



Ultracapacitor Grid Stabilizer System for bridging time up to one minute

UGS solution provides frequency stabilization in the Nordic Market

Customer: UPM Energy

UPM Energy is the second largest electricity producer in Finland. Electricity is generated at the company's own and co-owned hydro, thermal, and nuclear power plants. In addition, UPM engages in electricity trading and financial portfolio management and provides services to industrial electricity consumers and producers.

Initial situation and challenge

The share of renewable energies in electricity generation will continue to increase in the future. This will be accompanied by an increasing need for reserve capacities in order to quickly balance the grid and keep it stable. UPM Energy is a significant producer of hydropower and reserve power. In order to participate the future reserve markets the hydropower plant need to be upgraded, as the many small rapid load changes in FCR-N exceed the control speed of the regular system. In addition, the mechanical wear and tear on the plant is then higher. In order to meet the requirements for the provision of these control reserves, the integration of a short-term storage facility is necessary.

Industry:

Energy supply

Projekt:

Design and commissioning of a bidirectional ultracapacitor grid stabilizer system with an output of 3 MW and a bridging time of up to one minute in two 40-foot containers as well as integration of the system into the customer's plant.

Eingesetzte Produkte:

504 ultracapacitor modules,
MSC converter



Scope of Delivery

FREQCON was awarded a contract in 2021 to design and install on site an ultracapacitor-based grid stabilizer system for the Katerma and Kallioinen hydropower plants on the Ontojoki River. The 3 MW system consists of a multi-source converter and 504 Ultracap modules housed in two 40" containers. Furthermore, the contract also included supporting measures for integration into the power plant system.

Solution

The advantage of ultracapacitors is to be able to discharge or charge electrical energy quickly. In combination with the hydropower plants, the short-term storage can respond to disturbances within milliseconds to secure the power supply up to one minute before the hydropower plants take over this task. The combination of hydropower plant and high-performance ultracapacitor storage has the potential to become an important pillar for the reserve market. This is because the short-term storage system is capable of carrying out load changes quickly and millions of times without capacity losses.

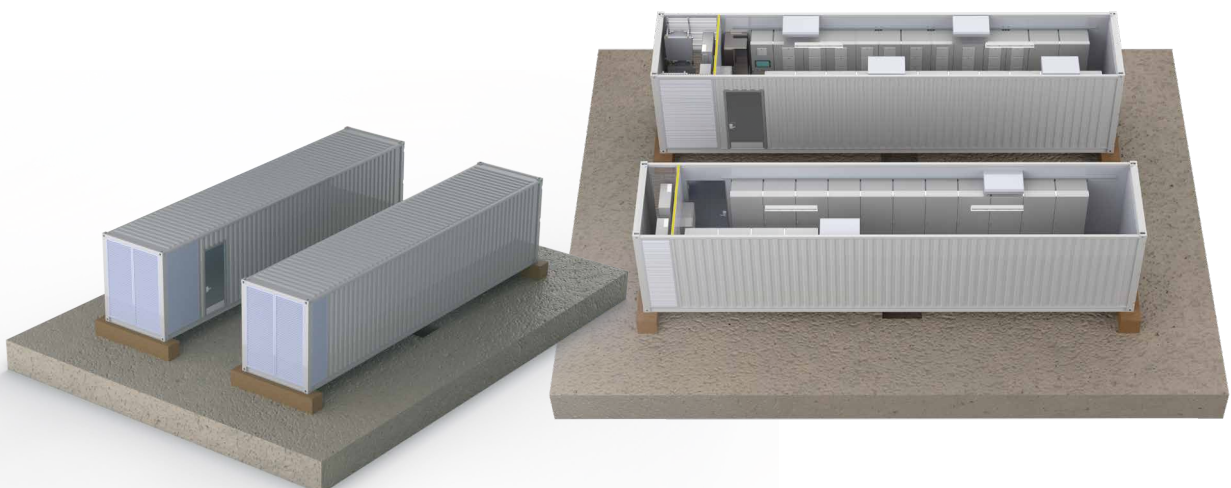
FCR-N responds continuously to frequency deviations with power injection or withdrawal. FFR, on the other hand, only triggers quickly in the event of very deep frequency dips and then feeds power into the grid for a few seconds, regardless of the further frequency response.

With this investment UPM Energy will be the first to pilot multiple hydropower plants with ultracapacitor energy storage as part of a hydropower system. Two hydropower plants are being combined under one optimization and control entity, using modern digital systems and automation processes.

“An ultracapacitor, combined with hydropower can react in milliseconds and produce energy in extensive range, even for days if needed. It has the potential to bring in a new type of asset for the future reserve market“, says Juha Haromo, Development Manager at UPM Energy.

Added Value

Thanks to the combination of hydropower plants and short-term storage, more renewable energy can be fed into the Finnish power grid. Furthermore, compared to batteries, ultracapacitors are nearly maintenance-free and have a much longer service life.





About FREQCON GmbH

Over 35 years ago, Freqcon supplied the first wind turbine with automation and converters and established the first full converters for wind turbines on the market in the early 1990s.

Today, we are one of the leading German manufacturers of frequency converters for renewable energy systems. As a provider of energy storage solutions, we are very familiar with the latest technologies and are constantly developing our systems to make them work even more efficiently.



With traditional, genuine craftsmanship and state-of-the-art technology, we ensure a secure energy supply all over the world every day.

Innovation is the key driver of our industry. Based on our technologies and our many years of experience in the renewable energy sector, we also regularly participate in research projects.

Our focus areas:

- Battery storage solutions
- Multi-source converters
- Fast charging stations
- Ultracapacitor energy storage systems

Are you facing a similar challenge? We would be happy to advise you!



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