



Ms Anna Collyer
Chair
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Ms Collyer

Anna

RE: ERC0296 – FREQUENCY CONTROL RULE CHANGES DIRECTIONS PAPER

The Energy and Technical Regulation Division (the Division) of the Department for Energy and Mining thanks you for the opportunity to make a submission on the Frequency Control Rule Changes Directions Paper.

Fast Frequency Response

South Australia considers fast frequency response (FFR) to be an important tool to address imbalances in the power system. As such the Government is investing in fast frequency from grid batteries, such as the expansion of Hornsdale Power Reserve, and Virtual Power Plants.

The Division considers the development of increase fast frequency response in the NEM as a significant part of the AEMC's consideration of the frequency control rule changes.

The Division notes and supports the analysis undertaken by Australian Energy Market Operator (AEMO) in its *Renewable Integration Study* that, based on the continuation of the current market and regulatory arrangements, system inertia is projected to continue to decline and the size of frequency deviations following contingency events is expected to increase. The Division notes that AEMO's report found that increased fast raise Frequency Control Ancillary Services (FCAS) will be required to manage system frequency.

The Division also notes the economic analysis undertaken by the AEMC which estimates that under the Integrated System Plan (ISP) central and step-change scenario's the dynamic requirement for fast raise services will be almost double the static requirement by between 2025 and 2030. This could result in significant increased costs for these services and that this increase could be reduced through the optimal dispatch of FFR services, and in future through the co-optimisation of inertia, FFR and fast raise services.

The Division agrees with the problem definition and reform objective presented in the AEMC's Directions Paper. Further the Division agrees that it is appropriate for FFR to be procured through spot market arrangements, similar to the existing market ancillary service arrangements for contingency FCAS.

The Division notes that AEMO will be providing critical technical advice in February 2021 to further inform the consideration and development of FFR arrangements for the NEM.

The Division agrees that the existing arrangements for contingency FCAS provide an appropriate model for FFR market arrangements. It is not clear why new market ancillary services for FFR would be warranted when AEMO could revise the existing fast raise and fast lower services to include the provision of FFR.



Primary Frequency Response

The Division welcomes the AEMC's initiation of the next stage to develop primary frequency response (PFR) arrangements to apply from June 2023. The Division supports a long-term model that values PFR provision while achieving effective frequency control.

The Mandatory PFR Rule was a pragmatic response in the context of rapidly changing power system needs. The Division notes that implementation of the Rule has had a significant impact on the NEM's frequency performance outcomes since October 2020, even while PFR control changes have been implemented for approximately half of the generator capacity that is subject to the Rule.¹ AEMO reports show the mainland frequency distribution curve now more closely resembles the tighter adherence around 50Hz evident in the 2005 distribution curve.²

This points to the possibility, highlighted by many stakeholders during earlier consultation stages, that the Mandatory PFR Rule may result in a level of supply that exceeds requirements, resulting in inefficiencies. The staged implementation approach should reveal useful insights into the quantities of PFR that are required and, in turn, inform decisions on the most suitable long-term procurement arrangement.

Scheduled and semi-scheduled generators will have implemented generator control changes under the Mandatory PFR Rule by mid-2021, and this should also enable AEMO and generators to better gauge the costs and benefits of the existing arrangement, as well as practical limitations, before the AEMC's draft determination in September.

Pathway one overcomes the current Rule's lack of a headroom requirement by using existing market ancillary service arrangements to procure energy reserves. This pathway offers a potentially simpler evolution of the existing mandatory PFR arrangement. However, it does not avoid the potential for inefficiencies such as over-supply and requiring PFR from higher cost / lower quality sources to be locked in.

The Division notes that further examination of the suitability of pathway one is subject to AEMO's feasibility advice and analysis. Amongst other things, this should examine the feasibility of this model in scenarios of low minimum demand and high renewable generation, including ever-growing distributed solar PV. In October 2020, South Australia's demand was met by distributed PV, a global first for a grid of this size. While synchronous generation was online in that instance (due to directions for system strength), it is uncertain if mandatory narrow band PFR would be available in future cases.

In principle, the Division agrees the AEMC's preferred 'hybrid' direction outlined by pathway two may represent the better course. This option would allow PFR procurement to be more dynamically aligned to changing operational requirements and enable PFR to be provided by those best-placed (efficient and least cost) to do so. As it does now for regulation FCAS, AEMO would determine the specification and quantity of a new primary regulating service for PFR during normal operation, somewhat mitigating the risk of inefficient 'over-provision'. The existing FCAS arrangements provide an existing and familiar construct and currently unpriced PFR would be valued by the market for a new PFR regulating service. A hybrid model of some form would also help to address the missing headroom requirement in a more efficient manner.

