



## **INNOVATION LOWERS ELECTRICITY COSTS AT GEORGIAN BAY APPLE CO-OP**

Innovation is the watchword at The Bay Growers Co-op Inc. in Clarksburg, where nearly 350,000 bushels of apples must be kept market-fresh for up to a year. This vigilance has resulted in significant electricity savings for the agricultural co-op.



**Bay Growers' Jim Dolmer (centre) describes the apple co-op's packing process to the OPA's Victoria Gagnon and Brian Shields.**

The 22-member Georgian Bay co-op packing plant began operations in 1994. It ships about 70 percent of its apples to customers across Canada, with the remainder going to the United States, Britain, Russia, Central America and the Caribbean. Sixty percent of the apples come from co-op members, with the remaining 40 percent from non-members across southern Ontario.

At the 87,000-square-foot Clarksburg facility, about 40,000 square feet is used for apple storage; the balance is used for the sorting and packing plant. Bay Growers ships a variety of Ontario-grown apples to retail grocery chains such as Sobeys and Loblaws.

During this past fall's two-month-long apple harvest, the Ontario Power Authority met with co-op general manager Jim Dolmer, operations manager Bryan Lowe and engineering consultant John O'Connor to learn about the energy-saving initiatives the co-op has taken to reduce its electricity costs.

With electricity costs representing up to 20 percent of the total operating costs in the storage facility and more than 12 percent in the plant, the co-op must manage these costs tightly, Jim says.

The challenge is to maintain cool temperatures in the dozens of 40-foot-high rooms that are used to store the various apple varieties, which include Red Delicious, McIntosh, Empire, Gala and Northern Spy. Maintaining the proper cool temperatures is especially difficult during the mild harvest season when warm apples are shipped to the facility from the Georgian Bay area and southwestern Ontario.

Electricity costs jump at this time of the year because the facility is frequently opened to receive deliveries, explains Jim, and the apples that come in are the same temperature as the outside air. Energy costs increase as the fans and cooling system must be operated longer to maintain the near freezing interior temperature. It can take three to four days for the apples to cool down.

Consultant John O'Connor, who is a stationary engineer, was asked to find ways to control energy costs, especially for the cooling and refrigeration system in the storage facility. One of the first things he looked at was the operation's power factor, because it affects the efficiency of the electrical power it buys and uses.

Utilities typically charge additional costs to customers who have a power factor that is below 0.90 or 90 percent; in this case was 0.72. "The growers were paying one dollar for 72 cents worth of electricity," John says.



## Innovation lowers electricity costs

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To use electricity more efficiently and cut costs, he installed capacitor banks in both the storage facility and in the plant. This significantly reduced the power losses. It reduced combined storage and plant monthly demand by an average of 114 kilowatts and saved the co-op \$18,000 each year.

John then examined the cooling system to see if he could further reduce costs. The programmable logic controller, which had recently been replaced after being damaged in an electrical storm, underwent a series of modifications to eliminate the continuous operation of nearly 50 three-horsepower motors that were running cooling fans in the 23 storage rooms.

Before the change was implemented, the fans were running at least 50 percent more than needed to maintain the proper temperature. In addition, when they operated continuously, heat from the fan motors created a bigger cooling load for the refrigeration system than the respiring apples in the same room.

By controlling the cooling fan operation with thermostats, the co-op saved about 297,000 kilowatt-hours (kWh) of electricity for fan motor operation plus another 103,000 kWh from lowered refrigeration (compressor) operation, totaling 400,000 kWh each year. This innovation alone translated into an electricity cost reduction of no less than \$31,000 annually. It also delivered additional electrical power (demand) savings – it was a win-win investment strategy.

The cost savings in the first year, after all the system changes were implemented, were between \$55,000 and \$60,000, general manager Jim Dolmer says. Since 2006 when the changes were made, the co-op has saved nearly \$100,000 and cut its annual electricity bill to \$225,000.

Electricity cost savings is only one part of the co-op's efforts to improve its operations and reduce costs. It has also focused on finding more ways to quickly cool and prepare apples for delivery to market.

“There are not many off-the-shelf solutions to the challenges in the apple storage industry,” Jim says.

Normally it requires three to four days to establish a safe oxygen working level before staff can re-enter the controlled atmosphere apple storage rooms. (After the apples are loaded into the sealed rooms, most of the oxygen is removed to slow the ripening process.)

