THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

School of Information Technology
and Electrical Engineering

4 February 2021

Mr Ben Hiron
Australian Energy Market Commission
Submitted online
AEMC Ref: ERC0263, ERC0296

Dear Mr Hiron,

Fast frequency response market ancillary service

We thank the Commission for the directions paper on new arrangements for frequency control in the NEM, with particular consideration of fast frequency response services and primary frequency response, and the opportunity to contribute to this important development within the NEM.

Please find attached our response to the questions in the directions paper. Overall, we agree with the Commission's characterisation of the problems facing FFR and PFR provision as "missing markets." We have not answered all question, focusing instead on topics of where we have experience or feel we can add value. Of note:

- We support Option 1 for FFR procurement, establishing new market ancillary FFR services, using existing contingency FCAS market arrangements, and
- We suggest the Commission consider the benefits of establishing more than one raise and one lower FFR service category and associated market, to improve granularity of the response and provide a more informative set of prices to guide investment.
- We provide a brief description of an alternative enduring PFR arrangement, in which PFR obligations on each generator are determined using the current methodology or some agreed alternative, but subsequently, these obligations can then be freely traded on an AEMO-administered pooled trading platform.

We welcome the opportunity to discuss the matters raised in this submission further, particularly regarding market design considerations.

Should you have any questions, please contact me on archie.chapman@uq.edu.au

Yours sincerely

Dr Archie Chapman
Senior Lecturer
School of Information Technology and Electrical Engineering

AEMC

Directions paper – Frequency control rule changes

STAKEHOLDER SUBMISSION TEMPLATE

The template below has been developed to enable stakeholders to provide their feedback on specific questions that the AEMC has identified in the directions paper for the frequency control rule changes.

The rule changes discussed in the frequency control directions paper are:

- AEMO – *Primary frequency response incentive arrangements* (ERC0263)
- Infigen Energy — *Fast frequency response market ancillary service* (ERC0296)

This template is designed to assist stakeholders provide valuable input on the questions the AEMC has identified in the directions paper. However, it is not meant to restrict any other issues that stakeholders would like to provide feedback on.

Given the breadth of issues discussed in the directions paper, it is not expected that all stakeholders respond to all the questions in this template. Rather, stakeholders are encouraged to answer any and all relevant questions.

SUBMITTER DETAILS

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CHAPTER 4 – FAST FREQUENCY RESPONSE MARKET ANCILLARY SERVICE

Question 1: Section 4.5.3 – PROBLEM DEFINITION AND REFORM OBJECTIVE — FFR RULE CHANGE	
What are stakeholders' views on the problem definition and reform objective for FRR as set out in section 4.5.3 of the directions paper?	The Commission's characterisation of the problem as one of a "missing market" captures both the key technical and economic issue facing low inertia power systems. In particular: - Provision of FFR should improve system performance, in system intact and emergency operation conditions, and - A competitive market procuring FFR will support efficient use of existing resources for supplying FFR and provide price signals for investment in new technology to deliver new FFR services as required.
Question 2: Section 4.7.1 – FFR PROCUREMENT	
In relation to the discussion of potential procurement arrangements for FFR services in section 4.7.1 of the directions paper: • What are stakeholders' views on the pros and cons of establishing new FCAS market arrangements for FFR services versus revising the existing arrangements to incorporate FFR within the fast raise and fast lower services? • Do stakeholders agree that the existing arrangements for contingency FCAS provide an appropriate model for FFR market arrangements? • What are stakeholders' views on how each of the proposed procurement arrangements for FFR would interact with the arrangements for the existing contingency services? • Are there any aspects of the existing contingency FCAS arrangements that should be varied for procurement of FFR services?	Our view is that option 1, establishing new market ancillary FFR services, is the preferred option, for the following reasons: • Spot market FCAS provision has provided clear price signals for investment in technology that provides existing the FCAS services, and the same is expected of an FFR spot market, • Specifically, existing contingency FCAS market arrangements are an adequate model for FFR, and in conditions of sufficient competition, these should deliver efficient FFR supply outcomes, • The systems of existing suppliers of FCAS will be unaffected by the establishment of new FFR service type, so there will be no additional costs applied these participants should they wish to stay out of the FFR services market; only participants who see a benefit from supplying FFR services will consider investing in the changes to their systems required to participate. • However, we also suggest the Commission consider the benefits of establishing more than one raise and one lower FFR service category and associated market, to improve granularity of the response and provide a more informative set of prices

