11/3/2021

To: AEMO MASS Consultation
Attn: Laura Walsh (by email: mass.consultation@aemo.com.au)

Re: Response to DER MASS review

Laura,

AEMO has recently proposed a change to the MASS with respect to DER participation. The proposed changes affect DERs under 1MW in size, and offers a technical pathway to contingency FCAS participation that is intended to relax the metering requirements associated and accordingly to increase market access.

It is noted that the general sentiment underpinning the proposal is directionally correct and consistent with AEMO's mission and position as a leading ISO, particularly with respect to integration of DERs in markets necessary to improve and maintain grid stability. The need for change is real and AEMO's proactivity in these matters is correct, leading and laudable.

There are however issues. The MASS 'Option' proposed within the Issues Paper ('Option 2') is based on experiences from AEMO's VPP Trial, which directly represents a limited portion of DER stakeholder interests and presents a solution with potential to create significant distortion in the fair, competitive procurement of relevant ancillary services, supporting retailing constructs and of DER assets able to supply and participate in the relevant services.

This submission is not a complete review of all matters associated with the DER MASS process. It does attempt to highlight some salient issues with a view to illustrating that some modification with respect to the execution of these initiatives would serve to better realise their intent.

The rationale for the timing is difficult to understand

When asked, the specific response from AEMO as to 'why now' concerns the end of the VPP Trial. This is a highly unusual rationale for a change to market design, one not reflected in Frequency Workplan Overview - which does not cite a need to redraft the MASS with respect to DER aims as an outcome of any workstream.

Participants to the VPP trial represent only a subset of customers - a recent subset at that - of customers with DER assets participating in frequency response markets under the current MASS, which themselves are a subset of customers with DER assets in the NEM that are otherwise equipped with infrastructure capable of frequency response market participation compliant with the current MASS. In most instances these assets predate the VPP trial.

AEMO's response on timing rationale concerns the revenue interests of a specific group of customers involved in a trial. Whilst it was understood that experiences from the trial would be used to shape future MASS, it was never made clear that the specific experiences tested within the VPP Trial design would form the sole basis of a new MASS.

As per the AEMC's National Energy Objectives, Market design is generally undertaken with a broader interest view.

It's difficult to see how this is fair for all

Rather than use the experiences of the VPP Trial to redesign the MASS in a manner using lessons from the VPP trial to increase DER access inclusive of assets and approaches predating the trial and newer means, the only two options presented are the trial conditions tested and the current MASS.

The notion of these two sole Options being elucidated in detail communicates with some difficulty.

The proposed changes broadly concern a modification of fast contingency response markets, within which a reduction of metering requirements at the connection point, the adoption of fleet MASS-compliant check metering and device ingestion testing per configuration type.

The reduction in metering sample frequency for Fast FCAS from 20Hz to 1Hz effectively disincentives fast, useful frequency response by reducing the mechanisms by which response speed and volume are characterised. It may be possible to characterise these via indirect means in some cases (discussed later) however:

- This change has a negative value effect on customers and companies already having bought or developed devices with comply with the existing MASS - some of which are registered for contingency FCAS under the existing MASS and outside of the VPP trial,
- The options presented have not considered other options which may provide better outcomes for all.

This may contravene the aforementioned energy objectives very directly - "Regulatory frameworks and market design should provide a clear, understandable set of rules without favouring one technology or business model over another". The MASS Option presented, in favouring the technical configuration of participants in the VPP Trial and their related stakeholders and business interests, may adversely impunge those compliant under the current MASS.

So are there other potential options?

Other options exist.

AEMO proposed a 10Hz variant of the current MASS as part of trial conditions, though no VPP Trial participant chose to demonstrate this standard. It did not require injection testing or check metering.

It should be stressed at this point that the VPP Trial did not necessarily evaluate a statistically significant portion of all BESS DERs known to market, or beyond that of all DER types of all classes. Whilst the trial had many customers, it did not have significant technology or vendor diversity.

