

TAPPING INTO SAVINGS

Cogeneration increases energy efficiency at malting plant

As a global company that benchmarks environmental practices, GrainCorp tracks energy and water use at 17 malting plants across the world.

At its Canada Malting facility in Thunder Bay, Ontario, energy represents about two thirds of the plant's production costs.

"We compete directly with malt producers around the world, and keeping our energy costs competitive is critical for our site," explains Jim Desaulniers, plant manager for Canada Malting in Thunder Bay. "When all of these places were built, water and electricity cost next to nothing—energy was very cheap."

The Thunder Bay grain elevator was built in 1923, with the first malt house built in 1946 and two more added in 1957.

"But the landscape has changed now," Desaulniers continues. "The electrical and energy costs for our site are about 65 percent of manufacturing costs. So before where it wouldn't even have a line item on our cost statement, now at 65 percent it stands out. That's why we measure ourselves against who's the best in our corporation, and then we set those benchmarks as our targets."

With the cost of power steadily on the increase in Ontario, plant officials started working on a plan five years ago to reduce the cost of energy. In that time, Thunder Bay has reduced its use of water and natural gas, and

reduced electrical consumption by 35 percent, placing it in the top quartile of GrainCorp facilities.

Big savings realized

Those energy savings are expected to multiply exponentially in the coming years with the addition of onsite cogeneration powered by a Cat® G3516H gas generator set.

"Now the CHP (combined heat and power) unit allows us to have power at a very low cost and also enables us to utilize the waste heat," Desaulniers says. "The waste heat has been a very pleasant surprise for us because we weren't exactly sure how much usable heat we were going to get and how we would blend it into our process. But we are exceeding all of our expectations right now for the amount of heat that we're recovering in the plant."

Since beginning operation in late April, the plant has already become largely self-sufficient, supplying all power during off-peak hours and about 65 percent of power during peak periods, says plant energy manager Clark Johnson.

"With the electrical output from our generator, we're going to become pretty much self-sufficient for providing energy to the plant," Johnson says. "We're generating 75 to 80 percent of our own power now, and we're anticipating being closer to 90 percent once we get everything squared away."



Canada Malting grain elevator at the Port of Thunder Bay

Efficiency of the genset is increased by funneling radiant heat from the generator and switchgear to the kilns, which is used to dry barley during the malting process.

"Being the oldest malt house, the A-House was always the most inefficient based on the amount of gas per ton required to heat it, and is now the best because it's the direct recipient of our heating coils," Desaulniers says. "We're just getting those numbers in, and it looks like it's going to be a very good thing for us."

The Thunder Bay malting plant is realizing about 83 percent theoretical efficiency from the cogen plant, and is expected to reach 90 percent once additional tweaks are made to the system, Johnson adds.

"Our early results indicate that we're getting a far greater reduction in gas consumption than we were anticipating—our kilns are using roughly half the gas that they were before we started up," he says.

Another major gain has been realized through CHP by using recovered waste

heat to warm water that is used to steep barley in the malting process. The plant utilizes cold water that comes from Lake Superior. The cogen plant enables efficient warming of the water for use in the malting process.

While heating the lake water formerly required a lot of natural gas using the facility's hydronic heaters, utilizing heat from the generator means the natural gas-powered heaters are no longer required.

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CUSTOMER PROFILE

Canada Malting

Location: Thunder Bay, Ontario

Application: Cogeneration

Cat® Equipment: G3416H gas genset



“All of that energy that was needed to heat with gas is now being heated by the waste heat from the engine, so it’s actually at no cost to us,” Johnson says. “So it translates into a tremendous gain.”

G3516H a proven performer

After conducting extensive research, Johnson and Desaulniers settled on the Cat G3516H as the generator set of choice.

“It’s a 16-cylinder generator. And each cylinder has more power than a V8 truck engine, so it’s a significant piece of equipment, and it’s proven in the field,” Johnson says.

The turnkey project started construction in late September of 2015, with startup taking place seven months later. Canada Malting received a 40 percent rebate on the cost of the plant from the regional utility, Thunder Bay Hydro.

