

Level 1, 165 Cremorne Street
Richmond
VIC 3121

Australian Energy Market Operator
Via email: mass.consultation@aemo.com.au

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AEMO MASS Consultation – Energy Locals response – updated August 2021

We appreciate the opportunity to comment on the ongoing Market Ancillary Service Specification (MASS) consultation.

Energy Locals exists to contribute to the transition to a cleaner energy system in which customers are more in control of the source and cost of the power they need. Launched in 2017, Energy Locals supports a range of storage propositions that make the adoption of battery storage easier for customers. In conjunction with Tesla, Energy Locals was the first participant in AEMO's VPP Trial. Energy Locals' majority shareholder is Quinbrook Infrastructure Partners, a renewable energy investor with assets in Australia, UK and US.

Executive Summary

Energy Locals has enjoyed playing a part in the SA VPP as part of AEMO's innovative VPP Demonstration project. We believe the program has been a huge success in terms of proving the practical, real-world potential of VPPs in a full operational and commercial setting. The program is leading edge not just in an Australian context, but globally.

We have appreciated AEMO's support throughout the process and AEMO's willingness to pursue practical approaches to testing new technology in furtherance of the energy transition. We believe that the VPP Demonstration project provides a catalyst to evolving the NEM regulatory and operational arrangements so that these benefits can be achieved at scale.

There are four key issues relating to AEMO's draft decision on the MASS where we believe an alternative approach is preferable:

1. Measurement location. As has been demonstrated through the AEMO VPP Trial, we argue that device-level metering allocates risk to where it is best managed. This also reduces barriers to entry and improves business model innovation. With better customer uptake of innovative energy storage propositions, AEMO would naturally have more FCAS supply at its disposal, reducing the system costs. These outcomes are consistent with the NEO.
2. Metering frequency. We believe there would be benefits consistent with the NEO and limited risk to system security if FCAS metering resolution is reduced. If AEMO does not pursue this approach, we propose that AEMO's transitional arrangements for VPPs be made permanent and apply to all market participants.
3. Transitional arrangements. We believe that if the transitional arrangements are not made permanent as discussed in point 2, they should be made permanent for existing VPP Demonstration participants.

4. Service prioritisation. We believe there is ambiguity in the proposed changes to sections 2.2 and 10.3 of the draft MASS and that this should be reviewed in the final determination.

The remainder of this paper covers these issues in more detail.

Measurement location

We disagree that device level measurement is inconsistent with the NEO.

The issue relates to the proper allocation of risk for behind the meter FCAS resources which share a common meter with other uncontrollable generation or load resources (solar PV or onsite load respectively).

Without FCAS resource, customers with load and no FCAS assets will contribute to system level demand fluctuations. FCAS will be procured at the system level with the cost recovered proportionally from load.

With FCAS resource, load variations will still occur and be managed at the system level. More FCAS-enabled storage naturally provides greater supply of FCAS services, thus reducing the overall system cost (consistent with the NEO). However, requiring the storage device to also manage behind the meter demand will be inefficient as the storage needs to manage local variations in load which would cancel out wholly or partially at the system level.

This treatment creates several issues which we believe are inconsistent with the NEO.

AEMO's proposed approach requires the FCAS operator to also manage all other generation and load behind the meter and we're not sure the implications of this for customers and operators are fully understood.

The draft determination could effectively end the new business models that have been warmly received by customers, create barriers to the uptake of new technology, and reduce or delay the deployment of FCAS – with knock on impacts to system security and the objective of lower cost. These outcomes are in direct conflict with the NEO.

The AEMC states that successful application of the NEO “considers the prospects for having the right mix of resources, to produce the maximum amount for the minimum cost, over time. Such markets are characterized where there are no barriers to innovation, the exit of technology or the uptake of new technology and efficient long-term investment.”¹

AEMO's determination imposes significant barriers to innovation in conflict with the NEO.

Furthermore, the AEMC states that when applying the NEO “Risks should be allocated to those best placed to manage them”². Behind the meter FCAS resources are not best placed to manage uncontrollable variations in the output or consumption of local generation and load.

