



Australian Energy Market Operator
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15 November 2021

Subject: Third Stage Consultation - Amendment of the Market Ancillary Service Specification – DER & General Consultation Draft Report and Determination

Thank you for the opportunity to comment on the 2nd published Draft Determination of the Market Ancillary Service Specification (MASS) Version 6.2.

We have significant concerns with respect to the process, transparency, technical evaluation, and applied governance procedures that guided AEMO in arriving at the latest draft of the MASS determination, with our concerns extending to how the decisions were informed by the new UOM report / findings. As such, we cannot support the conclusions adopted by AEMO that have informed the current MASS draft determination.

We have provided further details of our concerns and follow-on recommendations in our detailed response below.

This response is a joint response on behalf of both Rheem Australia Pty Ltd (RAPL) and Combined Energy Technologies Pty Ltd (CET), as we are technology partners in the DER market. Our views and recommendations detailed in this response relate specifically to the emergent control and orchestration of mixed DER sites, and importantly their participation in the Contingency FCAS market.

As the largest Australian manufacturer of water heaters, Rheem markets a wide range of solar, heat pump, high efficiency gas and electric water heater models to the domestic water heating market. Our brands include Rheem, Solahart, Vulcan and Aquamax. Additionally, we are now the number three supplier of photovoltaic (PV) systems in the country via our Solahart channel. Over the last three years we have also commenced the manufacture and installation of smart electric water heaters, controlled remotely by our technology partner, CET.

Combined Energy Technologies (CET) is an Australian technology company specialising in energy management for residential, commercial, and micro grid systems. CET has extensive experience in the integration and orchestration of systems with multiple DER devices including the integration of solar PV, batteries, water heating, electric vehicle chargers, pool pumps and A/C for the benefit of the homeowner, retailer and the grid.

Today Rheem has products in over 4 million Australian homes. Together, Rheem and CET are already actively participating in the emerging DER market with thousands of online, mixed, orchestrated DER sites (Solar PV, batteries, smart water heaters, HVAC, pool pumps, EV chargers, other loads) across the NEM and the WEM. Over the past 8 years we have identified and resolved many issues (at live field sites) regarding the orchestration of mixed, smart DER sites to achieve the best financial outcomes for consumers, whilst providing a foundation for grid support services such as Contingency FCAS.

This experience has given us a unique insight into the development and potential for the emerging new energy market. It is our belief that whilst batteries will be an essential component of the future grid, the cost of these devices will limit the speed of their uptake. We therefore would encourage the market operator to look beyond storage batteries and to support the uptake of affordable, equitable, smart DER solutions that will enable ubiquitous consumer participation in grid services. By doing so AEMO would increase the opportunity for consumer participation in the future energy market, not just by those that can afford batteries and solar PV, but also across a far greater socio-economic spectrum.

If the energy market is to be truly democratised, it is extremely important that any changes to market rules and associated technical specifications for participation in grid services (such as FCAS) are made with the consumer at the centre of the solution. This will ensure that current and future investment in smart DER by households continues to be made. Fundamental to this approach will be that new rules do not favour a particular technology, technology class, or technology manufacturer, and that technology neutrality is not impeded by barriers to entry in creating or modifying energy market rules.

Our specific responses to the Second Draft Determination are underpinned by this approach. Our experience and recommendations are supported by empirical data from an existing fleet of thousands of NEM consumer sites of mixed DER. The data from these sites support our technical, architectural and commercial conclusions which are in alignment with the principles of the National Electricity Objective (NEO).

In summary we have not changed our views from our previous submission and support the DER related recommendations in the First Draft Determination, in particular:

That current measurement specification requirements should remain unchanged

Whilst we are aware that any decision to leave measurement specification requirements in place may have a commercial impact on some market participants, consideration should also be given to those participants that have invested in metering solutions that are compliant with the current MASS. Rheem/CET believes that, if there is negligible cost imposition (as we have shown) in the procurement of MASS compliant metering, then it is appropriate for AEMO to reject any relaxation of the current MASS specifications.

We additionally support the **original** University of Melbourne report's findings that it is prudent to avoid diluting the metering specification, as this may erode the potential value of FCAS services provided by DER as it reaches scale. We however **do not** support the latest report / findings of the University of Melbourne, as detailed below, due to our primary concerns around the data set used and analysis methodology, amongst other concerns.