Once Desaulniers received final approval from Canada energy regulators, he knew he wanted to go with his local Cat dealer, Toromont Power Systems.

“We wanted a Cat engine because of the service, the reliability and the lower operating costs,” he says. “We entertained some European supplier



options, but due to the local service and Toromont’s reputation, we knew who we wanted to end up with.”

Adds Johnson: “What we liked about Toromont Cat is that there is a local branch here in Thunder Bay. And there’s another G3516H at the local regional hospital that started up just a few months before us, so we’re

comfortable with the fact that we have a Cat dealer here in town for service and the dependability of a highly reputable North American equipment supplier in Caterpillar.”

With a lean management staff, the Thunder Bay malting plant relied on the engineering expertise of Toromont Power Systems to design the plant,

which is positioned immediately west of the shipping port.

“They struck us as knowledgeable folks,” Johnson says. “And they have a good partnership with a local contracting firm to help get the plant built. They made us feel comfortable, and they have a history of building these projects around North America.”

Adds Desaulniers: “It has been a pleasure to work with Toromont. They made the process very seamless and not painful at all for me. They took the burden off of us, and it was a terrific project.”

The Cat designed control panel brings all aspects of the project—both thermal and electrical—together seamlessly. The control interface provides a user-friendly operation, and the reporting allows Canada Malting to see their savings on a daily basis.

Factory support was also built into the control panel design, providing Cat design engineers the ability to assist future troubleshooting activities without traveling to the site.

A key component of the project involved the high voltage electrical inter-connection with existing transformer sub-stations, so project work would not interfere with day-

to-day malting operations. Working closely with Thunder Bay Hydro, Toromont engineers ensured the commissioning process went according to schedule.

Reliable performance

In order to meet performance incentives, the generator set needs to run virtually 24/7.

“Uptime is everything to us, and not just for cost savings, alone,” Johnson says. “We had the Ontario Minister of Energy here in June, and he reiterated that these are the types of projects that he wants to support. However, we must document our performance.”

Every 15 minutes data is collected for kilowatts generated and the amount of natural gas consumed.

“That performance is audited once a year for the next 10 years, and if the generator is not up and running, we’re not generating electricity,” Johnson says. “We have to meet 80 percent of what we said we will produce, so we can’t afford to have it down if we want to achieve our incentives.”

The generator set has operated flawlessly since several startup issues were ironed out at the outset. All maintenance is performed by Toromont technicians as part of a long-term Customer Support Agreement.

“When you have a new installation, it’s unknown to the plant, the operators and the management team, and at some point you have to take ownership and run it yourself,” Johnson says. “The most comforting thing for me is knowing that whenever we have a problem, Toromont is only a phone call away and their technicians are right here in the city.”

Technical support is available 24/7 to help Canada Malting keep the cogen plant up and running, or to assist with technical issues.

“We have learned to rely on them less, but we have a full service agreement with them—which provides us with an added level of comfort,” Johnson says. “So it’s a real win-win for both Toromont and Canada Malting.”



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CLARK JOHNSON
Plant Energy Manager
Canada Malting

CANADA MALTING

As the largest malt company in Canada, Canada Malting produces 400,000 metric tons (992 million pounds) of malt for the brewing, distilling and food markets worldwide.

Its customers range from the largest multinational organizations to the smallest craft brewers—as well as food processors—located primarily in North America.

Its process ensures a stable supply of high-quality malt, year in and year out. A pelletized grain byproduct derived from the malting process is provided to the cattle industry as fodder for cattle feed.

Located on the western shore of Lake Superior in a major Canadian grain port, the Thunder Bay plant has a capacity of 125,000 metric tons and is well situated to pull malting barley from the Eastern Canadian prairies. It ships malt via rail and truck to eastern North America, and can load malt directly onto vessels from its malt storage elevator.

Across the enterprise, Canada Malting sets goals to reduce the use of energy and natural resources while measuring performance against these goals. Through a process of continuous improvement, the company seeks to implement processes and practices that reduce its demand on natural resources, while minimizing the environmental footprint across its operations.

