6 August 2021

Attention: Amendment of the Market Ancillary Service Specification (MASS) – DER and General consultation

Australian Energy Market Operator (AEMO)
Via e-mail: mass.consultation@aemo.com.au

sonnen Australia Pty Ltd - Amendment of the Market Ancillary Service Specification (MASS) – DER consultation response

Dear AEMO,

sonnen is at the forefront of innovative, well-engineered home energy storage systems and services empowering energy choice and contributing towards a healthier planet for local communities in markets including Australia, Germany, Great Britain, Italy and the USA. sonnen Australia is a registered Market Ancillary Services Provider (MASP), and our Virtual Power Plant (VPP) provides Frequency Control Ancillary Services (FCAS) in NSW under the AEMO/ARENA VPP demonstration program.

Our VPP technology provides closed-loop predictable responses to fluctuations in power system frequency to meet the needs of contemporary power systems tasked with incorporating growing amounts of variable renewable generation resources and achieves this at an efficient low incremental cost by utilising Distributed Energy Resources (DER).

Delivering an acceptable value proposition to sonnen's customers for their participation in FCAS markets requires market design elements that efficiently recognise the contribution of a range of technologies, and we are grateful for the opportunity to provide feedback on AEMO's Draft Determination.

Recognition of the capacity of behind the meter battery storage systems to deliver a predictable export FCAS raise response has made a significant contribution to advancing ancillary service provision from DER. However, the lack of meaningful advancement in accommodating DER into the proposed MASS is an egregious waste of tax-payers funds and the significant contributions made by the VPP demonstration program participants. The failure to drive further diversity, competition, and innovation in the provision of FCAS will ultimately be borne by consumers in the form of higher costs for the services needed to support a transition to a renewable future.

We are disappointed by the late introduction into the consultation of power system security concerns, and an apparent lack of critical review of some of the material provided to AEMO. sonnen would like to stress the importance of ensuring the MASS is focused on providing a framework to deliver technology agnostic and efficient market outcomes. The MASS is not an appropriate tool for addressing technology specific technical requirements such as those dealt with by network access arrangements or equipment standards. Neither should costly measurement requirements replace a rigorous equipment qualification process.

The proposed period of grandfathering of the existing VPP demonstration participant portfolios will do little to move the industry forward together and incentivise innovation in a competitive environment. sonnen does not believe 'squatters rights' support market development and maturity. Rather, to facilitate the rapid uptake of

alternative and 'cost effective' DER technologies we expect AEMO to provide leadership in evidence-based market design.

sonnen suggest the contribution of DER to FCAS markets will develop faster if the grandfathering proposal is withdrawn and replaced with targeted work programs open to broad participation that leverages the contribution from the VPP Demonstration program and inputs to the current MASS consultation.

In this submission we provide further detail of our concerns, and attempt to address some of the questions raised by AEMO in the Draft Determination.

sonnen values a productive dialogue between industry participants and AEMO, and we are happy to discuss our responses in further detail.

Yours faithfully,

Alister Alford
Director, Wholesale and Flexibility Markets
sonnen Australia Pty Ltd

Transitional arrangements for VPP Demonstration program participants

AEMO has proposed to implement a transitional arrangement for existing VPP Demonstration participants to come into effect when the revised MASS becomes effective and to close on 30 June 2023.

Participants in the VPP Demonstration program knew that the program brought no future guarantees of market access outside of the MASS measurement requirements at the end of the trial. sonnen participated in the trail on the expectation that the trial would be used to inform the development of ancillary services markets and the MASS to better utilise the rapidly growing resource of distributed storage assets.

If as suggested by AEMO in the Draft Determination the trial program arrangements are distortionary and place power system security at risk then there is little to justify the continuation of the temporary arrangements unless specific objectives to further refine DER resource capability and expand the range of participation are being pursued.

As the proposed transitional arrangements do not include elements to further inform market development and integration of DER into ancillary services frameworks the benefit to a few existing participants comes at the cost of:

- suppressing competition from better performing technologies
- providing less favourable market opportunities to equipment conforming with the MASS.

Recommendation

Maintain focus on developing DER FCAS capabilities from a broad range of providers.

