

# LPG for Electrical Power Generation



## The U.S. Virgin Islands Conversion to LPG

LPG is a clean and modern fuel, bringing comfort to tens of millions of consumers worldwide. Its multi-purpose attribute is what make it accessible and affordable to all. The U.S. Virgin Islands have turned to LPG in a new project for electrical power generation. With fuel oil prices rising, their dependency on it became less feasible, pushing the islands to search for an alternative, clean burning fuel. This case study will examine how LPG for electrical power generation reduces costs, providing power and water for the U.S. Virgin Islands.

A WLPGA case study for Exceptional Energy  
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# 1. A New Model

The U.S. Virgin Islands has set a new model for other island power authorities and small utilities serving confined areas to consider adapting. Their conversion to LPG for electrical power generation is the first project of its kind and hopes to pave a new path for clean, affordable power. The U.S. Virgin Islands Water and Power Authority (WAPA) believe LPG electrical power generation allows for more people to enjoy the benefits of a cleaner, less expensive fuel that benefits the utility and rate payers which at the same time improving air quality.



# 2. Need for Change

WAPA is the primary source of water and power production and distribution in the U.S. Virgin Islands, where 92% of electrical power was generated by No. 2 fuel oil and 8% by solar. Historical rates of the territorial peak power rating are 88 MW and 55 MW. In fiscal year 2015, WAPA’s operating expense was 333,710,000 U.S. dollars, of which 231,479,000 U.S. dollars was fuel cost.

Hugo V. Hodge Jr., past executive director of WAPA, states that “typical fuel cost is 16 cents per kilowatt hour; customer cost is 29-32 cents per kilowatt hour, and at the peak of oil prices, rates ran as high as 55 cents per kilowatt hour – the highest cost for electricity compared with any other U.S. state or territory.”

In addition to this, in 2012, with the close of the Hovensa Refinery (owned by Hess Corp. and Venezuelan state owned Petroleos de Venezuela), many jobs were lost and lucrative tax revenues to the local government were drying up. Due to the refinery’s sudden closure, the fuel contracts WAPA enjoyed were severed, forcing them to search for alternative sources of fuel.

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# 3. Why LPG?

Closing of the Hovensa refinery had an adverse impact on the territories residents and economy. In September 2012, WAPA issued a request for quotes for the islands fuel conversion project. LPG was chosen as the best suited solution. In July 2013, Vitol was selected as the project partner for infrastructure upgrades and LPG supply.

WAPA entered into a master agreement with Vitol for infrastructure construction, conversion of seven existing combustion General Electric turbines, and supply of LPG. With this partnership, WAPA expects to see a reduction in its fuel costs of at least 30%, as well as reducing green house gas emissions by 20%. In addition to this, best safety practices were implemented and enforced throughout the project to ensure environmental benefits.

## 4. Finding Relief

Because island utilities are small, isolated and are not interconnected to a grid made up of other utilities, islands have had no choice but to purchase small, simple-cycle generating units that are run on fuel oil. This is due to the separation of the islands by water, not to mention the depth of the ocean floor, which does not allow interconnection using underwater electricity cables.

This combined with rising fuel prices led WAPA to pursue alternative options for the past ten years. With support from the executive and legislative branches of the Virgin Islands government, WAPA senses relief coming with their conversion to LPG. The National Renewable Energy Laboratory assessed a 60% reduction in fossil fuel by 2025 for the Virgin Islands, while the Interior Department provided a 500,000 dollar grant to prepare a resource plan that will help determine future generational needs.



**WAPA was widely supported in its conversion to LPG for electrical power generation by the executive and legislative branches of the local government.**



## 5. Work for the Future

Construction for the conversion project took place over the course of eighteen months and required more than 200,000 man hours. The storage tanks are mounded and encased by layers of earth, sand, rock and gravel to maximise safety. Other benefits of the storage tank installations include providing a significant protective barrier from external damage or fire; elimination of oxygen preventing uncontrolled ignition; and additional earthquake and hurricane protection. The facilities were designed to ensure employee and public health, safety and protection. Although unforeseen complications rose, impacting the progress of the project, it was a challenge worth accepting and overcoming.



## 6. The Impact of LPG

WAPA received its first inventory of LPG in October 2015, followed by the completion of mechanical terminal facilities in November 2015, an upgrade of fire suppression systems in January 2016, and the commissioning of LPG turbines in February 2016.

The U.S. Virgin Islands' conversion to LPG represents the best possible near term project as a way to reduce costs for power generation. It is a project that benefits all in providing affordable power and water.



WAPA's LPG conversion project was put into practice in April 2016, as the first retrofitted generating unit in the Richmond power plant was switched from fuel oil to LPG. The commissioning of the unit follows WAPA's work with Vitol that began in 2016. Since then, local and federal permits were secured as a way to fully develop the conversion of two units to LPG.

## 7. Acknowledgements

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