

System Security Market Framework Review

Response to AEMC Interim Report – EPR0053

(9 February 2017)

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Overview

Energy Networks Australia welcomes the opportunity to provide a submission to the Australian Energy Market Commission's (AEMC) Interim Report into the System Security Market Frameworks Review (Review), published on 15 December 2016.

Energy Networks Australia is the national industry body representing 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 AEMC's Review is considering whether there is a need for changes to market frameworks to allow the continued uptake of new generating technologies such as wind and solar panels, while maintaining system security. The AEMC's key preliminary findings are that:

- » two new market services should be introduced to maintain control of power system frequency following a contingency event, namely a service to obtain inertia and the other for fast frequency response (FFR); and
- » four potential mechanisms could be used to provide the new services identified above. These include generator obligations, an AEMO contract process, transmission network service provider (TNSP) provision and five minute dispatch.

In the context of the current environment, Energy Networks Australia agrees that there is a need for the additional services proposed by the AEMC, and that it is appropriate for the market framework to be amended, to facilitate the efficient and optimal provision of such services where required.

Furthermore, TNSPs are well placed and willing to provide inertia and FFR services where it is technically feasible, efficient and economical for them to do so. However, as identified by the AEMC, this may require some amendment to the current regulatory framework to allow for the practical implementation of this option.

ENA recognises that the AEMC's review of system security market frameworks is being conducted at the same time as a number of other related reviews and Rule change requests, including the independent Review into the Future Security of the National Electricity Market (Finkel Review). Each of these works may result in further change or adaptation of the market framework. Given these factors, changing technologies and the current level of uncertainty in the market, Energy Networks Australia considers that the AEMC should recognise that the most optimal solution to providing additional system security services may vary over time. Therefore, the market framework should be sufficiently flexible to allow this to occur while

providing sufficient certainty of roles and responsibilities.

Energy Networks Australia would welcome opportunities to assist the AEMC in its considerations in the next stages of the Review and in related reviews and Rule change proposals.

Technical Solutions to address System Security

Energy Networks Australia notes that the AEMC's main focus at this stage of the Review has been to consider factors that influence the ability to effectively manage the power system following a contingency event. In this regard, Energy Networks Australia notes that the AEMC's preliminary views on the following matters are that:

- » **Rate of change of frequency (RoCoF)** - the ability to maintain power system security in an efficient manner would be enhanced by the development and introduction of a mechanism to obtain inertia;
- » **Fast Frequency Response (FFR)** - the development of an FFR service would be beneficial as it would provide greater flexibility in the level of RoCoF that could be permitted and a more efficient amount of inertia to be procured; and
- » **Generator performance standards** - further consideration will be given over the remainder of the Review to the appropriateness of the current generator performance standards and whether further work is necessary to better understand the capability of generators to withstand rates of change of system frequency.

Energy Networks Australia agrees that inertia and any FFR will perform differing roles in the effective management of power system frequency and that both of these services may be needed to manage future power system security.

Energy Networks Australia is therefore supportive of these two initiatives and also notes the AEMC's concerns about the decrease in system strength in regions of the National Electricity Market (NEM). Although a technology neutral framework is supported, solutions which also provide system strength should be incentivised where it is required.

Energy Networks Australia also agrees that the ability of generators and loads to withstand changes in frequency is critical to the existing and future security of the power system and welcomes the AEMC's initiatives to further consider the appropriateness of generator performance standards.

Inertia

Energy Networks Australia considers that the requirements for system security services may best be provided by a suite of mechanisms, and potentially by different providers either individually or in combination. Different solutions may be

appropriate at different points across the power system, and will depend on the generation mix, network configuration and efficient availability of solutions.

Energy Networks Australia supports the TNSP provision of inertia and system strength, when this is the most optimal solution and provided that that responsibilities are clearly defined and clarified in the existing regulatory framework, as discussed in further detail below.

