



AN EXCEPTIONAL ENERGY CASE STUDY
LPG FOR POWER GENERATION
OFF-GRID ISLAND RESORT IN THE U.S. VIRGIN ISLANDS

Image provided by Capstone Green Energy.

LPG is a modern, clean, portable energy and is increasingly recognised as an ideal solution for low carbon and clean electricity production in non-grid connected areas such as rural areas and islands. This Exceptional Energy case study looks further into the environmental, economic and reliability benefits of LPG for power generation - as a modular microturbine energy solution for a luxurious, off-grid resort in the U.S. Virgin Islands.



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1. The Challenge

Margaritaville Vacation Club by Wyndham Resorts is a luxurious, off-grid, 264 room beachside resort located on Water Bay at the eastern end of St. Thomas. In an effort to lessen exposure to an unreliable utility grid as well as to lower energy costs, Margaritaville resort owners sought an alternative energy solution that would provide a resilient, cost effective, modular power solution, allowing for multiple phased expansions.

Capstone Green Energy and Engineering Construction firm, Triton Energy, designed a modular, power solution fuelled by LPG which was capable of being scaled up as the resort grew. Ultimately, the system would reduce energy costs, increase power reliability and significantly lower the resort's carbon footprint.



Image provided by Cesar Okada, Canva.

2. The Technology

The new, on-site microturbine power plant was installed in December 2014. The system commenced with (1) C1000R and expanded two years later with the addition of (1) C800R. The site now features two highly efficient, low emission Capstone Green Energy microturbines that can generate up to 1,800 kW of electricity. Capstone Green Energy's distributor, E-Finity Distributed Generation, monitors the site and has the ability to remotely diagnose and troubleshoot issues, and provide strategic energy management.



Image provided by Capstone Green Energy.

Each Capstone Green Energy C1000R Microturbine provides up to 1 MW of electrical power and contains 5 microturbine engines.

3. The Solution

The entire system is fuelled by clean-burning, efficient LPG, replacing the need for higher-polluting fuels such as diesel. The installation also included a 35,000 gallon, on-site LPG storage tank providing sufficient fuel to sustain on-site power generation for fourteen consecutive days.

The oil-free, air-lubricated and air-cooled LPG for power generation system covers the resort's full electric load during peak occupancy. Due to the microturbine's modular design the system is able to continue running at high efficiency even in partial load conditions, such as during the off-season when occupancy is lower.



Image provided by Capstone Green Energy.

The on-site power plant at Margaritaville Vacation Club by Wyndham Resorts includes a 35,000-gallon LPG storage tank that provides enough fuel to sustain on-site power generation for fourteen consecutive days.

In 2017, the LPG for power generation system continued to power through extreme conditions during Hurricane Irma, providing power to the resort and over forty guests. The resort was able to keep the guests comfortable and the food fresh while the majority of St. Thomas was without power for months.

4. The Results

- The cost to operate the LPG-fuelled, microturbine-based system is roughly half that of purchasing local utility power, resulting in over USD 6 million in energy savings.
- The system has delivered an impressive 99.9997% uptime, coupled with added reliability as the resort no longer depends on an unreliable electric utility grid.
- Given the natural and sensitive beauty of the local environment, one of the important benefits of the system implementation has been its ability to significantly lower the resort's carbon footprint. Reducing emissions by 5,000 carbon tons - the equivalent of taking roughly 500 cars off the road.



5. Contributors

- Capstone Green Energy
- E-Finity Distributed Generation
- Triton Energy

