Clean Energy Council submission to the Australian Energy Market Operator Draft Determination: Amendment of the Market Ancillary Service Specification - DER and general consultation

The Clean Energy Council (CEC) welcomes the opportunity to provide feedback on the Australian Energy Market Operator (AEMO) Draft Determination on amendment of the Market Ancillary Service Specification (MASS) for distributed energy resources (DER).

The CEC is the peak body for the clean energy industry in Australia. We represent and work with Australia's leading renewable energy and energy storage businesses, as well as rooftop solar installers, to further the development of clean energy in Australia. We are committed to accelerating the transformation of Australia's energy system to one that is smarter and cleaner.

We are very disappointed that power system security concerns were introduced late in this review process as a barrier to amendment of the MASS. CEC has been working closely with AEMO to address the power system security concerns cited in the draft determination. We note AEMO's intention to consult with industry outside of this consultation on the need for further studies of DER inverter behaviour and we will continue to support AEMO in this area of its work. However, it is important to consider separately the issues regarding issues specific to FCAS market participation by virtual power plants (VPPs) (specifically measurement resolution needed for verification of fast FCAS performance, and measurement location) and the issues regarding inverter behaviour. It would be unhelpful if these issues are unnecessarily conflated. We welcome the proposal to establish a Consultative Forum as a vehicle for collaboration between AEMO and interested stakeholders. This submission outlines how AEMO and the industry could work together to address AEMO's power system security concerns.

In this submission we outline our concerns about the approach proposed in AEMO's Draft Determination and suggest alternatives.

We would be happy to discuss these issues in further detail with representatives of AEMO. We look forward to contributing further to this important area for policy development.

1. The importance of enabling VPP participation in FCAS markets

DER is a growing, critical, component of Australia's energy generation mix. Harnessing DER in the form of VPPs will be critical to ensuring reliable operation of the grid with very high levels of penetration of variable renewable energy, including a high proportion of generation by rooftop solar. The Energy Security Board (ESB) has recognised the importance of unlocking the value of flexible demand and DER. The Australian Energy Market Commission (AEMC) has recently recognised the important of VPPs and other forms of small generation aggregation and its Draft Determination on integrating energy storage systems into the National Electricity Market (NEM) has proposed enabling small generation aggregators to provide market ancillary services from generation and load. Delivering on the policy direction from the AEMC will require strong collaboration between AEMO, industry and distribution network service providers (DNSPs). The CEC is committed to working with AEMO to make sure this is appropriately supported.

The CEC strongly supports initiatives to enable VPPs to have full market access and participation by customers on an opt-in basis. The risk of leaving the MASS unchanged is that the additional costs involved will dampen VPP uptake resulting in a high proportion of passive DER. It is important that the market enables large and small owners of energy storage to access the full value stack to facilitate investment in energy storage within the energy system. Residential batteries aggregated in VPPs have the potential to add enormous value in maintaining system security and frequency stability due to their ability to provide extremely fast frequency response and synthetic inertia.

We strongly support the work that AEMO has undertaken in its VPP trials and the support for enhanced DER participation in markets. DER policy is lacking a framework or agreement on which services should be provided through market mechanisms and which should be provided using regulations and standards. As a general principle, provision of system services and network services should always be paid for and should not be mandated as a condition of grid connection. This should include support for FCAS markets and voltage management on distribution networks. The only exception to reliance on market mechanisms should be genuine, well-defined emergency situations.

2. Power system security concerns

We are very disappointed that power system security concerns were introduced late in this review process as a barrier to amendment of the MASS – particularly as the concerns raised seem to mostly be separate to concerns legitimate to the MASS and DER FCAS participation.

CEC has been working closely with AEMO to address the power system security concerns cited in the draft determination. If power system security concerns can be used to veto any other initiative between AEMO and the renewable energy industry, then it seems pointless to work with AEMO on anything other than power system security concerns. We therefore commence this submission by responding to AEMO's power system security concerns and with a proposal for a process to address these concerns.

2.1 Unexpected disconnection of inverters

The draft determination notes one potential risk is "unexpected disconnection due to a local network fault, and potential power system security risks in frequency recovery if the unexpected inverter disconnections are not properly accounted for".

