Eritrea microgrid economics

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Developers and technology companies worldwide continue to focus on electrifying energy-poor areas of Africa. Recent example: 40,000 residents and businesses in the northeast African country of Eritrea now have reliable electricity thanks to two new minigrids.

Developed by UK-based Solarcentury, the minigrids (Africa"s term for microgrids) combine solar PV, lithium-ion batteries and diesel generators. The projects -- a 1.25-MW minigrid in Areza and the 1-MW minigrid in Maidma -- replace small diesel generators, which were comparatively costly and polluting, unreliable and limited in hours of operation.

Local economic opportunities should increase by a significant margin as a result of the minigrids coming online, said Daniel Davies, Solarcentury Africa general manager.

"There are also many wider social benefits, including lighting for study, power for the health clinic and enhanced opportunities for small businesses," he said.

Solarcentury"s involvement with the Eritrean rural minigrids projects began when it responded to an invitation for proposals issued by EuropeAid in 2016, said Davies. Solarcentury won the fixed-priced contract as the lowest-priced, qualifying bidder.

The project was finished on budget and cost less than extending the utility grid to the two towns, Davies said. Residents and businesses will pay for the mingrid power they consume. Smart meters have been installed to monitor and keep track of their consumption.

"As a model for rural electrification, this presents an alternative technical solution which takes advantage of low-cost solar and energy storage and will provide abundant power 24 hours a day, seven days a week," he said.

Canadian Solar supplied the solar PV modules for the minigrids and SMA the PV inverters. Tesla supplied and supported installation of the energy storage and associated power electronics, and Caterpillar the diesel gen-sets.

"We are technology-agnostic and will choose the best technology for the project. Using second-rate materials in a harsh environment where the cost of replacements and repairs will be high is a common mistake, and we sought to avoid this to ensure reliable operation. The client had also specified that it wanted Tier 1 suppliers -- which is in line with our supply strategy-- so we selected suppliers who had the ability to support the project as well as providing the right materials at a competitive price," Davies said in an interview.

"Environmentally, the system is expected to deliver power which is 70-80 percent solar -- the balance coming from the new back-up generators," he said. "When the generators run they will be optimally loaded by using the batteries so that fuel use will be minimized. This is an improvement of the previous solution which was 100 percent diesel-powered. Obviously the performance and impact of the system can only be determined after some time -- as people adapt to having a continually available power supply."

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Solarcentury provided extensive training in minigrid operations and maintenance to employees of the Eritrean Electricity (EEC), which will operate and maintain the minigrids going forward. The London, U.K.-based project developer "will also provide after-sales support both on-site and remotely from our Nairobi O&M service hub along with support from colleagues in London who oversee our remote monitoring platforms. The cost of the training and after-sales service is part of the original contract, and going forward this will be an operational cost for the EEC," Davies said.