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October 31st, 2019

Ben Hiron
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

RE: Primary Frequency Response Consultation Paper

Dear Mr Hiron and Australian Energy Market Commission,

Fluence is a global energy storage technology solutions and services company. Our solutions are built on the foundation of industry-leading technology platforms that are optimized for different application groupings.

Fluence also offers a comprehensive services suite to ensure customers are staying ahead of the market. From early stage feasibility and cost-benefit analysis that stand up in the real world, to ensuring optimal performance of storage assets, Fluence provides the expert advice and services to propel customers forward.

Fluence offers the attached set of comments on the consultation paper for the Primary Frequency Response rule change requests, dated 19 September 2019.

Fluence Comments

Grid-scale battery-based energy storage resources are the most-cost effective way to provide frequency control and manage the second-to-second fluctuations between supply and demand. Battery-based energy storage is bidirectional—it can both deliver and absorb power from the system at speeds that are significantly faster than traditional generators. As a result, it is able to support grid stability from fewer MW of storage compared to traditional generators. This means lower operating costs and increased network reliability. Our battery-based energy storage systems are providing frequency control in the United States, Australia, Germany, United Kingdom, Netherlands, Philippines, Chile and Dominican Republic.

AEMO has proposed mandating the provision of primary frequency response for all generation (Scheduled/semi-scheduled). It has been highlighted in the paper that fossil-fueled generation is being replaced with non-synchronous generation, baseload fossil fuel generation will be retiring/or nearing the end of their technical life In the next 10-20 years. With further RE integration to the grid and maintaining a stable and secure grid is of highest priority. AEMO has

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highlighted that the frequency has deviated further and more often than before outside the operating band. With this we agree it is necessary for AEMO and AEMC to take action to ensure there is efficient and effective procurement of frequency regulation services.

Fluence acknowledges that the consultation paper has indicated “when the fundamental system security needs are met, the Commission will seek to investigate further improvements to the frequency control arrangements to increase the overall economic efficiency of frequency control in the NEM”. By carrying out the rule changes proposed, the market will deviate further away from an efficient market and that poses significant risks:

- A short-term intervention fix as proposed, may be needed to address the immediate concerns. The suggested method would be difficult to un-wind when the market decides its time to find a more efficient/economic structure, and to put in place new market mechanisms that will move to a more selective structure and have this approved by policy makers and regulators.
- Not have an incentive structure to pay for performance will increase the risk of system improvements in the future as higher performing assets (eg. Batteries) will not be deployed and continued dependence will exist on inefficient resources.

Incentivize fast-responding resources that are able to provide high quality frequency control, is critical for long term price efficiencies and increased reliability. Without such a mechanism driving market decisions, the long term improvement of the market will not be possible. We believe that providing the right market structures for incentivizing resources providing fast-frequency regulation will lead to lower power prices, reduced frequency related instability issues in the system and significantly higher quality energy delivery. One approach to accomplish this could be to institute a separate enhance or fast regulation market where resources that can respond very quickly are paid a premium for their service and cleared in the market.

One example of how energy storage provides extremely accurate and precise response for frequency deviations is shown in the charts below that were made by PJM, a regional grid operator in the United States. In the PJM[1] regulation market, each MW of energy storage provides regulation service that is the equivalent to more than 2MW of traditional generation based on accuracy and performance. Fluence energy storage projects in PJM have provided

[1] PJM is the regional transmission organization (RTO) in the United States that coordinates the movement of wholesale electricity in 13 eastern states with 150 GW of peak demand

