

# From Problem to Profit

## Latin America taps into green energy potential

By Marc Eeckhaut



This anaerobic reactor was designed for 24 tons of chemical oxygen demand per day.



Sabormex represents a large number of well-established Mexican brands including Clemente Jacques sauces and dressings.

Latin America and the Caribbean have rich potential to replace fossil fuels with green energy as technology delivers profitable and environmentally friendly alternative sources of heat and electricity generation.

The region's renewable energy endowment is large enough to cover its projected 2050 electricity needs 22 times over, according to a 2013 report titled "Rethinking Our Energy Future," commissioned by the Inter-American Development Bank (IDB).

The IDB report addresses a series of myths surrounding renewable energies, noting that several of these alternative technologies have become price competitive with conventional technologies, offer good investment opportunities and should be taken into consideration by policymakers aiming to diversify their national energy matrices, reduce fuel supply vulnerabilities and cut greenhouse gas emissions.

One promising source of green energy is the biogas potential found in the region's highly diverse food, beverage and agribusiness industries, which produce biologically rich wastewater streams.

Instead of being an environmental problem, these wastewater streams can be treated anaerobically to simultaneously clean the water to high discharge standards while producing biogas (methane) to generate green electricity or to fuel boilers and other factory plant fuel consumers.

### Reliable Base Load Power

Anaerobic plants typically can pay back the cost of their introduction within two years or even less and then go on working 24/7—virtually in perpetuity—to provide biogas for their owners, who then can reuse the energy or deploy gas-fired generators to sell electricity back to the grid.

The technology has broad potential: Advanced anaerobic treatment such as that installed in Latin America—and proven at more than 300 food, beverage, agro industry and processing plants worldwide—can be used wherever industry has a biological waste stream or wastewater with high organic carbon or chemical oxygen demand (COD) of natural origin that can be broken down into biogas by anaerobic bacteria.

Latin American early adopters of anaerobic technology are already reaping millions of dollars a year in benefits and planning further extensions to expand the concept.

### Cerveceria Nacional, Ecuador

Ecuador's leading brewery, Cerveceria Nacional (CN), is introducing a second waste-to-biogas plant that is expected to increase the company's savings by more than \$25 million worth of green energy over the next decade, while also benefitting the environment.

The new installation commissioned by CN—a subsidiary of the SAB Miller Group—expands on the success of its first plant, which already produces the equivalent of more than 6,000 kg of fossil fuel per day by extracting biogas from the plant's wastewater stream at its Guayaquil plant.

The latest installation, producing the equivalent of 3,000 kg of fossil fuel a day, is at CN's Quito plant, where the Global Water Eng. (GWE) wastewater treatment plant was carefully integrated into the relatively small area of the brewery in order to respect and preserve the scenic surrounding landscape of Cumbaya, a suburb of Quito.

A new anaerobic reactor was integrated into the Quito installation, which cost-efficiently incorporated pre-existing tanks reconverted into new equalization and aerobic treatments.



Sabormex installed a complete biogas reuse system.

After the savings observed in the first installation at the Guayaquil plant and in line with environmental sustainability, GWE was awarded a second biogas reuse system project, which was successfully started up in 2013.

The system, drawing on a 3,000-cu-meter-per-day wastewater treatment plant, is producing biogas for the main boiler of the brewery, generating savings of up to 3,000 kg of fuel oil per day.

The combined fossil fuel savings generated by the two plants quickly will repay the cost of the installation and generate the equivalent of more than \$2.5 million per year in fossil fuel savings. (This figure assumes a plant running 330 days a year at full capacity and a heavy fuel oil price of \$0.83 per liter.)

### Waste-to-Energy Initiative

Brewing company Compañía Cervecería de Nicaragua (CCN), also is embarking on a wastewater-to-energy initiative with a new wastewater treatment and biogas reuse plant at its brewery in Managua.

CCN, founded in 1926, is Nicaragua's biggest brewery. One of its beers—the Toña, launched in 1975—has more than 85% market share in Nicaragua and is exported to the U.S. Toña has become a national symbol in its own right, featuring on its label the volcano San Cristobal and the railway to the sugar mill of San Antonio.

At CCN, GWE has designed and installed an anaerobic reactor incorporating ANUBIX-B technology for 13 tons of COD throughput per day, as well as a biogas use system installed at one of CCN's boilers, which allows CCN to save up to 3,000 kg of fuel oil per day. A revamp of the plant's aerobic and a complete sludge dewatering systems also have been included in the current project.



The quantity of biogas to be produced by Sabormex is equivalent to about 2,650 tons of the fossil fuel equivalent per year.

The CCN project is GWE's second in Nicaragua. It follows two large ANAMIX-M digesters fed on wastewater or "slops" from a cane molasses-based distillery that has been installed at the factory that produces the rum Flor de Caña.

