Microgrid control saint kitts and nevis

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The Caribbean Renewable Energy Forum (CREF) awarded its 2023 prize for "Best Microgrid" to Solar Island Energy and the Eastern Caribbean Central Bank (ECCB) for a project on the Caribbean Island of St. Kitts that was designed using HOMER(R) Pro software. Key features of the microgrid include its design for resilience to tropical hurricanes and corrosion.

The ECCB is leading the promotion of renewable energy throughout the Caribbean region. Headquartered on the island of St. Kitts in the two-island Federation of St. Kitts and Nevis, the ECCB is the central bank for Eastern Caribbean nations, responsible for setting monetary policy, maintaining monetary and financial stability, printing currency and promoting growth and development.

St. Kitts is located on the edge of the Atlantic hurricane belt, which makes it highly vulnerable to cyclones and hurricanes. In an effort to tackle climate change and related extreme weather events, the ECCB has become a key player in the country"s mission to reduce its carbon emissions and become renewably powered by 2030.

As of April 2022, the ECCB project was the largest solar generator on the island of St. Kitts and "the largest solar-power system in the Eastern Caribbean operated by any entity other than a power company."

After the solar array was completed, the central bank added a battery storage system, creating a microgrid that could allow the bank to operate independently of the primary electric grid. The final system features 1.2 megawatts of PV and three megawatt hours of batteries.

The ECCB chose Solar Island Energy to design and manage the project. Solar Island Energy President and Founder Marc Lopata is an electrical engineer and microgrid expert specializing in designing distributed energy systems for Caribbean locations.

Lopata"s typical process is to create a "desktop estimate" with a load curve using past energy consumption, building size and energy intensity, logger data, or sometimes diesel fuel consumption.

"We use HOMER software to sketch out the basic size of the system that will satisfy the load while best meeting the owner"s performance goals," Lopata explained.

Before designing the central bank"s parking lot PV canopies, Lopata used a data logger to approximate a power curve -- a graph showing the energy that would need to be generated. Once Lopata established the basic cost of the system, he began plugging in specific components, modifying financing and other costs to develop a more refined estimate.

Solar Island Energy also participated in the engineering phase of the ECCB solar canopy development and

was closely involved during the construction process of the microgrid. Lopata was the engineer-of-record for the three phases of this project.

"The ECCB project had only a six-year payback and is offsetting about 90% of the bank"s energy consumption based on HOMER Pro software modeling," Lopata said. "The short payback is because it is offsetting diesel electricity, which can cost up to 70 cents per kWh in some locations, and the 90% offset is approximately the lowest levelized energy cost over the project"s lifetime."

Lopata concluded that the hardening of PV systems in the Caribbean against hurricane damage and corrosion is well worth the expense, at an estimated 2%-3% increase in cost for foundations, hardware and steel.

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