Fluctuations in supply and demand are best managed at the system level where aggregation cancels out many of the fluctuations at more localised levels of the market. Allocating risks to FCAS resource operators

¹ AEMC, Applying the energy market objectives, 8 July 2019, p12.

² AEMC, Applying the energy market objectives, 8 July 2019, p14.

simply because they share a meter with other assets does not allocate risks to those best able to manage them. AEMO's determination is therefore in conflict with the NEO.

Requiring FCAS resources that share a meter to meet unique conditions creates an unlevel playing field for those resources, reducing competition – especially between different behind the meter FCAS resources. Two identical assets, with the same technical ability to provide FCAS services, would be treated materially differently from a market perspective if the metering requirements in the draft determination are to stand.

We believe that AEMO's draft determination is not only inconsistent with the NEO but inconsistent with AEMO's own stated position on related issues. As part of its 2020 Renewable Integration Study AEMO surveyed all DNSPs and found:

“very little direct monitoring of DER generation output. Net metering arrangements mean that only the total site is monitored”³

AEMO concluded:

“This limited visibility makes it difficult for DNSPs to quantify the secure technical operating envelope of their LV networks, necessary to determine where constraints exist or where they are likely to develop in the future.”⁴

Given the draft determination requires measurement only at the meter, the problems previously documented by AEMO will be compounded as more behind the meter assets are deployed.

AEMO has also previously stated that it:

“... considers that it is no longer appropriate to base performance standards on the registered participant category as we are expecting to see more ESS and ‘hybrid’ facilities. A registered participant's performance standard should be based on its assets.”⁵

We agree with this conclusion with regard to performance standards. Adherence to FCAS enablement targets is one element of such performance standards, creating an inconsistency with the MASS.

AEMO's draft determination is inconsistent with the ESB's NEM2025 reform objectives, which have a core workstream dedicated to developing two-sided markets. The ESB has set the objective goals of “enabling access to products and services that innovation offers”⁶ and “integrating flexible DER and demand-based assets into the market at all levels”⁷.

Updating the MASS to allow device level metering is, in a number of cases, a necessary pre-condition to aggregators being able to offer innovative services to customers.

³ AEMO, Renewable Integration Study, Appendix A – Distributed Solar PV, May 2020, p25.

⁴ AEMO, Renewable Integration Study, Appendix A – Distributed Solar PV, May 2020, p25.

⁵ AEMO, Integrating ESS into the NEM, August 2019, p18.

⁶ ESB, Post 2025 Market Design Options – A paper for consultation Part A, April 2020, p55.

⁷ ESB, Post 2025 Market Design Options – A paper for consultation Part A, April 2020, p55.

The ESB also states that “DNSPs need visibility of DER to manage the variability of energy production and system security within their operating limits and facilitate wholesale market integration of aggregated DER resources.”⁸

Updating the MASS to allow device level metering for the provision of FCAS services is consistent with these objectives and the wider NEM2025 reform.

Recommendation

Our recommendation is that the MASS is updated to require measurement at the inverter or controllable asset (AEMO’s Measurement Location Option 2⁹). We do not believe this would exclude any existing business models and would reduce barriers to entry, increase business model innovation and FCAS supply, and ultimately reduce system costs and prices to customers while improving the long-term efficiency of the NEM consistent with the NEO.

Alternatively, connection point metering could remain the default approach with device level metering allowed wherever qualifying measurement equipment is installed to ensure the same beneficial outcomes can be captured. This approach would be less interventionist but may result in reduced system visibility on the margin compared to our preferred approach (but significantly higher visibility compared to AEMO’s draft determination).

Metering Frequency

AEMO has concluded:

“... that it is not appropriate to change the measurement resolution for Fast FCAS.

While changing the measurement time resolution requirement to 1s may increase competition in the short term, any issues this could create for the Fast FCAS markets would not promote the NEO.

While measurement resolution of 100/200ms along with changes to the FCAS assessment methodology may present a reasonable compromise, it is anticipated that in the time required to assess and confirm whether this is the case, advances in high-speed metering will reduce this as a barrier to entry.

