Ontario Power Authority

Electricity conservation on ONTARIO FARMS

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Naturally cool barns save energy

Milverton, Ontario, dairy farmer Levi Jantzi's and Thamesford, Ontario, poultry farmer Glen MacArthur's long-range planning to build energy-efficient barns is paying off as they – like other Ontario farmers – confront the steady rise in energy costs.

When Levi Jantzi and Glen MacArthur replaced their old barns, they backed away from building the conventional-style closed barn. Instead they built naturally ventilated structures to increase the amount of natural air and light available and to reduce the electricity needed to run fans and lights.

Under the High Performance New Construction (HPNC) program, Ontario farmers building new barns are now eligible for financial incentives for natural exhaust ventilation, energy-efficient lighting and recirculation ventilation fans, as were installed in the Jantzi and MacArthur barns. (Both Glen and Levi built their barns before the incentives under the HPNC program were available.)

The HPNC program is funded by the Ontario Power Authority (OPA) and administered across Ontario by Enbridge Gas Distribution and Union Gas. Details about the program are available at www.hpnc.ca and on page 3.

After his new 12,800 square-foot building went up, "My hydro costs went down," says Glen, a poultry farmer in Oxford County who produces about 40,000 chickens for each quota period.

Glen estimates that based on his operating experience with both types of barns, his electricity costs for the naturally ventilated barn are about one-half of the cost of an electrically ventilated closed barn of about the same size and with a similar number of birds.

"Unless the feed system is operating, the naturally ventilated barn isn't using any hydro," he says. "Nature wants to move the air, heat wants to rise. We're working with what nature already has." Glen's lighting costs are also low, largely because of the amount of natural light coming into the barn.

Glen, who built his barn in 2002, says the decision to switch to natural ventilation has become even more important as energy costs continue to increase. The MacArthur family still uses electricity to provide a relatively small part of the ventilation in their other older barns, using a strategy called dual ventilation, which is also eligible for an HPNC incentive.

Glen and his wife, Henriette, together with their two children, operate their 300-acre poultry farm in Oxford County. Glen took over the family farm in 1989 from his father, who had been farming on the site since 1949.

Glen says the switch to a naturally ventilated system cuts his input costs. "I can produce my product cheaper. I can't say it's a better product. The birds were as healthy in the fan-ventilated barn. I wouldn't want to go back, but I can't speak for anyone else."

At the MacArthur farm, because the natural lighting into the barn was so plentiful, Glen eliminated two of the six ceiling lamps originally installed for the barn lighting. Four dimmable, 150-watt high-pressure sodium lamps now light the barn when there is not enough natural light.

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Poultry farmer Glen MacArthur's 12,800 square-foot barn relies on natural light and air movement to control electricity costs and maintain bird health and productivity.

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In Perth County, Levi Jantzi built a new dairy barn two years ago to control energy costs and improve the working conditions for his dairy herd and the herd managers working in the barn.

Lack of adequate ventilation and lighting in the farm's decades-old dairy barn presented difficult working conditions for both the Jantzis and their herd, especially in the hot summer months.

The Jantzi's new barn was built because Levi was planning for the future. His two sons want to continue the family's dairy business and expand the size of the herd, says Levi.

Natural ventilation and energy-efficient equipment will enable the Jantzis to expand the herd from its current size of 70 cows to 100 cows with significantly improved working conditions.

Other energy-saving equipment in the barn includes a plate cooler and high-efficiency T-8 fluorescent lamps. The Jantzi hydro bill has not declined because they now maintain a larger herd in a much larger barn than they did in 2006.

Glen MacArthur (l.) demonstrates how retrofitting an existing barn with a natural ventilation system – including the roof exhaust vents and sidewall air inlets shown – cuts energy costs.

(L. to r.) Levi Jantzi explains to the OPA's Victoria Gagnon and Terry Rothwell how natural ventilation and energy-efficient equipment have improved the health of his herd as well as milk production.

For Levi, the naturally ventilated barn has helped improve the health of his herd as well as improved milk production.

In extremely hot weather, because the dairy cows are tied in their stalls, high-efficiency exhaust fans are used in combination with natural ventilation to maintain a comfortable and healthy environment.

Once he had made the decision to change over to a naturally ventilated barn, Glen worked with Wayne Blenkhorn of Stonecrest Engineering to find out what types of barns and energy-efficient products were available.

The majority of poultry barns in Ontario are mechanically (exhaust fan) ventilated, so there wasn't an abundance of historical information to rely on for making this pioneering switch.

