



Frequency control frameworks review

Publication of draft report

The Australian Energy Market Commission has published a draft report on its review of the market and regulatory frameworks that underpin frequency control in the National Electricity Market.

The draft report includes the Commission's proposed improvements to the existing frequency control arrangements to support the security of the power system. These draft recommendations aim to:

- address current concerns with frequency performance in the NEM
- remove barriers to distributed energy resources participating in system security frameworks
- explore how best to integrate faster frequency control services offered by new technologies into the current regulatory and market arrangements.

The review forms part of the AEMC's system security work program (see Attachment A), which aims to address risks to power system security as the electricity industry changes.

Background

In Australia, all generation, transmission, distribution and load components connected to the power system are standardised to operate at a nominal system frequency of 50 Hertz (Hz). Managing the frequency close to 50 Hz involves balancing the supply of electricity against customer demand on an instantaneous basis. Whenever total generation is higher than total energy consumption the system frequency will rise, and vice versa.

The Australian Energy Market Operator (AEMO) is responsible for managing the frequency of the power system during normal operation and following a contingency event, such as the sudden and unexpected failure of a generator or transmission line. Effective control of power system frequency requires the coordination of a range of frequency control services.

These frequency control services are intended to work together to maintain a steady power system frequency close to 50Hz during normal operation, and to stabilise and restore the power system frequency by reacting quickly and smoothly to frequency deviations caused by contingency events.

Drivers of change

The electricity industry in Australia is undergoing fundamental change as newer types of electricity generation, such as wind and solar, connect and conventional forms of electricity generation, such as coal, retire. In addition, a formerly passive demand side is becoming increasingly engaged in energy markets through the uptake of new technologies and services, such as solar PV, storage and demand response.

This transformation has potential implications for the management of power system frequency. Specifically, an increased potential for imbalances between electricity demand and supply is driven by:

- a reduction in frequency control capability as a result of the exit of traditional providers of frequency control services and a reduction in the frequency responsiveness of generators during normal operation
- an increased variability and unpredictability of supply and demand, which creates challenges for AEMO's forecasting and dispatch processes.

These drivers are creating challenges for conventional forms of frequency control in the NEM and making it more challenging for AEMO to manage power system security.

The Commission is seeking stakeholder feedback on the draft report. Submissions are due by 24 April 2018.

Key issues addressed in the draft report

The draft report presents the AEMC's analysis, informed by stakeholder input, and draft recommendations on ways in which the frameworks for frequency control could be improved to address some of the issues identified above.

The AEMC has split its analysis and recommendations into two categories that reflect a prioritisation of the need for changes to be determined and implemented over time.

Immediate priorities

Frequency performance under normal operating conditions has been deteriorating in recent times. As a result, the power system has increasingly operated further away from the nominal frequency of 50 Hz than has historically been the case.

The consequences of this deterioration include:

- increased operational costs for generators that are responsive to changes in system frequency
- a reduction of the resilience of the power system to withstand severe non-credible contingency events.

The Commission considers that this deterioration has near term implications for power system security and should be addressed as a priority.

The draft report sets out the drivers and consequences of deteriorating frequency performance, an assessment of the materiality of the degradation, and the AEMC's draft recommendations on options to address the deterioration in the interests of the National Electricity Objective.

To promote transparency for market participants, the draft report also proposes new requirements for AEMO and the AER to monitor and report on frequency performance and market outcomes.

Emerging issues

The draft report sets out the AEMC's analysis and draft recommendations in relation to the participation of distributed energy resources in system security frameworks. As set out in the final report of the *Distribution market model project*, the AEMC envisages a future where consumers have the ability to choose to utilise and sell the full range of services that the distributed energy resource is capable of providing, given any technical constraints.

Specifically, it explores whether there are any unnecessary regulatory barriers that may prevent distributed energy resources providing frequency control or other system security services, and provides draft recommendations on ways in which these barriers could be addressed.

The draft report also explores the range of potential market and regulatory approaches to frequency control that could be used in future. The existing frameworks for procuring frequency control services have proved effective in optimising the dispatch of these services in real time. However, as the generation mix changes, there is likely to be a growing need to re-evaluate the current arrangements for the procurement of these frequency control services. New approaches are likely to be needed to maintain the effectiveness of the existing available resources and to enable participation by emerging technologies.

Submissions to the draft report

The AEMC invites stakeholder submissions on the draft report.

Submissions should be received by 24 April 2018.

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AUSTRALIAN ENERGY MARKET COMMISSION

AEMC SYSTEM SECURITY ACTION PLAN

WORK PROGRAM UPDATE 20 MARCH 2018

Final:
Mar 2017



Emergency frequency control scheme rules

Enhanced schemes to act as a last line of defence in an emergency

Final:
June 2017



System security market frameworks review

Recommendations to deliver a stronger and more resilient system with better frequency control as the generation mix changes

Final:
Sept 2017



Managing the rate of change of power system frequency rule

Makes networks provide minimum levels of inertia

Final:
Sept 2017



Managing power system fault levels rule

Makes networks provide services necessary to meet minimum system strength

Final:
Sept 2017



Generating system model guidelines rule

Requires detailed information on how generators and networks perform

Stage one final:
Nov 2017



Reliability Panel review of frequency operating standards

Assessing whether the existing standard is appropriate to maintain a secure power system as the generation mix changes

Final:
Feb 2018



Inertia ancillary service market rule

The potential for a market mechanism for power system inertia is being assessed through the Frequency control frameworks review.

Draft:
June 2018

Generator technical performance standards rule

Updating the technical performance standards for connecting generators and the process for negotiating them

Final:
July 2018

Frequency control frameworks review

Looking at ways to integrate new technologies and demand response to help keep the system secure

Draft:
July 2018

Register of distributed energy resources rule

Setting up a national register of distributed energy like small-scale battery systems and rooftop solar to help AEMO better manage the power system.

Pending
AER review

Review of the system black event in South Australia

The AER is conducting a compliance investigation which will recommend possible changes to regulatory frameworks.



SYSTEM SECURITY

Keeping the lights on: Measure of the power system's capacity to continue operating within defined technical limits, even if a major power system element disconnects from the system.

