

Liquefied Natural Gas: A Power Solution For Isolated Markets

By **David Lang and Carli Gish** (January 13, 2020, 5:43 PM EST)

Natural gas is playing a growing role as an electricity generation fuel. As the drive for decarbonization intensifies, in light of growing attention to climate change risks, the increasing role that natural gas can play becomes clearer.

Burning natural gas to produce electricity produces lower emissions of nearly all types of air pollutants, including carbon dioxide, than other fuels. This is particularly true of liquefied natural gas, or LNG, which has had most impurities removed in its production.

The emissions advantages of burning natural gas offer great opportunities for large markets. We have seen this already in the United States. Carbon dioxide emissions from electricity generation in the United States fell from 2,411 million metric tons in 2007 to 1,732 in 2017 — a dramatic 28% reduction. While renewables penetration had a role in delivering that reduction, increased use of natural gas was the most significant factor.

There is great attention focused on China and India, and the significant role that natural gas can play in clearing the air in those regions. That focus is surely warranted, as China and India are huge, growing markets with significant air quality issues. However, both China and India are outliers in the small role that natural gas currently plays in their fuel mix for power generation.

In 2016, only 4% of China's 1,625 GW of power generation was derived from natural gas. In the same year, Organization for Economic Co-operation and Development countries produced 27% of their power from natural gas. Still, there is no question that natural gas can have a major role in reducing the carbon footprint of power generation in major markets like China and India.

Large, developed power markets are well positioned to absorb significant renewable energy penetration. These markets have diverse baseloads that can handle the intermittency of solar and wind power. They also offer geographic diversity that allows grid interconnectivity to reduce the impact of this intermittency.

If adequately interconnected, these large, diverse markets have the ability to manage the intermittency of solar and other renewables. China, for example, can combine solar, hydro, wind and conventional



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generation technologies in a way that allows large-scale penetration of renewables, while managing the challenges associated with their regional and temporal variabilities.

Europe, the United States, and other large markets have the ability to utilize the same technology. While LNG has a role in reducing the carbon footprint of power generation in large markets like China and India, as costs of renewable technologies decrease, large, diverse markets may see greater and faster penetration of renewables into the power generation mix than previously anticipated.

Though growing rapidly in developed power markets, renewables technologies face greater challenges in isolated markets. Real estate availability poses a serious limitation to renewables projects in these markets. Isolated markets are, by their nature, not diverse, resulting in intermittency issues that may be exasperated by a lack of diversity in generation and demand profiles.

There may also be serious local opposition to large-scale renewables projects in isolated markets, due to real estate constraints and other local issues. Because of the various challenges of developing renewable power projects in isolated markets, conventional generation technologies are at lower risk of being supplanted by renewables technologies.

Historically, small markets without local natural gas production did not have gas-fired power plants as an option. However, LNG-to-power projects may now be the best solution for reducing the carbon footprint of power generation activities in these isolated markets.

Small-scale LNG regasification technologies like floating storage and regasification units, or FSRUs, have been deployed around the world. Demand for reduction of carbon and other emissions has increased. Global LNG prices have dropped. All of these factors have caused LNG-to-power projects to become more competitive.

We have seen a significant number of important milestones in the development of LNG-to-power projects in 2019, including in isolated markets. Below we highlight a few of those.

AES Colon

In 2016, AES Corp. started construction of AES Colon, the first natural gas fired power plant in Central America, located in Panama. The 380-megawatt combined-cycle power plant is fired by natural gas regasified from LNG imported to a relatively small-scale land-based LNG terminal.

The facility is notable because it diversifies the fuel mix for power generation in the country, adding clean natural gas to the mix, which previously consisted of only bunker, diesel and coal for thermal generation.

Commencing operations in late 2018, the facility marks the first LNG terminal in Central America. Natural gas is expected to be sourced largely from the United States, and the LNG terminal is likely to be used not only for providing regasified LNG to AES Colon, but also for regional hub-and-spoke activities, according to AES's regional business model.

Outside of the power sector, the facility is also notable for its potential ability to facilitate LNG bunkering, as LNG becomes a more significant fuel for seaborne shipping.

NS Guantanamo Bay

A bit to the west, LNG is expected to land in Cuba. On July 24, 2019, the U.S. Navy issued a contract to Siemens AG for construction of a new power plant complex at Naval Station Guantanamo Bay. The Navy has stated that this is its first project for the use of liquefied natural gas. The new facility will become the primary power generation facility for Guantanamo Bay, and the current diesel generator will become a subsidiary and backup system.

This project highlights the usefulness of LNG in isolated markets. One can think of few more isolated situations than the U.S. naval base on land leased from an adversary.

The commanding officer of Naval Station Guantanamo Bay said that the “project will pay tremendous dividends in energy efficiency and security,” and the Navy noted that the project supports its three pillars of energy security — resiliency, reliability and efficiency. This is of course a strong endorsement of the use of LNG for generating power in isolated markets.

NFE Jamaica

Jamaica has also taken significant steps to add natural gas to its fuel mix, and is on its way to becoming an LNG hub in the Caribbean. New Fortress Energy commissioned an FSRU offshore Old Harbour to supply natural gas to the 190 MW Old Harbour power plant and the Jamalco cogeneration facility.

Jamaica’s prime minister has praised the project for its environmental friendliness and the expectation that LNG will continue to be cheaper than distillate fuels. Moreover, as the leadership at New Fortress has indicated, this project is just a first step on a broader plan spreading across the Caribbean.

Gibraltar LNG

In July 2019, MAN Energy Solutions successfully commissioned three 14V51/60 gas and another three dual-fuel engines in the newly constructed power plant in Gibraltar. Each of the engines can generate an output of approximately 14 MW.

The power plant on the North Mole in Gibraltar Harbour will form the backbone of the British overseas territory’s future power supply. A part of the waste heat from the engines will additionally be used for regasifying LNG in the connected LNG terminal.

With an output of 86 MW, the overall capacity of the new power plant significantly exceeds Gibraltar’s current peak demand by about 42 MW. MAN is responsible for delivering and commissioning the gensets and its related auxiliaries.

The French company Bouygues Energies & Services SAS is constructing the plant, and is responsible for the first year of operation. After this first year of operation the state energy provider, Gibraltar Electricity Authority, or Gibelec, will take over the operation of the plant.

“The new power plant guarantees Gibraltar’s energy supply. Our highest priority was the reliability of the technology in use. The power plant must also fulfill strict emission standards as it is located close to the city,” says Michael Caetano, CEO at Gibelec.

Maria Gleta Plant, Benin

In August 2019, the Maria Gleta plant near the city of Cotonou in the African country of Benin was officially inaugurated. The plant will supply the national grid 127 MW of electricity and runs on seven gensets from Germany's MAN Energy Solutions, which built the plant in a consortium with Denmark's Burmeister & Wain Scandinavian Contractor.

At the heart of the plant lie seven MAN 18V51/60DF gensets, which will mainly run on low-emission natural gas. The Maria Gleta plant is planned to be expanded later to a total capacity of 400 MW as part of this program. "The Maria Gleta power plant increases Benin's capacity for electricity generation by more than 50% — our country now becomes more independent of energy imports," said Benin's energy minister Dona Jean-Claude Houssou.

As isolated power markets wait for developments in energy storage and other technologies that allow deep penetration of renewables into their power markets, LNG is likely to have a major role in decreasing the carbon footprint of the power generation sector in these markets. Isolated markets are going to seek to reduce their carbon footprint, and will find that LNG is a natural bridge between conventional fuels and renewable options like solar and wind. We have seen a number of significant developments in this area in 2019 — and expect more to come in 2020.

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