"I needed someone to tell me how to do it properly," explains Glen.

Glen had been using natural ventilation for several years before by simply opening up the barn doors to allow more light in and increase air circulation during extremely hot weather conditions. "It was crude but it worked."

In the past 10 to 15 years, the vast amount of new technology and products available means that you need someone experienced and specialized in design engineering to develop the best solution, says Glen. StoneCrest is one of several Ontario agricultural engineering companies specializing in designing new barn construction using energy-efficient products.

StoneCrest designed both the MacArthur and Jantzi barns, says president Wayne Blenkhorn. "We see our role as helping individual farms to become rural energy centres that produce not only food but also energy that makes them self-sufficient, reduces their costs or makes them more viable economically."

Although Glen has significantly cut his electricity use through natural ventilation and efficient lighting, he remains concerned about the increasing heating costs. The farm depends on propane.

"Last winter, the cost of heating was the highest it has ever been," he says. "We'll be focusing on heating as it is having the most impact on our costs now." He has looked at wind turbines but sees the upfront investment as too high.

Glen MacArthur is doing more long-range energy planning.

High Performance New Construction program aids farmers

The High Performance New Construction (HPNC) program includes financial incentives and streamlined application procedures to recognize the common design features of farm buildings and to encourage use of energy-saving designs and products in new agricultural construction.

Agricultural buildings are substantially different from buildings in the commercial, institutional and industrial sector, explains Victoria Gagnon, manager for the OPA's farm energy conservation sector.

"The HPNC program recognizes this difference to ensure Ontario farmers planning to construct a new building or substantially renovate an existing structure do not face the same design limitations used in other sectors," Gagnon says.

The HPNC program, designed and funded by the Ontario Power Authority and administered by Enbridge Gas Distribution and Union Gas, is intended to encourage builders and developers to incorporate sustainable energy-efficient features in new construction and major renovation projects.

The incentives for the agricultural component of the program – shown in the table below – do not require the same level of architectural design or detail as is required in the other sectors.

Mechanical and electrical drawings are not typically requested, partly because farm buildings use more standardized designs and have far less variability with respect to design, including mechanical, electrical and structural engineering. "We want to remove the design restrictions for farmers that are not needed," Gagnon says.

Farmers are encouraged to seek the advice of professionals specializing in both agriculture and energy when planning their building projects.

Additional information is available at **www.hpnc.ca.**

Online energy tool for farmers

A new online resource is available to help farmers reduce their dependence on conventional energy sources and improve farm sustainability. The website **www.farm-energy.ca** offers farmers a complete repository of technical information and online tools for analyzing the potential for integrating renewable energy sources on individual farms. Farmers can assess viable options for using renewable energy and determine the exact return on their investment.

The new website was announced by the Government of Canada at the April 2008 Growing the Margins Conference.

High Performance New Construction Program – Incentives for Design/Construction of Energy-Efficient New Agricultural Buildings

Energy-Efficient New Building Technology and Agricultural Application	Description	Estimated Financial incentive (calculated as per the HPNC program based on energy saved)
Energy-Efficient Agricultural Lighting		
Agricultural buildings incl. livestock & poultry	Dimmable (twin) high-performance T-8 fixture	$41.75 per fixture
	Dimmable 150W HPS or 175W MH HID fixture	$130 per fixture
	Dimmable, hard-wired 8-to-15W (max.) CF fixture	$13 per fixture
	(Twin) high-performance T-8 fixture	$11.75 per fixture
	150W HPS or 175W MH HID fixture	$40 per fixture
	Hard-wired CF fixture (to 27W max.)	$11.25 per fixture
Natural Exhaust Ventilation		
Egg layers	Also applies to dual ventilation systems (1)	$100 per 1000 birds (2)
Chicken broilers	Also applies to dual ventilation systems (1)	$85 per 1000 birds (2)
Turkeys	Also applies to dual ventilation systems (1)	$282.50 per 1000 birds (2)
Swine - Breeding & Gestation	Also applies to dual ventilation systems (1)	$3.75 per sow
Swine - Growing & Finishing	Also applies to dual ventilation systems (1)	$1.25 per market-weight hog housed
Dairy - Tie-stall	Housed year-round, cows in barn during summer	$8.75 per cow housed
	Cows on pasture for any part of spring-summer-fall	$4.50 per cow housed
Greenhouses - Vegetables	Based on sq. meters of actual growing/production area	$137.50 per 1,000 sq. meters of growing/production floor area
Greenhouses - Flowers	Based on sq. meters of actual growing/production area	$315 per 1,000 sq. meters of growing/production floor area
Recirculation Ventilation		
High Volume Low Speed (HVLS) vertical ceiling mount fans minimum 8' diameter - All applications	For summer convective cooling of livestock, poultry & in some instances, personnel	$13 per 1,000 cfm of recirculated air

Note (1): For "dual" ventilation systems, the total mechanical ventilation component cannot exceed the sum of Stage 1 (continuous) + Stage 2 (moisture control) minimum winter ventilation requirement to qualify for the HPNC incentive.