That there is no significant cost impediment to requiring power metering capable of measuring power flow and local frequency at intervals of 50ms or less at every site (NMI)

CET have a MASS compliant meter (6 Channels, 3 CT's supplied + option for an extra 3 CT's) available at a wholesale price of AU\$385 (ex GST). We hope to reduce this cost in Q1 2022 when the impact of global Integrated Circuit production shortages is addressed. As a result, we do not believe that there are impediments to maintaining the current specifications to measure power flow and local frequency at intervals of 50ms or less at every site NMI - i.e. at the site connection point.

We remain open to commercial discussions with any party that is having difficulties designing or procuring cost effective MASS compliant metering solutions. To this end we again wish to advise that CET contacted the Clean Energy Council (3rd August) with details of their low cost meter, with an offer to supply any members interested in purchasing the same.

Rheem/CET are also aware that other Australian companies have similar cost-effective power metering technologies available that comply with the current requirement to measure power flow and local frequency at intervals of 50ms or less at every site NMI.

That net metering (connection point metering per NMI) must be a requirement of the MASS for DER participation in the delivery of Contingency FCAS to support mixed DER sites

We support AEMO's position to retain NMI level metering i.e. to measure the grid connection point net active power response. This aligns with our March submission that Net metering (connection point metering per NMI) must be a requirement of the MASS for DER participation in the delivery of Contingency FCAS to support mixed DER sites.

This approach to NMI level metering also has broad industry support, e.g. the ESB Post 2025 review in respect to DER site level interoperability and the ARENA sponsored DEIP interoperability forum.

As we are aware that the requirement for NMI level metering may create issues for some Demonstration VPP fleet owners, Rheem/CET is happy to offer to help them to make their fleets compliant, at a relatively low cost and with reasonable commercial terms.

We also refer to the June 23rd AEMO consultation which included the following "question on notice":

"Noting that the measurement location concerns primarily seem to be around more than one device providing FCAS at the same location, is AEMO willing to consider further optionality where device or grid flow data is allowed (with grid flow data required for sites with more than 1 FCAS enabled device, and all other sites having the option)?"

The underlying assumption behind this question is that all household DER is installed simultaneously. The reality is that consumers will often install a PV system first, and then add other DER over time. To mitigate the cost to the consumer of multiple meters and meter redundancy, it is important to mandate accessible NMI level metering with the installation of the first item of DER.



With the imminent introduction and broad adoption of Dynamic Operating Envelopes (DOE) across the NEM and WEM, it is even more critical to enable any households with DER with NMI level metering. This will be the most efficient way to secure the grid through the energy transition with as many households able to provide effective grid services such as DOE and FCAS, utilising all of the available DER within the household and avoiding both hardware (device level meters) redundancy and individual DER within the home negating FCAS responses from other DER within the same home.

Concluding remarks:

Taking into consideration the issues that we have raised in our response, we do not see how a fair, technically accurate, and open due process can occur to inform a final determination of the MASS under the timeline and conditions currently stated by AEMO.

Further, with the wide variation in DER types, combined with the considerable and unknown variation in responses due to functional, operational and status conditions of DER that is available now, and in the future, we believe a prudent and responsible approach by AEMO would be to maintain accurate metrology and sampling (i.e. the current MASS) until such time as better characterisation is available from large and diverse deployments of DER to better inform any changes (if required) to the MASS.

As such we believe that the MASS determination should be put on hold (i.e., The current MASS retained) until such time as the issues raised and the recommendations made by ourselves and many other stakeholders can be fully explored.

Finally, we would welcome involvement in a Consultative Forum as proposed by AEMO as a means of engaging stakeholders and better informing AEMO in its deliberative processes.

As this submission has been prepared using the expertise of a number of Rheem and CET personnel, I would ask that any enquiries related to the submission are directed in the first instance to myself. I will then co-ordinate follow up responses to your enquiries or further meetings with the appropriate personnel within our organisations.