A 10Hz approach without injection testing or check metering would usefully lower access requirements. A number of solutions exist in the market capable of 10Hz response on Modbus over RS485 communications, a common means of implementing metering infrastructure in many DERs (in particular in solar and battery inverters). All 20Hz infrastructure can compete in a 10Hz market with some additional measurement error (though considerably less than for a 1Hz solution).

A 10Hz standard for primary frequency response measurement is also the solution being developed and trialled for electric vehicle supply infrastructure (EVSEs) in standards governing EVSE-to-EV communications (ISO 15118-20) and in relevant standards between EVSEs and charge point operators (OCPP). This is an important example, as:

- The ultimate market for EVs is larger than the market for stationary BESS in Australia,
- It is unlikely, in lieu of a significant automotive manufacturing industry, that vehicle manufacturers will adopt an indigenous standard of lesser performance, and
- This current 10Hz direction is already in practical deployments overseas.

Whether the ultimate solution is 10Hz or otherwise, it should be clear that alternate Options are available, are known and are tested. They should be evaluated on merits consistent with energy market objectives. Concerns over later-horizon DER asset classes outside of those best represented in the VPP Trial are relevant - the NEO, in particular, promotes *"efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to (1) price, quality, safety, reliability, and security of supply of electricity; and (2) the reliability, safety and security of the national electricity system."*

But isn't fast metering hard?

A repeated theme throughout the recent DER MASS review discussion concerned the purported high cost of fast-response metering infrastructure.

The claim that such metering infrastructure is sufficiently costly as to render it inaccessible in a DER context is false. Fast-response on-site metering of a usable quality is neither inaccessible nor impossible, and within a year will be mandated on all inverting DERs regardless:

- Where metering infrastructure is external to the DER asset, the Bill of Materials cost of high-speed metering infrastructure is typically under $50 per phase (in limited volumes; relevant solutions capable of supporting this functionality as a feature subset have existed in the Australian market since 2015, and at the start of the VPP trial retailed at some $600 - these compare favourably to technical gateway solutions prevalent in the VPP Trial).

- Metering infrastructure inherent to any DER asset, management gateway or revenue meter is often able to be utilised for the same purpose with appropriate firmware development. This renders the cost of access to customers to zero - such a solution utilises latent value within existing infrastructure.

- It should further be stressed that in the last five years a number of organisations have committed to building dedicated, low-cost devices that approach, and in some cases meet some or all the requirements of Section 3.6 of the current MASS. The participants of the VPP Trial are not a complete representation of these efforts.

More critically - every small-scale inverting power device certified after December 2021 (which includes all inverters and AC-coupled BESS used in the VPP trial) will need to meet a 10Hz, 0.1Hz resolution measurement requirement at any rate (and an according power measurement at same frequency). These devices must comply with AS/NZS 4777; the new version of which - AS/NZ 4777.2:2020 - stipulates these very requirements very clearly, and is currently intended to be effective in the market from December 2021.

The Standards process leading to his determination was both wide and consultative. The 10Hz implementation of these measurements is to be regulated to serve the correct management of inverter ride-through in times of impared grid power quality, and to be able to support droop-linear responses and the like to support frequency deviation events (much aligned with the MASS review's intent).

Fast metering is not hard, and at 10Hz it's more accessible, it rewards best performance, it gives customers and companies invested in the previous MASS a fair glide path to comparable value generation and thanks to AS/NZS 4777… it's soon to be ubiquitous. That it wasn't evaluated in the VPP trial is not a good reason not to build a regulation around it.

Furthermore - as a general paradigm - if 10Hz works, then there is no need for check metering and characterisation efforts. It's simple.

But still, no one's tried something other than the current MASS or the VPP trial

This is neither true.

AEMO was party to at least one trial outside of the VPP Trial where a 10Hz approach using existing metering within DER assets was successfully demonstrated. It wasn't possible for the trial stakeholders to agree to commercial terms consistent with the requirements of the VPP Trial, so a private demonstration was held. AEMO was invited and attended, and agreed the work was positive.

There's also quite a lot of development work by a number of DER vendors locally, in addition to a significant body of overseas work at 10Hz. It's also very simple to simulate the impact of 10Hz sampling from existing Australian 20Hz data, and to assess the effect on measurement error, value generation and the like. Multiple data avenues have existed to assess this approach in aggregate.