Note (2): Based on 1,000 ready-for-market or mature birds, i.e., based on the finished crop capacity of the building; not the brooding capacity in the case of multi-stage production systems.

Proposed Changes to Renewable Energy Standard Offer Program Benefit Farmers

The Ontario Power Authority is proposing changes to its Renewable Energy Standard Offer Program (RESOP) to ensure the program continues to offer opportunities for small projects such as wind, solar, biomass and water projects up to 10 megawatts (MW) to contribute renewable power to the province's electricity grid.

To achieve this objective, the OPA will be focusing immediate attention on the following areas:

- making the RESOP open to more participants by restricting proponents to a single 10 MW project per transformer station
- encouraging broader participation in the RESOP by limiting any proponent to a maximum of 50 MW under development at any one time
- administrative revisions to the RESOP to improve efficiency and simplify the program
- making the RESOP more efficient by requiring that projects meet certain interim project milestones.

Applications for RESOP contacts received as of May 13, 2008, will be developed under the new principles. Applications that were complete and delivered to the OPA by the close of business May 12, 2008, will not be affected by these changes and will be processed under the previous system.

In addition, the Ontario Energy Board has proposed making a change that will currently allow solar, water and bio-fuel/biomass electricity distribution projects of up to 250 kilowatts (kW) to be processed using the simplified process now applied to projects of 10 kW and under – allowing shorter connection times. More information is available at **www.oeb.gov.on.ca.**

Since RESOP's launch in 2006, it has achieved more than 1,300 MW of contracted projects. It was originally expected to take 10 years to reach 1,000 MW.

"The response to this program (RESOP) for small renewable energy projects has been incredible," says Ontario Minister of Energy Gerry Phillips.

For more information on RESOP visit **www.powerauthority.on.ca**

The extent of OPA commitments to new electricity generation projects requires the OPA to limit the size of additional generation in many areas of the province. These limits do not apply to farm-based biomass projects of up to 250 kilowatts. More information on these limits is available on the OPA website, www.powerauthority.on.ca.

Program rules for Clean Energy Standard Offer Program (CESOP)

The OPA has released the program rules for the Clean Energy Standard Offer Program (CESOP) that will support small clean energy generators that are connected to a distribution system. In the farming community, CESOP may be of particular interest to large greenhouse operators.

CESOP is intended to encourage development of a variety of clean energy technologies including natural gas-fired combined heat and power (CHP), by-product fuel-fired generation projects, and generation projects fuelled by under-utilized energy (thermal or mechanical) sources.

CESOP contracts will be awarded to eligible projects that have a gross nameplate capacity of no more than 10 megawatts (MW) for a 20-year term. CESOP contract payments reflect the capacity value of these projects to the OPA.

The CHP capacity value is determined by four elements:

- assumed base value (in 2007 dollars) of combined-cycle gas turbine capacity
- market revenue that a representative CHP facility would be expected to receive
- adjustments to reflect avoided marginal transmission losses
- avoided or deferred investments in transmission capital costs.

Potential generators are expected to include any commercial or industrial facility that requires both heat and power or which produces electricity using by-product fuel or under-utilized energy sources.

Some typical applications include:

- large greenhouses
- institutional buildings with high thermal energy demands (e.g., in the municipalities, universities, schools and hospitals sector)
- multi-family buildings
- industrial facilities
- district energy projects
- natural gas pressure regulating stations.

More information is available at **www.powerauthority.on.ca.**

Electricity conservation on Ontario farms is produced by the Ontario Power Authority to provide information about energy conservation and efficiency and innovative applications to help Ontario farmers better manage their electricity costs. This publication, available online at **www.powerauthority.on.ca**, examines a variety of technologies and best practices that improve farming operations and reduce energy costs. Your comments and suggestions are welcome. To have your name added to the mailing list, send an e-mail note to info@powerauthority.on.ca.