



S&C Connects a 100-MW Ontario Solar Farm to the Grid

S&C Featured Solution: Renewable Energy Integration and Power Quality

Location: Kingston, Ontario, Canada

Customer Challenge

Samsung Renewable Energy Inc. and Connor, Clark & Lunn Infrastructure wanted to participate in Ontario's Feed in Tariff (FIT) program, which promotes greater use of renewable energy sources by providing a standardized way to contract for renewable energy generation. Their hopes were fulfilled when the Ontario government accepted their application to build a 100-MW solar farm with six separate collector zones located on approximately 800 acres of land bridging the city of Kingston and Loyalist Township. The system would generate 170,000 MWh of clean electricity annually, enough to supply 17,000 homes while generating an income for both companies.

However, with a solar farm of this size, the companies faced the challenge of complying with both real and reactive power requirements for connection to existing transmission lines. Because of the site's remote location, servicing the switchgear would be time-consuming and difficult, so Samsung also required switchgear that was virtually maintenance free. Compounding matters, Canada was experiencing its coldest winter on record.

Samsung appointed HB White Canada Corp. as the engineering, procurement, and construction contractor. HB White solicited bids for an expert to provide switchgear, a static-compensation device for grid code compliance, and specialized training to ensure its needs could be met. HB White's consultants advised their client that Ontario-based field labour was expensive, so HB White required that labour costs be kept to a minimum. Moreover, the government FIT regulation required that the project include at least 22% Canadian content.

S&C Solution

HB White ultimately chose S&C Electric Company for the project after viewing plans designed by S&C's experts in Power Systems Solutions. The S&C team also met with HB White's representatives at S&C's Product Demonstration Centre in Toronto, where they were able to demonstrate S&C's System VI™ Switchgear, which, unlike alternative outdoor walk-in metal-clad switchgear, is more cost effective in that it requires no spare parts, inventory, or annual maintenance. Its sealed tank, which protects critical protection components, also can be opened to maintain revenue-metering components.

S&C supplied a PureWave® DSTATCOM Distributed Static Compensator and System VI™ Switchgear.



For the project, the S&C team provided a comprehensive set of power system engineering analyses, including a reactive power compensation sizing analysis, an insulation coordination study, a protective relay coordination study, and a computer simulation for a reactive compensation system to be shared with the transmission interconnection company. S&C also designed, procured, and commissioned a solution comprised of a PureWave DSTATCOM Distributed Static Compensator and six System VI Switchgear units.

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S&C ELECTRIC COMPANY

Excellence Through Innovation

To help meet tight deadlines, S&C conducted factory acceptance testing of the PureWave DSTATCOM unit at its Franklin, Wisconsin, facility before shipping it to the site for commissioning. To meet the government restrictions, S&C provided extensive planning through local knowledge, local response, and an intricate understanding of the local independent electrical system operator requirements, the regulatory environment, and the grid code. Moreover, S&C used multiple departments working in parallel to make sure it completed approval drawings ahead of schedule.

Results

HB White was very pleased with S&C's work on the Kingston Solar project and its involvement from conception to energization, with the end result being a robust system that is virtually maintenance free. The company was also impressed with S&C's extensive planning, which ensured a smooth project that was delivered on time and on budget.

The S&C team met all of the modifications required, including choosing communication devices to suit the customer's needs. S&C also took on additional duties outside of the original project scope, including taking responsibility for sizing the transformers.

To mitigate the harsh weather conditions, S&C arranged for the switchgear to be commissioned while it was still in S&C's Toronto factory. S&C used its own team and resources to supervise and assist, resulting in the commissioning being completed to ISO 9001 standards. S&C also maintained a safe workplace, and

the project was completed with no lost-time injuries and a 100% safety rating.

Knowing the equipment was field-ready before it left the factory minimised the need for onsite field labour, reduced the installation cost for the customer, and ensured fewer people were subjected to the gruelling weather and for less time. Having field-ready equipment also offered both a logistical and safe solution because the remote site offered little access to tools and technology. The reduced labour costs also fulfilled HB White's request that labour costs be kept to a minimum.

The resulting solar farm is saving 14,700 tonnes of carbon dioxide per year, an amount equivalent to planting 3,340 acres of trees. With a nominal capacity of 100 MW ac/140 MW dc, Kingston Solar was the largest single solar project in Canada at the time of commissioning.

"The solution offered by S&C surpassed our expectations and we are thrilled with the service provided. We look forward to continuing our long standing relationship with S&C on our next project."

*- Shahid Pasha,
Engineering Director-Canada, HB White*

The 100-MW Kingston Solar project is located on land unsuitable for farming because of large limestone deposits.