The CEC and its members are very aware of AEMO's concerns regarding DER inverter behaviour during local distribution network faults and power system disturbances. CEC and its members worked closely with AEMO to support the introduction of its short duration under voltage disturbance ride through (VDRT) test procedure, which has been mandatory in South Australia and on the Western Power network since 28 September 2020 and 1 July 2021 respectively and which will be mandatory in Victoria from 1 September 2021. This test procedure will be superseded when AS/NZS 4777.2:2020 commences from 18 December 2021. We estimate that bringing forward the date for compliance with

the VDRT test procedure in advance of AS/NZS 4777.2:2020 cost inverter manufacturers in the order of tens of millions of dollars in total for product changes and retesting of products.

CEC has encouraged members to provide AEMO with inverters compliant with AS/NZS 4777.2:2020 to enable testing of their behaviour in response to power system disturbances. We understand that several manufacturers have already arranged to provide AEMO with 2020-compliant inverters or have plans to do so. There are already four manufacturers whose inverters are listed on the CEC Approved Products List as compliant with AS/NZS 4777.2:2020. We do not foresee any obstacles to AEMO commissioning independent testing of these inverters over the course of this year.

CEC would support the proposal to require compliance with AS/NZS 4777.2:2020 for all systems upon registration for FCAS. This would address the risk of unexpected behaviour by inverters installed prior to 2021.

Recommendation 1: AEMO and CEC members should continue cooperation on testing the behaviour of inverters compliant with AS/NZS 4777.2:2020 and consider formalising the program with a Memorandum of Understanding.

Recommendation 2: AEMO should require compliance with AS/NZS 4777.2:2020 for all systems upon registration for FCAS.

2.2 The control hierarchy for inverters

The draft determination expressed concern regarding behaviour during local distribution network and global power system disturbances posing a risk of under-delivery of FCAS due to inverter requirements e.g. autonomous reactive power (Volt-Var response) support assisting voltage management in the distribution network prioritised over active power (FCAS response).

The prioritisation table 2.6 in AS/NZS 4777.2:2020 (included below) does not stipulate prioritisation level of FCAS response but it does specify priority for sustained active power response to frequency disturbances (prioritisation level 4) ahead of power quality response modes like volt-var (prioritisation level 5). Frequency support does sit below generation control functions like export limits (prioritisation level 3), that will probably become dynamic/flexible in the future.

Table 2.6 — Specification for prioritization of inverter functions

Prioritization level	Description
1	All disturbance withstand limits described in Section 4 while abnormal conditions prevail and until the duration exceeds the time limits of the passive anti-islanding settings in Clause 4.4.
2	All requirements to operate the automatic disconnection device.
3	Generation control function of Section 6.
4	Sustained operation for frequency disturbances of Clause 4.5.3.
5	Inverter demand response mode of Clause 3.2 and power quality modes of Clauses 3.3.2 and 3.3.3 (see Note 1).
6	Power rate limit of Clause 3.3.4.
NOTE 1 The prioritization requirements for the power quality modes is defined in Clause 3.3.	
NOTE 2 The performance of the inverter when responding to demand response commands is defined in Clause 3.2.1.	

Thus, when frequency falls below the continuous operation range, inverters are required to increase their output if it was previously curtailed by volt-var and/or volt-watt response modes as illustrated, below.

