



Power Generation

POWERING LATIN AMERICA WITH RENEWABLE ENERGY SOLUTIONS

- Who** Agricultural operations, landfills, power stations and commercial buildings
- What** Biogas- and natural gas-fueled generator sets
- Where** Throughout Latin America, including Chile and Bolivia

Latin America is one of the most vulnerable regions in the world when it comes to global warming, so it should come as no surprise that many Latin American countries have started implanting technologies and infrastructure that contribute to reductions in greenhouse gases. The progress they have made is considerable. According to the International Energy Agency (IEA), Latin America produced 53 percent of its electricity from renewable sources in 2014, compared to the world average of 22 percent. In the same vein, some countries like Chile, Brazil and Mexico have “tweaked their regulations to encourage alternative energy without having to offer subsidies,” according to IEA.

As a leading provider of combined heat and power systems, Rolls-Royce has outfitted entities throughout Latin America with the help of its global MTU distributor network. Below are just a few examples of the multiple MTU system installations across this fascinating and fast-evolving region.

Chile’s first biogas plant

In Chile, renewable energy projects are strongly encouraged. In fact, the country is one of few that have launched legislation that sets a goal of 20 percent renewable energy in the overall energy mix by the year 2025.



Rolls-Royce customer, MaxAgro, is an example of a company making the “20x25” initiative a priority. MaxAgro is headquartered in Pichidegua, a small town in central Chile with a population of around 18,000. There, the company owns and operates seven pig farms—rearing a total of 130,000 pigs in its plants. Alongside Detroit Chile, a local MTU distributor, Rolls-Royce partnered to help MaxAgro become the first Chilean business to install a biogas plant that generates energy from solid and liquid pig waste (slurry).

For Chile, a country largely dependent on renewable energy, the benefit of balancing the grid with localized continuous power solutions that are also environmentally friendly can't be overstated.

“We wanted to find an eco-friendly and profitable solution to produce our pork,” said Cristián Kühlenenthal, CEO at MaxAgro. “An MTU biogas plant that we can use to generate energy from the gas produced is something entirely new for us, but we knew that without environmentally friendly solutions, no business is viable in the long run nowadays.”

Just one year earlier, a competitor that owned and operated pig farms in the area was forced to close their plant due to local protests

against the smell of manure and the host of flies that populated the residential areas. The government later referred to the operation as a “sanitary disaster.” MaxAgro knew they didn’t want to make the same mistake.

To handle the project, Detroit Chile solicited help from biogas plant operator, Genera Austral. They installed an MTU CHP plant not only at the MaxAgro facility in Pichidegua but also in nearby Santa Irene. They are both equipped with a Series 400 engine and produce 400 kW of electrical energy and 462 kW of thermal energy. “The two plants together generate a total of 6,400 MWh of electricity a year that we feed into the national power grid,” shares Kühlenenthal. The thermal energy recovered from the engine cooling and exhaust systems is used to heat the pigpens in the winter. “The electricity we produce from the two plants is enough to supply around 2,500 families in the region,” Kühlenenthal explains. The system is maintained by Detroit Chile.

Electricity from biomass

The principle of the plant is identical with that of numerous other biogas plants already installed around the world—slurry from the pigpens is pumped into a digester housed underneath a dome-shaped roof. “We have nicknamed the dome the ‘concrete cow’ because inside it the process is the same as in a ruminant’s stomach,” jokes Matías Errázuriz, CEO of Genera Austral and operator of the plant. “It is hermetically sealed and all that comes out at the end of the process is the almost odorless residue that runs off into a tank and is used as organic fertilizer for the surrounding fields.”

MTU generator sets in San Pablo undergo routine service every 1,500 hours.



The digester is 23 feet deep with an area of 430 square feet and holds roughly 1.6 million gallons of biomass. The biomass is mixed and fermented to produce biogas with a methanol content of between 50 percent and 60 percent. Before the gas is pumped to the engine, it is passed via underground pipes through an active carbon filter that reduces the sulfur content.

