AEMC

INFORMATION

Frequency control rule changes

Directions paper published for frequency control rule changes

The Commission has published a directions paper that sets out its initial views and policy directions for two rule change requests that relate to the arrangements for fast frequency response and primary frequency response in the NEM. This directions paper dovetails with the work being undertaken by the Energy Security Board (ESB) and its direction, on its post 2025 market design, and in particular, its essential system services market design initiative.

The frequency control rule changes

The rule changes covered in this directions paper are:

- ***Fast frequency response market ancillary service*** — Infigen Energy proposes changes to the NER to introduce spot-market arrangements for Fast frequency response (FFR) to help control system frequency following contingency events during low inertia operation.
- ***Primary frequency response incentive arrangements*** — AEMO proposes changes to the NER to support improved frequency control during normal operation.

Submissions in response to these rule changes should be provided to the AEMC by **4 February 2021**.

Fast frequency response market ancillary service

As the power system transitions to a lower emissions generation mix, there are emerging challenges for power system operation. One element of this change in the generation mix is the projected decrease in power system inertia.

Infigen's rule change request identifies that the projected decline in system inertia will negatively impact on AEMO's ability to control power system frequency. AEMO's *Renewable Integration Study stage 1 report* confirmed that more and faster frequency responsive contingency reserves will be required to keep the power system secure under reduced inertia operation.

The Commission's analysis, which builds on AEMO's, shows, in the absence of changes to the existing market arrangements, that the projected decline in system inertia may lead to a significant increase in the costs for existing FCAS, which could be partially mitigated by the procurement of faster responding services, such as FFR.

Infigen proposes new market arrangements for FFR services similar to the existing contingency FCAS arrangements, with service provision being based on enablement through the NEM dispatch on a five-minute basis. Infigen proposes an FFR service specification where full active power response is delivered within 2 seconds, as opposed to the 6 seconds specification for the existing fast services.

Consistent with the ESB's direction in its *Post 2025 market design* project, the development of spot-market arrangements for provision of FFR is preferred. The directions paper sets out two high-level market design options for the provision of contingency FFR services:

- Option 1 – implement x2 new market ancillary services to procure FFR FCAS, which would be co-optimised and operate alongside the existing x8 FCAS markets
- Option 2 – reconfiguration of the existing FCAS arrangements to amend the current service classifications to enable procurement of FFR through these arrangements, potentially combined with differential pricing to recognise the different responses.

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The Commission is interested in stakeholder views on these high-level FFR options along with a number of other policy considerations discussed in the directions paper. In particular, we are interested in the interaction between FFR and inertia. The consideration of spot market arrangements for inertia is being lead by the ESB through its work on essential system services. However, this rule change will consider the interactions between FFR and inertia e.g. whether an FFR arrangement could include some valuation for inertia response.

The Commission intends to publish a draft determination for the *Fast frequency response market ancillary service* rule change by **22 April 2021.** The draft determination will be informed by stakeholder submissions, AEMO technical advice, and the Commission's analysis with respect to the long term interests of electricity consumers.

Primary frequency response incentive arrangements

During the period 2014 to 2019, the control of power system frequency during normal operation degraded, such that the power system frequency was spending more time further away from the target frequency of 50Hz than had historically been the case. AEMO identified the degradation of frequency control in the NEM as being driven by a decline in the responsiveness of generation plant to system frequency combined with an increase in the variability of generation and load in the power system.

In March 2020, the AEMC made the *National Electricity Amendment (Mandatory primary frequency response) Rule 2020.* The rule resolved an immediate need for improved frequency control by requiring all scheduled and semi-scheduled generators to be responsive frequency variations in accordance with parameters defined by AEMO.

However, the mandatory PFR arrangements on their own are not a complete solution as they do not allow for adequate valuation of frequency response provided outside of participant enablement for provision of regulation and contingency FCAS. Therefore, to demonstrate a commitment to investigating alternative and complementary mechanisms, the Commission's final rule included a sunset for the mandatory PFR arrangements on 4 June 2023.

The directions paper identifies three pathways to enduring PFR arrangements in the NEM:

1. **Maintain** the existing Mandatory PFR arrangement with improved PFR pricing.
2. **Revise** the Mandatory PFR arrangement by widening the frequency response band and develop new FCAS arrangements for the provision of PFR during normal operation (Primary regulating services).
3. **Remove** the Mandatory PFR arrangement and **replace** it with alternative market arrangements to procure PFR during normal operation.

The initial position is that pathway two provides a balance between providing operational certainty and system resilience while incorporating new market arrangements that are likely to promote efficient investment in, and operation, and use of, electricity services in the long-term interests of consumers. This would enable the implementation of new market arrangements for continuous PFR services to respond to small frequency variations and maintains a mandatory arrangement to provide a frequency response safety net for improved system resilience.

The Commission intends to publish a draft determination for the *Primary frequency response incentive arrangements* rule change by **16 September 2021.** This timing allows for adequate monitoring of the power system and plant impacts associated with mandatory primary frequency response, currently being implemented by AEMO. The draft determination will be informed by stakeholder submissions, AEMO advice, independent advice, and the Commission's analysis with respect to the long term interests of electricity consumers.

Coordination with the Energy Security Board post-2025 market design project

The Energy Security Board (ESB) has been tasked with developing advice for the COAG Energy Council on a long-term, fit-for-purpose market framework to support the future security and reliability of the electricity system. Consideration of market and regulatory reforms for frequency control services falls within the scope of the ESB's essential system services market design initiative.

The AEMC is working closely with the ESB, AEMO and the AER in progressing the frequency control rule changes. These rule changes provide us with an opportunity to complement the consultation and assessment done in the ESB work program and move forward on priority areas of reform. The rule changes dovetail with the direction of work in the ESB's project.

What are frequency control services?

Stable frequency is an important part of maintaining a secure power system and keeping the lights on. Frequency varies whenever electricity supply does not exactly match consumer demand. To avoid unplanned system outages, power system frequency must be controlled within a narrow range around 50Hz.

Power system frequency is controlled through the coordination of inertia and frequency responsive generation and load that act to balance electricity generation and consumption in real time. Inertia acts to resist changes in frequency due to sudden changes in supply and demand. It is provided inherently by large spinning machinery associated with synchronous generators such as coal, hydro and gas-fired power stations. Small deviations in power system frequency during normal operation require continuous frequency response. Larger frequency deviations can occur following contingency events, such as the disconnection of a generator or transmission line. Contingency reserve services act to stabilise the power system frequency following these contingency events.

Frequency control services are provided by a range of technologies, including generation, storage and demand response which are enabled through the market arrangements for frequency control ancillary services (FCAS) that operate alongside the market for energy in the National Electricity Market.

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