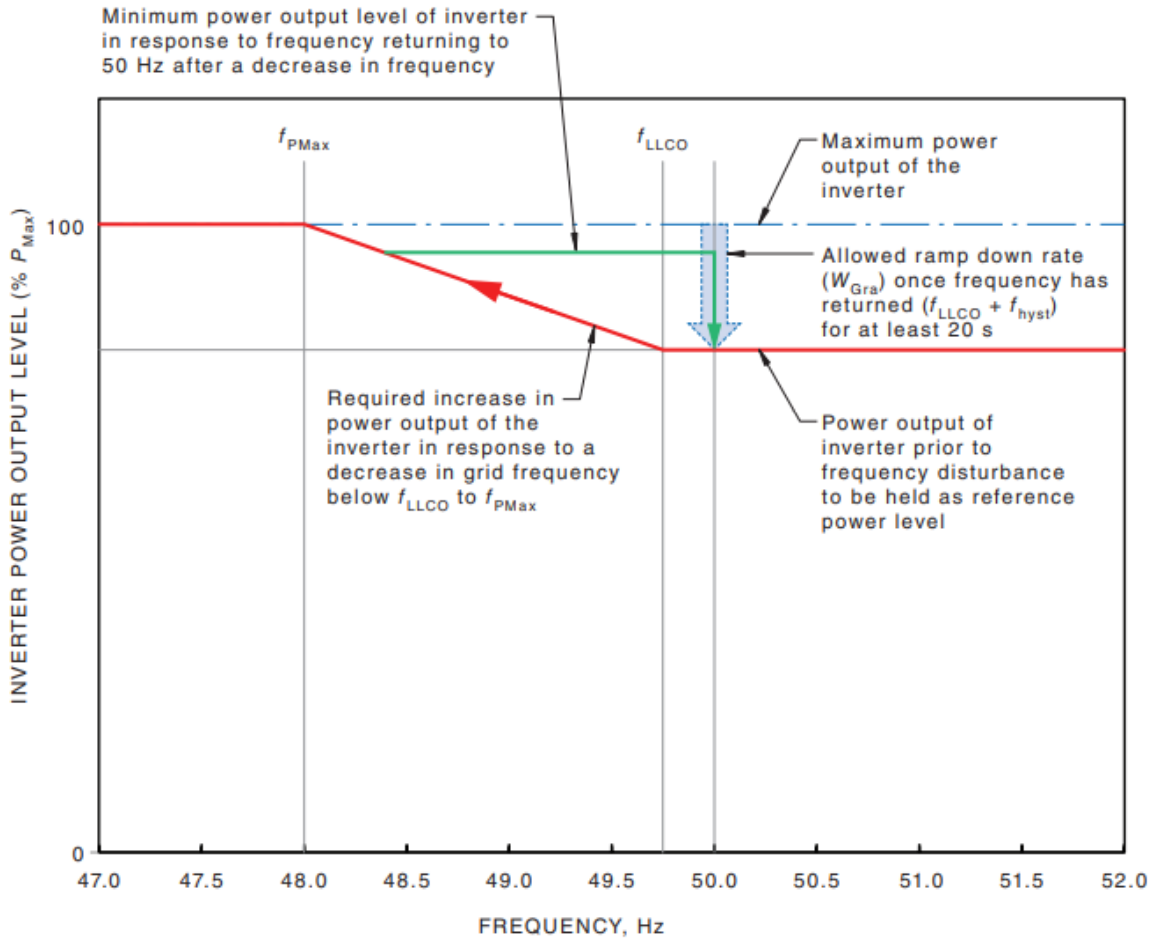

Figure 4.1 — Example frequency response for a decrease in frequency for an inverter that has a reduced output

The test procedure described in clause J.3.4, raises the voltage into the volt-watt region and then reduces frequency down below 48Hz to confirm this behaviour. This is a mandatory response. Delivering an FCAS response in advance of this would not necessarily conflict with AS/NZS 4777.2:2020.

The CEC is keen to understand AEMO's view as to which clauses in the revised standard could have an adverse effect on FCAS delivery.

We understand that these concerns were readily addressed in the South Australian VPP trials without any need to rewrite inverter standards.

Recommendation 3: AEMO and CEC members should work together to understand in more detail which aspects of AS/NZS 4777.2:2020, if any, could have an adverse effect on FCAS delivery, and how best to balance different priorities.

2.3 Risks of exceeding the limits of secure network operations

The draft determination expresses concern regarding "risks associated with large-scale, rapid active power injection or withdrawal from deeply embedded assets (aggregated to provide FCAS) exceeding the limits of secure distribution network operation limits" and describes this as one of the risks "associated with the behaviour of DER inverters".

This is not a risk associated with DER inverter behaviour. It is a risk associated with management of distribution networks. In the short term, it could be managed with a process of registration of FCAS participants to ensure that no feeder is at risk of being overloaded.

CEC members who are DNSPs have indicated that in the longer term this issue will be addressed using dynamic operating envelopes and that consideration is being given to long-duration operating envelopes for wholesale market exports co-existing with short-duration operating envelopes for FCAS. The work by SA Power Networks undertaken as part of the Advanced VPP Grid Integration trial has demonstrated that the use of dynamic operating envelopes provides a model for safe and effective integration of large market-participating VPPs with the network, enabling VPPs to bid into FCAS markets and dispatch with confidence and without risk of breaching local network constraints.

The risk of exceeding secure network operations will not be limited to VPPs. Batteries responding to price events or other events recognised by algorithms will present the same risks for network operation. The solution to this lies in network management and dynamic operating envelopes. Leaving the MASS unchanged does nothing to address this risk. Nor would amending the MASS exacerbate this risk.