For Chile, a country largely dependent on renewable energy, the benefit of balancing the grid with localized continuous power solutions that are also environmentally friendly can't be overstated. As new technologies are integrated across the country over time, Rolls-Royce expects greater opportunity to help the region deliver on its greenhouse gas goals. "In Chile there is a massive market for generating energy from biogas," said Matías Errázuriz, CEO at Genera Austral. "Not only in the agricultural industry but also on landfill sites, in forestry and salmon farming, in the food industry and in the wholesale grocery trade."

Lights on in Lomeiro

The village of San Pablo is in the Lomeiro region just seven hours away—a stone's throw by Bolivian standards—from the country's economic powerhouse, the city of Santa Cruz de la Sierra. The natural-gas rich, 91-acre Santa Cruz district is the largest inland administrative area in South America, but at the same time is home to fewer than three million people spread across an area larger than Germany. What is more, most of them live in the large urban conglomeration.

The local electricity supplier, Cooperativa Rural de Electrificación (CRE), which claims to be the world's largest power generation cooperative with over 500,000 members, saw itself facing many challenges. The equipment and power distribution lines along with the associated transformer stations must be adapted to a hot climate with high levels of air humidity. On top of that, out in the country the power lines are long but serve only a few consumers. In other words, high investment costs are countered only by small revenue streams.

Power in San Pablo

For the first time, MTU gas-fueled generator sets were successfully installed in South America in parallel mode with other systems. Working with local distribution partner, Gerona Power, four 20V and five 12V Series 4000 L62 generator sets, plus a diesel-fueled 16V Series 4000 system, were installed at five central locations. All of these are connected to the Bolivian natural gas mains and supply the villages in their respective regions with electricity. The villages

themselves are not connected to the gas grid and are reliant on gas cylinders for their supply. The MTU plants in San Ramón are routinely serviced every 1,500 hours of duty.

"The MTU generator sets are undoubtedly state-of-the-art and so much more efficient than other systems, which is why we operate them continuously," says Dr. Fernando Haderspock, the man in charge of supply to rural areas at CRE.

New quality of life

Not far from San Pablo is Puquío. With its population of 500, it is one of the larger settlements in the region. There, the changes are even more far-reaching. The continuous supply of electricity allows for an electrically driven water pump to be installed in the village. With it, the villagers' quality of life took an enormous step forward. They no longer have to carry buckets to and from a manual pump in the center of the village every day since they have water on tap at home. Something that is such a basic assumption for many, to the extent that they do not even give it a second thought, is understandably the pride and joy of a whole community here.

Land of opportunity

Additional Latin American installations include shopping centers in Mexico and Argentina's biggest meat producer, Alimentos Margos in Cordoba, which installed a biogas-fueled Series 400 MTU CHP system, delivering 400 kW of power. The unit provides energy for manufacturing pork-meat products, while heat from the engine's exhaust is used to heat up fresh water to clean large areas of the farm, or routed through an absorption chiller and transformed into cooling energy for refrigerating the products.

Globally, developing countries continue to outpace developed countries, like the United States, when it comes to total new renewable energy investment. According to Bloomberg New Energy Finance's 2016 Global Trends in Renewable Energy Investment Report, three of the top ten countries primed for clean energy investment are in Latin America—Brazil, Chile and Mexico. The countries are more inclined to continue investing in green manufacturing because it brings more jobs, public health improvements and a decrease in energy costs overall. As the global demand for reliable and efficient energy solutions continues to rise, Rolls-Royce is poised to continue its ongoing commitment, and is proud to make significant impacts in farming communities across the globe.

Rolls-Royce provides world-class power solutions and complete lifecycle support under our product and solution brand MTU. Through digitalization and electrification, we strive to develop drive and power generation solutions that are even cleaner and smarter and thus provide answers to the challenges posed by the rapidly growing societal demands for energy and mobility. We deliver and service comprehensive, powerful and reliable systems, based on both gas and diesel engines, as well as electrified hybrid systems. These clean and technologically advanced solutions serve our customers in the marine and infrastructure sectors worldwide.