

Hybrid Battery and Flywheel Energy Storage Sytem

Almelo, The Netherlands - 2020



Hybrid energy storage system mixing battery and
flywheel technology for frequency regulation

The Challenges



Renewable Energy is the future of energy production.

Many countries in Europe and around the world are taking part in the energy transition, reducing their fossil fuel-based generation and increasing the share of renewable energy in their overall energy mix. Yet this presents a new challenge as renewable energy sources are highly intermittent and this can cause the grid to become unstable. The issue of grid stability is not new and different assets have historically been deployed to maintain the balance between generation and demand, but many of these assets have slow response times that are incapable of managing the large and rapid changes in generation associated with the large-scale renewable energy. Battery Energy Storage Systems (BESS) overcome that challenge. By providing rapid and efficient Frequency Regulation services, battery energy storage will be a critical value-add for system operators for years to come.

Frequency regulation can be sourced from the ancillary grid service market. The most rapidly reacting frequency regulation service is known as Primary Control Reserve (PCR). A BESS is an ideal PCR asset as it is able to provide frequency regulation services in just milliseconds and in both directions owing to its ability to serve as both a load and a source of energy.

The Solution



In **Almelo**, Holland, Leclanche has completed the design, engineering, installation, and commissioning of a **8.8 MW / 7.12 MWh** BESS that is integrated with flywheels installed by S4 Energy. The combination of batteries and flywheels is a unique hybrid system design that will provide frequency regulation in such a way that the flywheels support the state of health of the BESS and prolong its useful life.

Another uniqueness of the hybrid Almelo system is its flexibility and redundancy, a critical requirement for the customer. Each battery bank is able to operate independently from one another and has its own dedicated inverter. This provides the customer the option to connect one or several battery banks to the grid at a given time depending on what is required.

In addition to providing turnkey EPC solutions Leclanche offers operation and maintenance services to its customers. This service is of importance in Almelo in order to ensure the continuous operation of the BESS so that it remains available to respond to the frequency regulation market at any time. In this way downtime and potential fines from the system operator can be avoided and the project's financial return is ensured.

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