Yours Sincerely

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Specific comments to the Second Draft Determination:

THIRD STAGE CONSULTATION – AMENDMENT OF THE MARKET ANCILLARY SERVICE SPECIFICATION – DER AND GENERAL CONSULTATION

1) Process and transparency:

Having considered the AEMO notice of “Third Stage Consultation – Amendment of the market ancillary service specification – DER and General Consultation”, AND having attended the “MASS Consultation Stakeholder Forum” - third stage, on Monday November 8th 2021 we wish to raise the following technical and process/governance related concerns:

- That the conclusions and recommendations informing the second draft determination have come from a single source of data and a single VPP trialist.
- That only one vendor was approached for data.
- That the data represents only one class/type of DER asset, i.e. BESS.
- That the single source of data is derived from lab tests on a single BESS.
- That the single BESS test has been used in the creation of 1,000 points of simulated connection point responses.
- That a subjective artificial error was injected to produce the data for 1,000 NMI simulated connection point responses and that a normal distribution was applied, the results of which we contend is not reflective of real field data.
- That the simulated data (as provided by AEMO to UOM) was the basis of the further analysis carried out by UOM, which then formed the recommendations for the “minimum measurement time for Fast FCAS providers” based on the “calculated” error, and as the data was lab produced, and the error was injected into a normalised distribution, then there was no other result that UOM could obtain than a finding consistent with the “calculated” error, being the same as that which was injected into the sample BESS in the laboratory.
- That during the third stage MASS Consultation Forum on Monday November 8th, AEMO disclosed that some VPP vendors were unable to meet a 100ms measurement sampling accuracy. As such we are concerned as to what part this issue may have played in informing the second draft determination i.e., to propose a relaxation of the current MASS to allow for a 200ms sampling window.
- That there are NEO implications within the process adopted by AEMO, including questions around data source, vendor independence, governance, interoperability etc, that have informed the processes and outcomes at AEMO in arriving at the second draft determination.

2) Experience and observations specific to deployed DER assets and associated metrology:

As stated, we have thousands of mixed DER sites across the NEM and WEM. Whilst we are yet to enter the Fast FCAS market, we offer the following observations backed by our experience:

DER deployed asset and metrology experience:

- Our capabilities include the design and mass rollout of our MASS compliant (50ms) metering at thousands of mixed DER sites. We again wish to note that in our previous



response we stated “*CET has a MASS compliant meter (6 Channels, 3 CT’s supplied + option for an extra 3 CT’s) available at a wholesale price of AU\$385 (ex GST). We hope to reduce this cost in 2022 when the impact of global Integrated Circuit production shortages is overcome. As a result, we do not believe that there are impediments to maintaining the current specifications to measure power flow and local frequency at intervals of 50ms or less at every site NMI - i.e. at the site connection point.*”

- Our experience beyond simple BESS DER extends to multiple brands of inverter, BESS, EV smart chargers, smart hot water systems, HVAC, pool pumps, heat pumps and other DER.

Observations based on our deployed DER assets:

- Our experience and empirical data from MASS compliant metering (from all our DER sites) concludes that there are significant variations in DER response, not only across different DER asset classes (BESS, smart water heaters etc.), but also across individual assets of the same class deployed in the field.
- Our observations are that the response from inverter based DER assets varies significantly in the field such that only high-speed metrology (50ms preferred) can accurately capture the response and faithfully determine the energy delivered in a response to a Fast FCAS contingency event.
- Our observations are that the response of inverter-based technology is affected by temperature, BESS charge state, firmware version and local voltage, and that 200ms metering does not capture the resulting response which may include lag and oscillation of the energy supplied as compared with the results compiled from the laboratory testing of a single/small sample of a particular DER.

3) Recommendations and comments - process, transparency, interoperability, governance and technical.

Based on our experience of managing and observing a large number of mixed DER sites (as detailed above) we offer the following comments and recommendations:

Recommendations - process, transparency, interoperability and governance

- That vendor independence and transparency form the basis of further required MASS determination processes and testing, to be underpinned by independently audited governance processes in arriving at a final draft determination.
- In our previous responses we provided an overview of our MASS compliant metering solution and associated pricing. We note that whilst a number of respondents were made aware of our metering solution offering, there continues to be wild and unsubstantiated varying cost estimates put forward as to ongoing costs associated with providing MASS compliant metering at new DER sites, and costs associated with upgrades to metering at VPP sites that cannot meet the current MASS (50ms) requirement. Further, there were particularly concerning representations made for the installation component of MASS compliant metering on both single and three phase sites with some estimates in the thousands of dollars. We wish to raise that we are in receipt of a quotation clarifying the installation costs for metering solutions that was provided to both AEMO and the



CEC by a Tier 1 installer of DER solutions, Service Plus Australia, during the previous consultation process. However, we can find no reference to the quotation in the Second Draft Determination. That quotation clarified the installation costs of both MASS Compliant and non-MASS Compliant Metering across single and multiphase sites. The Service Plus quotation confirmed that across thousands of sites the average installation costs for existing sites (i.e. a metering upgrade) were between \$250 and \$350 for single phase and \$350 and \$ 450 for three phase sites. On new sites (i.e. metering installed at the same time as a Solar PV or BESS installation) prices could be reduced by \$100.

