Sebastien Henry
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

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System Security Market Frameworks Review Consultation Paper
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The Australian Energy Council (the Energy Council) welcomes the opportunity to make a submission to the Australian Energy Market Commission's (AEMC) System Security Market Frameworks Review Consultation Paper.

The Energy Council is the industry body representing 21 electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. These businesses collectively generate the overwhelming majority of electricity in Australia and sell gas and electricity to over 10 million homes and businesses.

As Australia's energy system progresses through a structural adjustment towards lower emissions, challenges are arising to balance system security, affordability and emissions reduction. We support the AEMC in taking a holistic approach to the challenges to system security, as the energy market adjusts structurally. The security impacts of other rule change processes should form part of this holistic view of maintaining future energy security[i]. The Energy Council's member businesses are participating in the AEMC's Technical Working Group for this review, to provide important market and generation expertise to the process. We welcome the AEMC's approach to work closely with the Australian Energy Market Operator (AEMO) to extend the work of the Future Power System Security Program.

At this early stage of understanding, it is important to explore all ideas when considering the issues associated with non-synchronous and intermittent generation in an interconnected network and the maintenance of power security as Australia lowers its emissions. We encourage the AEMC to consider potential solutions to system security in the context of the system and market as a whole, to achieve the most efficient solution. Our responses to specific consultation questions are set out in Appendix A, and we welcome the opportunity to discuss the issues of maintaining system security in our changing market.

Any questions about our submission should be addressed to Emma Richardson, Policy Adviser by email to emma.richardson@energycouncil.com.au or by telephone on (03) 9205 3103.

Yours sincerely,

Sarah McNamara
General Manager, Corporate Affairs
Australian Energy Council

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

ABN 98 052 416 083

Appendix A: Energy Council responses to selected consultation questions

Do you consider that the issues outlined above cover the matters that need to be considered going forward in managing changes in system frequency?

In 2014 AEMO proposed changes to the National Electricity Rules (NER) to accommodate a protected events category. The protected events category would allow AEMO to use the NEM-wide central dispatch process to mitigate against specified events presently considered to be non-credible[ii].

The introduction of this new category would allow AEMO to have a mid-point of risk mitigation measures between a credible contingency event (fully protected, but potentially expensive to achieve) and non-credible contingency event (no protection and low cost but poor outcome if the contingency event occurs).

AEMO's obligations for a protected contingency event would be less stringent than a credible contingency, and so not as costly for the market. For example, the criteria for a protected event might allow the frequency to deviate further than what it would for a credible contingency, and there might be allowance for a certain amount of under frequency load shedding to occur. The aim of the additional category would be to allow AEMO to take preemptive mitigation measures that would allow a better outcome in a contingency than a non-credible contingency event. The AEMC Reliability Panel would play a key role in establishing any new criteria.

The NER currently allows AEMO to reclassify non-credible contingencies as credible, subject to criteria that AEMO review and amend under NER 4.2.3B. Once a contingency event has been declared credible, AEMO is obliged under the NER to ensure that the system will remain in a satisfactory operating condition following the credible contingency occurring, and will return to a secure operating condition within 30 minutes. This level of protection may not be warranted for all events.

In conjunction with consideration of a "protected" category, NER section 4.2.3A could be reviewed to examine AEMO's ability to reclassify non-credible contingency events as credible in the expectation of abnormal conditions. The review could examine if multiple high risk conditions are forecast (such as high non-synchronous generation, destructive winds, lightening, and high imports over Heywood) whether the rules accommodate temporary reclassification of non-credible contingencies as credible. This approach of considering multiple non-credible contingencies together may have allowed for the reclassification of the double circuit outage of the Heywood interconnector and possibly prevented the recent blackout in South Australia. Understanding the dynamics of multiple events that can cause separation to happen, such as power swing events or voltage collapse, is essential to ensure the power system is not exposed and that AEMO has the appropriate ability to respond.

The need for predictable operational rules for market participants should be balanced against the need for flexibility in adjusting and responding to severe events which cannot always be foreseen well in advance. Examining the current framework to understand whether it is overly prescriptive is also important to ensure AEMO can respond to events as they arise during the structural shift that is occurring in the power system.

Do you consider it beneficial to set a standard for rate of change of frequency (RoCoF)? What format should this standard take and what factors should be taken into account when setting the standard? Who should set it? Would the establishment of a new standard trigger significant additional costs to comply?

A new requirement for a RoCoF standard should be carefully weighed against other options to control frequency such as constraints, the procurement of inertia or fast frequency response. Ultimately to maintain a secure system, the post contingent frequency needs to remain within (or quickly revert to) the Frequency Operating Standard (FOS). However, as system inertia decreases and RoCoF increases, AEMO's task of ensuring that the frequency remains within the FOS becomes difficult. The existing measures to control frequency are relatively slow frequency control ancillary services (FCAS) tools such as 6 second and 60 second response.

