MASS Consultation – Third stage consultation forum

On 8 November 2021, AEMO held a stakeholder forum as part of the third stage of consultation on the amendments to the Market Ancillary Service Specification to provide an opportunity for Q&A and feedback. The forum, held via video link from AEMO's offices, ran from 3:00pm to 4:30pm and was chaired by an independent facilitator, Richard Owens from farrierswier. This document provides a summary of the matters discussed, including views expressed by stakeholders at the forum.

1. Introduction

1.1 Welcome by the Chair

The Chair opened the meeting by noting that the aim of the forum was to discuss AEMO's second draft determination on the MASS, published on 28 October 2021. While the discussion would focus on the sections of the MASS specifically related to Distributed Energy Resources (DER), participants would also have an opportunity to raise questions on other sections of the MASS where additional clarification would be helpful.

The Chair explained that the forum would provide stakeholders with an opportunity to better understand AEMO's second draft determination, the reasons for the positions AEMO took in that determination and how AEMO had responded to initial stakeholder feedback on the first draft determination (published in June 2021). The forum would also give AEMO an opportunity to hear initial feedback on the second draft determination.

The Chair noted that AEMO was particularly interested in questions from stakeholders targeted at parts of the draft determination that were unclear and that would help stakeholders finalise their submissions (due on 18 November 2021). The forum should not, however, be considered a substitute for written submissions.

The Chair provided an overview of the structure of the forum, explaining that there would be Q&A sessions on the key issues outlined in the second draft determination. Many stakeholders had taken the opportunity to submit questions to AEMO in advance of the forum. The Chair noted that these questions would be answered in addition to questions from the floor.

1.2 Welcome by AEMO

AEMO opened by thanking stakeholders for joining the forum and providing AEMO with an opportunity to speak to the outcomes of the second draft determination. AEMO reiterated that the forum was an opportunity for it to explain and further clarify the content of the second draft determination, to help stakeholders finalise their submissions. AEMO encouraged stakeholders to share their views through the formal submission process.

AEMO explained that submissions to the first draft determination had highlighted several areas that required further analysis and consideration. These areas included:

- Sampling rate requirements and the level of error introduced at different sampling rates
- The requirements for measurement location
- Transitional arrangement requirements for the VPP demonstrations projects.

The outcomes of AEMO's additional analysis and consideration in these areas formed the basis of the second draft determination and were the focus of the forum.

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2. Sampling rate

2.1 Presentation from AEMO

AEMO provided an overview of the second draft determination's approach to the minimum sampling rate required for measuring FCAS.

AEMO started the discussion on sampling rate by explaining that the University of Melbourne (UoM) had been commissioned to complete a set of studies to assist AEMO in exploring four key matters. Specifically, AEMO noted the following:

- In relation to whether under-damped oscillatory behaviour could be detected at different sampling rates: the UoM study determined that a 1s sampling rate is not suitable for capturing oscillatory response. The under-damped oscillatory behaviour was able to be identified using measurements of power flow at 100 ms and 200 ms intervals.
- In relation to verification errors associated with a sampling rate of 100ms, 200ms and 1s: While a discount could be applied to manage the verification error for virtual power plants (VPPs) capturing data at 1s intervals, the UoM study confirmed that a sampling rate of 1s would not be adequate to verify the frequency control ancillary services (FCAS) response and behaviour of devices highly sensitive to frequency and voltage changes.
- In relation to whether a discount needs to be applied to the VPP demonstration participants during the VPP transitional arrangements period where a 1s sampling rate applies: Having regard to the number of sites and FCAS capacity of the VPPs participating in the demonstrations, the UoM study showed that a 5 percent discount would be sufficient to offset the verification errors associated with the data captured at 1s intervals.
- In relation to whether a lower sampling rate would allow the inertial component from synchronous generators to be identified and calculated accurately: The UoM study highlighted how significant errors could be introduced where the inertial component is calculated using data at 200ms.