John O'Connor was able to shorten this time to eight hours by improvising an alternative oxygen-recharging system using a venting fan.

A similar rough-and-ready approach was used to build a portable “chiller” that can be moved around the facility so the apples can be cooled where they are held after they are delivered to the plant. In most apple cool-storage facilities, tens of thousands of apples have to be moved to a single location where a permanent chiller is available, which adds additional costs and delays.

Quick turnaround has become increasingly important for Bay Growers in capturing more markets for its members, Jim says. The apple market is very competitive, especially with the rise of competition from around the world, he adds.

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## More cash incentives for exhaust fans

**The number of energy-efficient fans that qualify for the Ontario Power Authority's Electricity Retrofit Incentive Program (ERIP) is being expanded and will come into effect early in 2009. All energy-efficient fans ranging from 18" to 53" will be eligible. The expanded list totals 194 high-efficiency (HE) and ultra high-efficiency (UHE) fans.**

While the incentives are financially attractive, so are the annual operating savings. For example, a \$50 ERIP incentive will be available towards the purchase of a UHE 20" fan. For the farm operator, the power demand for the fan is 124 watts less than its most inefficient 20" counterparts.

What does this mean to your farm operating budget? If you operate one UHE 20" fan for 2,700 hours each year, it will burn 335 fewer kilowatt-hours (kWh) than an inefficient one, saving you \$42 per year.

For more information on the agricultural Electricity Retrofit Incentive Program, visit [www.everykilowattcounts.ca/ERIP](http://www.everykilowattcounts.ca/ERIP) or contact Hydro One Networks or your local distribution company.

If you're a farm operator, a contractor or an equipment/lighting supplier who is constructing a new farm building, check out the financial incentives available from the OPA's High Performance New Construction (HPNC) program at [www.hpnc.ca](http://www.hpnc.ca).

## Innovation lowers electricity costs

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“We face major competition in the global market from countries such as South Africa, New Zealand and Chile,” Jim says. The state of Washington, which grows 10 times more apples than all of Ontario’s growing areas combined, is the co-op’s largest competitor.

But Ontario apple growers have a market advantage over their competitors because of their proximity to a huge market. “We’re 12 hours from probably the best apple market in the world – the Golden Horseshoe, Toronto, Montreal, Detroit, Chicago, New York City, Boston and Philadelphia,” Jim says.



**The OPA’s Brian Shields (left) and Victoria Gagnon (right) view the automated apple sorting system with Bay Growers’ Jim Dolmer.**

rise in the future and that the apple market will remain competitive and challenging for Ontario apple growers.

Both Jim and John see additional potential cost savings from efficiency strategies including:

- installing more efficient lighting throughout the storage rooms and parts of the plant. By replacing halogen lamps with T-5 fixtures, the co-op will save 383 watts (W) of demand and 766 kWh of energy annually, for a combined yearly cost reduction of \$120 per replaced fixture. The T5 lamp lifetime is from five to 10 times greater than the halogen’s, and it delivers the same amount of light – about 10,000 lumens.
- installing an occupancy sensor in the electrical room, which will save at least 750 kWh each year and lower annual costs by about \$60
- replacing the many small ceiling fans in the plant with a couple of large high-volume, low-speed recirculation fans.

The Bay Growers Co-op is eligible for incentives for these retrofits under the Ontario Power Authority’s Electricity Retrofit Incentive Program (ERIP). More information about OPA’s ERIP program is available at [www.hydroonenetworks.com](http://www.hydroonenetworks.com) and [www.everykilowattcounts.ca/ERIP](http://www.everykilowattcounts.ca/ERIP).

Bay Growers has the capacity to compete in this global market because of its innovative approach to watching its costs, as well as its pre-sorting process and rapid turnaround and delivery systems, the co-op’s general manager says.

He illustrated this by explaining that Bay Growers had earlier in the day received an order from Sobeys for thousands of apples to meet a special in-store grocery feature. By mid-afternoon the order was on its way. “This gives us an edge in the market,” Jim says.

Jim expects that the cost of electricity will continue to



## Raffle ticket produces solar power

What would you do if you won \$25,000? Buy a new car? Take a world cruise? Put the money into a rainy day bank account?

Retired dairy farmer Bob Bregman and his wife, Agnes, who won \$25,000 last year in a raffle ticket contest, did the unexpected.

They used their prize money plus another \$20,000 to install solar panels on the roof of their home in Teeswater, Ontario.

