14 October 2016

Ms. Anne Pearson
Chief Executive
PO Box A2449
Sydney South NSW 1235

Project no: EPR0053

System Security Market Framework Review
Consultation Paper

Dear Ms. Pearson

The Energy Networks Association (ENA) welcomes the opportunity to make a submission to the Australian Energy Market Commission (AEMC) to the System Security Framework Review Consultation paper.

The ENA is the national industry association representing the businesses operating Australia's electricity transmission and distribution and gas distribution networks. Member businesses provide energy to virtually every household and business in Australia.

The ENA understands that this rule change proposal is closely linked with other concurrent AEMC rule change consultations dealing with power system security. As a result, the ENA recommends that the AEMC closely assess this submission in conjunction with our submission to the "Emergency Under-Frequency Control Scheme and Emergency Over-Frequency Control Scheme" consultation paper.

ENA recommends that any rule change should ensure that:

- New mechanisms are established to ensure that minimum values of inertia and system strength are maintained in the power system at all times, and that AEMO is able to acquire additional inertia or fast frequency response as required to maintain system security;
- Events that are considered "non-credible events" are reviewed, and that AEMO ensure that they re-classify "non-credible" events as appropriate during abnormal or emergency conditions.
- Any proposed solutions are technology agnostic, to ensure that the most cost-effective mix of existing plant and new technologies can be utilised to ensure reliable operation of the power system at minimum cost to all market participants and end users;
- Schedule 5.1.8 of the NER be updated to reflect current market conditions, and that these regulations define clear responsibilities for the various aspects of system security;
- That the areas where Transmission Network Service Providers (TNSPs) can provide the most efficient system security solutions or services be identified; and that the regulatory frameworks be updated to explicitly place these obligations on the TNSPs.

The ENA's specific responses to the Consultation Paper questions are included in Attachment # 1.

Should you have any additional queries, please feel free to contact Peter Cole, Director Future Networks, on 0434 871 422 or pcole@ena.asn.au.

Yours sincerely

John Bradley
Chief Executive Officer

Attachment 1

Question 1

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

Response to Question 1

The issues outlined in the consultation paper generally cover the major concerns of ENA members and require consideration and resolution. The following items are of particular concern and should be prioritised:

1. Management of "non-credible" contingencies. Recent events have demonstrated that contingencies classified as "non-credible" do occur and can result in significant consequences. Events that are currently considered "non-credible" should be reviewed; and it may be appropriate for the AEMC Reliability panel to endorse the outcomes of such a review. AEMO must also ensure that they re-classify non-credible contingencies, as appropriate, during abnormal or emergency conditions;
2. Determining and maintaining minimum values of inertia and system strength. Note that there is currently no provision for AEMO to acquire additional inertia or fast frequency response services;
3. Determining the maximum RoCoF that the system can currently sustain, and determining suitable limits for the future.
4. Provision of an over frequency generator shedding scheme.

Question 2

What do you consider to be the issues associated with low power system strength?

Response to Question 2

The following items are of particular concern to ENA members and should be prioritised:

1. Reduced fault levels which can increase the operating time, and may cause mal-operation of protection systems;
2. Power Quality issues such as voltage stability, flicker and harmonics which can be exacerbated by low power system strength;
3. Power System equipment may be affected by low power system strength. For example, generators may be unable to ride through faults, network devices may need to be re-tuned or replaced, solar plants may be unstable when connected to weak connection points, and distributed energy resources may not behave as expected.

Question 3

a. **Do you consider it beneficial to set a standard for RoCoF?**

b. **What format should this standard take and what factors should be taken into account when setting the standard?**

c. **Who should set it?**

d. **Would the establishment of a new standard trigger significant additional costs to comply?**

e. **Do you consider there to be a role for maintaining system strength?**

f. **Who should be responsible for undertaking this role or how should the responsibility be determined?**

Response to Question 3

a. ENA agrees that it would be beneficial to set a standard for RoCoF. The standard must be clearly defined, and should be measurable.

b. In determining any new standard for RoCoF, the maximum RoCoF that the current power system can withstand must be considered. The ability of new and emerging technologies to withstand RoCoF should also be considered as this will affect the maximum permissible RoCoF of the power system of the future. Note that it may be appropriate for the standards for RoCoF to be different for different parts of the network, and may change overtime to accommodate varying system parameters.

   The cost of ensuring compliance must also be considered. Any new standard should minimise economic impacts including barriers to entry for new generation given that new generation will face the costs of compliance to the standards. If new generation and DER that cannot withstand *reasonable* levels of RoCoF are allowed to connect to the Network:

   - unreasonable limitations may need to be placed on the operation of the Network to minimize potential RoCoF; and / or
   - Significant cost may be incurred to increase inertia on the system to the required levels; and /or
   - Other options for ensuring the security of the system under contingencies will need to be applied e.g. fast response load shedding schemes.

c. The Reliability Panel should set the RoCoF standard. The RoCoF standard should be determined after seeking advice from suitably qualified specialist expertise; and after detailed consultation with all affected market participants.

d. As indicated in b. some additional costs may be incurred to ensure compliance with the standard. The standard for RoCoF needs to be carefully selected to ensure that the compliance that is required to ensure system security is economically efficient; and that standard minimises barriers to entry, including for emerging technologies.

e. ENA supports the need for clear responsibilities for maintaining system strength and this should be clarified, taking into account existing responsibilities under current regulatory frameworks. Under Schedule 5.1.8 NER, TNSPs currently have responsibilities that contribute directly to system strength including, ensuring that the condition of the power system is stable (in accordance with requirements designated in or under clause Schedule 5.1.8.)