A number of TNSPs currently own and operate assets such as synchronous condensers, which are currently providing both system strength and inertia to the NEM. Market frameworks should encourage the utilisation of existing potential resources, such as these assets where it is technically feasible and efficient to do so. It is also essential that inertia and its contribution to system strength are procured in such locations throughout the NEM so as to be effective in assisting with system security. Any market mechanism should be designed to ensure that inertia and system strength are provided where they are required. The concept of 'local' and 'global' requirements under specific circumstances may add clarity. For example, if additional inertia were required to be available in the event of a potential separation event in South Australia, then clearly the procurement through obligations (e.g. on a TNSP or a generator) or market incentives should require the additional inertia to be based in the required location. In other operating contexts, a 'global' requirement for inertia could be procured from anywhere in the NEM.

Furthermore, when determining the minimum inertia required for the system, contingencies that involve the loss of the largest inertia contributor should be considered.

Anti-Islanding technologies such as Vector Shift, Frequency Forcing or other special protection schemes may be appropriate in some cases. Any proposed market mechanisms should allow for the continued use of these schemes where efficient. The development, installation and operation of these schemes, should also be fostered where they provide a technically feasible and efficient solution.

It should also be noted that the switching of aggregated DER in the distribution system (e.g. in response to a price signal) may result in a shift in frequency, as the future aggregated capacity may exceed the capacity of a power station. Market and regulatory frameworks should recognise this potential with high penetration of Distributed Energy Resources, with appropriate measures or incentives to prevent aggregated switching that would adversely affect system security. Equally, technological developments are likely to allow inverters and smart controls to assist in frequency management. It is widely recognised that that Distributed Energy Resources can be harnessed to provide ancillary services including synthetic inertia in the future. For instance, the New York Independent System Operator has recently released a 5-year Roadmap to enable Distributed Energy Resources to participate in the ancillary services market. However, it is recognised this will require close coordination between the Independent System Operator and Distribution System Operators, to provide confidence that the response of aggregated DER to wholesale market ancillary service opportunities doesn't present risks to local distribution system reliability.

Potential options to obtain additional system security services

The AEMC proposed a range of potential mechanisms that could be used for the provision of system security services identified in the Interim Report, including:

- » **Generator obligation** - a minimum technical standard imposed on generators to physically provide the services or enter into an agreement with another provider of the services;
- » **AEMO contract process** - AEMO procures services via contracts with market participants through a competitive tender process undertaken by AEMO;
- » **TNSP provision** - the direct provision of services by TNSPs or the procurement of services by TNSPs under a modified Network Support and Control Ancillary Service (NSCAS) framework; and
- » **Five-minute dispatch** - prices are set for the services on a five-minute basis, similar to the existing energy market dispatch process.

Energy Networks Australia supports the application of the guiding principles identified in the Interim Report to assist in the consideration of options for obtaining additional system security services. However, given the level of uncertainty that exists currently within the market, in the context of the various interrelated programs of work currently underway which may impact the market framework, Energy Networks Australia considers that the AEMC's approach to the provision of system security services should:

- a. Ensure that the services can be provided efficiently and at the least cost to the benefit of market participants and ultimately customers. This may mean that all identified delivery options require further consideration to enable participants to optimise a range of relevant factors (which may include a combination of service delivery options) and weigh these against potentially constraining the system on a case-by-case basis;
- b. Allow new and emerging technologies to be integrated where appropriate; and
- c. Establish a flexible framework that allows for changes in the optimal mix of services and the way that these services are procured as the system develops over time.

Energy Networks Australia agrees that an overall solution to the management of system frequency and power system security is likely to involve the development of a combination of options and which may not necessarily be limited to those identified at this stage of the Review.

TNSP Provision

Energy Networks Australia provided input on the procurement options for additional system security services identified in the AEMC's earlier Consultation Paper and

notes that the Interim Report identifies the potential for the development of a new additional procurement mechanism that allows for the provision of system security services by TNSPs.

As noted in Energy Networks Australia's submission to the Consultation Paper, TNSPs proposed that they could provide the additional system security services identified by the Interim Report, if this were enabled in regulatory frameworks. As indicated in Energy Networks Australia's previous submission on this review, TNSPs have the knowledge, information and requisite skills to undertake modelling and analysis of the power system. Consequently, in many circumstances, TNSPs are well positioned to evaluate and potentially provide and/or procure optimal solutions for power system security and stability in the medium and longer term. Solutions may range from the use of an existing synchronous condenser to the procurement of security services from a grid scale battery storage facility, or provided from a fast frequency load-shedding scheme.

