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Australian Energy Market Operator
GPO Box 2008
Melbourne VIC 3001
Submission by email to:
mass.consultation@aemo.com.au

Dear AEMO

RE: Market Ancillary Service Specification Consultation - Stage 2

SwitchDin is an Australian energy software company that bridges the gap between energy companies, equipment manufacturers and energy end users to better integrate and manage energy resources on the grid. SwitchDin's technology enables our clients to build and operate vendor-neutral virtual power plants and microgrids, and to optimise performance across fleets of diverse assets. Founded in Newcastle NSW in 2015, SwitchDin now operates in all states of Australia with early successes in Europe and emerging opportunities in the Americas and Asia.

SwitchDin welcomes the opportunity to provide feedback on AEMO's draft determination on amendment of the Market Ancillary Service Specification (MASS) as part of Stage 2 of the consultation process. In this submission we outline our feedback on the draft determination, and propose alternative solutions for consideration. We are more than happy to discuss these issues with you if required.

1. Measurement Requirement for Fast FCAS Verification to Address Power Quality Concerns

The primary concern that we would like to raise with the draft determination is the ongoing requirement for the measurement of power flow and frequency at 50ms or less for every site within a VPP in order to participate in the fast contingency FCAS markets.

AEMO's main reason for conducting the Amendment of the Market Ancillary Service Specification (MASS) - DER and General consultation was "with regards to measurement requirements for DERs to participate in the Contingency Frequency Control Ancillary Services (FCAS) markets". The draft determination is a poor outcome for DER and will un-necessarily limit the ability of DER to deliver fast FCAS. The proposed arrangements will:

- Significantly increase the cost and technical complexity for DER to be able to provide fast FCAS through a VPP, compared to the previous VPP trial arrangements
- At least in the short term, potentially lock out DER from the highest value FCAS markets, thereby making participation in FCAS un-economical.

SwitchDin understand that AEMO's overarching reason for continuing to require measurement at 50ms is due to the DER inverter behaviour concerns identified and that *"given the power system*

security concerns associated with DER inverter behaviour, AEMO does not consider it to be prudent to reduce the granularity of the measurement resolution until approaches to address these concerns are implemented."

While we acknowledge the importance of maintaining power system security, the measurement of power and frequency as required for verification of delivery of FCAS is not necessarily associated with the inverter's control behaviour and changing the FCAS reporting rate will not in itself lead to a resolution of the inverter behaviour issues. The resolution of the DER inverter behaviour is independent of the issue of FCAS measurement data reporting. We would recommend that AEMO treat these as separate rather than compounded issues.

We recommend that AEMO directly addresses power system security issues through more appropriate measures such as type testing at point of registration. Further detail is included in the following points.

2. Options for Direct Management of Power Quality Issues

Power quality issues and their management, can be split into two separate categories: inverter specific behaviours and aggregator response issues.

The inverter specific behaviours that have been identified by AEMO are:

- Unexpected disconnection due to a local network fault, and potential power system security risks in frequency recovery if the unexpected inverter disconnections are not properly accounted for, resulting in a DER FCAS Provider not being able to respond to a frequency disturbance.
- Unexpected responses from inverters that cannot be identified using low granularity measurement, for example, if inverters deliver an oscillatory response within 1s intervals due to a voltage or frequency disturbance.

The issue of unexpected inverter disconnection is already addressed through AS/NZS 4777.2:2020, and unexpected inverter responses, such as oscillation, could be identified through type testing. We therefore suggest that these inverter specific power quality issues are addressed directly by AEMO by requiring type testing of inverters, including compliance with AS/NZS 4777.2:2020, at the point of registration. This would provide a minimal barrier to DER participants wanting to provide FCAS services, so long as the registration requirements are clearly defined.

The aggregator response issues identified by AEMO are:

- Behaviour during local distribution network and global power system disturbances posing a risk of under-delivery of FCAS due to inverter requirements, e.g. autonomous reactive power (Volt-Var response) support assisting voltage management in the distribution network prioritised over active power (FCAS response).
- Risks associated with large-scale, rapid active power injection or withdrawal from deeply embedded assets (aggregated to provide FCAS) exceeding the limits of secure distribution network operation limits.

We agree that these issues do warrant concern as penetration increases and that the impact of locally concentrated aggregator responses on the distribution network needs to be carefully managed in general, and not just in relation to providing an FCAS response. Prioritising voltage management in the distribution network over an FCAS response is a risk that the VPP operator should be expected to manage when determining their FCAS bids. Likewise, while the risk of large-scale, rapid active power injection exceeding the limits of secure distribution network operation limits is primarily a DNSP issue,

VPP operators should be expected to take dynamic operation envelopes into account as part of their operation.

We therefore suggest that VPP operators should be responsible for managing these distribution/aggregator power quality issues and risks as part of their operation. Clear rules around the penalties that apply for under-delivery of FCAS would assist VPP operators in implementing an appropriate risk management strategy.

3. Measurement Time Resolution for FCAS Verification and Monitoring Cost

We agree that power system security is paramount and it is important for AEMO to have reliable measurements of the FCAS services provided by DER that enable AEMO to retrospectively verify system operations (up to 20 days later). It is important to note that these measurements are not used in any power system control actions by AEMO (or by the DER) and they only play a strategic role in determining system security. With this in mind it is not apparent that AEMO has taken into account the actual requirements of the contemporary power system in determining an appropriate FCAS measurement resolution requirement for DER. The 50ms requirement is an historical precedent that was instigated at a time when FCAS was provided by a few large generators and DER was not envisaged as a feature of the power system. Given the growth in DER it may be appropriate to consider the impact on measurement resolution requirements which may be different for DER compared to centralised generation due to the differences in system size, location and the effect of system diversity on aggregated DER.