   However, the system changes resulting from loss of synchronous generation were not contemplated at the time of the development of the current regulatory framework. It is noted that at least one ENA member ensures that the addition of a non-synchronous generator to the network does not reduce system strength (under a range of credible scenarios); by insisting that the new generator takes mitigating action if required. However, this does not ensure adequate system strength when a synchronous generator is lost from the system. It is therefore necessary to clarify the institutional and regulatory responsibility for system strength. This will require an evaluation of the gaps in the regulatory framework under Schedule 5.1.8 of the NER.

f. As above, the ENA and TNSPs would support the responsibilities of ensuring system strength being clarified through Schedule 5.1.8 of the NER. TNSP are willing to accept additional responsibility for any actions that will efficiently maintain or increase system strength where these actions are technically feasible and appropriate for a TNSP. In the event that some roles for managing system strength are explicitly allocated to a party other than the TNSP, TNSPs would seek to support that function by making available TNSP facilitated services. It is important that the institutional responsibilities are sufficiently clarified in the existing regulatory framework however, and the potential for overlap with existing responsibilities are addressed.

Question 4

What roles do you consider services such as inertia and fast frequency response should play in maintaining system security in the NEM? How else could RoCoF be managed?

Response to Question 4

It is essential that the power system is able to operate securely during contingency events. This is possible if the system has adequate inertia; or if RoCoF can be managed by fast frequency response mechanisms. RoCoF also can be effectively managed by limiting the contingency size; which may be possible by management of generation or by augmentation or configuration of networks, where these options are economical. Note that FCAS and UFLS are delayed mechanisms, and may no longer be effective in keeping RoCoF within the limits.

ENA would recommend that any proposal to manage RoCoF should be technology agnostic, and should attempt to minimise costs, for the benefit of all consumers and market participants. This would allow the use of synthetic inertia, or other alternatives when it is economical. Note however that any form of synthetic inertia will need to be robust to ensure that it can assist in maintaining the power system in a secure state during abnormal and fault conditions. Note also that replacement of RoCoF schemes with alternative anti-islanding technologies, such as vector shift or frequency-forcing, may be appropriate in some situations.

Fast Frequency response could also provide an economical solution to some system security issues, although this would need to be considered in conjunction with relevant stakeholders, to ensure that critical loads were not shed. Schedule 5.1.8 of the NER could be expanded to provide TNSPs with explicit responsibility for implementing fast frequency response schemes, or for providing other forms of support or services to manage RoCoF. This approach would leverage the existing corporate capability, information management systems and forecasting capacity of TNSPs given their current responsibilities. For instance, modern TNSP infrastructure such as Optical Ground Wire (OPGW) systems provides fast communication capabilities which may support a fast frequency response scheme for the management of change in frequency.

The economic efficiency with which TNSPs achieved such explicit obligations would remain the subject of regulatory oversight. This would provide incentives for TNSPs to leverage existing capacities or procure efficient services or support as required to meet the regulatory obligations.

Question 5

Do you consider it beneficial to establish new mechanisms for the procurement of additional systems security services? What form of mechanism do you consider to be preferable and which services should the mechanism be targeted at?

Response to Question 5

As inertia and system strength are essential to ensure secure operation of the power system; a mechanism to ensure their availability is also essential. This could be achieved by placing an obligation on all new generators to contribute to inertia and system strength. It would be necessary to determine what technical obligation related to inertia and system strength should be contributed from each new connection. If the generator being installed could not meet identified obligations, the asset owner could invest in additional plant to meet their obligations e.g. synchronous condensers or synthetic inertia; or contract another market participant to provide these services on their behalf. This may include contracting an existing generator who has the capacity to exceed their obligations; or sourcing inertia from a Network Service Provider's synchronous condenser. It should also be noted that in areas of the NEM where the system does not have adequate strength or inertia, this approach is unlikely to resolve all current issues. Furthermore, this approach is unlikely to ensure that system strength and inertia will adequate when synchronous generators are lost from the NEM.

As an alternative or complementary measure, these system security services could be procured centrally via a market mechanism, with costs then recovered from generation participants. This could be in addition to any minimum requirements placed upon market participants through technical regulations. The market would need to be designed to ensure that there was adequate incentive for the investment necessary to provide these services where required in the network.

The ENA recommends that any mechanism for the procurement of system security services:

- Allows the service to be provided efficiently and at the least cost, to the benefit of all market participants and ultimately customers; and
- Is technology agnostic to allow new and emerging technologies to be integrated where appropriate.

TNSPs generally have the information and the skills to allow the modelling and analysis of the power system; and will often be well placed to evaluate the optimal solutions. Solutions may range from the use of an existing synchronous condenser to the provision of security services from a grid scale battery storage facility; or from a fast frequency response load shedding scheme. Subject to regulatory requirements, TNSPs may be able to provide some of these solutions and services efficiently, for the benefit of all stakeholders.

- Note that different solutions may be appropriate at different points in the power system, and will depend on the generation mix, network configuration and availability of solutions;

Question 6

What form of cost recovery do you consider to be preferable in the design of a mechanism to procure additional system security services? Should the cost recovery mechanism be designed to create stronger incentives to provide the required services?

Response to Question 6

If there is a market for these services, then the market should be designed to incentivize the provision of these critical system security services, in the most efficient and technology agnostic manner.

TNSPs are willing to provide solutions and services to assist with power system security, provided that their responsibilities are clarified in the existing regulatory framework and the potential for overlap with existing responsibilities are addressed.