Notwithstanding the potential pathway AEMO has identified to address the errors associated with a lower data time resolution, 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.”¹⁰

System security concerns

⁸ ESB, Post 2025 Market Design Options – A paper for consultation Part A, April 2020, p57.

⁹ AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p8.

¹⁰ AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p19-20.

We don't believe AEMO's stated concerns about metering resolution relating to system security are supported by the evidence presented to date. AEMO does not use high speed metering data as part of real-time operation and monitoring. The Draft MASS requires that Ancillary Service Facilities transmit real-time data via SCADA "every 4 seconds to AEMO via SCADA and with no greater than 8 seconds latency"¹¹. As such, measuring FCAS resources on a 50ms, 100ms or 1s basis does not impact the real-time data sent to AEMO on a 4s basis and therefore cannot impact AEMO's ability to monitor and manage system security in real-time.

High speed metering data at FCAS resources is used for ex post analysis, especially around major events. A move to 100ms or 1s basis may limit the ability to analyse ex post outcomes on a sub-second basis to some degree. We note that where major incident reports do focus on high-speed data (50ms or less) the focus is typically system frequency and interconnector flows which would still be fully available to AEMO as would high speed data from transmission and distribution operators. AEMO does not explicitly highlight this as a risk and we would be interested to understand AEMO's view on how a different metering basis may impact its ability to conduct ex post event analysis now and in future with greater levels of DER penetration.

AEMO does raise several risks in the MASS draft determination relating to "DER inverter behaviour" such as: unexpected disconnection due to a local network fault; behaviour during local distribution network and global power system disturbances posing a risk of under-delivery of FCAS due to inverter requirements; large-scale, rapid active power injection or withdrawal ... exceeding [operational] limits. These issues are analysed in a supporting report (DER Behaviour Report).¹² It does not appear that the analysis of any of these issues or the proposed solutions depend on 50ms metering of FCAS resources. The DER Behaviour Report uses high speed data (which appears to be 5ms or 10ms resolution) as part of its analysis, however this data is from distribution feeders, not specific DER assets, and in any case is higher resolution than the proposed MASS standard. There is no mention in the DER Behaviour Report of FCAS metering speed requirements in the MASS.

AEMO does raise another risk in the MASS report:

"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."¹³

AEMO recommends a potential action to "maintain the 50 ms measurement resolution requirement in the MASS in order to identify phenomena such as oscillatory responses".¹⁴ This issue is not covered in any of the referenced reports and we are interested to understand the basis of AEMO's concerns and to have access to the supporting analysis informing their position as has been provided with the other issues. We suggest that even if this issue were to manifest:

¹¹ AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p22.

¹² AEMO, Behaviour of distributed resources during power system disturbances, May 2021.

¹³ AEMO, AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p18.

¹⁴ Ibid.

- The issue could be analysed in the field in the same manner as the issues covered by the DER Behaviour Report – namely using distribution feeder level high speed data. It seems unlikely that AEMO would need individual device data to analyse a sub-second oscillatory issue at the distribution system level.
- Individual devices could be analysed on the bench using high speed measurement.
- Specific, not all, devices could be analysis in the field using high speed measurement.

Finally, AEMO states that it is “critical that the Fast FCAS response from proportional or switching FCAS controllers can be verified over the first 6s of a frequency disturbance”¹⁵. We agree. However, as noted above, AEMO only monitors the system on a 4s basis in real-time, so this is not a real-time operational requirement. We also note that even 1s metering resolution would allow AEMO to confirm ex post that a given FCAS resource was responding across the 6 seconds after a frequency disturbance as opposed to ramping to full response at the very end of the 6 second response period.

We do not believe AEMO has made the case that system security requires all individual FCAS resources to record high speed measurement at all times when this data is only used on an ex post basis in highly limited circumstances.

Consistency with the NEO

AEMO states that “changing the measurement time resolution requirement to 1s may increase competition in the short term, the distortionary impact on the Fast FCAS markets does not promote the NEO.”¹⁶

As outlined above, we do not believe AEMO has made the case that there is in fact a “distortionary impact on the Fast FCAS markets” related to any change in metering resolution. AEMO’s ability to safely and securely operate the system in real-time is not contingent on metering resolution below 4s (the resolution of SCADA monitoring). AEMO’s ability to analyse the system ex post gives access to many other resources (such 10ms distribution feeder data) and could be complemented by benchtesting and field testing of specific, not all, devices.