Effects on power system/distribution network security

sonnen is concerned that AEMO's conclusion appears to unjustifiably conflate the separate issues of power system security and market settlement accuracy. DER has an existing relationship with DNSPs through equipment standards and network access arrangements. There is no direct regulatory relationship between the MASS and these interfaces. AEMO has not established a reasonable basis for applying another layer of regulation that is only applicable to a subset of DER, nor has AEMO presented any quantified technical analysis supported by the DNSPs that the metering requirements of the MASS will address the system security concerns raised.

Recommendation

Focus MASS development on enhancing market participation and efficiency.

Uncertainty in delivery

sonnen is concerned by the mixed messages delivered by AEMO during the second stage of this consultation with AEMO advising via a Fact Sheet that "Accuracy of measurement is not within the scope of the current MASS consultation" while AEMO is seeking responses from industry participants and interested parties on achievable measurement technical capabilities and projected costs.

sonnen notes that no objective benchmarks or metrology framework have been provided linking the accuracy of measurement to the quality and effectiveness of FCAS scheduling and delivery. While AEMO states its conclusions are guided by the principles of the National Energy Object (NEO) it has not established how an

'efficient frontier' was established with regard to measurement accuracy in order "to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity".

The NEM energy market metrology framework balances measurement and settlement accuracy with the cost and complexity of metering installations. However, the MASS metrology framework has remained substantially unchanged from its introduction at a time when FCAS was primarily provided by large synchronous machines and the measurement provisions were aligned to the typical capabilities of high-speed fault or power system disturbance recorders installed on large synchronous machines to support asset management strategies. The suitability of these legacy arrangements in a power system that is rapidly diversifying is questionable.

sonnen expected that data gathered through the VPP Demonstration program would be used to inform a 'fit for purpose' FCAS metrology framework for a market undergoing a rapid transition, but this has not happened.

sonnen suggest that once a quantitative based relationship has been established between the accuracy of FCAS delivery measurement and the true power system and market consequence of degraded accuracy an appropriate discount can be applied to resources utilising lower sample rate metering.

If enablement quantities for the purpose of dispatch and settlement are discounted for objectively lower quality FCAS resources then competitive forces will resolve the efficient balance of measurement equipment costs and utilisation of DER capabilities.

sonnen notes that AEMO's proposed transitional arrangement incorporates the principle of discounting a contribution from DER based on the achievable accuracy based on the numerical analysis commissioned by AEMO from University of Melbourne. This analysis provides useful guidance to further developing appropriate discount factors, however the additional quantitative assessment of the consequence of deviations in FCAS scheduling and delivery quantities has not been established.

Recommendation

Following the principles used in energy market metrology establish tiered measurement requirements that seek to balance the cost and complexity with the scale of the FCAS resource. Utilise the analysis performed by the University of Melbourne to establish discount factors linked to an efficient (typically 90%) confidence level of delivery for the sample rate of the measurement installation.

Impact of measurement requirements on DER participation in FCAS markets

FCAS is only one component of the DER value stack. The business case for FCAS market participation is slender and it is important to sonnen's customers that there is a material benefit to them for allowing their assets to be controlled for the provision of FCAS. The current value proposition is acceptable by some, but not all of sonnen's customer base.

Increased equipment and VPP infrastructure development costs which are likely to greater than $2k per installation quickly erode the small benefit to the customer of approximately $30 per month.

sonnen invests heavily in developing the capability of our hardware, however the assets utilised in our VPP are not able to meet a 50ms sampling update requirement without integrating additional hardware to act as an

event recorder for fast contingency FCAS verification. For the reasons outlined below the costs associated with fast contingency services measurement requirements of the MASS are significant.

Submissions to the first stage consultation provided a wide range of views on the costs of meeting the fast contingency FCAS markets MASS measurement requirements. sonnen believes that the significant variance is unlikely to be explained by direct engineering and material costs which in a competitive environment will most likely converge rapidly if all manufacturers were seeking the same narrow technical objectives.

sonnen suggests the diversity in cost expectations arises from vendor specific assumptions including the:

- cost of integration of high-speed event data recovery in a distributed IT environment; and
- variability in the interpretation of the measurement principles in the MASS, particularly the accuracy and resolution of frequency measurement at high update rates.

Integration of high-speed event data recovery in a distributed IT environment

The sophistication of control/co-ordination capabilities and end user functionality of a VPP platform have significant impacts on implementation complexity and data flows requirements. sonnen provides our end users high resolution data on the performance of their batteries and power flows at their home while also providing a high degree of real time co-ordinated control of FCAS delivery. Developing and maintaining the sophisticated IT systems that provide a high level of functionality to end users increases the costs associated with implementing additional requirements that have very different data handling characteristics such as the difference between continuous monitoring and 'event driven' data.

