

30 March 2023

John Kim
Australian Energy Market Commission
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Dear Mr Kim,

Submission: Consultation on options for the efficient provision of inertia

ZIGer Energy welcomes the opportunity to provide a submission to the Australian Energy Market Commission's (AEMC's) consultation on options for the efficient provision of inertia.

About ZIGer Energy

Sydney-based ZIGer Energy provides most advanced energy storage and power quality solutions for utilities and critical applications and has the mission to drive towards 100% renewables with innovative solutions.

We provide innovative flywheel-based energy storage systems that are optimally designed for power system inertia response and primary frequency regulation. It can provide a clean, emission-free, safe and economic alternative to synchronous condensers, battery energy storage system and coal/gas-fuelled power plant that are being used to provide essential capabilities including inertia and primary/fast frequency response for power systems.

Innovative flywheel-based energy storage systems for inertia and primary frequency response

Our flywheel-based energy storage systems have the characteristics of high-power (MW level), short period (15 seconds per full charging or discharging) and huge numbers of charging and discharging cycles (daily depth charge/discharge >1000 times; full power cycle of charge/discharge in life > 1 million times), spontaneous responding (<10ms), and security, which make it a great fit to provide high transient power balance for renewable-dominated grid.

The system can improve inertia response and primary frequency control capability for wind farms, and work along with wind farms to provide essential power capabilities including inertia response and primary frequency regulation for national power systems. According to our research, if energy storage is used as a means of supporting the virtual inertia, the active power of the energy storage system is proportional to the frequency change rate; and with considerations of the frequency characteristics of the power grid, assuming the frequency change rate is 0.05Hz/s and the energy storage is configured according to 1% of the power capacity of wind turbine units, the rotational inertia of the wind turbine units will double.

The Flywheel and Battery Hybrid Energy Storage System is the combination of the flywheel energy storage system

and the battery energy storage system. In areas where the grid frequency is frequently disturbed, the flywheel energy storage system is frequently activated, and when the flywheel energy storage cannot meet the requirements, the battery energy storage supplement (power and capacity). By doing so, it can minimize the number of actions of the battery energy storage system, thus increase the life of the battery energy storage system and meanwhile reduce the probability of fire and explosion.

Key recommendations

In the current inertia framework, there are no adequate information used to assess the investments on inertia related assets thus investors are unable to make reliable calculations or forecasts on the demands and the pricing for inertia services. So we strongly support the proposal to set up inertia spot market and agree that it can significantly increase efficiency and transparency, though we have some ideas on the market for your consideration.

- 1) Technology neutral and encourage new and innovative technologies to participate in the markets. We suggest specific policies and instructions be in place to encourage the use of any innovative technologies to provide inertia and other ancillary services in the power systems and the markets. Contact window of AEMO for grid access and trial of innovative solutions may be created to fast track the process.
- 2) Co-optimization with other markets. It becomes essential for such assets to have multiple revenue streams by providing multiple grid services, in order to have an acceptable rate of return while mitigating revenue stream risks,
- 3) Addition of derivative contracting market to the inertia spot market. As the assets may have the lifespan of 10-20 years to provide grid services, long-term investment certainties matter for the investors.
- 4) Long-term contracting approaches to procure inertia should continue until the time when the inertia spot market provide enough information to make long-term investment decisions. The spot market itself at its early life can not suffice for investments on the assets that operate for 10 years or more.
- 5) It is worthwhile to investigate further on the option of RoCoF Control Services. It is a proven mechanism with working records. It may be able to be used as basis to create the inertia spot market.
- 6) It is worthwhile to consider another option – provide incentives for generators such as wind farms to provide more than their mandatory inertia response and primary frequency control using innovative technologies. The option can encourage asset owners to optimize the use of the generation assets and extract full value of

the asset, thus save the total costs of the next-generation power systems.

We are looking forward to further discussion on the submission and the opportunity for a trial to demonstrate the capability of our innovative flywheel-based energy storage systems.

Yours sincerely



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