Colombia Microgrid

Trojan brings power to the northern state of Choco, located in western Colombia, in the Municipality of Acandi, an area that is mainly jungle, along the Caribbean Sea bordering Panama. This region is in a remote area of the country that is not tied to an electrical grid.

The Colombian government issued a mandate to expand the availability of electricity to the remote area of Acandi by building five solar hybrid installations, or microgrids. Acandi is mostly jungle, located on the Caribbean Sea bordering Panama, and its remoteness made it impossible to effectively connect to the country's main electrical grid. These communities were forced to rely on diesel generators which only provided power for a few hours each day.

The government decided to improve electricity service to the communities using state-of-the-art solar photovoltaic technology with energy storage powered by advanced deep-cycle batteries.

One of the greatest incentives to installing these microgrids was to reduce the use of diesel fuel. Not only were the generators loud and emitted pollutants, but because the area can only be accessed by boat, the cost to transport fuel is prohibitively high. Also, when a generator broke down, the community would have to go without electricity until someone could fix it—which could be a while in these remote locations.

This project is the first of its kind in the Choco region and allowed 431 households,

including an indigenous community, to have access to clean, affordable and reliable energy for the next 20 years.

"One of the greatest incentives to installing these microgrids was to reduce the use of diesel fuel," said Ana Maria Murillo, Business Director of Tecmac Ingenieria, the project's solar installer.

The five communities that benefited from this project included:

- Bahia de Trigana, San Francisco, Sardi, Acandi, Choco (293 households)
- CHUGANDI, Acandi, Choco (45 households)
- Caleta, Acandi, Choco (45 households)
- Aguas Blancas, Acandi, Choco (28 households)
- Pescadito, Acandi, Choco (20 Indigenous Community Families)

The key to the successful implementation of this project was to choose durable components that would last for the estimated 20-year duration of the project, as well as withstand the region's harsh environment. The project was designed with a long-term vision to reduce the burden of increasing electricity prices for the community, which was quickly becoming unsustainable if they were to continue running the microgrids only with diesel generators.

Adding additional capacity, with solar photovoltaic panels and batteries to extend the hours of electricity proved to be a more economical choice. It was also the most environmentally friendly.

The overall 191KWp solar system configuration included the following components:

Batteries:

- 288 Trojan IND29-4V, 2,105 Ah @ C100-Hr, deep-cycle, advanced lead acid with Smart Carbon

- 12 Trojan IND13-6V, 695 Ah @C20-Hr, deep-cycle, advanced lead acid with Smart Carbon

Battery Life: 17 years, per IEC 61427

Battery Bank Configuration: 48V and 24V

Solar Modules: 250W Trina Solar panels

Inverter-chargers: Bidirectional Sunny Island inverter-chargers

Inverters: Sunny Boy inverters

Backup Generator: Cummins diesel generators

With batteries being one of the most expensive components of a microgrid, the economics of the installations required the batteries to last for the duration of the project, while at the same time having the lowest Levelized Cost of Energy (LCOE).

Trojan's Industrial Line of advanced lead acid batteries with Smart Carbon were selected as the energy storage solution for all five microgrids, which totals 50KWh of storage and 191KWp of solar photovoltaic capacity. The Trojan Industrial Line features Smart Carbon, Trojan's proprietary paste formula that addresses the negative effects of inconsistent or under charging due to environmental conditions such as long periods of cloudy days.

The rugged design of the Industrial Line helps prevent possible costly mishandling of the batteries during transportation and installation in these remote areas. Housed in a dual container to protect the 2V cells from damage, the Industrial line features built-in handles that enable easy movement of the batteries by hand when forklifts are not available.

Weighing more than 75 tons, the 288 Trojan batteries travelled from California to Buenaventura, Colombia, crossing 1,100 miles. From there they were transported to the town of Turbo, Colombia along the Atlantic Ocean and then transported on wooden barges to the 5 communities of Choco. After arriving in Turbo, the batteries had to be manually loaded and unloaded with the help of residents in the area.

Thanks to installing a battery-based PV system, dependency on diesel generators has been minimized reducing noise and emission of pollutants.

Having reliable electricity available for most of the day enables these villages to expand and improve the quality of life of residents, as well as enhance commercial business activities. In addition, improved communications capabilities, education and more jobs are major benefits to the residents.

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