AEMO explained that these results had informed the conclusions set out in the second draft determination – that is, that a sampling rate of 200ms or less would be adequate for aggregated ancillary service facilities with no inertial response. In addition, a 5 percent discount would be required if the number of sites within the aggregate was less than 200.

2.2 Sampling rate Q&A

AEMO received several questions in advance of the forum related to sampling rate. Multiple questions were also raised by stakeholders on this matter during the forum and responded to by AEMO during the forum.

The first question received on notice related to whether 200ms would be sufficient for a site participating in slow and delayed FCAS markets that later decides to add a battery system to enable participation in fast FCAS markets. AEMO explained that if the existing site was classified as an ancillary service generating unit, and the battery is subsequently classified as an ancillary service load, they cannot be aggregated under the same dispatchable unit identifier. However, if the existing site also participates in the fast FCAS markets under the same registration/classification category as the battery and under the same dispatchable unit identifier, 200ms metering may be sufficient for the entire site.

A series of questions from one stakeholder related to the data set relied on by AEMO and the UoM for the sampling rate analysis were also provided on notice. Several related questions were also raised by that stakeholder and one other stakeholder during the forum. Broadly, these questions related to the source of the input data used by UoM and AEMO for their analysis, its suitability for the analysis, whether AEMO requested other stakeholders to provide similar input data, and whether AEMO would be open to rerunning the analysis using different data sets.

In response to the specific questions, AEMO made the following points:

- The data set used by AEMO and the UoM was the same input data used by Tesla in its analysis set out in the application note it submitted to AEMO as part of the Tesla submission to the first draft determination on the MASS.
- The input data was not based on actual metered connection point data for particular devices. Rather, it was the calculated FCAS response based on a proportional controller with a droop of 0.7 percent and the frequency observed during a mainland event.
- AEMO did request data from another stakeholder, but it had been unable to provide the data to AEMO at that time.
- AEMO agreed to consider whether further analysis could be undertaken within the consultation timeframe and, if this was feasible, would give stakeholders an opportunity to provide suitable data.
- The objective of the UoM analysis was to confirm whether the verification error would decrease as more sites were added to a VPP. The objective was not to determine the verification error by trying to characterise the metered response across multiple technology types and battery systems from all manufacturers participating in the FCAS markets. AEMO acknowledges that the error would vary with multiple combinations of DER types. However, irrespective of the technology types, if the sample size is large enough, the UoM analysis shows that the error can be significantly minimised.
- As noted in the roadmap (included as Appendix D of the second draft determination), parallel projects such as Project Match will provide the tools for analysing data from a broad range of providers. AEMO encourages stakeholders with NMI level datasets from DER to participate in Project Match.

The two stakeholders asking these questions felt strongly that the approach taken to the analysis of sample size in the second draft determination was not appropriate or fit-for-purpose. AEMO encouraged stakeholders with concerns about AEMO's data sources and related analysis to share their concerns, and any alternative analysis they had to support an alternative position, in their submissions to the second draft determination.

In addition to the sampling rate, several stakeholders raised questions related to AEMO's analysis and final position on oscillatory response from DER. The first question on notice asked AEMO to explain the reasons behind its conclusion that oscillatory responses from DER inverters was limited to a period of 1Hz - 3Hz.

AEMO clarified that the UoM study was not intended to determine if DER inverters behave in any particular manner. Rather, it was to confirm whether the oscillatory periods previously observed by AEMO could be detected at different sampling rates. AEMO and the UoM had considered the oscillatory behaviour from generators providing FCAS to base the analysis on real-world examples of oscillatory behaviour observed in the NEM. AEMO noted that it had not yet observed an under-damped oscillatory response from a fleet of DER inverters.

Another question on notice asked AEMO to clarify why the 6Hz oscillatory response data shared in Reposit's first submission had not been considered.