### Sabormex's Complete Reuse System

A global exporter of diversified food and beverage products, Sabormex is capitalizing on the benefits of its existing high-efficiency wastewater treatment plant by installing a complete biogas reuse system to replace fossil fuels with green energy.

Founded in 1964 in the city of Puebla, Sabormex ("Mexican flavor") is behind a large number of well-established Mexican brands including Clemente Jacques (sauces and dressings), La Sierra (canned foods) and Tazza, Garat and Familiar (coffee). These brands are exported to more than 20 countries, bringing the authentic Mexican flavor to different corners of the world.

Such diversified production results in fast and significant changes in the composition and flows of the company's wastewater, which, before treatment, often contains high concentrations of fats, oil and grease and generally high levels of total suspended solids and COD.

In order to deal with the variable characteristics of the wastewater, GWE engineered and installed an ANUBIX-B anaerobic reactor designed for 24 tons of COD per day. This reactor, operating since 2011, has consistently shown high removal rates and stable performances.

The plant was built by GWE's longstanding partner ICR Ambiental of Mexico. ICR specializes in the engineering and construction of projects for water and wastewater treatment, solids digestion and power generation. ICR has partnered with



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GWE in many projects over the years by engineering and building wastewater treatment plants in Latin America.

All of the suspended solids and fats sent to the wastewater treatment plant are first separated in a dissolved air flotation installation, which generates up to 100 cu meters per day of primary sludge. In order to digest this primary sludge, which is rich in organics, GWE installed an ANAMIX-T reactor. This is a thermophilic continuous stirred-tank reactor that achieves high removals of pollutants even while fed with a difficult stream containing high concentrations of fat and solids. Up to 10 tons of COD per day are fed to this ANAMIX-T, with the system achieving high removal efficiencies of more than 80%.

Startup of this reactor took only a few weeks, thanks to a special seed sludge collected from another GWE ANAMIX-T that had been operating in Belgium for several years. A method of preserving the activity of bacteria developed by GWE means this seed sludge can be shipped overseas in regular containers.

Following the success of the wastewater treatment plant, Sabormex has subsequently ordered a complete biogas use system in order to burn the biogas generated by the two anaerobic reactors.

This will generate 6,000 cu Nm per day of biogas, allowing savings equivalent to up to 8,000 kg of fuel oil per day.

The quantity of biogas to be produced by Sabormex is equivalent to about 2,650 tons of the fossil fuel equivalent per year, worth more than \$2 million in the first year and well over \$20 million in the first decade.

### Anaerobic Process Advantages

Modern anaerobic processes vastly concentrate the process in environmentally harmonious closed reactors, operated under ideal temperature and process control to optimize waste degradation

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**Compañía Cervecera de Nicaragua has a new wastewater treatment & biogas reuse plant at its brewery in Managua.**

and, in the process, generate large quantities of methane from the organic materials in the wastewater.

“The quantities of methane produced can diminish or even completely replace the use of fossil fuels in the production process,” said Jean Pierre Ombregt, GWE chairman and CEO. “One ton of COD digested anaerobically generates 350 cu Nm of methane—equivalent to approximately 312 liters of fuel oil—or about 1,400 kWh of green electricity.”

As a result of their efficiency, anaerobic digestion facilities have been recognized by the United Nations Development Program as one of the most useful decentralized sources of energy supply, as

they are less capital-intensive than large power plants. They also can benefit local communities by providing local energy supplies and eliminate the need for large and often smelly and environmentally challenging anaerobic lagoons.

“Most industries have not realized the potential of this green energy cash cow,” Ombregt said. “They have mainly been focusing on treating their effluent to meet local discharge standards at the lowest possible investment costs. By doing so, wastewater treatment installations have only generated additional operating costs and have never been seen as revenue generators.

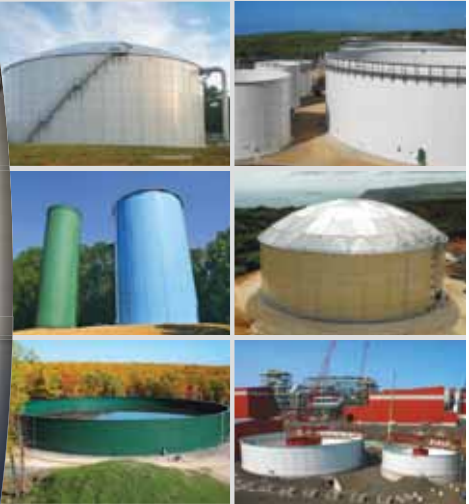
“However, applying anaerobic wastewater treatment sheds a whole different light on the cost structure of wastewater treatment infrastructure. It can now actually become a substantial additional source of income for many factories and processing plants throughout the world, including the food, beverage and agro industry and other primary product processing.” **IWWD**

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