Recommendation 4: AEMO should work with DNSPs and other CEC members on measures to mitigate the risk of exceeding the limits of secure distribution network operation limits during FCAS response.

2.4 Measurement of unexpected responses using low granularity measurement

The draft determination expresses concern that unexpected responses from inverters might not be identified using low granularity measurement and cites the example of an oscillatory response going undetected if measurement is done at 1 second intervals.

We are aware of the concerns outlined previously by AEMO[1]. We share AEMO's concerns regarding the risk of uncontrolled oscillations in response to grid disturbances. Devices that demonstrate this behaviour should be ineligible for FCAS participation, regardless of their measurement resolution.

We are not aware of any actual examples of oscillatory behaviour apart from the example reported by Reposit. Moreover, we understand that the inverter in question was never approved for FCAS registration.

The risk of oscillatory behaviour is not an argument for retaining the MASS in its current form. It is an argument for reviewing the laboratory test requirements for FCAS registration.

Any oscillatory behaviour of a particular asset type should be detected during the frequency injection test that every system is required to undertake as part of the FCAS registration process. If AEMO is concerned that oscillatory behaviour is not being detected, it should review the laboratory test requirements for FCAS registration.

The process of testing inverters for FCAS participation would benefit from increased transparency, development of a set of agreed testing protocols, and publication of a list of all meters approved by AEMO for fast FCAS. This could be undertaken as a best practice guide for industry, with a view to moving toward an Australian standard in future. The CEC would be happy to collaborate with AEMO in such a process.

We would like to bring to AEMO's attention some procedures used in the UK and the US that could provide valuable lessons for a procedure for testing inverters for FCAS participation.

The UK operator (National Grid) requires a pre-qualification assessment process for all frequency response market participants. The testing procedure includes two predefined tests (pre-set frequency pattern) and an additional live test against natural grid behaviour. Data relating to power and frequency is required at a measurement interval of 100 ms for the first two tests and at a 1 second interval for the

[1] See *Behaviour of distributed resources during power system disturbances*, here

real time event metering. The data is reviewed by an Independent Technical Expert (ITE) and, if approved by the ITE, is then considered by National Grid for final approval. Real time response is open to any device that meets the pre-qualification criteria and can collect and submit 1 second data, which is reasonably achievable by many types of generators[2].

The Hawaiian Electric Company (HECO) Fast Frequency Response (FFR) service requires metering at a 5-minute interval. HECO focuses on response time (rather than measurement interval). It requires vendors to provide certification to verify that the end devices can detect the frequency excursion and respond to it within a predefined number of grid cycles[3].

Recommendation 5: AEMO should review its inverter testing and certification requirements for FCAS registration so that inverters that display oscillatory behaviour are excluded.

2.5 Proposal for a process to address power system security concerns

We welcome the proposal to establish a Consultative Forum as a vehicle for collaboration between AEMO and interested stakeholders.

The CEC recognises that one of the key issues that AEMO is currently facing is the lack of reliable data from DER which can better help AEMO plan for the high DER scenarios. This creates issues both for AEMO, and for CEC members as this lack of consistent and accurate data with visibility into what is happening on the low voltage networks has resulted in some rushed solutions and risk-averse actions in the last few years. The most telling example of this was the recent VDRT test requirements. These were released by AEMO and rushed through the South Australian Smarter Homes program in 2020 with limited consultation. This resulted in industry investing tens of millions in compliance costs. We have now been informed by AEMO that this test has been ineffective in solving for ride-through issues and has not created any noticeable system security outcomes. A collaborative process of trials and industry provision of data could have achieved a better outcome with minimal expense and lack of negative industry impact.

During the VPP Demonstrations trial, AEMO developed an application programming interface (API) to capture real-time fleet and asset level data from VPP participants and DER that had previously been invisible to AEMO. This data was invaluable for fault detection and forecasting behaviour, however AEMO has opted not to maintain the API. This is a bizarre decision and raises concerns about the future alignment of AEMO processes with DNSPs who are primarily looking at API-based interfaces. If AEMO uses a different system for asset visibility, forecasting and dispatch, it is unclear how this is can be properly coordinated with the work being done by DNSPs.