Putting aside these system security concerns, we agree with AEMO that these is likely to be an “increase competition in the short term” for similar reasons to those outlined with regard to the metering location issue. Moving to a lower metering resolution would likely:

- reduce barriers to entry and innovation; and,
- increase supply of FCAS resources, resulting in reduced system costs.

This would reduce prices to consumers both short-term and long-term and result in a more efficient market consistent with the NEO.

Settlement accuracy

AEMO’s final concern relates to measurement error for the purpose of determining procurement quantities and in settlement. We believe this issue is overblown and can largely be managed by altering the MASS to a compromise metering resolution and adopting the trapezoidal rule for calculating quantities.

¹⁵ AEMO, AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p14.

¹⁶ AEMO, Amendment of the Market Ancillary Service Specification – DER and General Consultation, 14 June 2014, p20.

AEMO states “While measurement resolution of 100/200ms and changes to the FCAS assessment methodology may present a reasonable compromise, it is anticipated that in the time required to assess and confirm whether this is the case, advances in high speed metering will reduce this as a barrier to entry”. We believe 100/200ms metering resolution is a reasonable compromise, and that given the results of the VPP Demonstrator projects there is ample evidence that this will work in practice. We also believe that moving to 100/200ms will ensure barriers to entry are reduced. In our experience there are many cost-effective metering solutions even at 100ms but this reduces significantly at 50ms for small scale devices and usually involves secondary costs beyond the unit cost of the meter (e.g. expensive annual subscriptions for meter reading platforms).

Recommendation

Our preferred position is that the MASS is updated to require measurement on less than or equal to 200ms and that the trapezoidal measurement rule is adopted. 200ms with the trapezoidal rule strikes the right trade-off between the short-term benefits highlighted by AEMO, the wider benefits under the NEO identified in this submission and manages metering accuracy.

Alternatively, we would suggest that the transitional arrangements proposed by AEMO (MASS, Section 11.3) for the VPP Demonstrators are made permanent and opened to all participants.

Transitional arrangements

Subject to any changes to AEMO’s determination on metering frequency, we propose that the transitional arrangements proposed by AEMO (MASS, Section 11.3) for the VPP Demonstrators are made permanent and opened to all participants, or at least be made permanent for existing participants. This would be on the basis of the considerable time and expense provided as part of the demonstrators which is at risk of non-recovery in the event there are requirements to change metering arrangements and incur additional costs.

Ambiguity on service prioritisation

We believe that a combination of proposed MASS changes create unnecessary ambiguity regarding the priority of response across the Primary Frequency Response (PFR) and FCAS services.

Changes to MASS, Sections 2.2 and 10.3 appear to conflict. Section 2.2 includes a requirement to adhere to AGC unless otherwise advised by AEMO. We note AGC instructions are provided with 4s latency.

This would therefore introduce circumstances where responding to AGC (with a 4s delay) exacerbates a real-time frequency event (which has changed dynamically within the 4s delay). Changes to MASS, Section 10.3 outline an unclear process by which Contingency and PFR responses are aggregated with AGC requests. The MASS states “Occasionally, the direction of the Contingency FCAS or PFR response may oppose the AGC request; this is not unexpected.”¹⁷

¹⁷ AEMO, Market Ancillary Service Specification Draft Determination Version, June 2021, p22.

We are unclear on the outcome that AEMO is trying to achieve with changes to sections 2.2 and 10.3 of the Draft MASS. We further suggest that the proposal could be refined further to remove ambiguity.

Recommendation

We recommend AEMO explain its objectives and revise its proposed changes to clearly achieve those objectives.

Conclusion

We've enjoyed participating in the VPP Trial with AEMO and demonstrating the value that VPPs can deliver to both customers and the energy system. We look forward to an Australian energy market that continues to support vibrant clean energy innovation rather than one that reverts to the status quo.

Yours faithfully,



Adrian Merrick
Founder & CEO
Energy Locals