There is at least one DUID registered to a VPP complying to the current MASS.

With some delicacy, it is stressed that the implied commercial terms of the VPP Trial - particularly with respect to resource commitments and open knowledge sharing of a development effort - are not favourable for all vendors operating in this space. In some cases (consistent with my own experience) it was difficult to elicit technology partners to willingly partake. There are myriad reasons for this.

Whilst the VPP Trial has certainly proven to be a valuable experience and knowledge source which should influence and serve as a point of reference, as much as any other local or international example of relevance - there is no cogent argument wherein the VPP Trial should be the sole exemplar of a rule change.

Is it primary or secondary response we're concerned with?

Discussions in the last MASS review meeting, which preceded the DER MASS review meeting, included a comment that Fast FCAS is not primary frequency response. Later discussions with Tesla Australia's engineering staff echoed this comment. A number of discussions with stakeholders to both meetings afterwards revealed some confusion in this matter - many believe fast FCAS is a primary contingency frequency response mechanism (as opposed to MPFR, which is a primary regulation response mechanism).

The ambiguity of this situation is further complicated by the AEMC present conducting a response to the Fast Frequency Response (FFR) Directions Paper which in part identifies the potential of DER assets among a new generation of (asynchronous) energy assets able to enact primary frequency response - whether regulation or contingency - in a more technically flexible manner than assets available at the time the current MASS paradigms were designed. The outcomes of the FFR review are yet to be determined, though options are known to new market ancillary services to procure FFR FCAS or to procure FFR through existing service classifications.

Some (not all) participants in the FFR process are also represented in the current MASS DER review, and with this holistic appreciation of the development of FCAS have offered particularly valuable insight into how a transition from the status quo to could occur - the italicised below is from Tesla's submission to the AEMC's FFR process:

…"Whilst Tesla remains open to both design options, Option 1 (new FFR markets) *would be preferable, with a layered approach to ensure consistency across system services - e.g.: first response primary frequency services (narrow deadband, continuous operations); adding a new FFR product (with <1 or <2 second response, rewarding speed and accuracy); followed by existing contingency response (i.e. current 6 second, with slightly wider deadband).*

If Option 1 is progressed, we agree with the AEMC's approach to co-optimise inertia, FFR and R6 services. Tesla also supports additional consideration on the introduction of performance factors to differentiate the quality and speed of service from different technologies and reward more 'premium' provision accordingly..."

It would seem therefore that there exists a consensus from at least one leading vendor also involved in the VPP trial that:

- The initiatives promulgated in the VPP trial are possibly being considered as *secondary* contingency frequency response by at least one key stakeholder, though this matter is still a matter for conjecture, and
- That responses to *primary* contingency frequency response should be assessed on merit of quality and speed.

From here, the intent of the proposed MASS changes with respect to DER becomes quite confusing… because if a DER:

- Can meter power and frequency at Class 0.2 with 1Hz frequency, and
- Is intended for *secondary* frequency response

Then it already meets the requirements of the Slow FCAS (secondary frequency response) within the current MASS - there's nothing to change! No need for check metering, injection testing or the like. The current MASS requires 0.25Hz Class 0.2 metering for secondary response. 1Hz metering exceeds this requirement. It is difficult to understand in this instance why anything needs to be changed - let alone the design of our current fastest contingency market in a manner disincentivizing competitive response performance - for assets that currently meet secondary frequency response requirements.

The only incentive to change fast FCAS market access in this time of frequency response regulation change - prior to a holistic approach to frequency regulation being finalised - may be to provide a certain customer and technology segment with access to markets that are intrinsically more financially lucrative. If so:

- This is not an opportunity afforded to any other asset class through any other process.
- This may create market opportunities for the customers so affected, but creates value challenges for all participants already competing under the current MASS (whether DER or not),
- This decreases primary contingency frequency response market performance by failing to incentivise better performance.

The above points would seem to contravene the AEMC's market objectives.

AEMO should make clear its intent for Fast FCAS as primary or secondary frequency response moving forwards, and within this process provide transparency around a known roadmap for all activity shaping these markets in the near term. It is apparent that the DER MASS review is not a complete means to these ends.