We suggest that AEMO undertake the necessary technical analysis to determine the appropriate resolution required for FCAS measurements. This analysis should consider whether there are different requirements for DER and centralised generation and whether these different requirements could be accommodated in the business processes of AEMO so as to maximise whole-of-system benefits.

The other AEMO concern is that lower sampling rates may result in an overestimation of the volume of FCAS provided which will lead to financial settlement error. The modelling by the University of Melbourne has shown that for a measurement sampling rate of 200ms the overestimation of FCAS delivery is less than 3%. Whilst this may be considered a small decrease in the financial efficiency of the FCAS system, this loss needs to be considered in relation to the overall whole-of-system benefits arising from the participation of DER. The cost of providing 50ms measurements is prohibitively higher than the cost of 200ms measurements and we are concerned that this additional cost will exclude DER, especially smaller systems, from participating in FCAS.

While AEMO cites a cost range from $120 - $15,000 for a compliant meter, lower cost meters need to be considered in terms of reliability as well as their up-front costs. In our experience, quality is a key driver for cost in meters and cheaper and possibly unreliable meters have a significant lifecycle cost (taking into account replacement costs) comparable to higher quality and more expensive meters. A more realistic lower bound for a reasonable quality compliant meter may be in the range of $350-$400. This price does not take into account the potential for additional integration, communications and data storage costs especially where an external meter is required.

Based on information provided in VPP Trial Knowledge Sharing Report #3, the estimated revenue per system per year for FCAS is $200 - $400[1] depending on how the systems were operated. This revenue is typically volatile and in general is expected to decrease as more large-scale batteries and VPPs access the FCAS markets. The additional cost for high speed metering at 50ms, on top of the other

[1] Assuming an average continuous power rating of 5kW per system

costs associated with setting up and running a VPP fleet for FCAS, is likely to severely impact the business case for FCAS using DER (especially smaller systems).

We suggest that AEMO increases the measurement resolution for FCAS verification to 200ms to reduce the cost of compliance for DER. This will not impact on the response from a VPP during an FCAS event as these measurements are used for verification only, not control.

4. Grandfathering Arrangements for Existing VPP Demonstration Sites

The draft determination requires that existing VPP demonstration sites will need to comply with the new MASS requirements by 1 July 2023.

Participants have already invested significant capital to participate in the trial and the change in measurement arrangements will incur further significant cost as each site will require a new meter, plus truck roll/installation. ARENA have acknowledged that a change in measurement resolution will not have any effect on FCAS power delivery, only visibility of the delivery of a response. Given this, the additional cost of compliance, for no change in quality of power delivery, seems like an unnecessary burden for trial participants.

We suggest that, rather than requiring monitoring compliance for existing VPP demonstration participants by a particular date, that meters or inverters are upgraded through the standard replacement and warranty programs to limit additional cost. We also suggest that any additional technical requirements for inverters for participation in the FCAS markets are only applied at the time of registration for FCAS, and not retrospectively applied to registered units.

5. Fees for Registering/De-registering NMIs within a VPP

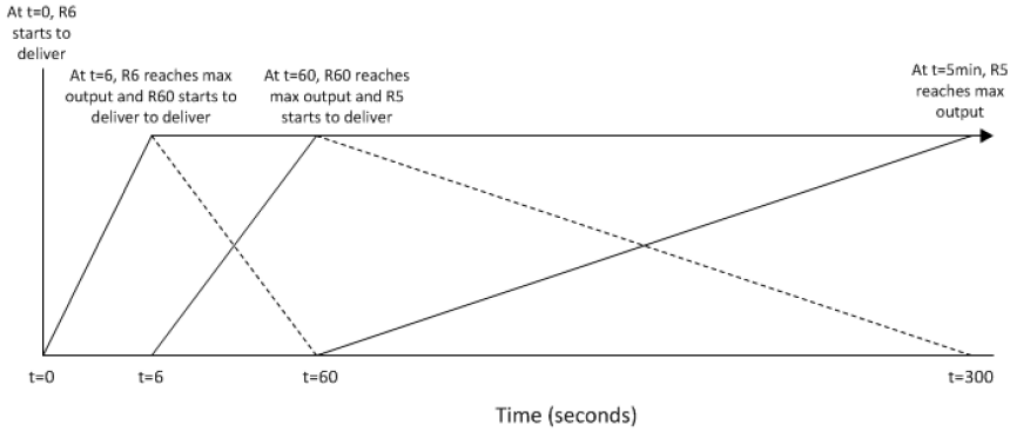
Currently normal market registration fees are incurred by VPPs every time amendment of the portfolio is required (for example for de-registering and re-registering NMIs), with the published market registration fee set at $2,800. While multiple NMIs can be added and removed at a time, this is a significant cost to VPP operators who have little control over customer churn. In addition, this results in less accurate registration information over time as the fee structure encourages operators to batch process any changes.

We suggest that registration fees should only be incurred for a change to a DUID (for example, for an increase in the registered capacity) and not for changes to individual NMIs. The fees should also be cost reflective taking into account the administrative costs required to implement the change rather than charging a standard fee.

6. Clarity of the MASS

The readability and clarity of the draft MASS is significantly improved from the current MASS, however further clarity on the expected response and interaction between the different contingency markets is still required. We suggest that a diagram, similar to that shown below from the AEMC Frequency Control Frameworks Review - Issues Paper, is included along with accompanying text in order to clearly communicate the desired response throughout the response timeframe and in particular the desired response one the maximum output has been reached.

Figure 6.1 Interaction of fast, slow and delayed FCAS services



Source: AEMC Frequency Control Frameworks Review - Issues Paper, Nov 2017

We thank AEMO for the opportunity to provide feedback to this process.

Best regards,

Andrew Mears
Chief Executive Officer