



Australian Government
Australian Renewable
Energy Agency

ARENA

3 June 2021

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Fast Frequency Response Draft Determination
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ARENA submission on the fast frequency response market ancillary services draft determination

This submission provides insights from projects funded by the Australian Renewable Energy Agency (ARENA) as relevant to the AEMC's current rule change consultation process.

For your convenience, [Appendix 1](#) provides a list of ARENA-supported projects that provide 6-second FCAS and that we expect may be technically capable of providing the faster service.

Implementation of the proposed 2-second market

ARENA supports the establishment of 2-second (FFR) raise and lower services and notes the role this could play in supporting power system security, promoting innovation and reducing costs in the transition to renewables.

The FFR proposal appears to have wide-spread support across the energy sector and all efforts should be made to ensure that Market Ancillary Services Specification (MASS) updates are completed, and the services enabled, at the earliest opportunity. This could include making use of the current update/consultation process for the MASS, while noting the delays that have recently been announced for that process to determine appropriate arrangements for VPPs. It is important that AEMC and AEMO consider the extent to which any currently proposed changes to the MASS may provide a barrier to VPPs providing an efficient and accurate FFR service.

Investment signals for advanced inverters

ARENA notes the increasing capability of inverter-based resources (IBR) to provide fast and accurate frequency response, including as demonstrated through a number of ARENA-supported battery trials. At ARENA's advanced inverter event on 27th May 2021, trial

participants reported their ability to provide an increasing range of services including synthetic inertia products that can provide a rapid, proportional and accurate response to Rate of Change of Frequency (RoCoF) in a way that can complement current primary frequency control and contingency FCAS services. While there is currently no market signal for industry to provide synthetic inertia, it is important that the requirements of a FFR service are compatible with the development of inertia markets in the future (as proposed by the ESB). Acknowledgement of this opportunity by the AEMC would encourage investors to consider the value of more advanced capability of inverters they are procuring.

Preparing for the ultra-high DER grid

The current best projection by the Clean Energy Regulator has rooftop solar reaching a nominal capacity of 33 GW nationally by the end of 2025¹ (i.e. comparable to NEM peak demand). The global momentum for electrification of transport and heating loads is also building rapidly.

The history of technology change in the NEM, and other sectors disrupted by digitalisation, is that change generally happens *slowly - then quickly*. As such, the current rate of adoption of new technologies is rarely a good indication of the likely future pace of change. It is therefore important that:

- the AEMC uses each rule change process as an opportunity to prepare for major disruption, even if the timing and exact form of future change is uncertain, and
- the FFR final determination provides an account of how frequency stability can be achieved in an ultra-high DER grid.

Irrespective of its exact timing, solar will provide an increasingly material share of instantaneous demand and, associated with this, large contingency events could, at times, originate from the coincident behaviour of demand-side resources. Demand-side resources need to be provided with a level playing field on which to participate in FFR markets and cost-recovery mechanisms need to be updated to match the source of underlying systemic risks.

ARENA notes the AEMC consideration of the need to improve the cost recovery arrangements for FCAS including its consideration of 'runway pricing'². However the draft determination does not make the link between this need and complementary reforms such as 'schedule lite'³ or the inadequacy of the current *mandatory* primary frequency response regime in an ultra-high DER context. ARENA encourages the AEMC to address this emerging context, and identify the need for further work, as required, in its final determination.

Transparency of offsetting savings

¹ Reported at the [DEIP CEO forum, 18 March 2021](#)

² p.53

³ [ESB post-2025 options paper](#) (p.70)

ARENA notes the benefits of FFR reported by the AEMC in its draft determination.⁴ While the costs of the new service will be clear, it would be beneficial to provide stakeholders with ongoing transparency, and some confidence, that this will be translated into savings for consumers. Reported benefits might include:

- greater system hosting capacity for renewables via decreases in minimum inertia levels
- reduced wholesale prices and GHG emissions flowing from fewer market interventions and directions, and
- reduced procurement costs for other contingency services.

This could be reported through AEMO's *Frequency and Time Error Monitoring* program with oversight by the AER or Reliability Panel. This will help illustrate that the cost of reform is not additive, and that AEMO is accountable for ensuring that offsetting values are achieved.

About ARENA

The Australian Renewable Energy Agency (ARENA) was established in 2012 by the Australian Government. ARENA's function and objectives are set out in the *Australian Renewable Energy Agency Act 2011*.

ARENA provides financial assistance to support innovation and the commercialisation of clean energy, including low, zero and negative emission technologies by helping to overcome technical and commercial barriers. A key part of ARENA's role is to collect, store and disseminate knowledge gained from the projects and activities it supports for use by the wider industry and Australia's energy market institutions.

Please contact Carl Tidemann, (carl.tidemann@arena.gov.au) if you would like to discuss any aspect of ARENA's submission.

Yours sincerely

Darren Miller

Chief Executive Officer, ARENA

⁴ p.60

Appendix 1 - ARENA projects addressing the opportunity for improved frequency management

Project name	Description
ActewAGL Retail – Realising Electric Vehicle-to-grid Services	Project aiming to demonstrate the full economic value of vehicle-to-grid services including FCAS services. Results due early 2022.
AEMO Virtual Power Plant Demonstrations	7 VPP demonstrations - each providing all contingency FCAS services except 1, which is not supplying L6. Knowledge Sharing report can be found here.
Ballarat Terminal Station Battery Energy Storage System (BESS)	It is the first standalone battery-based energy storage asset in Australia. It generates revenue through energy arbitrage, Contingency and Regulation FCAS services. Operational report can be found here.
ElectraNet Energy Storage for Commercial Renewable Integration (ESCRI) Phase 2 (South Australia) - Deployment and Testing	The ESCRI project is the first LSBS project in Australia to operate in voltage source mode as a virtual synchronous generator while grid connected (grid forming). It generates revenue through energy arbitrage and contingency FCAS services. Results can be found here.
Gannawarra Energy Storage System (GESS)	It is the first retrofit model where a LSBS was installed at an existing renewable energy generator site (solar farm). It generates revenue through energy arbitrage and Regulation FCAS service. Operational report can be found here
Goldwind IBFFR	Goldwind is demonstrating virtual synchronous generator control systems at the Gullen Range Wind Farm. This uses the mechanical inertia of rotating turbines to produce a fast frequency response to under frequency contingency events. Results can be found here.
Hornsedale Power Reserve 2	The project will demonstrate the ability for large scale batteries to provide an inertia-like product (rapid response proportional to RoCoF) and an enhanced FCAS response, enhancing the ability of large batteries to support grid stability. The first project operations report is due in July 2022.
Lake Bonney LSBS	This project aims to generate revenue through energy arbitrage, Contingency and Regulation FCAS services. Operational report can be found here.
Musselroe Wind Farm	Musselroe Wind Farm is demonstrating the potential for wind farms to participate in all FCAS markets - including fast raise and lower, which HWF2 did not participate in. Results are expected in June

	2021.
<u>Optimal DER Scheduling for Frequency Stability study</u>	Development and testing of software to coordinate fleets of DER on electricity networks, enabling them to provide frequency control ancillary services (FCAS) and system stability functionalities currently provided by conventional generators. Results due June 2021.
<u>Transgrid Wallgrove LSBS</u>	The TransGrid Wallgrove Battery project will be equipped with synthetic inertia and fast frequency response capabilities. Results due April 2023.