

A publication from Enbridge Gas Distribution for Industrial Energy Users, providing information on technology, programs and services.

Major poultry processor generates power, hot water and steam from cogen installation.

Maple Lodge Farms cogeneration installation cuts energy costs across the board with 86% efficiency.

At A Glance:

- Cogeneration system produces 5 MW electric power, 4 million lbs steam (at 125 psig) weekly and 125,000,000 gallons of hot water annually.
- System installation has extremely low emissions, anticipating tighter restrictions.
- Electric power costs cut from \$0.065 to \$0.05 kWh.
- Estimated annual reduction in consumption of natural gas 680,000 m³.

Processing about 300,000 chickens daily, Maple Lodge Farms, near Norval, Ontario produces whole chickens, cut-up chicken parts and processed chicken products for the wholesale, retail and export markets. About 25% of all chicken products sold throughout Ontario emerge from the Maple Lodge facilities.



At the discharge from the economizer, a Sofame direct-contact water heater recovers 12 million Btu/hr from the flue gas, which is used to heat 300 IPGM of hot water at 120°F.

Because strict sanitary conditions are employed at all stages of the processing, substantial volumes of electric power are consumed

– as high as 9.5 MW in summer months. Processing also requires hot water and steam as well. During the twice-daily production shifts, water heated to 120°F (49°C) is employed, and more water, at 140°F (60°C) is needed for nightly clean-up operations. In all, about 2,273,000 litres (500,000 gallons) of hot water are required daily.

Until recently, the hot water was produced by various interconnected equipment including a Kemco direct-contact water heater, a 400 kW heat pump and five 350 hp boilers. The boilers ranged in age from 6 to 15 years.

Finding the right fit and rationalizing the investment

Alan Wassens, Engineering/ Services Manager at the Maple Lodge plant, recognized the potential benefits of

cogeneration. “It was a matter of finding the right fit,” he says, “and rationalizing the financial investment.”

In late 1997, Wassens found an ideal fit for the plant’s needs, and the discovery coincided with a growing awareness of possible future restrictions on the emission of



The 6000-square foot cogeneration building is set well back from the main production area to permit future expansion. The large metal pipe carries steam and hot water back to the processing floor.

greenhouse gases. “The desire to reduce emissions prompted us to take a close look at our old boilers,” Wassens recalls. “When we realized they wouldn’t measure up to the required performance levels, we decided to take a proactive position and go the cogeneration route.”

Wassens and his Maple Lodge team established their cogeneration needs: 5 MW of electric power (representing

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about half the plant's peak demand), 4 million pounds of steam weekly (at 125 psig), and about 570,000,000 litres (125,000,000 gallons) of hot water annually. A capital cost budget for an installation meeting these specifications was set at between \$7.5 and 9 million.



The Maple Lodge Farms 5.2 MW cogeneration unit produces 65,000 lb/hr of steam plus hot water. Its energy efficiency has been estimated at 86 per cent.

Working closely with both Energy Engineering Corporation of Sarnia and Daniel Chum, an Energy Solutions Consultant with Enbridge Gas Distribution, the Maple Lodge team chose a Solar 5.2 MW natural gas turbine/generator to meet their electrical needs and an ERI heat-recovery steam generator (HRSG) for the plant's steam requirements. To provide the flexibility needed to meet a projected future demand for 65,000 lb/hr of steam, a natural gas duct burner was installed between the gas turbine outlet and the HRSG inlet.

At the discharge from the economizer, a Sofame direct-contact water heater was installed to recover an additional 12 million Btu/hr from the flue gas, which is used to heat 300 IPGM of hot water at 120°F (49°C).

Lease contract offers several benefits

Covering the capital cost is a five-year lease contract obtained through Royal Bank. The arrangement created an immediate positive cash-flow situation with off-the-balance-sheet financing. At the end of the five-year term, Maple Lodge will own the cogeneration facility outright.

To ensure future expansion room for the main processing plant, the cogeneration system was installed in a separate 6000-square foot building, which also reduced the need for expensive sound-deadening materials in the facility. The installation was supervised by Energy Engineering and was completed in 1998. The secret, according to Energy Engineering president Tom O'Farrell, was in the details. "We did a good deal of pre-assembly," O'Farrell explains, "working to within a sixteenth of an inch, and this helped us to assemble and install the entire system in just a few months."

The new system has met or exceeded expectations. Electricity costs have been cut from between 6 and 7 cents to about 5 cents per kWh, and energy efficiency has been estimated as high as 86 per cent.

Based on current steam requirements, projections indicate an annual reduction in energy consumption, compared with their existing boilers, of 680,000 m³ of natural gas. Under the Enbridge Gas Distribution Energy Efficiency Program (EEP), Maple Lodge Farms qualified for a \$30,000 cash grant.

Maple Lodge Farms has established a leadership position in its industry for both high quality in its products and high efficiency in its operations. The addition of multiple benefits made possible by the cogeneration installation is serving to enhance this reputation even further and perhaps most important of all, bolster its position in a highly-competitive marketplace.



Alan Wassens, Maple Lodge Engineering/Services Manager, inspects the Allen-Bradley control panel. Wassens was a strong advocate of cogeneration for the plant. "It was a matter of finding the right fit," he says, "and rationalizing the financial investment."

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