



Managing the rate of change of power system frequency

Draft determination released for consultation

The Australian Energy Market Commission has made a draft rule, which is a more preferable rule, to place an obligation on Transmission Network Service Providers to procure minimum required levels of inertia or alternative frequency control services to meet these minimum levels.

The Commission's draft rule

The widespread deployment of non-synchronous generating technologies, such as wind farms and solar panels, is having impacts on the operation of the power system. These technologies have low or no physical inertia, and are therefore currently limited in their ability to dampen rapid changes in power system frequency, which is needed in order to maintain a secure power system.

The Commission considers that a secure power system demands the availability of minimum levels of inertia at all times and has placed an obligation on Transmission Network Service providers (TNSPs) to provide this service as a means of establishing confidence that system security can be maintained in all regions of the National Electricity Market (NEM).

Minimum required levels of inertia

The more preferable draft rule has been made with respect to a rule change request received from the South Australian Government and accompanies the Commission's final report on the *System security market frameworks review*. The South Australian Government considers that less synchronous generation in the NEM is leading less inertia. This reduction in inertia is increasing the susceptibility of the system to rapid changes in frequency that arise as a result of system disturbances, which can lead to blackouts.

Historically, most generation in the NEM has been synchronous and, as such, the inertia provided by these generators has not been separately valued. As the generation mix shifts to smaller and more non-synchronous generation however, inertia is not provided as a matter of course giving rise to increasing challenges for the Australian Energy Market Operator (AEMO) in maintaining the power system in a secure operating state.

The shift to newer types of generation has been more pronounced in some regions of the NEM than others. South Australia, in particular, has experienced a substantially faster change than other regions as an increasing volume of non-synchronous generation is integrated. Flows on the interconnector with Victoria allow power system security to be maintained in normal circumstances because of inertia provided by generators in other parts of the NEM. Where there is an outage of this interconnector, the risks to system security in South Australia increase significantly because it must rely on inertia provided by generators within the region. This makes it harder to arrest the frequency change and restore the frequency to normal operating levels. As the generation mix changes in a similar way across the NEM, these risks may become more widespread.

Prior to a system disturbance, AEMO can minimise the resulting initial frequency change by either constraining the power system to minimise the potential size of the disturbance or increase the level of inertia in the system to resist the initial frequency change. However, short of constraining all generation and network flows - and therefore demand - to zero, there is a minimum level of inertia required even to operate the system in a heavily constrained manner.

With increasingly less synchronous generation in the NEM, this draft rule establishes an obligation on TNSPs to provide confidence that this minimum level of inertia will be available to AEMO when needed to maintain a secure operating system.

The Commission is seeking stakeholder feedback on the draft determination. Submissions are due by 8 August 2017.

The draft rule

The key features of the more preferable draft rule are as follows.

- An obligation on AEMO to determine sub-networks in the NEM that are required to be able to operate independently as an island and, for each sub-network, to assess whether a shortfall in inertia exists or is likely to exist in the future.
- Where an inertia shortfall exists in a sub-network, an obligation on the relevant TNSPs to make continuously available minimum required levels of inertia, determined by AEMO through a prescribed process.
- An ability for TNSPs to contract with third-party providers of alternative frequency control services, including fast frequency response (FFR) services, as a means of meeting a proportion of the obligation to provide the minimum required levels of inertia, with approval from AEMO.
- An ability for AEMO to enable the inertia network services provided by TNSPs and third-party providers under specific circumstances in order to maintain the power system in a secure operating state.

The Commission has concluded that, for the following reasons, the best mechanism to meet the minimum inertia requirements associated with maintaining system security would be through provision of inertia services by TNSPs.

- The requirement for TNSPs to identify the least cost option or combination of options to provide minimum levels of inertia, together with the existing economic regulatory framework for TNSPs, will provide discipline on the level of expenditure on inertia network services by enabling the Australian Energy Regulator to assess the efficiency of that expenditure.
- Placing the obligation on TNSPs to provide inertia network services will provide a greater ability to coordinate the provision of inertia network services with other network support requirements for the relevant sub-network, such as system strength. This should result in a more efficient outcome for consumers in the long term by avoiding the potential duplication of investment.

Consultation and next steps

This draft determination forms part of the work program of the *System security market frameworks review*. This review supports the continuing transformation of the NEM by considering the market and regulatory frameworks that affect system security. The Commission is seeking stakeholder feedback on this draft rule determination. Submissions on the draft determination and draft rule are due by 8 August 2017.

The draft rule relates to the provision by TNSPs of the minimum level of inertia required to maintain secure operation of the power system. This can be distinguished from additional levels of inertia, or alternative frequency control services, that may increase economic benefits by allowing for greater power transfers on the network.

The draft rule does not provide a mechanism to realise the market benefits that could be obtained through the provision of inertia at levels above the minimum level of inertia required to maintain secure operation of the power system.

As part of the *System security market frameworks review*, the AEMC has been assessing a rule change request received from AGL, which proposes the establishment of an inertia ancillary services market. The AEMC intends to continue its assessment of this rule change request with a view to implementing a mechanism to guide the provision of additional inertia for market benefit. The Commission has decided to extend the period of time for making a draft determination on this rule change request until 7 November 2017.

A market mechanism will complement and build on the certainty created through the TNSP obligation by providing the ability to continuously adjust the level of service provision in real time to maximise efficiency. Ultimately, the combined TNSP obligation and market mechanism will form an enhanced framework which efficiently balances certainty and flexibility for the management of system frequency in the long term interests of consumers.

For information contact:

AEMC Senior Director, **Suzanne Falvi** (02) 8296 7800

AEMC Senior Adviser, **Sebastien Henry** (02) 8296 7800

Media: Communication Director, **Prudence Anderson** 0404 821 935 or (02) 8296 7817

27 June 2017