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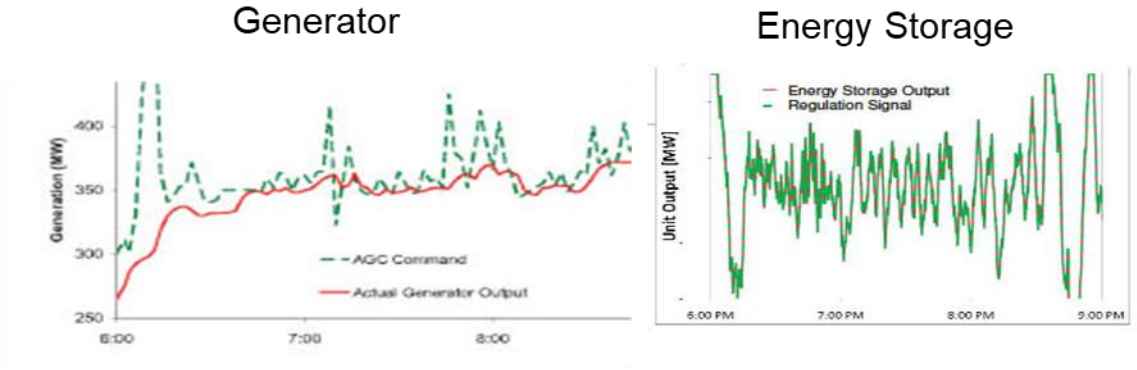
substantial savings to customers and relieved thermal generators from providing frequency regulation. The energy storage projects that Fluence has developed throughout the world over the past decade provide autonomous contingency response to enhance grid reliability while lowering overall system costs.

Figure 1 – Generator and Energy Storage AGC Signal Response



Source: PJM

Energy storage resources also provide high quality digital inertia to the grid and increase the ability of generators to tolerate high Rate of Change of Frequency (RoCoF). For example, in a study using data from our Killroot Energy Storage Array in Northern Ireland researchers from the Queen's University Belfast found "*360MW of batteries could have provided the same amount of power after 0.1 secs as the inertial response of 3,000 MW of synchronous generators*."[2] The study calculated that in Ireland using batteries for digital inertia could result in up to €19 million in annual savings and 1.4 million metric tons of CO_2 by replacing the inertia typically provided by thermal power plants. This high-quality digital inertia will help support the Northern Ireland grid as it increases the instantaneous proportion of power being delivered by non-synchronous generation sources, such as wind and solar to 75% by 2020.

Let's just consider a simple example. If we had 500 MW of thermal resources providing regulation needs in the market. Assume that the market price is $20/MW/hr. These resources are by design slower moving and so not as accurate. The overall market then incurs a cost

[2] http://s2.q4cdn.com/601666628/files/doc_presentations/2017/Everoze-Batteries-Beyond-the-Spin.pdf

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equivalent to 500 MW X $20/MW/hr X 8760 hours (in a year); this would be $88 million per year in regulation costs.

If we had fast-responding regulation resources that could provide highly accurate and precise response to manage frequency deviations, assume that we need only 250 MW of fast-responding resources[3]. In this case, the regulation payments will become half; $44 million per year. However, there is no "pay for performance" being provided to these fast-responding resources. Assume, that the market pays a 50% premium on the regulation price for fast-responding resources. In this case, the market incurs a cost of 250 MW X $30/MW/hr (50% premium on price) X 8760 hours; this would be $66 million per year in regulation costs, which is a 25% savings in overall market costs for providing regulation service.

We understand that these are simplistic examples and that these have to be considered in conjunction with overall causer-pays approach for frequency related costs in the NEM. However, providing a strong market incentive is important for the fast-responding resources in that their services are valued not at the prevailing rate, but at a premium. Whether that market price premium is 10% or 50% can be deduced carefully through detailed engineering studies, we are happy to engage with AEMO and AEMC in greater detail to provide these thoughts.

We believe it is critical to establish a frequency regulation market that incorporates the pay for performance mechanism. AEMO will find that the regulation market need in MW decreases and that consumers ultimately pay much lesser in overall regulation related costs.

Fluence understands that such a structure will require analysis, time and careful policy structuring, and we believe that there is such a desire to pursue a similar approach to determine a market. In the interim an interventionist approach may be required to bring system reliability, but it should take another form than suggested, to ensure a clear roadmap to a more efficient market in the future and lower pricing.

Fluence is willing to work closely with AEMO and AEMC to determine potential alternate solutions, be it regional procurement of FCAS via bilateral contracts, as done in other markets in similar situations, alternate market changes to AGC signals to ensure more accurate participation, or removing the disincentive for PFR, so more FCAS is bid into the market.

[3]Actual engineering studies have to be performed to ascertain the actual translation value of X MW of traditional resources equivalency to Y MW of fast-responding resources. This number will vary by market and region.

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Thank you for the opportunity to provide feedback on this important consultation. If you have any questions, please do not hesitate to contact us.

Sincerely,

31-10-19

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