

February 13th, 2020

To: Ben Hiron
AEMC
PO Box A2449
Sydney South NSW 1235

RE: Primary Frequency Response Draft Rule

Dear Mr. Hiron,

Fluence is a global energy storage technology solutions and services company. Our team has deployed and managed grid-scale energy storage systems for the last 13 years as part of the US-based AES Corporation and Siemens, and launched Fluence as a new company in 2018 to achieve greater scale and reach globally. To date, our company has deployed or been awarded contracts for projects totaling over 1,600 MW in 21 countries or territories. Our solutions are built on the foundation of industry-leading technology platforms that are optimized for different application groupings, reflecting our focus on addressing the network's most pressing issues.

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 expert advice and services to propel customers forward.

Fluence offers the attached set of comments on the Mandatory Primary Frequency Response draft rule dated 19th December 2019. Some of our below comments reflect the inefficiencies that this draft rule would bring in the market that we highlighted in our submission previously on 31st October 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, battery-based assets are able to support grid stability with fewer megawatts (MW) of resource compared to traditional generators. This results in lower operating costs, ability to respond faster, and increased network reliability. Battery-based energy storage systems we have supplied are currently providing frequency control in a wide range of power markets, including in the United States, Australia’s National Electricity Market, Germany, United Kingdom, Netherlands, Philippines, Chile and Dominican Republic.

A rule has been proposed for the mandatory provision of primary frequency response (PFR) for all scheduled and semi-scheduled generation. With maintaining a stable and secure grid of highest priority as increasing amounts of renewable energy are integration onto the network, AEMO has highlighted that frequency has deviated further and more often outside the operating band than in previous [years/decades]. Noting 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. However, we assert that requiring mandatory PFR introduces potentially damaging inefficiencies into the overall operation of the NEM that may provide the needed services in the short term, but leave the NEM lacking in key resources in the medium term.

Fluence acknowledges that the draft rule has indicated a sunset date when the Commission will determine further improvements to the frequency control arrangements to increase the overall economic efficiency of frequency control in the NEM. By carrying out the proposed rule changes, the market will deviate further away from an efficient market, which carries significant risks:

- We acknowledge a short-term intervention may be needed to address the immediate concerns. However, the proposed method would be difficult to un-wind when the

market stabilizes and AEMO is able to consider and put in place a more efficient/economic structure and new market mechanisms that will move to a more selective structure and have this approved by policy makers and regulators.

- Not having a revenue structure to incentivize faster performance will increase the likelihood of needing system improvements in the future as higher performing assets (e.g., batteries) will not be deployed and the NEM will continue its dependence on inefficient resources.
- With a mandatory requirement, there is also the potential for generators to not provide their optimal service for PFR. This will reduce the efficacy of the draft rule in serving its intended purpose. Not only will this result in less highly efficient and capable responders not being built on the grid, the existing assets may underperform, requiring more support for the grid than is anticipated or available.

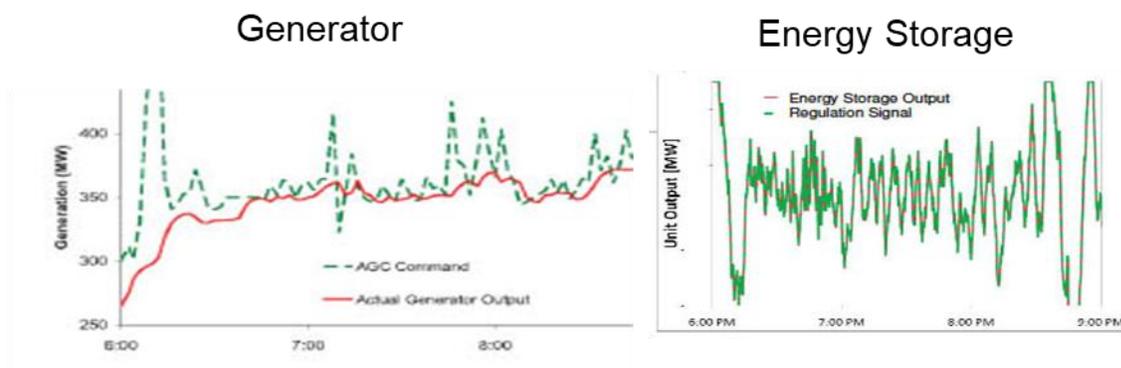
Incentivizing fast-responding resources that are able to provide high-quality frequency control, is critical for long-term price efficiencies and increased reliability. Without such a mechanism driving market decisions, the long-term improvement of the market will not be possible. We believe that providing 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 Enhanced or Fast Frequency 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 PJM¹ regulation market, each MW of energy storage