With respect to FFR schemes, given their current responsibilities, TNSPs could reasonably extend their current role in terms of implementing FFR. In doing so, TNSPs would be able to leverage off their existing corporate capability, information management systems and forecasting capacity. For instance, Energy Networks Australia notes that modern TNSP infrastructure such as Optical Ground Wire (OPGW) systems provides fast communication capabilities which may support a FFR scheme for the management of change in frequency. Subject to regulatory requirements, TNSPs may be able to provide some of these solutions and services efficiently, for the benefit of all stakeholders.

Other potential options

Energy Networks Australia submits that Distribution Network Service Providers (DNSPs) may also be able to assist with the provision of FFR services by the switching of individual distributed energy resources or an aggregation of these resources. Energy Networks Australia does not however support the switching of aggregated DER resources by other market participants unless the DNSP has visibility, and the ability to manage any implications of proposed switching for distribution services. This is required to ensure power quality on the lower voltage networks is maintained. As noted above the need for such coordination is being explicitly acknowledged in other jurisdictions, such as the NY-ISO framework.¹

On balance, Energy Networks Australia considers that the Australian Energy Market Operator (AEMO), may be best placed to determine what option would best deliver the optimal solution and appropriate levels of inertia or FFR that needs to be procured under the current market and system security conditions. However, for the reasons noted above, TNSPs may be able to provide efficient solutions and should not be prevented from either bidding on a case-by-case basis to provide such services, or where appropriate undertaking a Regulatory Investment Test for

¹ NY-ISO, Distributed Energy Resources Roadmap, p.20.

Transmission (RIT-T) assessment prior to the building of, or procuring, a system security market service.

Cost recovery arrangements

In the event that the AEMC retains the option for TNSPs to provide system security services in the future, Energy Networks Australia submits that it would be prudent for the AEMC to provide clarity on the nature of the service options for TNSP provision, and mechanisms by which the costs surrounding these solutions could be recovered (e.g. in comparison to the existing NSCAS framework).

Clarification of roles and responsibilities

Energy Networks Australia's transmission members consider that they are well-positioned to take on additional responsibility for actions that will efficiently maintain system stability, particularly where these actions are technically feasible and are risk appropriate for a TNSP. In the event that some roles for managing system strength are explicitly allocated to a party other than the TNSP, Energy Networks Australia TNSP members would seek to support that function by making available TNSP facilitated services.

Energy Networks Australia submits that it is important that any new roles and responsibilities are sufficiently clarified in relation to the existing regulatory framework to mitigate against any potential overlap in terms of roles, responsibilities and future accountabilities and to ensure the objectives of system security.

In particular, Energy Network Australia notes that Chapter 4 of the National Electricity Rules (NER) that provides the framework for achieving and maintaining a secure power system and Schedule 5.1.8, which provides network service providers with responsibility for ensuring power system stability, would need to be updated to reflect current market conditions.

Energy Networks Australia welcomes the opportunity to provide further input and support to any consequential Rule changes necessary to support improved system security.

Next stage of the Review

Energy Networks Australia submits that an area where the AEMC could place additional focus is on the potential contribution of the distribution system, using Distributed Energy Resources (DER) to assist with system security in the future. Aggregated DER can currently be utilised as a source of FFR; and in the future it may be possible to use inverter based devices, including those on the distribution networks, to control frequency. Energy Networks Australia is aware that AEMO has

published a Progress Report (January 2017) that provides some commentary on the issue.

The Interim Report also mentions the possible introduction of a new category of event, referred to as a “*protected event*,” and that the *protected event* is discussed in detail in the AEMC’s Emergency Frequency Control Schemes, Draft determination (published on 22 December 2016). Energy Networks Australia comments on the *protected event* concept and framework will be provided in its forthcoming submission to that separate Draft Determination.