



RELIABILITY PANEL AEMC

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Dear Ben,

AEC letter - Normal Operating Band Frequency Operating Standard

The Panel wishes to thank the Australian Energy Council (AEC) for its letter, Normal Operating Band Frequency Operating Standard, dated 2 July 2020, and for the accompanying briefing provided to the Panel on 11 August 2020. The AEC has requested that the Panel review the Frequency Operating Standard (FOS) to determine a restructured standard for system frequency performance during normal operation. This revised standard would consider the security advantages of a tighter frequency distribution during normal operation with respect to the costs of achieving this outcome.

The Panel understands that the AEC has made this request in response to the AEMC's final rule on the *Mandatory primary frequency response* (Mandatory PFR rule) rule change request, made in March 2020. The core elements of this rule are:

- NER cl 4.4.2 (c) requires all scheduled and semi-scheduled generators to operate in accordance with the Primary frequency response requirements (PFRR). The PFRR specifies the operational requirements for PFR and is determined by AEMO.
- NER cl 4.4.2A sets out obligations for AEMO in determining the PFRR, this includes that the PFRR include maximum allowable dead bands that must not be narrower than the primary frequency control band (PFCB)
- The PFCB is defined in chapter 10 of the NER being the range 49.985Hz to 50.015Hz (50Hz \pm 0.015Hz) or such other range as specified by the Reliability Panel in the FOS.
- These mandatory PFR arrangements take effect on 4 June 2020 and will sunset on 4 June 2023

The AEC considers that the Commission's determination on the Mandatory PFR rule was silent on the key question of the expected distribution of frequency performance during normal operation, and that a revised FOS would help guide future policy decisions to achieve desired outcomes. The AEC considers that a clearly defined FOS, and accompanying market-based procurement of continuous narrow band primary frequency response, are both necessary to support efficient investment decisions in frequency responsive plant that will be required in the future power system.

Future review of the Frequency operating standard for normal operation

The Panel has been briefed by relevant personnel from AEMO and the AEMC on the active frequency control work program that is being progressed by these market bodies. The Panel understands that a review of the FOS is part of the market bodies' frequency work program and that such a review is planned to commence in Q3 2021. While this may appear some time away, the Panel considers that this timing is necessary in order to allow for further analysis and investigations to be undertaken by AEMO on the nature of the FOS for normal operation, with this informing the review of the FOS. It will be important to have this input when the Panel reviews the FOS – if the review does not happen in a coordinated way with other reforms under consideration it may cause unintended consequences.

AEMO's analysis will be informed by AEMO's monitoring of plant and power system impacts from the rollout of the Mandatory PFR arrangements from Q3 2020 through Q2 2021, as well as learnings from that process.

AEMO published a frequency control workplan in September as part of its follow up work to the *Renewable integration study – stage 1 report*. The frequency control work plan provides further details on AEMO's activities related to the ongoing reform of the frequency control frameworks for the NEM. One of the actions in the workplan is an investigation by AEMO of how the FOS specifies the operational objectives for frequency management in the power system including the target frequency performance during normal operation.

This investigation, “FOS Criteria Options Analysis”, will be informed by AEMO’s monitoring of system performance as it coordinates changes to plant settings through the implementation of the Mandatory PFR arrangements. The investigation will inform the design of the enduring arrangements for PFR, that the AEMC will develop through the assessment of the *Primary frequency response incentive arrangements* rule change request. It will also inform the scope and objectives for a future review of the FOS by the Reliability Panel. AEMO plans to publish a report documenting its findings in relation to PFR incentivisation and the FOS in June 2021.¹

AEMO’s advice will inform the AEMC’s draft decision on whether and how new incentive arrangements could complement or replace the Mandatory PFR arrangements introduced in June 2020. The AEMC has recently extended the timeframe for making a draft determination for the *Primary frequency response incentive arrangements* rule change to 16 September 2021. The extended timeframe will allow AEMO to undertake further work to understand the operational and economic impacts of incentive or marked-based provision of continuous PFR.

Also relevant is advice that AEMO will provide in February 2021 to describe the interactions between FFR, inertia and existing FCAS. The AEMC has extended the timeframe for making a draft determination for Infigen’s *Fast frequency response ancillary service market* rule change to 22 April 2021 to allow for the incorporation of this advice.

If the Panel commences a review of the FOS in October 2021, this timing would allow a revised standard to be determined by Q2 2022, one year ahead of the sunset to the Mandatory PFR arrangements on 4 June 2023. The Panel considers that this provides sufficient time for the market to adapt and incorporate any changes that may be required as a result of the review of the FOS.

The Panel notes the AEC’s concerns that the Mandatory PFR arrangement was made in the absence of sufficient consideration of the costs and benefits of the resulting frequency distribution during normal operation. The AEMC’s final determination noted that:²

- a mandatory requirement for narrow band PFR is not a complete solution and, on its own, will not incentivise the provision of primary frequency response.
- further work needs to be done to understand the power system requirements for maintaining good frequency control.
- the appropriateness of the mandatory requirement for narrow band PFR and other alternative and complementary measures will be considered through the assessment of the *Primary frequency response incentive arrangements* rule change request.