	to guide investment.
Question 3: Section 4.7.2 – FFR PRICING ARRANGEMENTS	
In relation to the discussion of potential pricing arrangements for FFR services in section 4.7.2 of the directions paper: • What are stakeholders' views on the pros and cons of maintaining the existing FCAS pricing arrangements for FFR services? • What are stakeholders' views on the potential pros and cons of incorporating performance-based multipliers into the pricing arrangements for FFR services? • Do stakeholders have any other comments or suggestions in relation to the pricing arrangements for FFR services?	Our perspective is that the existing pricing arrangements are sufficient for the proposed FFR services markets. In particular, we have difficulty with the rationale for differential pricing, for the following reasons: • One of the major benefits of spot markets is that they serve as efficient price discovery mechanism. This process is predicated on the provision of standardised services into a competitive market. Removing the requirement to provide standardised services can obfuscate the way in which prices are determined in the market, which can make it difficult for investors to assess the value that new resources could potentially earn in these markets. • Markets procuring standardised services using clear, predefined pricing rules are easier, less costly and quicker to establish that those require a round of technical negotiations; that is, transaction costs are reduced. • In effect, AER or another body would be tasked with determining the value of FFR and FCAS to the system, and to set prices appropriately. It is not clear what inputs these prices would be based on. Instead, appropriate market design principles should be applied to procure the required amount of these services at least cost. • Last, note that the differential pricing methods applier in Eiregrid and the WEM apply to long-term contracts and not to spot market arrangements. Beyond this, we argue that by establishing FFR markets, scarcity pricing will and the desire to maximise returns will push providers FFR and FCAS to the markets with the highest value to the system. This matches with the conjecture of Commission regarding potential issues with the volume weighted registration approach that "The implementation of new FFR service classifications could help mitigate this issue, by increasing the granularity of the service specifications for the market ancillary services" (p40).

Question 4: Section 4.7.3 – FFR COST ALLOCATION	
In relation to the discussion of arrangements for the allocation of costs associated with FFR services set out in section 4.7.3 of the directions paper: • What are stakeholders' views on the arrangements for the allocation of costs for FFR services? • Would it be appropriate for the cost of FFR services to be allocated in a similar way to the existing arrangements for the allocation of contingency FCAS costs?	We see no compelling reason to not apply the existing FCAS causer-pays cost allocation arrangements to FFR. In particular, if inertia, or primary frequency response, are considered scare resources, then we encourage the Commission to consider establishing market arrangements for the provision of these services, so that they may be appropriately priced. Efficient pricing should drive that least-cost substitution between inertia, PFR, FFR and FCAS, which involve trade-offs which is not currently well understood (this is an observation, not a criticism, noting the efforts to quantify the technical effects of substituting FCAS with FFR provided in the Directions Paper). The market currently has no clear picture of the relative value and substitutability of all of these different services.
Question 5: Section 4.8 – ISSUES FOR CONSIDERATION – FFR	
Are stakeholders aware of any additional issues that the Commission should take into account in developing market ancillary service arrangements for FFR?	
Question 6: Section 4.8.1 – VALUATION OF INERTIAL RESPONSE	
In relation to the potential arrangements for the valuation of inertial response described in section 4.8.1 of the directions paper: • What are stakeholders' views on the valuation of inertial response as part of the contingency services, including the proposed new FFR contingency services? • What are stakeholders' views on the current governance arrangements for contingency services; where the detailed service specification is determined by AEMO and documented in the MASS? (Is it appropriate for the NER to provide further guidance on how inertial response should be considered in the MASS?)	Short comments: • The relative value of inertia and FFR to the system depends on how much one can substitute for the other. More information on this is required. • Implementing the substitution of one for the other with NEMDE may require carful design to ensure the dispatch problem remains tractable and the algorithms are stable.

Question 7: Section 4.8.2 – PRICE RESPONSIVE DEMAND FOR CONTINGENCY SERVICES	
In relation to the discussion of arrangements for incorporating price responsiveness into the procurement of contingency services in the NEM set out in section 4.8.2: • What are stakeholders' views on the potential pros and cons associated with the implementation of a "demand curve" approach to procurement of FCAS? • What are stakeholders' views on the priority of such a change to the market frameworks? • If such an approach was to be implemented, what are stakeholders' views on the appropriate governance arrangements, including the potential oversight role for the AER?	Low priority at this point in time.
Question 8: Section 4.8.3 – INTERACTION BETWEEN MANDATORY PFR & FFR ARRANGEMENTS	
What are stakeholders' views in relation to the potential interactions between new FFR arrangements and the Mandatory PFR arrangement?	
Question 9: Section 4.8.4 – IMPLEMENTATION AND STAGING FOR FFR	
In relation to the discussion of the implementation arrangements for FFR services as set out in section 4.8.4: • What are stakeholders' views in relation to the process for the implementation of FFR arrangements in the NEM? • What are stakeholders' views on the potential need for interim or transitional arrangements as part of the transition to spot market arrangements for FFR?	

