



Canada's First Utility-Scale Energy Storage System Islands Remote Town During Outages

S&C Featured Solution: Engineering Services

Location: British Columbia, Canada

Customer Challenge

Nestled in the Canadian Rockies, the remote town of Field relies on one 25-kV distribution feeder, provided by BC Hydro, to supply its 300 residents with power. Field has a winter peak over 400 kW and a summer peak of approximately 280 kW. Providing reliable power to Field is challenging. Not only is the town located 55 km from the substation, the feeder runs along a railway line, making access and repair work difficult, time-consuming, and costly.

Due to the geography and climate, faults frequently affect the power line, causing extended outages. Crews must coordinate with the rail system to avoid trains and travel along the rail route to locate the fault and repair the line, often in formidable weather. These factors result in longer-than-average response times for power restoration, impacting every resident in the town.

BC Hydro needed an innovative energy storage technology solution that could swiftly respond to faults by supplying reliable power to Field for extended periods, giving crews time to repair the line and minimizing service disruptions. Not only did BC Hydro seek improved power reliability for Field through "islanding," they wanted to reduce peak load, use clean power to cut greenhouse gas emissions, extend the lives of transformers, and eliminate the need for diesel backup generators—all within a set budget.

S&C Solution

BC Hydro chose S&C for the project because of the company's extensive experience with large-scale, battery-based energy storage systems. S&C proposed a complete energy storage solution, including all engineering, procurement, and construction services. The solution enabled BC Hydro to achieve all of their goals, from islanding to using clean power. S&C's proposal also helped BC Hydro to obtain 50% of the project's funding from Natural Resources Canada (NRC).

Completed 1-MW BC Hydro Energy Storage System at Field Substation.



"With the battery system, we can supply power to Field for about seven hours, which gives us the opportunity to repair the line."

*– Helen Whittaker,
Manager of Technology Innovation, BC Hydro*

The energy storage management system controls a 1-MW battery, which supplies clean, reliable power to a town with frequent, extended outages.



The solution includes a 1-MW/7-hour output NGK sodium-sulfur (NaS) battery and an energy storage management system, which controls battery charging and discharging. It also includes S&C's IntelliRupter®PulseCloser® Fault Interrupter for fault detection, S&C's System VI™ Switchgear, and S&C's IntelliTeam®SG Automatic Restoration System for peak shaving and transitions between the battery and grid. S&C SpeedNet™ Radios provide fast, two-way communication to help speed restoration.

The first of its kind in Canada, BC Hydro's battery storage facility is 5 km south of Field and supplies uninterruptible power to the entire town for approximately seven hours during feeder-related outages. Due to extremely cold temperatures, the battery is housed in a prefabricated building. After an islanding or peak shaving event, the battery charges from the grid. This ensures the system is available to supply power for the next occurrence of those events. When a fault occurs, S&C's IntelliRupter® fault interrupter detects and isolates the upstream fault while signaling energy storage management system to start discharging battery power, a seamless process that takes seconds.

In addition to providing islanding, the battery is scheduled through an energy storage management system to supply power during peak demand periods. This added capacity lessens the load on system components, extends the life of transformers at the main substation, and reduces greenhouse gas emissions by eliminating the need for diesel-powered backup generators.

Construction of energy storage system, enclosure, and controls at Field Substation.



Results

The energy storage solution met all of BC Hydro's expectations, and the project was completed on time and within budget. Field residents now have reliable, clean power available for islanding, greatly reducing outage durations while also reducing the peak demand of the town.

In the first six months of system operation, six major events occurred, ranging from trees falling on the lines to broken poles. Each time, S&C's system operated to avoid an outage, supplying Field with battery power for a total of 40 hours over just six months. In fact, during the facility's ribbon-cutting ceremony, a line fault occurred when a feeder pole was broken. S&C's solution quickly demonstrated its value by islanding the town for eight hours until grid power was restored. Since the initial commissioning, the town of Field has undergone 48 islanding events, resulting in 195 total hours of islanded operation.

The community of Field receives updates on island events via Twitter. In the event of an outage, the account notifies residents when the battery is supplying power. During an island event, Twitter alerts residents approximately every 20 to 30 minutes on the battery capacity and the actual load size. This encourages residents to cut back on energy use during these times, thereby extending how long the battery can be used. The system has supplied power for nearly 23 hours during a low-peak summer event, aided by the community's energy conservation efforts, as Twitter alerts residents that the system is active and has limited capacity.

This pivotal project promises to accelerate the adoption and integration of innovative energy storage technologies into Canada's grid. With an energy storage management system and large-scale battery storage, BC Hydro ensures that residents of British Columbia benefit from cleaner, more reliable power.