In making the Mandatory PFR Rule, the Commission recognised that the required system frequency performance would ideally be defined in the FOS and that the NER would establish sufficient arrangements to provide AEMO with the necessary tools to operate the power system to meet that standard. As noted in the final determination:³

“the Commission notes that the Mandatory primary frequency response rule is an interim arrangement that includes sunset provisions which will repeal the arrangement on 4 June 2023. The Commission considers that the introduction of this interim arrangement for mandatory narrow band PFR will allow time for further consideration of how power system frequency performance is specified in the Frequency operating standard and the design of appropriate tools to enable AEMO to effectively manage the power system in accordance with the Frequency operating standard.”

The Panel encourages the AEC to engage with the AEMC on the design of enduring PFR arrangements through the ongoing consultation on the *Primary frequency response incentive arrangements* rule change; and AEMO on its technical studies into frequency response.

The Panel looks forward to continuing to engage with the AEC on future projects and encourages the AEC to continue to raise any concerns directly with the Panel.

Yours sincerely



Mr Charles Popple
Chair, Reliability Panel

¹ AEMO, Frequency Control Work Plan, 25 September 2020, p.14.

² AEMC, Mandatory primary frequency response — final determination, 26 March 2020, p.ii.

³ Ibid. pp.96-97.

2 July 2020

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By Email to victoria.mollard@aemc.gov.au

Normal Operating Band Frequency Operating Standard

Dear Charles

The Australian Energy Council (AEC) has been closely engaged with the challenges and reforms associated with National Electricity Market (NEM) frequency control for several years. The AEC supports progress toward a secure NEM frequency characteristic that is also efficient and economically sustainable. This letter conveys our members' desire to update the Normal Operating Frequency Band (NOFB) standard.

The AEC considers the Panel's Frequency Operating Standards (FOS) perform a crucial determinative role in the NEM. By setting clear performance targets, rule-making by the AEMC and operating decisions by AEMO are guided by the objective of meeting them, and only them, at least cost. The Panel's expertise and make-up supports the difficult but necessary balance of security against cost.

The existing NOFB standard only requires the frequency to remain within 50 ± 0.15 Hz for 99% of the time. With a very few exceptions, this has been achieved in all months since NEM start. However, since 2015 that frequency has sat much more commonly at the edges of this band rather than the centre. It is claimed this characteristic has adverse implications for system security and plant operability. However the NOFB standard remains silent on the desired distribution of frequency outcomes within the band.

The AEC emphasised the need to update the FOS in its submission to the Panel's 2017-19 FOS review¹ and to the AEMC's 2018-19 Frequency Control Frameworks Review². However the FOS review declined to update it beyond some unrelated incremental adjustments.

In August 2019, AEMO sponsored expert advice (the Undrill Report)³ that criticised the NEM's recent frequency NOFB performance, despite it meeting the prevailing standard, and recommended radical actions to deliver a much tighter frequency characteristic.

The AEC's preferred approach is that evidence such as the Undrill report would be used first by the Reliability Panel to consider and promulgate a new standard. Subsequently, ancillary services markets would then be adapted to achieve the new standard, or, if necessary, rule changes could be introduced to procure frequency support by other means.

¹ https://www.aemc.gov.au/sites/default/files/2019-01/Australian%20Energy%20Council_0.pdf

² <https://www.aemc.gov.au/sites/default/files/2018-04/Australian%20Energy%20Council.PDF>

³ <https://www.aemc.gov.au/sites/default/files/2019-08/International%20Expert%20Advice%20-%20Notes%20on%20frequency%20control.pdf>

Developments in 2019 and 2020 have gone via a different route, with AEMO proposing a rule change directly obliging Primary Frequency Response (PFR) to a $50\pm 0.015\text{Hz}$ deadband from all capable providers as a condition of market participation⁴. This rule change has been subsequently made by the AEMC. It is of concern to the AEC that the FOS, due to its silence on the key question of NOFB distribution, did not appear to be of relevance to the consideration of this rule change.

The AEC feels that the Panel should now determine a restructured standard, trading off the security advantages of a tighter outcome against the cost⁵ of its procurement. Such a standard will then guide the market bodies' decisions and re-assert the Panel's role.

The AEC notes that the rule obliging PFR will sunset on 4 June 2023, after which frequency control will revert to procurement from the existing ancillary services markets or a new mechanism, if one is developed in the intervening period. A restructured and respected NOFB standard can guide their development in time for the sunset. Only with a clearly defined standard (and eventual market-based procurement method) can investors plan to develop or maintain sufficient capability in the future – including developing new technologies or software capabilities where required.

It is possible that in the shorter-term the mandatory PFR rule will result in a very tight frequency performance well beyond the cost-benefit optimum. The AEC believes the Panel should not simply seek to extend this performance beyond 2023, but to instead develop a new standard derived from first principles, balancing the costs of procurement against an economic interpretation of the risks of insecurity. Ideally this work should be completed well before the Reliability Standard and Settings Review 2022, rather than in conjunction with it.

The AEC looks forward to working with the Panel on updating the NOFB standard. I would be very happy to discuss further by email to ben.skinner@energycouncil.com.au or by telephone on 03 9205 3116.

Yours sincerely,



Ben Skinner
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Australian Energy Council

⁴ <https://www.aemc.gov.au/rule-changes/mandatory-primary-frequency-response>

⁵ "Cost" in this context means the cost burden upon the entire market, both suppliers and consumers.