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Mr Rob Jackson

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Australian Energy Market Operator

Submitted by email: rob.jackson@aemo.com.au

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Dear Mr Jackson,

Market Ancillary Service Specification – Issues Paper

AGL welcomes the opportunity to respond to the *Market Ancillary Service Specification (**MASS**), Issues Paper* (**Issues Paper**), January 2017.

AGL is one of Australia's largest integrated energy companies and the largest ASX listed owner, operator and developer of renewable generation. Our diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources. AGL is also a significant retailer of energy, providing energy solutions to around 3.7 million customer accounts throughout eastern Australia. In 2015, AGL established a New Energy Services division, with a dedicated focus on distributed energy services and solutions.

AGL is supportive of the Australian Energy Market Operator's (**AEMO**) general approach to this revision of the MASS. It recognises that, as the National Electricity Market (**NEM**) continues to move away from large centralised thermal power stations, it will be necessary to enable new service providers and technologies to participate in the Frequency Control Ancillary Services (**FCAS**) markets to ensure sufficient volume and diversity of sources are available to support stable system operations.

The increasing proportion of smaller, renewable forms of power generation (such as wind farms and solar farms), as well as 'behind-the-meter' power sources (such as solar PV and battery installations), means that in the future no single frequency stabilising source is likely to be of dominance. This requires that increased flexibility be built into the MASS and to AEMO's processes to allow participation and performance verification to be managed in ways that are suitably adapted to the technologies involved while not degrading service performance or market functioning.

Barriers to entry under current MASS

Currently participation in the regulation raise and lower services requires that generators be equipped with Automatic Generator Control (**AGC**). For a would-be market ancillary service provider whose generation/load is comprised of an aggregation of smaller-scale sources (such as batteries), it would be economically infeasible to deploy AGC/SCADA control to each connection point.

One solution canvassed in the Issues Paper is that, following enablement, AEMO could send the AGC signal direct to the market participant which then manages the relay of the signal to sources in its fleet. However, if this relay were managed via a 3G or 4G network then it is questionable whether the signal would be received within the 4 second timeframe required. To install a fixed line, would result in expenses equivalent to AGC-enablement.

A more viable means of enabling a fleet of small-scale batteries to participate would be to permit provision/response via local sensing devices installed in the meter or inverter. The market participant would *enable* the fleet upon direction from AEMO (with such enablement

certainly achievable within the 5-minute dispatch window), but then service delivery would occur via automatic response to local frequency deviations.

Local sensing is inherent in many inverters associated with DC power sources (like solar PV and batteries) and can follow a frequency setting to either raise, lower or keep/regulate. Operationally they can achieve a very fast-acting response to disturbances. Therefore, encouraging market participation by these sources will better enable AEMO to oversee a secure and reliable grid into the future.

Measurement of response across aggregated sites

Many (if not most) of the 'non-conventional' sources that could be aggregated to participate in the FCAS markets would have their own measurement capability at a resolution which would be useful for the calculation of service provision. To the extent that these are not in the form of an accredited meter source, then AEMO should facilitate a process for the testing and verification of these measurement devices to ensure they are sufficiently accurate and reliable to assure service delivery. Accreditation could be against particular devices (make/model) or proceed as accreditation of the aggregate performance of the fleet seeking registration. It would be a considerable burden if accreditation were required against each individual participating asset.

In AGL's view, AEMO's processes and registration requirements will need to have a degree of flexibility embedded within them to allow alternative means of verifying and assuring service delivery to be proposed as technologies evolve. It should also recognise that as the NEM continues to move to less concentrated, smaller and more variable sources for frequency support, the effect of the deficient performance of one or more of these component distributed resources will have less of an impact than losing a large single stabilising source. Through performance and testing, statistical models can be developed to account for this diversity in participation.

AGL has recently tested a small number of residential scale batteries in an aggregated formation to an artificial AGC signal. The batteries individually and in aggregate followed the signal and responded with a latency of 4 seconds to both raise and lower signals. These kinds of trials and pilots will be a useful means of understanding the operating performance characteristics of new forms of technologies.

For larger-scale variable renewable generation, AGL considers that straight line interpolation over 5 minute intervals remains appropriate.

Principle underpinning FCAS services

AGL agrees that the purpose of FCAS services is to control power system frequency, rather than simply the delivery of a defined amount of energy, and this should be reflected in the MASS as far as possible. A performance measure which encompasses the reaction time (ie lag time) and how close the frequency is adjusted to 50Hz without over or under-shooting (or limiting the over and under-shooting) will better suit variable and aggregated sources than power output alone, which may hide the true performance of the individual and aggregated resource/s.

However, it is important that participants not be penalised if, despite them delivering the stabilising service that they have committed, frequency continues to deviate due to other external factors.

Smooth transition between services

In AGL's view, relying on a more diverse range of FCAS sources and service providers will promote a smooth transition between services. Other means of promoting smooth transitions include staggering dispatch and encourage providers to deliver into more than one FCAS service.

New Zealand achieve the hand-over with just two frequency products – the Fast Instantaneous Reserves (FIR) and Sustained Instantaneous Reserves (SIR). FIR are registered resources which can continue beyond their operating time to provide SIR services

when activated for FIR then get paid for providing both services. Therefore, having resources spread across both of these markets facilitates the hand-over – ie some FIR resources last for only a short time, others last for a longer time, and if the event warrants it, then dedicated SIR resources can also be activated.

AGL agrees with AEMO that on recovery of the frequency from a contingency, the source should return to follow the AGC signal. However, if/where the AGC signal is not in use and the local frequency is used as the reference then there is no need to change reference on recovery.

FCASVT (Verification Tool)

The FCASVT could be improved to clearly distinguish between grid event data and the need for the machine inertia, over injected data which does not need inertia. AGL has not used the tool to assess assets with allocated switching settings, so cannot provide a view as to its capability in this space. While performing such a capability test would be straightforward, it would be timely and costly to do so.

Assets with switching controllers

Requiring larger-scale 'traditional' generation with switching controllers to be configured to provide a staggered response would add complexity. Further, hydro assets need to be spinning (dispatched normally in the 'energy market') to provide this service. Digital governors lend themselves to a range of frequency settings, but some assets are yet to be modernised (digitised) and therefore these settings are much more difficult to implement.

AGL's view is that switching type controllers potentially cause overall frequency problems due to overshoot shortly after an event. Droop functionality, found in hydro and thermal generators, provides a more measured response and should lessen the 'over' compensation during events. Most of AGL's hydro units have frequency droop enabled. AGL notes this proportional frequency control system is provided 'free' to the market for little incentive or reward, apart from potential causer pays factor.

However, in the case of a market ancillary service provider comprised of an aggregation of smaller sources (such as batteries), achieving variable switching is very straightforward. This is managed using specialised software specifically designed with these capabilities in mind.

Should you have any questions in relation to this submission, please contact Eleanor McCracken-Hewson, Manager Policy and Research, on 03 8633 7252 or myself on 03 8633 6836.

Yours sincerely,

Stephanie Bashir

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