

POWER PROFILE

Customer: Rosa Flora

Location:

Dunnville, Ontario, Canada

Customer Business Issue:

Renewable power generation

Solution:

Two Cat® G3516 natural gas generator sets
Two Cat G3520C natural gas generator sets
Cat switchgear
Project design, construction and operation

Cat® Dealer:

Toromont Power Systems



Rosa Flora improves energy efficiency with a number of conservation strategies including a new combined heat and power (CHP) system for its 40-acre greenhouse facility.

POWER NEED

Based in Dunnville, Ontario, Canada, Rosa Flora Limited has become the largest wholesale distributor of gerbera (daisies) in North America with 1.5 million square feet of greenhouse space. Temperatures in the Niagara region of Southern Ontario can drop to -5° C during the winter season making it difficult to grow flowers year round, and with Rosa Flora’s five greenhouses covering 40 acres, it makes heating costly.

Since energy represents roughly 40 percent of costs for the typical greenhouse operation, efforts to reduce energy consumption and production costs are always top of mind. For the past 30 years, Rosa Flora has relied on a long-term energy strategy that has helped to improve efficiency and reduce operational costs while creating a favorable environment for flower growth.

Rosa Flora’s road to energy efficiency can be traced back to 1978 when Dutch owners, Otto and Corrine Bulk, established the company with renewable energy concepts including optimized greenhouse design, energy-saving initiatives and power generation strategies.

Investment in energy efficiency is a theme seen throughout the company’s 36-year history, including extensive use of double-pane acrylic glass in Rosa Flora’s greenhouses, which saves \$1 million per year. The greenhouse structures also include a state-of-the-art design approach to minimize energy use. Lighting is carefully considered given that some crops require long hours under light, especially in the fall and winter months. The company uses automatic control systems that turn the lights on or off depending on the amount of natural light coming into the facility.

In 2003, Rosa Flora added a biomass heating system run by three combustors. The boilers use chips ground from recyclable wood to heat hot water, providing 15,000 kW of heat, which is circulated throughout the greenhouses. This offsets the use of fossil fuels, ensures the quality and consistency of fuel and reduces costs. Additionally, the hot water pipes run from the boilers through underground tunnels

that stretch across the facility to transfer any lost heat to the greenhouse floor.

The company also installed a wind turbine in 2006 to produce 600 kW of power, reducing reliance on the grid. While an expensive investment, the wind turbine provides 5 to 10 percent of Rosa Flora’s electricity requirements.

The company’s efforts to conserve energy have attracted national attention. In 2006, Rosa Flora was recognized by the Canadian Industry Program for Energy Conservation (CIPEC) as an Industrial Energy Innovator. This program helps companies create a stronger economy and reduce greenhouse gas emissions through energy efficiency.

As Rosa Flora expanded its operations to include combined heat and power (CHP), executives looked for a cutting-edge system that would further reduce total energy costs and help make their operations even more self-sufficient.

“One of the drivers for investing in CHP is the continuing rise of power prices here in Ontario,” said Ralph DeBoer, operations manager at Rosa Flora. “With the stability we hope to see in natural gas pricing, CHP can become more attractive to growers who use heat and electricity.”

SOLUTION

Rosa Flora partnered with the local Cat dealer, Toromont Power Systems, to develop a customized CHP system with the ability to provide electricity for electrical loads and thermal energy for warming the greenhouse when natural light isn’t enough.

Heat from the generator sets is captured through jacket water, exhaust, lube oil and after-cooler recovery. The captured heat is used to send hot water directly into the greenhouse. If the heat is not used immediately, it is stored in insulated hot water storage tanks, which act as a thermal battery for use in the evening.

“With CHP equipment, the real advantage for us as greenhouse growers is during the coldest months of the year when the heat is worth the

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most to us,” said DeBoer. “We generally run the generator sets from mid-August to mid-April to help offset cost of electricity that we would normally purchase from the grid. We also utilize a thermal load in the summer to de-humidify the greenhouse.”

Toromont Power Systems installed two new, high-efficiency Cat G3520C natural gas generator sets providing 4 MW of power to anchor the CHP system. The new generator sets join a pair of Cat G3516 generator sets that were installed in 1992 to supply a total of 5.6 MW of power. Additionally, in the event of a power outage on the main grid, the CHP system can be used as standby power until utility power is restored.

Rated at 2,077 ekW, the Cat G3520C generator sets deliver new cogeneration technologies with optimized electrical and thermal efficiency. Rated at 1,040 ekW, the Cat G3516 generator sets provide prolonged life at lower gas engine loads. Routine maintenance is handled by Rosa Flora, while Toromont Power Systems technicians perform scheduled maintenance on both a quarterly and annual basis.

“Truly, one of the strengths of the relationship between Rosa Flora and Toromont is the responsive service,” DeBoer said. “We have maintenance technicians from Toromont who are dedicated to making sure that Rosa Flora’s generator sets are up and running at all times.”

RESULTS

The Cat G3516s have accumulated 82,000 and 65,000 hours and continue to support the power system. After more than 20 years of operation, the G3516s recently had an in-frame overhaul, where many of the moving components and wear items were replaced.

Rosa Flora plans to install two more G3520C generator sets to be part of a new CHP plant providing 4,000 kW. The new plant began operation in late 2014.

“CHP ensures that our greenhouses stay warm, it’s one more level of added security,” said DeBoer. “We would love to see Caterpillar and Toromont be part of any future expansion of our CHP system.”

For more information, please visit cat.com/powergeneration



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