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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 Pro(R) 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.

In 2017, two powerful hurricanes, Irma and Maria, inflicted severe damage across multiple Caribbean nations and islands, taking lives and devastating infrastructure and economic potential. The historic intensity and record-breaking economic damage also signaled a dangerous escalation in the risk associated with a changing Caribbean climate. Irma was the first recorded Category 5 hurricane ever to strike the Leeward Islands. At the time, it was the most powerful hurricane ever recorded in the Atlantic, with wind speeds of more than 185 miles per hour. Irma caused 52 fatalities and was estimated to have cost $52 billion in damages, according to the U.S. Government Accountability Office.

Spurred by the physical and economic devastation from catastrophic hurricanes, in 2018, Caribbean political leaders declared climate action and disaster resilience to be a matter of their survival. In keeping with those objectives, the ECCB announced its intention to achieve carbon neutrality by the end of 2022. The bank"s leadership decided to install large solar photovoltaic (PV) canopies over parking lots as part of a larger initiative called "The Greening of the Campus." The first phase of the project was completed in 2020 during the COVID-19 pandemic, and the second phase was completed in 2021. Ultimately, the ECCB installed 3,620 solar panels and 20 inverters with a total capacity of 1,200 kilowatts (kW).

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.

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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.

"I use HOMER Pro software all the time, almost every day," Lopata said. "It really excels when the electrical load and weather are not consistent."

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.