

Ultra capacitor Grid Stabilizer System for bridging time up to one minute

UGS solution provides frequency stabilization in the Nordic Market

Customer: One of the largest electricity producers in Finland.

Our customer is one of the largest electricity producers in Finland. Electricity is generated at the company's own and co-owned hydro, thermal, and nuclear power plants. In addition, the customer 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. The customer 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

Project:

Design and commissioning of a bidirectional ultra capacitor 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.

Products used:

504 ultra capacitor modules, MSC converter



WFREQCON

Scope of Delivery

Freqcon was awarded a contract in 2021 to design and install on site an ultra-capacitor-based grid stabilizer system for finish hydro power plants on the Ontojoki River. The 3 MW system consists of a multisource 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 ultra capacitors is to be able to discharge or charge electrical energy quickly. In combination with the hydro power plants, the short-term storage can respond to disturbances within milliseconds to secure the power supply up to one minute before the hydro power plants take over this task. The combination of hydro power plant and high-performance ultra capacitor 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 the customer will be the first to pilot multiple hydro power plants with ultra capacitor energy storage as part of a hydro power system. Two hydro power plants are being combined under one optimization and control entity, using modern digital systems and automation processes.

"An ultra capacitor, combined with hydro power 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",

Customer's Development Manager

Added Value

Thanks to the combination of hydro power plants and short-term storage, more renewable energy can be fed into the Finnish power grid. Furthermore, compared to batteries, ultra capacitors 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 stateof-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
- Ultra capacitor energy storage systems

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

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