

POWER PROJECTS



CUSTOMER: Guelph Hydro



The 2.5 MW Guelph Hydro power plant was built in just eight months to meet the requirements of Ontario's renewable energy program.

POWER NEED

When Guelph Hydro bid successfully for one of ten new green power projects approved for the Ontario provincial government's independent green power program, it needed expertise to build a 2.5 MW power plant at the City of Guelph Eastview landfill.

Toromont Energy was selected to provide that expertise. A division of Toromont Industries of Concord, Ontario, the company is a leading developer of off-grid, district energy and co-generation projects. Its selection was based in part on its successful design, construction, and operation of the Waterloo Landfill Gas Power Plant in Ontario.

That plant's production of 186 million kWh at greater than 98.5 percent availability gave Guelph Hydro convincing testimony on Caterpillar generating systems and Toromont's engineering, operation and product support capabilities.

Ontario's Renewable Energy Supply Request for Proposals process included a tight deadline when the successful bidders were announced in November 2004: Projects had to be online by June 2005. That gave Guelph Hydro and Toromont eight months to complete the work.

LOCATION: Guelph, Ontario, Canada

Customer Requirement:

Turnkey design-build service for 2.5 MW landfill-gas-to-energy project on 8-month timetable

Scope of Supply: Equipment –

Three G3516LE Cat® Generator Sets (925 kW); Caterpillar® switchgear; PowerLynx controls

Services –

Supply of equipment & switchgear, operation & maintenance

Cat Dealer: Toromont Energy Ltd. (wholly owned subsidiary of Toromont Industries, Ltd., Concord, Ontario, Canada)

SOLUTION

Guelph Hydro serves more than 40,000 customers in Guelph, and its Rockwood division serves more than 1,000 customers in a nearby village of the same name. The Guelph landfill operated from 1961 to 2003 and has about 4.5 million tons (4 million tonnes) of solid waste.

The Eastview Landfill Gas to Energy Plant is part of Guelph Hydro's ongoing commitment to preserving the environmental well-being of the community, according to president and CEO Jim McKenzie.

"Generating electricity from sources such as landfill gas is an important step, not just for Guelph, but for the whole province," says McKenzie. "Every such step we take reduces our dependence on traditional generating sources, such as coal. We are turning the methane gas, once considered a liability, into a real asset."

The \$5.9 million dollar plant was equipped with three Cat® G3516LE gas engines, coupled to 925 kW, 600V SRB4 generators with Caterpillar® switchgear and PowerLynx controls. Toromont operates and maintains the plant, while Guelph Hydro formed a new subsidiary Ecotricity Guelph Inc., to own the facility.

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The landfill has enough gas reserves to fuel the generators for about 20 years. Wells spaced 130 feet (40 meters) apart with an average depth of 50 to 65 feet (15 to 20 meters) capture methane from the landfill.

The generating plant runs continuously, each engine requiring about 340 cfm of gas to operate at maximum output. The G3516LE engines, operating at 1,200 rpm, are configured to be durable and reliable in burning low energy fuels without needing extensive fuel conditioning.

The fuel treatment system at the Guelph landfill requires only a moisture removal system followed by a coalescing filter to remove remaining moisture droplets and particulate.

A specially designed cooling system elevates engine jacket water to the optimum temperature to prevent condensation of fuel-borne corrosive compounds. A crankcase ventilation pump ejects potentially acidic blowby gases and draws in fresh, filtered air. In addition aluminum and unprotected steel are eliminated from key components, such as aftercooler cores and main and connecting rod bearings.

RESULT

To help meet the aggressive project deadline, Toromont took advantage of Caterpillar Integrated Systems, according to Lou Colangelo, general manager of engineering and operations for Toromont Cat Power Systems.

“Under that program, Caterpillar provided the generator sets along with controls and switchgear designed to work with the equipment,” Colangelo says. “This package approach greatly reduced the design and construction cycle and helped us meet the June 2005 start date.” The plant was the first of the ten Ontario renewable energy projects to begin operations.

Under a performance-based operations and maintenance contract, Toromont receives graduated payments per megawatt-hour based on availability. As availability goes up, so does Toromont revenue. “If we maintain the units so they produce full load all the time and keep the units running, then both Toromont and Guelph Hydro benefit,” Colangelo says.



Three Cat® 63516LE gas engines provide enough electricity for about 1,000 customers of Guelph Hydro while reducing pollution emissions from the Eastview Landfill by about 100,000 tons a year.

Being in a residential area, the plant is built to fit into the neighborhood. It has high sound attenuation and includes office space and a small conference room. “It could pass for a small office building,” he says.

Power from the Eastview plant goes to Guelph Hydro customers, meeting about one percent of the demand on its system, equal to the needs of about 2,500 homes. By burning the landfill gas to create electricity, the project has reduced pollutant emissions by about 100,000 tons per year, according to the Federation of Canadian Municipalities, which provided \$350,000 in funding for the project’s feasibility study.

Toromont had projected a seven-year payback for the Eastview project, which is living up to its expectations. Because the generator sets and the gas field have been highly reliable, the plant is operating with a 98.75 percent gross availability factor, Colangelo reports.

“This facility is a real illustration of how our local utility works with the city to bring benefits to the community,” say Paul Truex, chairman of Guelph Hydro. “The city benefits as Guelph Hydro buys the gas from the city and we all benefit when we generate clean electricity locally.”

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