Is the current MASS change for DER consistent with AEMO's view on FFR and FCAS?

AEMO's response to the AEMC on the matter of market design efforts for best procurement of services would tend to agree with the situation being in flux, with more effort required before an understanding of a best approach to procurement of frequency services clarifies a considered market restructure:

"At a high-level, AEMO notes FFR could be added as a separate Contingency FCAS in addition to the existing services but it may be more efficient to implement FFR by re-specifying existing FCAS. In either case much work is needed before being able to conclude one way or the other."

AEMO's response does not mention efforts to re-draft the MASS with respect to DER.

Given cognisance of impending potential, significant and structural change to the very markets the DER MASS review seeks to change - it is difficult to understand why AEMO has not sought to formally align these efforts, particularly given the close timing between them and the potential for a change to Fast FCAS to influence the design or impact of any determination on FFR.

Does the approach in the VPP Trial make it easier to bring DER FCAS access to market?

Not for everyone, unfortunately.

It is understandable that technology vendors may 'hear' 1Hz and assume that in being less than 10Hz or 20Hz, that this trial makes their products easier to design, that this should reduce costs and increase access to FCAS markets, both of which and make their products easier to sell.

But check metering and injection testing costs are not trivial, and generally are not carried by technology manufacturers. Nor are technology vendors consistently involved in retail energy customer acquisition efforts.

Imagine an energy retailer trying to pull together a VPP offering. It'd be great if all VPPs were procured as per the SA government's trial - a large, firm order from a single government vendor, a monolithic technology offering with a well-resourced and highly proactive technology vendor, and a single retailer procured as part of the above. There's an enviable certainty around this approach that's very useful in planning retail business activities. However favourable or ideal this scenario, whilst there are many VPPs active in Australia none have been procured similarly.

In many cases customers are acquired one by one as per typical retail energy customer acquisition campaigns. In many cases, retailers are gentailers already have MASS-compliant check metering infrastructure including client and server asset relationships, whole-of-system management processes and the like. These installations are expensive - up to $20k per measurement node.

In many cases, retailers seeking a maximum addressable market of customers will initially wish to acquire customers with any DER assets having latent value in FCAS markets. These combinations are infinite in number, particularly when considering hybrid inverters with DC-coupled batteries or behind-the-meter aggregated response (e.g. from resistive element water heaters, BESS, etc). Does each combination need to be injection tested?

This doesn't scale. An easier solution for a given retailer would then be to work with select customers with specific technology combinations and to support those.

Again, this also contravenes market objectives - quite clearly. We need good, robust competition with respect to new DER assets to raise consumer awareness, promote good practices in supply and lower costs. We need to procure as much frequency regulation services as possible for grid stability and resilience. With respect to DER and despite good intent, the current Option proposal has the potential to limit this much.

This neither scales to the future. The current rewrite of AS/NZS 4777 is written in part to address the potential of grid-connected electric vehicles (EVs), which is massive and positive for our grid. In a developed market over 95% - and closer to 99% - of EVSEs will be AC, with ISO 15118-20 supporting frequency response from AC connections. The frequency response characteristic of a given EV, particularly an AC-connected EV concerns:

- Static and dynamic energy storage system characteristics,
- Battery management system characteristics,
- On-board charger characteristics, and
- EVSE characteristics.

In short, there are three key components in the car affecting response, in addition to the characteristics of the asset the car is plugged into. Per the Option presented, does each combination need to be injection tested in order to characterise the response and permit access to fast contingency FCAS markets?

That's clearly not workable. Not least as it'd significantly hamper the potential of a very lucrative, cost-effective means of stabilising the grid. And in doing so, both with reference to limiting access to a strategic, low-cost alternative and again in preferring certain technologies over others, it again contravenes market objectives.

Compliance testing really isn't workable

It should also be mentioned that physically installing MASS-compliant check metering at customer premises creates additional costs beyond the cost of equipment. Firstly there's the need to find a customer site to install the relevant equipment. In a general sense, the equipment involved is not trivial - these instruments are generally large.