¹ AEMO, *Implementation of the National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020: Status as at 20 Jan 2021*, January 2021.

² AEMC, *Frequency Control Rule Changes: Directions Paper*, December 2020, Figure 5.2 p61.



Widening the primary frequency control band (PFCB), whether to the extent proposed by the Australian Energy Council ($\pm 0.5\text{Hz}$) or more moderately, contrasts with the original premise for this rule change process, namely, to address the effectiveness of frequency control within the normal operating frequency band. This would represent a significant shift from the current mandatory setting ($\pm 0.015\text{Hz}$), although the Division acknowledges the need for a hybrid model to clearly delineate between market and mandatory PFR services. There will also be a need for clarity around the interaction between these PFR services and delivery of FCAS.

As per the FFR rule change, the Division looks forward to the availability of AEMO's detailed technical advice on the feasibility of various pathways in February, as well as the independent advice being commissioned by the AEMC about the impact on and capabilities of individual plant. These will help inform the decision about the most appropriate pathway, as well as any revision of the primary frequency control band and the intersection with FCAS arrangements.

Evidence of the costs and challenges of implementing changes and ongoing PFR provision by affected generating systems should be detailed to support the evolution of the current framework. The Division notes stakeholder concerns about the impost and bluntness of the universal obligation, but also that reliable data to support (or reject) these claims was not readily available including because, prior to the Rule, many generators had not provided frequency response.³ Given the divergent claims, the Division strongly encourages the AEMC to examine the costs, benefits and market impacts of mandatory PFR provision in preparing its draft determination and to make relevant data available to stakeholders.

The enduring arrangements for PFR should be designed for the current and future needs of a power system in rapid transition to net zero emissions and facing exit or reducing utilisation of large thermal generators. With increasing contributions from asynchronous generation, AEMO has declared system strength and inertia shortfalls for South Australia, requiring procurement by the transmission network service provider (TNSP) of high inertia synchronous condensers, as well as FFR. Once commissioning of the synchronous condensers is complete by mid-2021, PFR that is being provided currently by synchronous generators in South Australia will likely decrease, as the need to direct generators for system security diminishes. Longer term arrangements that adequately incentivise PFR provision could help to overcome challenges arising in the context of low spot prices and low demand affecting commitment decisions in a future power system dominated by renewables.

Similarly, the evolution of the PFR framework should account for the growing dominance of variable renewable energy generation and ensuring there is adequate under-frequency response capability. For South Australia, a region at risk of islanding, when frequency services must be supplied locally, the future PFR framework needs to ensure there is adequate regional availability of services. AEMO's *Renewable Integration Study* identified that access to continuously frequency-sensitive PFR is required within a region for it to successfully island.⁴

With greater contributions from inverter-based resources, including distributed PV, and lower levels of synchronous generation, there may be increasing reliance on battery storage systems to provide primary frequency raise response. Although battery storage systems are increasing and greater interconnection will substantially reduce the risk of South Australia islanding, the Division nonetheless considers it important that market-based frequency response services are sufficient and competitive in case of islanding events.

³ AEMO, *Interim Primary Frequency Response Requirements: Report and Determination*, 1 June 2020.

⁴ AEMO, *Renewable Integration Study Stage 1 Appendix B: Frequency control*, March 2020, p41.



Government of South Australia

Department for Energy and Mining

The Division notes the proposed directions for FFR and PFR, if confirmed by the final determinations for these rule changes, could result in the creation of four new market ancillary services. Separately, the AEMC is also examining the merits of additional market ancillary services proposed in the Ramping Services rule change (ERC0307). In parallel, the inertia framework allows for the provision of FFR as an inertia support activity. It is unclear how FFR procured under the inertia framework would be enabled and coordinated with the proposed new FFR FCAS. Careful design and specification will be important to ensure the interactions between different services are effectively managed.

Thank you for considering this submission. Should you wish to discuss this further please contact Sally Gartelmann, Principal Policy Officer, Energy and Technical Regulation Division, on (08) 8429 3296.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Vince Duffy'.

Vince Duffy
Executive Director, Energy and Technical Regulation

5 February 2021