CHAPTER 5 – PRIMARY FREQUENCY RESPONSE INCENTIVE ARRANGEMENTS

Question 10: Section 5.1.3 – THE ROLE OF MANDATORY PFR	
In relation to the discussion of the role for a mandatory obligation as part of the enduring PFR arrangements in the NEM, set out in section 5.1.3: • Do stakeholders agree that a mandatory PFR arrangement provides a valuable safety net to help protect the power system from significant non-credible contingency events? • Do stakeholders agree that the narrow, moderate and wide settings for a mandatory PFR response band adequately represent the broad policy options for the frequency response band for Mandatory PFR?	
Question 11: Section 5.4 – PROBLEM DEFINITION AND REFORM OBJECTIVE — PFR INCENTIVE ARRANGEMENTS RULE CHANGE	
What are stakeholders' views on the problem definition and reform objectives for enduring PFR arrangements set out in section 5.4?	We agree with main points raised by the Commission, particularly that "under-valuation of PFR does not support efficient allocation of resources in the NEM and weakens the signals for efficient investment in power system plant to meet future power system needs" (p 71), which is another case of a "missing market" alongside FFR. (Note that we provide only one response to the questions below, at Question 17.)
Question 12: Section 5.4.1 – ECONOMIC ANALYSIS OF MANDATORY PFR	
In relation to the discussion of the costs and benefits of Mandatory PFR arrangements set out in section 5.4.1: • What are stakeholders' views of the indicative curves for costs and benefits of Mandatory PFR with respect to the frequency response band settings, set out in figure 5.4? • Do stakeholders agree that the frequency response band setting is a key variable for the determination of enduring PFR arrangements that meet the power	

system needs and are economically efficient over the long term? • What are stakeholders' views on the effectiveness of the exemption framework under the Mandatory PFR arrangement? • What are stakeholders' views on the role that the allowance for variable droop settings plays in relation to the cost impacts of Mandatory PFR? • Based on the initial roll out of the Mandatory PFR arrangement to generators over 200MW, what are stakeholders' views on how the cost impacts of Mandatory PFR are impacted by the proportion of the fleet that is responsive to frequency variations? • What other considerations are there in relation to developing effective and efficient arrangements for PFR in the NEM?	
Question 13: Section 5.5 – ADVICE FOR ENDURING PFR ARRANGEMENTS	
What are stakeholders' views of the Commission's proposed approach to obtaining advice to inform its determination of enduring arrangements for PFR in the NEM?	
Question 14: Section 5.6.1 – PROCUREMENT ARRANGEMENTS FOR NARROW BAND PFR SERVICES	
In relation to the discussion of potential procurement arrangements for narrow band PFR services in section 5.6.1: • What are stakeholders' views on three options identified for further consideration? a. Existing market ancillary service arrangements b. New market ancillary service arrangements c. New incentive-based arrangements for voluntary provision • Are there any other options that would be preferable?	
Question 15: Section 5.6.2 – PROCUREMENT ARRANGEMENTS FOR NARROW BAND PFR SERVICES	

What are stakeholders' views on the arrangements for the pricing of PFR as described in section 5.6.2?	
Question 16: Section 5.6.3 – ALLOCATION OF COSTS FOR NARROW BAND PFR	
What are stakeholder's views on the allocation of costs for narrow band PFR services as described in section 5.6.3? Do stakeholders agree that the any additional costs for narrow band PFR be allocated through the existing causer pays procedure for the allocation of regulation costs (or a revised version as described in section 5.9?	
Question 17: Section 5.7 – PATHWAYS FOR ENDURING PFR ARRANGEMENTS	
In relation to the pathways for enduring PFR arrangements set out in section 5.7: • What are stakeholders' views on the enduring PFR pathways? • Do stakeholders agree with the Commission's preliminary preference for pathway two? (the widening of the PFCB and the introduction of market arrangements for narrow band PFR)	Several submissions have highlighted the costs of providing mandatory PRF. An alternative arrangement could be to make these obligations tradeable, in order to deliver sufficient PFR at least cost, system-wide. As such, an alternative pathway may be to: (i) determine primary frequency response obligations on each generator using the current methodology or some agreed alternative, (ii) allow these obligations to be freely traded on an AEMO-administered pooled trading platform. PFR costs will be borne by the generators obliged to provide PFR, while efficient prices can be found by the pooled exchange of obligations, which should reduce system-wide costs compared to mandatory and untraded PFR obligations.
Question 18: Section 5.8 – FUTURE REVIEW OF THE FOS	
What are stakeholders' views of the Commission's proposed approach towards a future review of the FOS as part of the development of enduring PFR arrangements?	
Question 19: Section 5.9 – REFORMS TO THE NER RELATING TO COST ALLOCATION FOR REGULATION SERVICES – CAUSER PAYS	
In relation to the proposed reforms to the NER relating to the allocation of regulation costs, set out in section 5.9:	

• What are stakeholders' views on the proposal to allocate regulation costs on the basis of performance against system frequency as opposed to Frequency indicator (FI)? • What are stakeholders' views on the proposal to align the sample and application periods for determination of causer pays factors and shorten the application period to 5 minutes, in line with the NEM dispatch interval? • What are stakeholders' views on the removal or shortening of the ten-day notice period for causer pays contribution factors? • What are stakeholders' views on AEMO's proposal to pre-calculate seven sets of contribution factors including local contribution factors? • What are stakeholders' views of AEMO proposal to include non-metered generation in the residual component for allocation of regulation costs?	