Level 14, 50 Market Street
Melbourne 3000
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Email info@energycouncil.com.au
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Schemes such as Under Frequency Load Shedding and potentially, Over Frequency Generation Shedding are key protection mechanisms for frequency limits. However, high RoCoF degrades or eliminates the usefulness of these protection systems because they require time to identify and respond to frequency deviations. There may be merit to limiting RoCoF in a transparent and predictable fashion when circumstances require it. The protected event classification could be useful for such situations when severe weather events are predicted in areas with high RoCoF and vulnerable infrastructure. Either under a protected event or a contingency re-classified from non-credible to credible, then a RoCoF constraint could be used to mitigate risk to the system.

To maintain system frequency within the current limits, AEMO could purchase more system inertia (as proposed in the AGL rule change[iii]), and a new fast FCAS service. If alternative support services were not developed or feasible then a RoCoF limit may be appropriate. At this early stage of understanding of RoCoF in the NEM, it is essential to consider and balance the relative costs and benefits of all options.

The proposal for a RoCoF standard should be considered within the existing regulatory framework which already contains a FOS. The FOS sets the bounds of acceptable frequency deviations and if AEMO can estimate RoCoF and has the ability to procure inertia and fast frequency response, then a RoCoF standard may be superfluous. For example, if RoCoF is sufficiently high that under a contingency event, the frequency will deviate outside the FOS, then AEMO should already be incentivized to act.

Do you consider there to be a role for maintaining system strength? Who should be responsible for undertaking this role or how should the responsibility be determined? Do you consider it beneficial to establish new mechanisms for the procurement of additional systems security services?

As non-synchronous generation becomes are larger share of total generation, we can expect more regions to have low system strength. If strong systems provide positive externalities then those investors that assist system strength should be able to realise the full benefit of their contribution to the market. If strong systems provide positive additional benefits to the whole network, beyond their direct benefit to the investor and customer, then there may be a role for AEMO to procure services that enhance system strength.

For example, some generators provide voltage control, inertia, fault levels and system strength by installing and running synchronous condensers or running generators in a 'synchronous condenser mode'. This provides the direct benefit to the generator of improving system operating conditions. However, any other generator in the area and energy users also benefit from the stronger system. Currently, there is no mechanism for financial recovery of these services provided by the generator. In this case, the service provided is non-rival and non-excludable. So the generator who invests in providing improved system security cannot exclude others from benefitting from the service (non-rival in consumption), and all those connected to the network benefit from the service at the same time (the service is non-excludable). In this case, the service that enhances system security cannot be efficiently provided by a competitive market. These services should be procured by the operator or network, to increase investment and continue current voluntary practices.

AEMO currently has the ability within the NER to procure a suite of security enhancing services and in particular Network Support and Control Ancillary Service (NSCAS) could allow AEMO to create contracts for equipment or generation that provides inertia. Voltage Control Ancillary Service also allows AEMO to procure synchronous condensers which have been identified to assist security in the South Australia region[iv] these are also used in Tasmania in areas of high wind generation to assist with weak systems[v]. The existing NSCAS mechanism provides a framework for these services to be procured by either AEMO or network businesses, however the NSCAS quantity procurement methodology is backward looking and does not allow for future impacts or current operations. Prior to establishing new regulatory requirements or markets for services, an examination should be undertaken of the appropriateness of existing measures to meet security challenges.

Level 14, 50 Market Street
Melbourne 3000
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[i] Processes underway such as the 5 Minute Settlement Rule Change may have frequency control implications. The Non-Scheduled Generation and Load in Central Dispatch Rule Change could assist AEMO to maintain visibility of the power system for system security. The COAG Secretariat Review of Renewable Policies could examine the focus of renewable policies incentivising "energy" but neglecting the other essential electricity market services such as inertia.

[ii] ElectraNet and AEMO, 2014, Renewable energy integration in south Australia, https://www.aemo.com.au/-/media/Files/PDF/Renewable_Energy_Integration_in_South_Australia_AEMO_Electranet_Report_Oct_2014.ashx

[iii] AGL, 2016, *Proposed rule change: NEM Wide Inertia Ancillary Service*, letter to the AEMC, http://www.aemc.gov.au/getattachment/bacba344-8989-4107-ae2a-480427c9c9f9/Rule-change-request.aspx

[iv] ElectraNet and AEMO, 2014, *Renewable energy integration in south Australia*, https://www.aemo.com.au/-/media/Files/PDF/Renewable_Energy_Integration_in_South_Australia_AEMO_Electranet_Report_Oct_2014.ashx

[v] Hydro Tasmania and Tasnetworks, 2016, *Managing a high penetration of renewables – a Tasmanian case study*, report

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