Market Ancillary Service Specification Consultation - May 2022

Submission to Issues paper template

This template has been developed to assist Consulted Persons in providing submissions on the questions posed in the Issues Paper. AEMO encourages Consulted Persons to use this template to assist AEMO when considering the views expressed on each issue.

Consulted Persons should feel free to address only those questions that are of particular interest/concern to them and delete those they are not responding to.

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1 Background	
1.4 Industry advice	
3 Capability of different technologies to deliver Very Fast FCAS	
Question 3:	Are there any technologies not mentioned in Table 3 that could potentially provide Very Fast FCAS? If so, what characteristics (including response time) could be expected of them? Please provide evidence to support their capabilities.
Response: Hybrid (DC coupled solar PV) residential battery systems utilising a single inverter may approach the discrete battery storage response times identified in Table 3.	
Question 5:	Are there any other issues relevant to the capability to provide Very Fast FCAS by different technologies that AEMO should consider?
Response: Robust determination by control systems within an acceptable time frame of frequency estimates in the presence of disturbances typically occurring during contingency events including but not limited to: • high Rate of Change of Frequency (RoCoF) • network switching transients • harmonic distortions • DC offset • Local noise	

4 Proposed design of Very Fast FCAS markets	
4.2 Guidance from other FFR Markets	
4.3 Proposed design of Very Fast FCAS markets	
4.3.2 AEMO's proposed high level market design	
Question 7:	Are there any issues with the concept of shifting Fast FCAS to accommodate a similar, but faster, Very Fast FCAS? Is there a better alternative that is compatible with the Amending Rule?
Response: Existing fast FCAS resources capable of responding in less than 1 second (such as distributed batteries) but not capable of meeting all the requirements to participate in Very Fast FCAS may see an adverse impact on the measured quantity of fast FCAS.	
4.3.3 Impact of inertia	
4.3.4 Primary Frequency Response	
4.4 Existing capability to deliver Very Fast FCAS	
Question 11:	Does a 1-second response time specification automatically exclude certain technologies from being able to participate in the Very Fast FCAS markets? Which ones and why?
Response: It is likely that a substantial portion of existing distributed residential battery energy storage systems currently registered to provide fast FCAS are unable to meet a 1-second response target. New generation residential BESS with faster inverter control loops maybe less affected.	
Question 12:	Is there anything else AEMO should consider in maximising the pool of potential Very Fast FCAS?
Response: Distributed residential BESS and solar PV system market penetration continues to grow rapidly. Increases in the speed of inverter control loops to meet more stringent network protection requirements has the potential to deliver a large pool of fast responding FCAS resources. However, due to the small size of these systems the economics of aggregation is highly sensitive to any additional costs associated with compliance or verification such as supplementary very fast metering devices. A Very Fast FCAS response verification framework based principally on high per unit cost very fast metering risks locking this highly distributed resource out of the Very Fast FCAS market.	
5 Specification of Very Fast FCAS and associated changes to the MASS	
5.2 Proposed key parameters for Very Fast FCAS	
5.2.1 Response time, timeframe and initiation delay	
Question 13:	Will some technology types be locked out of the Very Fast FCAS markets if the maximum response time is specified as 0.5 seconds rather than 1 second?
Response: Costs associated with higher resolution metering (hardware, data transfers and storage) to support a 0.5 second response time disproportionally disadvantage aggregated distributed resources such as residential BESS.	

Question 15:	Are there any other issues relevant to the proposed response time and timeframe that AEMO should consider?
Response: Practically achievable control system response and verification error budgets including but not limited to frequency estimation errors under dynamic and 'real world network' conditions.	

5.2.2 Market ancillary service offer requirements

Question 16:	Are there any other issues relevant to the proposed market ancillary service offer requirements that AEMO should consider?
Response: Capping the delivered FCAS response to the actual peak active power is inconsistent with the principle need of rapid energy injection or withdrawal to rebalance the power system. Resources capable of a more responsive droop characteristic maybe be discouraged from providing this capability under the proposed requirements and seek to amend registered droop capabilities. Not all impacted resources will be able to take advantage of the new Very Fast FCAS services due to other limitations such as high-speed metering.	

5.2.3 Reference frequency levels

5.2.4 Frequency Ramp Rate

Question 18:	Are there any other issues relevant to RoCoF that AEMO should consider?
Response: sonnen supports AEMO aligning frequency estimation dynamic accuracy requirements for control system and verification purposes with a 1 Hz/s frequency ramp rate.	

5.3 Control system requirements

Question 21:	Are there other FCAS delivery methods that AEMO should consider allowing for Very Fast FCAS?
Response: sonnen's approach of dynamically allocating switched FCAS trigger frequencies across a sufficiently large aggregation of distributed resources to deliver an aggregate droop characteristic would seem plausible for delivery of Very Fast FCAS.	

5.4 Verification and measurement requirements

5.4.3 Frequency measurements

Question 22:	What is the error margin and resolution for frequency measurements by high-speed metering installed by Fast FCAS Providers that could be retrofitted to existing Ancillary Service Facilities for participation in Very Fast FCAS markets?
Response: sonnen has yet to identify a suitable (both technical and cost effective) solution that can be retrofitted to our residential BESS for participation in Very Fast FCAS markets.	

Question 23:	What is the error margin and resolution for frequency measurements by high-speed metering that is not currently in use in the NEM, but is available for use in the Very Fast FCAS markets?

Response:

sonnen has yet to identify a suitable (technical and cost effective) solution that can be included in our residential BESS for participation in Very Fast FCAS markets. Global metering solution providers for residential battery systems are not familiar with high-speed (<1 sec update rate) requirements.

Question 24:	What is the cost of high-speed metering that captures frequency measurements with a margin of error lower than <0.1 Hz?

Response:

sonnen suggests this question is incomplete and could generate potentially misleading interpretations of consultation responses.

Given that frequency estimation algorithm errors are typically sensitive to Rate of Change of Frequency and waveform distortions (transients, harmonics, DC offsets and other noise sources) sonnen suggests that responses to this question be categorised between those able to provide details on performance under a 1Hz/s RoCoF and acceptable rejection of typical waveform distortions that occur during contingency events, and those that do not explicitly state performance under the dynamic conditions expected during a contingency event in a low inertia power system.

sonnen notes that higher performance algorithms typically require high internal sample rates and high-performance computational resources.

Question 26:	Are measurement rates of <100ms feasible for your technology? What is the nature and extent of changes that would need to be made to support rates of <100ms?

Response:

sonnen is currently investigating the potential development road map implications of support for updated rates of <100ms, however we are unable to provide feedback at this point in time.

5.5 Overload capacity

5.6 Changes to other FCAS

5.6.1 Interaction between Very Fast FCAS and Fast FCAS

5.6.2 Interaction between Very Fast FCAS and Slow FCAS and Delayed FCAS

5.6.3 Interaction between Very Fast FCAS and Regulation FCAS

5.6.4 Revision to FCAS measurement

Question 39:	Are there alternatives to capping the registered Very Fast FCAS capacity to the actual peak active power change to minimise the discrepancy between the amount of FCAS enabled and the actual contingency size?

Response:

Capping the capability to the actual peak active power change is not required as the overlaps between the contingency services transition from fast energy injections to arrest the frequency disturbance through to a sustained capacity response for the delayed service.

5.7	**Proposed handling of Contingency Event Time**
6	**Issues not under consideration**
6.4	**Geographic diversity**