AEMO referred to Reposit's note in their formal submission that the hardware had not been included in the supported products list due to its oscillatory response. AEMO took the view that in those circumstances that hardware should not be used to characterise DER response or determine the appropriate sampling rate for an aggregated ancillary service facility. The feedback from the same stakeholder to AEMO was that the oscillatory response from this hardware should not be ignored as others may choose to integrate it in their VPP fleet, and that the oscillatory behaviour from batteries should be considered in the analysis.

While there appeared to be agreement from stakeholders that oscillatory response is something that AEMO needs to be cognisant of, some stakeholders questioned whether a handful of DER devices exhibiting oscillatory responses within a fleet of hundreds or a thousand, would manifest at the fleet level and be detectible by AEMO.

AEMO acknowledged that it was unlikely that a few devices producing an oscillatory response from a large fleet would result in an error that AEMO could measure. Nevertheless, oscillatory responses are something AEMO looks at in many contexts in the NEM, including in the context of power system security. AEMO's objective is to keep oscillatory behaviour at a minimum. Therefore, while this behaviour may not be an issue within a large fleet or where it can be contained within a network, broader issues could surface at the grid level if the behaviour is widespread and/or significant. AEMO noted that oscillatory problems are becoming more prevalent in the NEM and AEMO needs to work to minimise this at all levels.

3. Measurement location

3.1 Presentation from AEMO

AEMO provided an overview of the second draft determination's approach to the measurement location for FCAS delivered by DER.

AEMO explained that it had considered three key matters related to measurement location in its second draft determination:

- Maintaining the ability to detect if FCAS response is negated when BTM devices are not orchestrated in the manner intended by an FCAS provider.
- Ensuring proper orchestration of mixed DER sites after the initial FCAS registration process
- Proposals by some stakeholders that it should specify the location of the FCAS measurement depending on number of controllable BTM devices

Having considered these matters, AEMO concluded that measurement should continue to be captured at or close to the connection point. This would ensure that, irrespective of the number of controllable devices at the time of FCAS registration or later, the FCAS verification process would not be impacted.

AEMO also noted its position that asset level measurements would be considered during investigations into potential non-compliance, and that this was particularly important where mixed DER sites may not have been orchestrated correctly.

3.2 Measurement location Q&A

One question on notice was provided in relation to measurement location. The stakeholder questioned whether measurement at the responsive device, for example a battery inverter, would be considered 'close' to the connection point.

AEMO clarified that local frequency could be measured at the responsive device because it is not impacted by the other BTM devices on site. As part of FCAS assessment during the registration process, participants would be expected to demonstrate that the measurements of power and frequency are provided on a common timescale.

4. VPP transitional arrangements and other DER related issues

4.1 AEMO presentation

AEMO provided an overview of the second draft determination's approach to transitional arrangements for the VPP demonstrations projects.

Based on the analysis competed by UoM, the second draft determination adopted a 5 percent discount for measured fast FCAS delivered during the VPP transitional period, based on the number of sites within each VPP and their respective FCAS capacity.

In addition, the second draft determination confirmed the position that there would be no increases allowed to the registered capacity during the transitional period, and that the transitional arrangements would end in 2023. Participants of the VPP demonstration trial would be provided with information to assist them with this transition.

In terms of the power systems security concerns related to the FCAS provision, AEMO noted these would be addressed outside the MASS framework. The message from many stakeholders who submitted to the first draft determination was that these concerns are not linked to the sampling requirement of the MASS and should be addressed outside the MASS consultation.

AEMO noted that it had shared the schedule of the roadmap with stakeholders (see appendix D of the second draft determination). The roadmap provides an indication of the work intended in the coming months to enable further investigation and collaboration with the industry on the concerns raised in the first draft determination.

4.2 VPP transitional arrangements and other DER issues Q&A

Several questions on the proposed VPP transitional arrangements and other DER issues were provided to AEMO ahead of the forum.

