



Frequency control frameworks review

Commencement of consultation

The Australian Energy Market Commission invites stakeholder submissions on a review into the regulatory and market frameworks that underpin frequency control in the National Electricity Market.

Background

The electricity sector in Australia is experiencing a period of change as newer types of electricity generation, such as wind and solar, connect, and conventional forms of electricity generation, such as coal, retire. These new sources of electricity are changing the way Australia's power system works, which can have implications for power system security.

The power system is in a secure operating state if it is capable of withstanding the failure of a single network element or generating unit. System security events are caused by sudden equipment failure (often associated with extreme weather or bushfires) that results in the system operating outside of defined technical limits.

One of these technical limits is frequency. Managing frequency involves balancing the supply of electricity against customer demand on an instantaneous basis. Large deviations in frequency can occur if a generator or transmission line trips unexpectedly, and can have significant impacts on the safety and reliability of the power system. Controlling frequency is therefore critically important.

The uptake of these technologies is presenting challenges for the Australian Energy Market Operator (AEMO) in managing power system security. Greater variability in supply from intermittent generating technologies has the potential to make it increasingly difficult for AEMO to balance supply and demand. Analysis undertaken for AEMO also reflects that, in recent years, the frequency performance of the power system under normal operating conditions has deteriorated due to changes in the provision of frequency response capability. The AEMC considers that it is timely to assess whether the current market and regulatory arrangements to support effective control of system frequency are appropriate in light of these issues.

The AEMC self-initiated the *Frequency control frameworks review* to assess whether the current market and regulatory arrangements to support effective control of system frequency are fit for purpose as the electricity system changes, and what opportunities there are for new technologies to support power system security.

Scope of the review

The *Frequency control frameworks review* will progress a number of recommendations made by the AEMC in the *System security market frameworks review* and the *Distribution market model* project for possible changes to market arrangements that will lead to more efficient outcomes for energy consumers while delivering a secure operating system.

The scope of the review may include, but is not limited to the following issues:

- **Primary frequency control:** an assessment of the options available to lessen the deterioration in the frequency performance of the power system under normal operating conditions, and the costs/benefits of those options. Options will include whether generator governor response should be mandatory among others.
- **Frequency control ancillary services:** the most appropriate ways to incorporate fast frequency response services, or alternatively enhance incentives for these services within the current six second contingency service, and long term options to facilitate co-optimisation between frequency control ancillary services and inertia

The Commission is seeking stakeholder feedback on the issues paper. Submissions are due by 5 December 2017.

- **Distributed energy resources:** the capability of distributed energy resources to provide system security services, and the associated regulatory, technical and commercial opportunities and challenges.

The review will seek to identify and develop the changes to market and regulatory arrangements required to address the frequency issues highlighted by AEMO.

Nevertheless, there are trade-offs to be made between the risks and costs of meeting system security requirements. The objective of the review is to recommend the combination of changes that are necessary to provide a secure power system at the lowest cost to consumers.

The review will be informed by recommendations from the Finkel Panel's *Independent review into the future security of the national electricity market*.

The issues paper

The AEMC has published an issues paper to facilitate consultation on the key issues that may be affecting frequency control in the NEM, and potential solutions.

The issues paper provides an overview of the existing frequency control framework and the drivers for consideration of frequency control arrangements in the NEM. The paper also sets out the AEMC's framework for assessing any changes to the existing arrangements for frequency control, and preliminary analysis of the issues within the scope.

The AEMC invites stakeholder submissions on the issues paper. Submissions should be received by 5 December 2017.

The Commission will provide a progress report, incorporating stakeholder feedback, to the COAG Energy Council in December 2017.

The AEMC's system security work program

The *Frequency control frameworks review* forms part of the AEMC's ongoing system security work program. Specifically, it represents continued consideration of, and collaboration with stakeholders on, those aspects of the *System security market frameworks review* that relate to frequency control. In June 2017 the AEMC published its final report on the *System security market frameworks review*. The review made nine recommendations for changes to market and regulatory frameworks that enable the continued take-up of new generation technologies while maintaining power system security. Progress on these recommendations is set out in the attachment.

A number of the recommendations made in the final report relate to rule change requests that have since been completed or are under consideration. These rules seek to address risks to power system security caused by the transition from conventional generation powered by coal, gas and hydro to generation powered by renewable sources such as wind and solar.

The review also provides the means by which to further progress a recommendation made by the AEMC in the final report of the Distribution market model project regarding the participation of distributed energy resources in system security frameworks.

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PROGRESS AGAINST RECOMMENDATIONS MADE IN SYSTEM SECURITY MARKET FRAMEWORKS REVIEW

RECOMMENDATION

STATUS

A STRONGER SYSTEM

Require network service providers to maintain system strength at generator connection points above agreed minimum levels, and require new generators to 'do no harm' to previously agreed levels of system strength.

Final rule on *Managing power system fault levels* made 19 September 2017.

Consider requiring inverters and related items of plant within a connecting party's generating system to be capable of operating correctly down to specified system strength levels.

Consultation paper on *Generator technical performance standards* rule change published 24 October 2017.

RESISTING FREQUENCY CHANGES

Require transmission network service providers to provide minimum required levels of inertia, or alternative equivalent services.

Final rule on *Managing the rate of change of power system frequency* made 19 September 2017.

Introduce a market-based mechanism to realise the market benefits that could be obtained through the provision of inertia above the minimum required levels.

Draft rule on *Inertia ancillary service market* published 7 November 2017. Further consideration through the *Frequency control frameworks review*.

BETTER FREQUENCY CONTROL

Assess whether mandatory governor response requirements should be introduced and investigate any consequential impacts of this.

Review the structure of FCAS markets, to consider:

- any drivers for changes to the current arrangements, how to most appropriately incorporate FFR (fast frequency response) services, or alternatively enhancing incentives for FFR services within the current six second contingency service
- any longer-term options to facilitate co-optimisation between FCAS and inertia provision.

For consideration through the *Frequency control frameworks review*.

Assess whether existing frequency control arrangements will remain fit for purpose in light of likely increased ramping requirements, driven by increases in solar PV reducing operational demand at times and leading to increased demand variation within a day

Consider placing an obligation on all new entrant plant to have fast active power control capabilities.

Consultation paper on *Generator technical performance standards* rule change published 24 October 2017.

FACILITATING THE TRANSFORMATION

Continue to scope further power system security issues likely to arise from the ongoing transformation of the market, such as the impact on system restart ancillary services of decreasing levels of synchronous generation and the adequacy of current voltage control arrangements.

AEMO to further scope these issues.