What happens if that customer then wishes to churn to another retailer, as it is their right to do?

Are incentives to retain that customer fair - has AEMO given any consideration as to, in a competitive market for such offerings - how other customers may view ‘missing out’ on such incentives? Do any such incentives need to be disclosed as part of a market offering allowing customers to make informed choices as to how they use energy and the benefits any given offering may afford them?

Are extra check meters to be installed to allow customers to churn at will as the law allows? Will there be grace periods for a VPP operating in lieu of them if their ‘check meter homes’ all churn away in a given instance? If a VPP is based around a single inverter design and a second is introduced, do customers with that asset need to be metered separately?

The costs associated with managing these operational efforts are presently unaccounted for, as technical trial environments do not sufficiently explore them.

Let alone that it’s yet to be proven - and is quite difficult to understand in technical practice - how check metering a small number of technologically similar DER assets creates a statistically accurate understanding of the initial response characteristic critical to arresting the nadir of any grid frequency excursion, and thus limiting the impact of any contingency event and accordingly maximising grid stability e.g. where energy storage systems are concerned, does AEMO propose to assess individual system response at all SoC?

Compliance testing is not a workable solution in a practical environment.

A number of factors here make it difficult to entrain many vendors

It’s finally important to again stress that potential stakeholders interested in increasing access to DER are considerably large in number, though vary significantly in resource capacity. For all but a select few, matters such as technical development, product development, market assessment and the like are not trivial undertakings and must be weighed internally against competing corporate priorities.

It is imperative that the broad design of AEMO’s efforts are shaped for transparency, certainty and lowest access barriers where possible. Appreciably, the DER space is fast-changing and this challenge alone is neither trivial. A rework of the MASS ahead of an AEMC determination that will again reshape the MASS - and have potential, significant impact on the access and value associated with DER FCAS participation - does not create the necessary confidence in the market for many vendors to dedicate resources creating a diversity of competitive outcomes for Australian consumers. As the VPP Trial has (indirectly) demonstrated, where confidence in these matters is low, as are the willing number of market participants.

Similarly, when understood, aforementioned difficulties around market access further impair the ability of technology vendors to invest in developing solutions - with the same end result on competitive outcomes for Australian consumers.

Again, market objectives require that we do better.

Conclusions

AEMO has undertaken to research a number of possibilities around DER FCAS integration. Whilst not the sole source of knowledge available in this space, the VPP Trial has resulted in a leading body of knowledge being made publicly available and has rendered a number of conclusions unequivocal, particularly around the value potential of DERs in modern, competitive balancing and ancillary service markets. A number of paradigms for control and participation were similarly explored that have much value to all stakeholders in this space moving forwards.

At the present time this knowledge needs to be condensed in a way that is executable in constructs befitting a regulated market guided by objectives supporting low consumer costs, increased access and no favouritism to any actors or approaches involved.

It is accordingly incorrect to, by default of immediate and specific experience, conflate the terms of the VPP Trial with market rule changes moving forwards. To do so places real limits on the outcome potential of the VPP Trial in a manner ultimately inconsistent with its best intent.

A better Option is required than that presented that uses the knowledge acquired in the VPP Trial in addition to other, broader experiences with relevant DER market participation activities to create a fair, accessible and effective solution moving forwards.

We therefore request the following:

- That AEMO undertake efforts to ensure that FFR and DER considerations to the MASS are aligned, resulting in a clear, duly communicated understanding as to the nature of any frequency response sought by the proposed changes to the MASS,
- That AEMO release a formal determination as to whether the proposed MASS changes concern a primary or secondary contingency frequency response, and to propose any regulation changes as necessary on the merits of the intent of the response type,
- That AEMO extends the VPP Trial to continue the contribution of relevant DER assets in contingency FCAS in new ways within a trial environment, whilst decoupling their stakeholder interests from MASS review timings, and
- That AEMO provides an additional Option or Options for MASS review with respect to DER participation in FCAS, or provides a single Option that encompasses a broader range of stakeholder interests in the DER space and affording better outcomes across a wider range of market stakeholders.

Kind regards,

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