The first question asked whether participants would be provided with templates to guide the use of the RoCoF method for frequency disturbance time (FDT) estimation and time alignment of all device-level measurements, for the purposes of aggregation. AEMO confirmed that it would publish an updated version of the MASS verification tool for stakeholder review. The tool would include the changes proposed under section 6 of the second draft determination, including the trapezoid and RoCoF method. The user guide for the verification tool would also be updated to assist participants.

Stakeholders also questioned whether site, load and solar measurements would still be required during the VPP transitional period. AEMO confirmed that the minimum requirement would be for site measurement, as is the case now. If there is a potential non-compliance issue identified using site measurement, AEMO confirmed it would consider any other data available to the participant to confirm (or otherwise) non-compliance.

In response to a query on the start date of the VPP transitional period, AEMO clarified that the VPP transitional period will start when the revised MASS becomes effective – that is, a minimum of 30 days after it is published. AEMO noted it would specify the exact date in the final determination for the MASS.

In response to a question about customer churn in VPP demonstrations projects, AEMO also clarified that the size limits apply to the maximum registered FCAS capacity rather than specific NMIs.

A stakeholder questioned whether AEMO had considered loosening the accuracy requirements for frequency on the basis that the typical accuracy of energy meters is 0.1Hz and the current requirement for frequency is 0.01Hz. AEMO noted that it had not considered revisiting the accuracy requirements for frequency, noting that VPP trial participants had not raised this as a barrier to entry in FCAS markets and it had not been raised in submissions. AEMO also noted that the frequency dead-bands of proportional FCAS controllers and the trigger settings of switching controllers are specified to 2 decimal places.

In response to a follow-up question about the accuracy of power measurements (as distinct from frequency measurements), AEMO explained that it had asked UoM to investigate the verification error resulting from lowering the accuracy of power measurements from 2 to 4 percent. UoM reported that significant errors would be introduced in the FCAS verification process if the FCAS provider was also responding to energy price signals or providing any other services. Assuming VPPs are likely to explore revenue streams beyond FCAS markets going forward, AEMO did not consider it would be prudent to lower the accuracy requirements for power at this stage. The stakeholder who asked this question responded that the UoM analysis on the 2 or 4% issue was well done, but that the issue may end up not being important given AS 4777 would shortly require the same as the MASS for frequency.

A question was raised around standards for measurement accuracy, particularly for frequency. The stakeholder explained that there are several ways you can determine the accuracy of a power quality meter and while historically AEMO hadn't needed to specify standards because large power stations tended to use similar equipment, this is no longer the case. As different DER incorporates different metering equipment, the stakeholder suggested a standard or methodology to help assess the accuracy of equipment for measurement may be worth considering. AEMO welcomed the comment and noted that it would be useful for this to be included the stakeholder's submission, ideally with some suggestions about how that could be achieved (for example, benchmark or compliance testing).

Concern was expressed by a stakeholder around the UoM analysis and AEMO's decision to include a discount rate set at 5 percent in the VPP transitional arrangements. The stakeholder considered issues with the analysis may have led AEMO to understate the error and asked AEMO whether it would reconsider the discount rate applicable during the VPP transition period if presented with more comprehensive analysis or an improved source data set. AEMO referred to their previous response to the stakeholder questions regarding sampling rate and encouraged stakeholders concerned about AEMO's analysis to set out their concerns in submissions to the second draft determination. AEMO indicated that it would consider the flow-on implications for the discount rate if updated sampling rate analysis showed a materially different level of error.

Another stakeholder asked a further question in relation to the sampling rate issue. Specifically, if further analysis determined an intermediate sampling rate, for example 100ms, was a more technically robust solution, what would the market access implications be? AEMO noted that submissions did not appear to indicate that a difference between 100ms and 200ms would have a material impact on VPP participants, but requested stakeholders to comment if they considered that was not the case.

