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With electricity only five hours a day, Annobon Island is much like many other remote areas of the developing world. Darren Hammel of Princeton Power Systems explains the changes that the Annobon Island microgrid will bring to this Equatorial Guinea community.

Annobon Island is the southern-most island of Equatorial Guinea off the coast of west central Africa. The island has a population of approximately 5,000 residents, with limited access to reliable electricity. In 2014, residents of Annobon Island had access to electricity for about five hours per day, if at all, and even then the electricity did not come cheap as they would spend an average of 15-20 percent of their annual income on supplemental power.

What"s worse, generators are typically oversized for the average amount of power they provide, which makes them run inefficiently, burn more fuel, and need more maintenance. Finally, with many mechanical moving parts they are prone to break-downs and are tough to count on for reliable electricity, especially in warm temperatures.

Princeton Power Systems, based out of Lawrenceville, New Jersey, opened doors in 2001. The company has extensive experience with microgrids having developed perhaps the highest profile solar microgrid in the world for the US National Park Service on Alcatraz Island in the San Francisco Bay, plus many other projects with customers across the United States, the Caribbean, Europe, and Africa. Princeton"s UL and CE-certified power electronics are used worldwide in advanced battery operations both tied to the electric grid and offgrid, with built-in smart functions for ancillary services.

The BIGI-250 operates both on-grid and off-grid and features built-in smart functions, such as demand peak shaving, photovoltaic (PV) ramp rate control and area frequency regulation (AFR). It includes a droop control algorithm that allows multiple power converters to synchronize on an AC-microgrid along with diesel generators and without dedicated communication lines between the converters. This control method allows inverters to drop off-line or communications to go down without affecting the reliability of the electric grid.

The control structure is based on Princeton"s Energy Management Operating System (EMOSTM) and four EMOS-Hub controllers placed around the island. There is one EMOS-Hub located near the mouth of the island"s inactive volcano, another near the island"s airport, one near the island"s only hotel and the fourth master controller near the southern tip to coordinate between all of the locations and support three small villages. The island-wide microgrid EMOS controllers allow remote control and monitoring of the power system, and allows remote maintenance and software upgrades as needed.

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for people in rural areas where grid connected power does not exist or is not reliable," said Ken McCauley, president and CEO Princeton Power Systems.

The Annobon project is a part of Equitorial Guinea"s National Economic Development Plan Horizon 2020, which aims to make Equitorial Guinea an "emerging economy" while accelerating its development and democratization by 2020. Along, with a much needed power supply, the microgrid will enable the development of multiple industries on the island, therefore, providing residents more jobs and significantly raise the standard of living.

Annobon Province has a population of approximately 5,000 residents. Today, the residents have reliable electricity for up to five hours per day and spend an average of 15-20 percent of their income on supplemental power. The solar microgrid in development will eliminate this expense entirely and provide reliable electricity 24 hours a day, seven days a week. The project is a part of Equatorial Guinea’s National Economic Development Plan Horizon 2020, which aims to make Equatorial Guinea an “emerging economy” and accelerate its development and democratization by 2020.

The Annobon microgrid is enabled by the Princeton Power Systems’ BIGI-250 energy management platform, a three-port industrial-scale solar energy management system with UL listing. Princeton Power Systems has extensive prior experience working with GE’s energy storage team. GE’s batteries, in addition to providing high temperature performance and improved safety, are designed to offer environmental responsibility with non-toxic and recyclable materials and worldwide support.

“Today, over 1 billion people are without power. We are taking our experience in microgrids from Alcatraz Island, the U.S. Department of Defense and private sector customers to now apply it to improving quality of life for people in rural areas where grid power does not exist or is not reliable,” said Ken McCauley, president and CEO, Princeton Power Systems. “We look forward to future global projects across the world to provide power to these areas to have hospitals, lighting and other basic human needs.”