We propose to set a joint work program to both address DER specific power system security concerns, and better understand the data needs of AEMO. This process should look at all the ongoing work that AEMO has underway currently that would benefit from DER datasets (the CEC is aware of Project Match and Project Edge as priorities) as well as identifying key data gaps and potential concerns from AEMO's perspective. This joint DER data work program could then be presented to industry with clearly defined goals and measurable outcomes clearly outlined and prioritised. As a starting point we believe that this forum could be used to convene DNSPs, industry and AEMO to address the power system security concerns flagged in the MASS Draft Determination to better enable full DER market development. This approach will naturally lead to a better articulation of the data needs of AEMO and understanding how industry can better support. The process could also involve an additional phase of VPP trials, designed to address the power system security concerns that AEMO has identified in the draft determination.

Recommendation 6: AEMO and CEC should formalise a collaborative work program to address AEMO's power system security concerns relating to DER inverter behaviour.

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[2] See *National Grid, Firm Frequency Response Balancing Service, Test Guidance for Providers*, here

[3] See *Hawaiian Electric Companies' Phase 2 Draft Requests for Proposals*, here

3. Time resolution for measurement of FCAS delivered by DER

The MASS requires measurements of power flow and local frequency be made at intervals of 50 ms or less for the purpose of verifying FCAS delivery and AEMO has concluded that it is not appropriate to change the measurement resolution for fast FCAS.

We understand the concerns that have led to AEMO's decision not to increase the measurement resolution to 1 s. Nevertheless, we do not support the decision to leave the measurement resolution at 50 ms. A resolution of 100 ms has been demonstrated to be sufficient and would reduce costs to customer who are part of a VPP. This would benefit all consumers in the long term.

AEMO has confirmed that the maximum error introduced at 100 ms measurement intervals is only 2.3%.

AS/NZS 4777.2:2020 commences 18 December 2021. It specifies measurement times of 100 ms for voltage and frequency and 200 ms for power. Alignment of the FCAS measurement requirements with AS/NZS 4777.2:2020 would reduce implementation costs and would benefit the long-term interests of consumers. AEMO had observes that data functionality is specific to each inverter make and model, but this does not change the expectation that better alignment of technical standards and market rules would reduce implementation costs.

3.1 Power system security and measurement interval

It is unclear how the concerns about the response of inverters to power system disturbances would be addressed by requiring VPPs to measure at 50 ms intervals. This appears to be conflating two separate issues. AEMO has acknowledged that reduced granularity sampling will still identify inverter disconnection. We acknowledge that reducing the granularity of sampling would affect the accuracy of the verification of FCAS delivery, but the maximum error for 100 ms measurement intervals would be only 2.3% and there are options to address that level of error. The Draft Determination states, "AEMO is committed to working with industry to address the DER inverter behaviour concerns but cannot raise the 50 ms sampling rate requirement until this work is complete". However, AEMO has failed to adequately explain why the sampling rate cannot be changed or how leaving the sampling rate unchanged will help to address power system security concerns.

The Draft Determination states, "While measurement resolution of 100/200 ms 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". However, the Draft Determination provides no evidence for AEMO's expectation of imminent cost reductions in high-speed metering.

3.2 Inverter capability

Original equipment manufacturers (OEMs) are in the process of redesigning their inverters to comply with AS/NZS 4777.2:2020. The standard requires measurement intervals of 100 ms for voltage and frequency and 200 ms for power. This is the sampling rate requirement. We are not aware of any inverters that capture and store data at 50 ms or 100 ms intervals. Most capture and store data at 1 s intervals.

3.3 The cost of high-speed data capture and storage

The requirements proposed by AEMO would necessitate installation of a separate high-speed meter as the data capture needs to be based on measurement at the connection point. AEMO has requested clear evidence of the additional costs of becoming compliant with the current MASS – noting that the diverse range of statements on costs (without much supporting evidence) in the first round of submissions did not provide a clear picture on this.