Interpretation of MASS measurement requirements

Key elements of the fast contingency services MASS measurement requirements have a legacy relationship with common specifications of high-speed fault and disturbance recorders installed on large synchronous machines. These devices are an important tool for demonstrating compliance with Generator Performance Standards and making asset management decisions following a significant power system fault in or near a power station. The use of data for FCAS verification is a secondary purpose of disturbance recorder data.

Choices in the methods deployed to determine power system frequency at high update rates are strongly linked to the robustness of the solution when subject to high rates of change of frequency, power system noise, and transient disturbances. Highly robust solutions such as those found in grid protective relaying or disturbance recorders for large synchronous machines implement sophisticated algorithms and higher sample rates to derive accurate and consistent responses in the challenging conditions found under real operating conditions during major disturbances. These limitations and effects on accuracy are clearly understood and have been characterised by the power systems engineering community.

In sonnen's view the frequency measurement requirements in the MASS are not sufficiently complete to avoid different engineering interpretations. The settling time requirement of 99% of final value after a step change from zero is nonsensical in a frequency measurement context as this implies an ability to accurately track a rate of change of frequency (RoCoF) of approximately 1000Hz/second. In the absence of adherence to this dynamic response criteria the remaining frequency measurement resolution and accuracy requirements are specified in the MASS without reference to handling of dynamic influences such as high RoCoF or common noise sources present in a power system.

A cost sensitive engineering solution that is capable of accurately reporting frequency of a stationary noise free 50Hz signal is unlikely to provide similar accuracy in response to a power system disturbance with dynamically varying frequency under typical noise conditions experienced in a distribution network. The accuracy and achievable resolution of a low cost simple zero-crossing detector as suggested in a response to the first stage consultation degrades substantially under real world conditions[1]. Similarly, rudimentary filtering approaches add delays and level shifts that degrade accuracy under dynamic conditions.

Convergence in the cost estimates from market participants or interested parties is unlikely to occur unless AEMO documents the dynamic and noise rejection expectations associated with the accuracy requirements stated in the MASS. A provider of robust and predictable frequency measurement devices implemented proprietary algorithms for protective relaying, large synchronous machine or network performance monitoring, or measurements in a power engineering laboratory will provide a significantly higher cost estimate based on an expectation that good dynamic response and noise tolerance is required.

Recommendation

To drive consistency in frequency measurement installations provide additional specifications addressing accuracy requirements under typical system disturbance conditions.

Point of Measurement

For small aggregated loads the physical relationship between a load and a specific connection point is not a significant factor in the aggregate response experienced by the power system in a region. Rather, the system wide aggregate characteristics of all loads, particularly those that are frequency sensitive, influence the dispatch and performance requirements of ancillary services such as FCAS.

sonnen suggests that AEMO revisit the assessment of the potential system wide magnitude of adverse correlations between small controlled and uncontrolled loads under dynamic frequency conditions. Efficient evidence-based assessments should not be built on a single example of an adverse correlation observation unless there is an intolerable cost associated with the single observation. Rejecting measurement configurations that on aggregate may provide a cost effective FCAS response without the prior examination of a representative data set raises questions regarding the degree of risk aversion in the decision-making process.

sonnen is wary that the degree of adverse correlation between small controlled and uncontrolled loads may be overstated by an individual respondents' experiences. Business models are often adapted to specific load classes and do not necessarily capture a broad representative sample.

To facilitate efficient use of the available DER resource sonnen sees merit in linking the measurement point requirement to the types of devices installed at the connection point and the degree of confidence the metering configuration provides. For example, where only one controlled device exists behind a connection point the risk of adverse uncontrolled responses is no different as if the uncontrolled load is behind or in front of the connection point.

[1] Spark Xue, Bogdan Kasztenney, Ilia Voloh, and Dapo Oyenuga Power System Frequency Measurement for Frequency Relaying, GE Multilin, October 2007

Recommendation

Permit DER device level measurements where it can be demonstrated in the registration process that device level measurements adequately address controlled responses behind the connection point. If necessary adopt discount factors to achieve an efficient (typically 90%) confidence level of delivery.