

7 AFFORDABLE AND CLEAN ENERGY



Three billion people still cook, heat and light their homes using polluting fuels like wood and charcoal, dung and kerosene that produce unhealthy emissions and degrade forests. SDG 7 focuses on the need to provide modern energy access for all. In the cooking sector, this means moving to lower carbon, clean-burning fuels like LPG that are better for health and the environment, and that can be rapidly and widely scaled.

Countries such as India, Indonesia, Malaysia, Vietnam, Senegal, Cote d'Ivoire, Brazil, Colombia, and others have achieved national LPG use for cooking by 75% or more of their urban populations, and in some cases, 50% or more of their rural populations. LPG is already the main cooking fuel in many Latin American countries.

Over 2.5 billion people use LPG for some cooking tasks in resource-poor settings and millions more in developed countries⁹. The International Energy Agency (IEA) highlights LPG as a key fuel for substantially reducing energy-related pollution emissions. In its 2017 report, the IEA projects

that 1.4 billion people in the developing world will transition to LPG as a clean cooking solution if universal energy access is to be achieved by 2030. Countries like India, Indonesia and El Salvador have demonstrated how quickly and sustainably LPG can be scaled up over national territories for clean cooking.

In addition to its use for cooking, LPG is used in rural communities in many countries all around the world for heating purposes, as a lower emissions alternative to the use of heating oil or coal in residential settings. Because LPG is a very portable fuel, it can be transported and used in cylinders across urban, peri-urban and remote rural settings — wherever it can be transported safely.

In addition, LPG is used in the power sector, especially for remote applications and island economies where its flexibility is well suited to meet household energy needs, with little central infrastructure required. LPG is also suited to large-scale power infrastructure, where its use integrates well with renewable energy solutions.

In a 2015 United Nations report, Ghana's commitments to achieve sustainable development goals included large scale adoption of LPG use for cooking, increasing from 5.5% in 2015 to 50% of peri-urban and rural households by 2030.



A CLEAN START – CLEAN COOKING IN KENYA WITH A PAY-AS-YOU-COOK SMART METER

Cecilia Wanjiku is a mother of four. She lives with her family in the so-called “slumburb” of Kawangware, Kenya. When Kawangware is in the news it is often for its difficult living conditions. Many families cannot afford to send their children to school. Clean water and electricity are in short supply. While many families have access to LPG, they often cook with charcoal.

It is at the start of the day when Wanjiku’s first decision regarding household energy must be made. Charcoal takes nearly 20 minutes to heat up. However, charcoal is reliably available and she can purchase what is needed for the day close to her home at a cost she can afford.

LPG, on the other hand, burns cleaner and can cook meals faster. However, gas must be bought by the cylinder, which is inconvenient and expensive for many poorer households.

Envirofit’s SmartGas technology overcomes this barrier by offering users the ability to pay-as-you-cook – or make daily LPG purchases using mobile money. These payments can be as little as \$0.50 a day at a cost equal to or cheaper than charcoal. This flexibility is necessary because income can vary throughout the month. “I like that I can buy gas in smaller amounts; a factor that ensures that I always have gas. I don’t have to save for a full cylinder refill, which was sometimes a challenge especially during those difficult curves of the month,” said Wanjiku.

Envirofit’s SmartGas cylinders use an Internet of things (IoT) smart meter technology, which allows consumers to pay for gas in daily increments, and communicate through mobile systems which schedule cylinder refills automatically before customers run out of gas. This ensures a consistent, affordable supply of fuel, and removes the burden of refilling from Wanjiku’s schedule by having a full cylinder of LPG delivered safely to her door just as her current cylinder is running out of LPG.

Much of the cooking with LPG that takes place in Kawangware happens on cylinder-top burners. For larger families, a single burner isn’t enough to make a meal consisting of multiple dishes. Often, a charcoal stove is used as well, diminishing the positive health impact of LPG use. Envirofit also helps users upgrade their kitchen by financing a two-burner LPG stove. As LPG usage increases, households like the Wanjiku family benefit from more reliable, affordable and convenient access to modern fuels, and lowered exposure to smoke and soot.



Cecilia Wanjiku, SmartGas customer in Kenya

POWERING SUSTAINABLE ENERGY TRANSITIONS IN THE CARIBBEAN: ROATAN, HONDURAS

LPG powers environmentally-friendly energy transitions by fueling electricity generation in developing nations in the Caribbean.

Wärtsilä, an energy company, has closely cooperated with Roatan Electric Company to deliver a modern, low-emissions LPG-fueled power plant to the island of Roatan, Honduras. This plant has prepared the Roatan hybrid power system for the future large-scale integration of renewably sourced energy generation¹⁰.

For this project, Roatan Electric Company evaluated LPG and Liquefied Natural Gas (LNG) and decided to use LPG due to its easy portability: LPG (in contrast to LNG) can be stored in industry standard pressurised bullet tanks, avoiding the complex and costly cryogenic storage infrastructure required for LNG. Furthermore, the worldwide fleet of small-sized pressurised LPG tankers is large, and existing vessels can be used for the Roatan trade while at the same time supplying LPG to other consumers in the region.

Andrej Borgmästars, Senior Manager LPG to Power at Wärtsilä Energy Solutions, says the following regarding the benefits of LPG for the Caribbean region: "At Wärtsilä, we believe that LPG is an excellent fuel, not only for the Caribbean and Central America where we already have LPG plants in operation, but for any site that needs clean energy and does not have access to pipeline natural gas. Furthermore, thanks to the flexibility of our LPG power plants, they represent the optimal solution allowing for the integration of renewable energy generation into any power system."

LPG also increases energy security and reliability for the Caribbean island. This improvement to the energy infrastructure will help to generate faster local economic development.

LPG POWER PLANTS FOR LARGE-SCALE ENERGY ACCESS

Bridge Power project¹¹, an LPG-fueled power plant under development in Tema, Ghana, will use high efficiency turbine generators. The US\$953 million power plant being built in two phases, one of 194 MW and the second of



LPG-powered electricity generation

206 MW, is the largest of its kind. Because of the scale of this LPG energy project, the power plant will not only fuel sustainable energy transition, but also local employment and economic development.

LPG greatly suits the Ghanaian market for power generation, due to Ghana's high wholesale electricity prices. LPG's versatility makes it efficient and easy to use, and it delivers lower carbon emissions with great results. The project will use imported LPG as the primary fuel, and diesel as the secondary fuel during the first five years of operation. Natural gas is expected to become available to serve as the primary fuel, and LPG will become the secondary fuel later.

LPG's versatility is demonstrated in ways beyond its efficiency and sustainability aspects. LPG is easier and less expensive to compress, ship, and store than LNG, and LPG power plants can be developed close to where energy is needed, thus avoiding significant losses from power transmission lines. It is adaptable to other fuel sources such as wind, solar, hydro or other renewable sources, as well as natural gas and, because of this quality, LPG is considered as a valuable "bridge" energy source for such power plants. Fueling power plants with LPG therefore also contributes over time to a greater renewable energy share in overall electricity generation.