We have been advised by AEMO that some submissions to the consultation paper suggested that high speed meters capable of meeting the MASS for high speed FCAS can be purchased for as little as $120. CEC has sought quotes or price lists from metering providers who can supply meters compliant

with the MASS for high speed FCAS. We have been unable to source anything for as little as $120. The cheapest quote we have been able to obtain for an FCAS-compliant meter is from Reposit and is priced at $599 plus installation costs. An invoice from Reposit is included as Attachment 1. This invoice has been reproduced with their permission. We have also received a quote from Combined Energy Technologies (CET) for a meter which CET believes will be compliant with the MASS and which is available for $385 (ex GST) plus installation costs. However, we understand that CET's meter has not been approved by AEMO as compliant with the MASS for fast FCAS and is being assessed by AEMO as part of the Rheem Smart Water project which proposes to trial a fleet of water heaters for the fast FCAS market once the 1MW capacity is reached. The quote from CET is included as Attachment 2. The total cost to the end customer must also include the cost of meter installation. This can vary depending on the installation circumstances. SolarEdge has informed CEC that when a Reposit system is added to a SolarEdge system, the additional equipment and installation costs are about $1,350 for a single-phase system and $2,000 for three-phase. In addition, another meter is still required for export control and monitoring.

Some suppliers have indicated that in future it might be possible that a compliant meter could be available for as little as $200 retail[4] by 2022. There would still be installation costs and costs associated with integration of the meter with the inverter.

Installation costs will vary according to the circumstances of the site, whether the site requires installation of a meter to limit exports, whether the installation requires swapping an existing meter, whether a whole new installation is needed, whether the work involves running cable or using a wireless meter, whether the configuration uses a current transformer instead of a meter, in which state the work takes place and the amount of labour needed for installation of a particular product (noting that installation of some products can be much more time-consuming than others). Suffice to say that at about $160 per hour for an electrician's labour plus call out fees[5], the cost of installation can exceed the cost of the meter.

Recommendation 7: Analysis based on the minimum cost of an FCAS-compliant meter should assume an equipment price of $599 (rather than the $120 estimate cited in earlier submissions to AEMO) and, including installations costs, the cost to the consumer is about $1,350 (single phase) and $2,000 (three phase).

3.4 Impact on the business case for VPPs

VPP operators have indicated that metering solutions would need to be less than about $200 to ensure there are incentives for households to invest in participating in a VPP[6]. Forecast FCAS revenues on a site-by-site basis (based on third party curves, in-market experience and third-party due diligence checks assessed by the Clean Energy Finance Corporation (CEFC)) estimate FCAS revenues in the $180 (low/ investment case) to $280 – 330 range (base case), depending on the state.

3.5 Data capture resolution capabilities

AEMO has requested clear information on the data capture resolution capabilities of OEM equipment to measure grid flow (at or close to the connection point), currently or with simple upgrades to current capabilities (e.g., firmware upgrades) and noting that this data capture capability is distinct from the sampling rates specified in AS4777.2.2020.

It is extremely difficult and unnecessary to measure and transmit the FCAS data in real time. The CET meter can store one hour of FCAS measurements. An external device is required to extract and store the FCAS data at the end of each FCAS event. The cost of the external device will be development time and cost, rather than equipment cost. The development task could involve firmware changes in

[4] Redback Technologies, personal communication (no documentary evidence provided)
[5] Ibid.
[6] Tesla, personal communication (no documentary evidence provided)

the meter and coordination between the meter and the inverter so that the inverter can store the data. This could be complicated, especially if there is insufficient storage within the meter and changes to meters are required.

Typically, the way this works today for almost everyone with a storage inverter or AC coupled battery is as follows:

1. There is a metering device that is responsible for metering. It is separate from the inverter, and usually connected via RS485 serial protocol and installed next to the smart meter. That device must be capable of sampling faster than 50 ms or it cannot do its job (e.g. calculate power factor, accurate power measurements, frequency readings, etc.)
2. The inverter polls that device regularly to enable it to figure out whether it needs to export limit, ramp up the battery, etc. What 'regularly' means varies a lot. It is likely to be slightly sub-second, but highly unlikely to be every 50 ms.
3. There is a microprocessor on the monitoring device and *some* flash storage, but usually not much.

Currently there are no requirements for DER vendors to meter to 50 ms levels of accuracy. There is a sampling response requirement of 100 ms for voltage and frequency and 200 ms for power thresholds in AS/NZS 4777.2:2020 but no requirements for data capture or recording.

Most OEMs will be able to achieve data capture and recording at the 100 ms rate, with additional storage to enable uploading of data when an FCAS event has occurred.

The cost of requiring OEMs to move to 50 ms is difficult to estimate. It would require hardware changes for 50 ms metering as AS/NZS 4777.2:2020 only requires sampling at 100 ms intervals. Hardware changes are very hard to quantify as they involve the cost of research and development, prototypes, production, testing, and deployment. There is also the option of integration with a third-party meter (e.g. SwitchDin or Reposit. However, this again takes time, money and effort and makes OEMs dependent on another company. For some companies, this will be an unacceptable business risk.