Finally, one stakeholder questioned why AEMO was pursuing transitional arrangements for VPP trial participants. The stakeholder considered that this was not flagged in the original arrangements for the trial and now risked creating a favoured class of market participants. AEMO explained that it wanted to provide participants in the trial a chance to become MASS compliant. It noted that grandfathered provisions were common in other NEM regulatory requirements and encouraged any concerns to be raised in submissions.

5. General MASS related issues

5.1 Presentation from AEMO

AEMO provided an overview of the second draft determination's approach to the general provisions in section 5 of the MASS.

AEMO noted that there were comparatively less comments on the changes proposed to section 5 in the MASS in the first draft determination and that submissions were mostly supportive of changes. Consequently, no significant changes were proposed between the first and second draft determinations. In summary, AEMO confirmed that the following general amendments would be made to the MASS:

- Further additions to improve readability and clarity.
- Further clarification of MASS references to FOS.
- Requirements for non-frequency responsive facilities clarified.
- Improved guidance on the coordination of different FCAS and Primary Frequency Response (PFR).
- No change to clarification of the relationship between the MASS and other instruments.
- Further refinements to guidance for Regulation FCAS providers.
- No change to deferring changes to Delayed FCAS requirements.
- No material change regarding issues associated with pending rule changes.

AEMO also confirmed that there were several matters that would not be resolved through the MASS consultation this year. As outlined in the first draft determination, these matters included considerations around general limits on FCAS response types, such as ensuring adequate amounts of variable control FCAS, and further changes on delayed FCAS. The roadmap set out in the second draft determination includes working groups where these discussions would be progressed.

5.2 General MASS related issues Q&A

One question was provided on notice to AEMO in relation to general MASS issues. The stakeholder queried whether inertial response would be subtracted from the new 2 second fast frequency response service, given it is currently subtracted from 6 and 60 second contingency FCAS response. AEMO confirmed that its consultation next year would focus on fast frequency response integration, including how it would be defined, for example, 1s, 2s or other.

AEMO noted that two other questions on notice had been received from the same stakeholder, but those questions related to issues that were outside of the scope of the MASS so AEMO would contact the stakeholder directly to discuss them.

6. Next steps

6.1 Frequency control

AEMO provided an overview of related work AEMO is undertaking on frequency issues.

AEMO noted the considerable number of rule changes related to frequency that have been or are currently being progressed and which would likely impact the MASS. Specifically, AEMO noted the following:

- The fast frequency response market ancillary service rule change - A new rule was made this year requiring AEMO to implement a fast frequency response (FFR) market. A critical part of this work would be defining the FFR market. AEMO noted that it intends to undertake a substantial review in line with the new rules.
- The Integrating Energy Storage rule change – AEMO noted that the changes proposed by this rule change (currently being progressed by the AEMC) would have a significant impact on the MASS.
- Primary frequency response incentive arrangements - AEMO also noted that the changes proposed in respect of incentive mechanisms for PFR (currently being progressed by the AEMC) would also likely require a fairly substantial process of consultation with the market to consider impacts on the MASS.

In addition, AEMO noted that there are several other frequency related issues are on the horizon. AEMO noted that its quarterly frequency report will be published next week outlining the considerable work AEMO is doing in this space.

6.2 DER Update

AEMO provided an overview of related work being undertaken on DER issues.

AEMO explained that, in respect of DER, AEMO's focus going forward would largely be on the Energy Security Board's DER implementation plan. In particular, AEMO would be thinking about dynamic operating envelope, including normal run and coping with minimum demand. AEMO also confirmed it is working with DNSPs to develop local services to help optimise distribution networks and is also undertaking work in relation to the integration of electric vehicles into the NEM and WEM.

7. Close

The Chair thanked stakeholders for their participation in the forum. The Chair noted that a summary of the key issues and feedback from the forum would be published on AEMO's website. The Chair reiterated that AEMO encourages stakeholders to provide written submissions to the second draft determination, which are due by 18 November 2021.