- We are aware that AEMO has previously indicated behind the meter DER interoperability is not within the scope of the MASS review. However, as it relates directly to the costs incurred by consumers, the representations of metering / metering installation costs made by respondents to participate in VPP's, AND this directly relates to the assessment of DER VPP solutions under the NEO, we wish to make the following observations for AEMO's consideration:
 - It is our experience having integrated and orchestrated thousands of DER sites with multiple DER types (inclusive of multiple BESS DER solutions) that those that support open, local, standards based connectivity afford consumers the best pricing, and the best connectivity orchestration options with other DER. This approach is consistent with ARENA's DEIP program (including the DER Interoperability and DER Dynamic Operating Envelopes (DOE) working groups), and the ESB / energy market regulators' desires for a future fully integrated open source 2-sided market.
 - Further we fully support the ANU led, Australian IEEE2030.5 working group which has developed the Australian IEEE2030.5 Implementation Guide, now in the Standards Australia processes.
 - We would contend that outcomes of the MASS would be better aligned with the NEO should Fast FCAS MASS solutions support a mix and match of DER type with MASS compliant metrology. As open connectivity would also enable Home Energy Management Systems (HEMS) orchestration all DER types behind the meter, AEMO's support would thus enhance grid security of supply.
 - We believe that open, standards based local control and interoperability behind the meter is absolutely necessary to a secure grid. Hence the requirement for Fast FCAS DER to support full local (at the Customer site) behind the connection point interoperability is in our opinion in line with testing a MASS Fast FCAS solution against the NEO.

Recommendations - Technical

- That the type and diversity of DER data sets that can increase the accuracy of Fast FCAS response be expanded to include other (than BESS) types of DER and be tested in parallel with metrology compliant with the current MASS. Such testing to be independently overseen.
- That such testing can be undertaken in a laboratory but the results must be confirmed via a statistically valid set of DER in a diversity of field locations – again with parallel



- metrology (to MASS compliance) confirming or otherwise the resultant response and the data gathered. Such testing and data to be independently overseen and verified.
- That Metrology be separately certified for MASS participation and that injection testing responses take into account accuracy of metrology in determination of a graded scale of payments (discount) that is applied based on the determined error should there be any future allowed deviation from the 50ms measurement accuracy requirement of the current MASS.
 - Metrology location: - As we have stated in our previous responses, the location of metrology should be maintained at or near to the connection point. That is, device level metering for the purposes of Fast FCAS should be precluded for reasons we have given previously in support of mixed DER sites. Again, we support AEMO's position to retain NMI level metering i.e. to measure the grid connection point net active power response. This also aligns with our March submission that Net metering (connection point metering per NMI) must be a requirement of the MASS for DER participation in the delivery of Contingency FCAS to support mixed DER sites. This approach to NMI level metering also has broad industry support, e.g. the ESB Post 2025 review in respect to DER site level interoperability and the ARENA sponsored DEIP interoperability forum.
 - For any data to be useful, it is critically important that the frequency monitoring meets the MASS specifications and that the power measurements and frequency monitoring are aligned. ***Given the frequency requirements of the MASS are not changing it will be incumbent upon the system providers to prove that the frequency monitoring and power measurements are aligned.*** If power metering is carried out at the connection point, as recommended by AEMO, but frequency monitoring is carried out at the DER, then it is essential that ***both the power metering device and the DER device both meet the MASS specification for frequency monitoring.***

Concluding remarks:

Taking into consideration the issues that we have raised in our response, we do not see how a fair, technically accurate, and open due process to inform a final determination of the MASS can occur under the timeline and conditions currently stated by AEMO.

Given the wide variation in DER types and the considerable and unknown variation in responses due to functional, operational and status conditions of DER that are available now or likely to be in the future, we believe a prudent and responsible approach by AEMO would be to maintain accurate metrology and sampling (i.e. the current MASS) until such time as better characterisation is available from a large number of diverse deployments of DER.

As such we believe that the MASS determination should be put on hold, with the current MASS being retained, until such time as the issues raised and the recommendations made can be fully explored.

Finally, we would welcome involvement in a Consultative Forum as proposed by AEMO as a means of engaging stakeholders and better informing AEMO in its deliberative processes.