4. Location of the measurement point for FCAS

There are costs, benefits and risks associated with each choice of measurement point, as outlined below.

<u>Measurement at the connection point</u>

The primary concern expressed by some VPP operators in relation to measuring FCAS response at the connection point is that it could add significant costs to VPPs. There are varying views regarding how much additional costs would be added. As noted above, there is currently only one meter approved for fast FCAS, which can be purchased for $599[7] and can cost the customer an additional $1,350 in total for single-phase connections once installation costs are accounted for[8]. There are concerns that the upfront and ongoing costs would very likely exceed revenue from FCAS market participation. The result will be that VPPs do not participate in FCAS markets in future. However, some suppliers anticipate they will have cheaper metering solutions suitable for fast FCAS available in future years.

<u>Measurement at the inverter</u>

Measurement at the inverter has the benefit of reducing the cost to customers associated with the purchase and installation of a meter approved for fast FCAS participation.

A key risk associated with measurement at the inverter arises when there are multiple controllable devices behind the meter. It is worth noting that only one market ancillary services provider (MASP)

[7] See invoice provided by Reposit, included as Attachment 1
[8] SolarEdge, personal communication (no documentary evidence provided)

can register a National Metering Identifier (NMI). This mitigates some of the issues and risks associated with measurement at the device.

We understand there might be other scenarios involving multiple controllable devices behind the meter with one enabled for FCAS participation. We have not attempted to analyse every situation and would recommend AEMO and the industry undertake some scenario analysis to understand whether there is a need for regulation to protect customers from risks arising from multiple aggregators controlling different devices behind the same NMI.

Measurement wherever FCAS is provided

An alternative proposal suggested during CEC consultation with its members is that performance should be verified at the point at which the FCAS service is delivered. Site-based control should require verification at the site. Asset level control should require verification at the asset. This enables differentiation between closed-loop and open-loop controls.

If aggregators are using site-based (closed-loop) controls to manage one or more devices behind the meter, the performance should be verified using site level data. These sites should also be required to provide asset level data for compliance checks. For example, if one asset is overperforming and a second asset is underperforming then it could be problematic if AEMO were to approve the installation of the second asset independently at another site.

If aggregators are using device-based (open-loop) controls to manage performance for an individual device, then the performance should be verified using device-level data. These sites should also be required to provide site level data for completeness.

This solves for the issue of “what if there are multiple systems registered to provide FCAS at a single site”. At least where those devices are registered under the same Dispatchable Unit Identifier (DUID), using the same aggregator.

We acknowledge that a gap in this solution is if a second aggregator (say an EV charging aggregator/ hot water heater aggregator) approaches a customer who is already registered to use device-based control and wants to install a system under a separate DUID. This could be solved using a registration process. AEMO already registers NMIs for all ancillary services load registered, so an additional flag on the system could be used to indicate that this site is already registered for FCAS. The implication of this approach is that the customer would be required either to choose one provider or move to site-based control. This could be influenced by policy recommendations regarding whether and how multiple aggregators are allowed at a single site. The ESB post-2025 market design for DER might provide further guidance on this matter at a policy level.

4.1 Measurement of grid flow

AEMO has requested confirmation of whether the grid flow is already captured when a hybrid system (battery plus PV) has been newly installed or where a battery system has been retrofitted, or would the grid flow only be measured if a site were participating in the FCAS markets?

Grid flow is always measured on sites that have export limiting or that have a battery. A separate meter needs to be installed if an inverter requires export limitation or has a battery installed. The meter is not required to be revenue grade. The issue is the frequency of measurement, not whether measurement occurs.

Most DER sites will have an external meter that should be located or reading a point which is close to the incoming mains. This means all voltage, current and frequency data is reported close to the point of supply and the import, export, production, and consumption of the site can easily be determined.

5. Fees for registering/de-registering NMIs for VPP

Fees for de-registering and registering NMIs are applicable. Under the proposed rules, VPPs would incur normal market registration fees ($2,800) each time they need to amend their portfolio. Fees for adjusting registration should only be applicable when the DUID changes, not for individual NMIs – and then the cost should reflect the administrative time required rather than the standard registration fee.