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

provides regulation service that is the equivalent to more than 2MW of traditional generation based on accuracy and performance. Fluence-supplied energy storage projects in PJM have provided substantial savings to customers and relieved thermal generators of the need to provide frequency regulation. The energy storage projects that Fluence has supplied and help maintain 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 can 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 the Kilroot Energy Storage project in Northern Ireland (which was supplied by Fluence’s team), 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 CO₂ by replacing the inertia typically provided by thermal power plants. This high-quality

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

digital inertia will help support the Irish Single Electricity Market 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.

To consider a simple example: assume 500 MW of thermal resources are available in the market to provide for regulation needs, and the market price is \$20/MW/hr. These resources are, by design, slower-moving and consequently not as accurate. The overall market then incurs a cost equivalent to 500 MW multiplied by \$20/MW/hr multiplied by 8760 hours (in a year); this results in \$88 million per year in regulation costs.

If the NEM had fast-responding regulation resources in the market that could provide highly accurate and precise response to manage frequency deviations, assume that we need only 250 MW of fast-responding resources³. In that case, the regulation payments will be reduced by half to \$44 million per year. However, there is no “pay for performance” being provided to these fast-responding resources. Assume then 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 multiplied by \$30/MW/hr (50% premium on price) multiplied by 8760 hours; this would result in \$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 the overall causer-pays approach currently employed 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 should be 10% or 50% can be evaluated

³Actual 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.

carefully through detailed engineering studies. We at Fluence are happy to engage with AEMO and AEMC in greater detail to work through an appropriate approach.

We believe it is critical to establish a frequency regulation market that incorporates a pay-for-performance mechanism. AEMO will find that the regulation market needs in terms of MW of capacity 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 is put in place to a more efficient market in the future and lower pricing.

Fluence is willing to work closely with AEMO and AEMC to determine potential interim alternate solutions, while a structure is evaluated, discussed and determined to ensure efficient operation of the market for frequency regulation. A 3-year sunset clause is too long, can have a prolonged impact on the market and we argue revisiting the mechanism for procuring frequency regulation services is unnecessarily long. Other markets around the world have been developed and run for years, offering examples that should be either easily replicable or quick to learn from. Additionally, with the retirement of Liddell planned for 2023, the 3-year sunset clause will overlap with this event, which may result in another need for market intervention. Alternative solutions could take the form of:

- Regional procurement of FCAS via bilateral contracts, which in turn may prove financial more beneficial than the draft rule. Procuring services via bilateral contracts is an approach other markets have taken, which requires less support of existing assets that may have the required capabilities.

- Alternatively, if Mandatory PFR is deemed to be required, a performance score/accuracy score should be determined. With this scoring system, scalars can be determined for faster and higher performance/accuracy assets, such that those assets that can perform better do so to more effectively support the system, while other assets provide frequency regulation at the level they are capable of.
- Removing the disincentive for PFR, so more FCAS is bid into the market.

In short, funds should be allocated to ensuring studies are quickly undertaken to identify the right structure to deploy, rather than requiring PFR for three years or longer and requiring generators to augment facilities to provide such services.

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,



Achal Sondhi
Asia Pacific Market Director
Fluence Energy LLC
Achal.Sondhi@fluenceenergy.com
+65-8139-4744