be a lower cost solution than a synchronous condenser. If this new inverter technology is deemed appropriate, then perhaps the Generator Performance Standard could be amended to include a requirement on all future inverter based technology to have such capability.</p>
<p>4. Have stakeholders identified any other significant issues as a result of the "do no harm" framework?</p>	<p>No</p>
Section 2.7 – Conclusion	
<p>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?</p>	<p>Mondo agrees with the Commission's conclusion that the system strength framework needs to evolve to keep head of the challenges being imposed by the energy transformation. Mondo would suggest that a staged approach may be appropriate, where we do not seek to implement a perfect solution in one attempt. The fact that the energy sector is still going through a rapid transformation, and that the future remains so uncertain in many respects, it</p>

may be more prudent to take small steps to overcome current and obvious problems (as identified in the discussion paper). Industry will similarly need to recognise that additional future changes will more than likely be required as new challenges present themselves.

CHAPTER 3 – CONSIDERATIONS FOR PROVISION OF SYSTEM STRENGTH

Section 3.1 - What is system strength?

<p>6. Do stakeholders agree with the Commission's characterisation of system strength?</p>	<p>Yes – this section provides a useful summary of what system strength is and why it is important. The only point that Mondo would question is the description of Short Circuit Ratio (SCR) in para 3 on page 34. The description of SCR refers to a non-synchronous generator at the connection point. This reference to a non-synchronous generator is potentially misleading, and it implies that this is something that only relates to this type of generator. In fact, the traditional definition of SCR is based on parameters relevant only to synchronous generators, and we are now faced with the difficulty of trying to adapt these to the new non-synchronous world.</p> <p>It would be preferable if there could be a definition of SCR that is more technology neutral.</p>
<p>7. Has the Commission set out all the necessary considerations for defining a system strength service? If not, what additional considerations could be included?</p>	<p>Mondo agrees with the Commission that the current definition of system strength service in the NER, and the current definitions of what system strength is, are somewhat lacking in terms of the challenges now facing the industry. Mondo therefore supports the proposal to firm up these definitions as part of this review, with a view to making it clearer how both synchronous and non-synchronous plant can contribute to these services.</p> <p>One minor point to note is that whilst the emphasis at present is understandably on ensuring that we continue to have sufficient system strength (fault current), it should also be noted that having too much fault current is also a problem (exceeds the capability of circuit breakers to clear a fault).</p>
<p>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?</p>	<p>Mondo agrees that the regulatory definition of system strength and system strength service need to be updated to be more relevant to non-synchronous, as well as synchronous technology (but preferably defined in a technology neutral manner if possible). In preparing these improved definitions it will be important to try and ensure that participants and investors can understand the requirements that they will need to meet to connect and operate in the NEM. Also, the definitions of system strength service should be written in a manner that facilitates future procurement of these services from a range of technology types.</p>
<p>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?</p>	<p>This should be considered as part of this consultative process. There are potential benefits in recognising both the passive and active response, but it is also possible that including both in a single definition could dilute the clarity of the definition. It might be that there is a single definition of system strength that does not refer to either active or passive service, and then there is a two part definition of system strength services which separately describes the passive and active options.</p>
<p>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?</p>	<p>Yes – discussed above.</p>

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11. Are there any additional sources of fault current in the NEM that can contribute to meeting system strength needs?	Probably yes – new technology may provide various options utilising batteries etc. In any case, a clear definition of system strength services should encourage these new technology options coming forward.
12. Are there any other technologies in the NEM that can contribute to meeting system strength needs that should be considered?	See above.
Section 3.2 - Why is system strength needed?	
13. Do stakeholders agree with why system strength is needed?	Yes
14. Are there any additional reasons for why system strength is needed in a power system?	None that we can identify
15. Do stakeholders agree with the characterisation of the impact of inverter-based generation on system strength?	Yes. The examples in section 3.2 are very helpful in clarifying the impacts and issues. The paper mentions “grid forming” inverters which are capable of creating their own voltage source and are therefore more robust to low system strength conditions. Mondo is aware of that inverter technology has advanced further to what are referred to as “virtual synchronous machines”, which have the potential to contribute to the provision of system strength (as well as inertia) services. Mondo suggests that the AEMC include consideration if this form of technology and its capabilities to assist in management of system strength.
16. Are there any additional impacts on system strength that should be taken into account?	Not that we can identify at present.
Section 3.3 - The provision of system strength in the NEM	
17. Do stakeholders agree that with the characterisation of system strength thresholds?	Yes
18. Are there any additional thresholds or alternative characterisations that might be included in the investigation?	Not that we can identify at present
Section 3.4 - The provision of system strength in the NEM	
19. Do stakeholders agree with the system strength attributes?	The paper describes system strength service as ‘lumpy’ for synchronous generators since all of the system strength service is available as soon as the generator is synchronised to the system, and cannot be incrementally adjusted. Whilst this is true for synchronous generators, Mondo is unsure whether this characterisation is correct for the previously mentioned “virtual synchronous machines”. This is a question that would be worth investigating further.
20. Are there any additional attributes of system strength that the Commission should be aware of?	Not that we can identify at present

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?	Yes – this is a very good approach.
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?	Generally, yes. Whilst we generally agree with the characterisations and assessments of each of the options, Mondo suggests that it may be useful to consider these issues from two different contexts. The first would be to consider the issues in table 4.1 under the current context of rapidly evolving energy policy and technology. The second context for consideration would be a future world when the current policy and technology transformations have plateaued, and there is less uncertainty. It is likely that under the current context, a centralised approach might be more suitable. However, when things have settled somewhat, market-based arrangements might come into consideration.
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?	Yes
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?	Yes
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?	Yes
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?	Yes
Chapter 4 - General	

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27. Are there other model(s) stakeholders think should be explored?	Not that we can identify at present
28. What combinations of models (i.e. hybrids) should be explored further?	See comments to Q22
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.	See comments to Q22