Since installing the roof panels this past summer, the Bregmans have produced about 1,000 kilowatt-hours (kWh) of energy for the Ontario electricity system. The Bregmans estimate the panels will generate about 4,750 watts of electrical power at peak output on a temperate day. Each of their 16 solar panels is about 75” x 50”.

The generated power is sold to the Ontario electricity system through the Ontario Power Authority’s Renewable Energy Standard Offer Program (RESOP). The Standard Offer Program helps Ontario meet its renewable energy supply targets by providing small electricity generators a standard pricing regime and a streamlined process.

Bob Bregman, who retired from dairy farming in 2004, said the investment in solar energy was a much better use of their prize money than putting it into the bank.

(The benefits of solar energy, including return on investment, and low and predictable maintenance and repair costs, are discussed in the accompanying article on Swiss renewable energy expert Thomas Boehni.)

Their home is positioned perfectly to capture the sunlight – facing south. Their home also faces Hillcrest Central elementary school so the children can see the solar panels used to collect the sun’s light.

The University of Waterloo has recently asked the Bregmans to take part in a project evaluating the effectiveness of solar energy as an alternative energy source.

Information about the OPA’s RESOP is available at [www.powerauthority.on.ca/sop](http://www.powerauthority.on.ca/sop).

# INTEGRATING RENEWABLE ENERGY INTO RURAL COMMUNITIES

**As one of Europe's smallest countries, Switzerland, with its population of 7.6 million and landmass of 41,000 square kilometres, is easily dwarfed by Ontario's 12 million people and 937,000 square kilometres. But on the renewable energy development front, Switzerland does have guidance for Ontario.**

Thomas Boehni, owner of Boehni Energy and Environment in Switzerland, provided these insights at a presentation last month to the Ontario Power Authority. Jake Debruyne and Don Hilborn of the Ontario Ministry of Agriculture and Rural Development arranged the presentation. Thomas visited the OPA as part of a 14-day tour sponsored by the Agricultural Adaptation Council.

**A broad range of renewable sources is used ... with the emphasis on local self-sufficiency and sustainability.**

In Switzerland, they pay about 15 cents and 10 cents for residential and industrial kilowatt-hours (kWh), respectively – comparable to Ontario rates. Because Switzerland has far less available land than Ontario – 234 people per square kilometre compared to 21 people per square kilometre in Ontario – land-based energy generation is approached quite differently.

For example, if you use a roof-mounted solar photovoltaic (PV) system in Thomas Boehni's home town of Hohentannen (50 km east of Zurich) and you can get a standard offer contract (funding is capped and the offer period extends for only two days each year!), you will be paid 70 cents/kWh. Land-mounted solar PV systems receive 50 cents/kWh.

Hohentannen, which is home to more than 600 citizens residing in about 200 homes will, by 2012, be providing 50 percent of all of its electrical, transportation and heating energy from renewable sources. Conservation is a major part of meeting that goal, and it was critical to optimize not just the individual technologies, but also to integrate the technologies to increase their aggregate efficiency, he explained.

Thomas gave the example of a solar PV heat-pump system that heats the local school. For every one kWh of electricity provided by the solar PV generator, the heat-pump system delivers three kWh (10,240 BTU) of total heat into the school. (The other two kWh are provided by geothermal – beneath the earth – heat).

Although solar PV is initially expensive, many people in Switzerland are purchasing it – partly as a conscious decision to live more responsibly, and also because the long-term economics are proven to be attractive and predictable.

Thomas's village has been operating solar PV panels for 15 years, and their reliability is solid – they're still operating – and maintenance costs for a \$100,000 solar PV investment are a very low one percent per year.

With minimal environmental footprint, no moving parts, and no ash or spent fuel to dispose of, solar PV efficiency continues to advance by three to four percent each year, while the economics also continue to improve.

A broad range of renewable sources is used in Hohentannen with the emphasis on local self-sufficiency and sustainability. Swiss incentives for smaller (about 100 kW) biogas-based electricity generators are greater than for larger ones, primarily because smaller local generators require significantly less transportation and are less susceptible to (off-farm) supplementary feedstock supply disruptions.

For more information, contact either Jake or Don via the OMAFRA engineering website at [www.omafra.gov.on.ca/english/engineer/energy.html](http://www.omafra.gov.on.ca/english/engineer/energy.html).

