Energy Innovators Initiative

Energy Innovators Case Study

March 2004

COMMISSION SCOLAIRE DES PATRIOTES: TOP MARKS FOR ENERGY EFFICIENCY

André Dubreuil
Director, Material Resources
Commission scolaire des Patriotes

A successful curriculum for energy savings

The Commission scolaire des Patriotes has set a winning course of action to become more energy efficient. The school board is responsible for 67 school buildings in a region of 21 municipalities east of Montréal, Quebec. It is on track to reach its ambitious goal of cutting energy costs by 30 percent and reducing its greenhouse gas (GHG) emissions, thanks to a series of energy-efficient retrofits.

To help reach its goal, in 2001 the school board joined the Energy Innovators Initiative (EII) of Natural Resources Canada's Office of Energy Efficiency. The EII encourages Canadian businesses and public institutions to reduce costs and GHG emissions by becoming more energy efficient. Improving energy efficiency reduces GHGs that contribute to climate change. To date, more than 1200 registered Energy Innovators have made commitments that will contribute to Canada's GHG emissions reduction target, while saving money and energy.

Paul Lorion, the school board's engineer, proposed an energy strategy comprising a series of retrofits to be implemented in phases. Each phase would involve retrofitting five or six schools at a time. This makes it easier to monitor the progress of retrofits and also permits adjustments along the way.

André Dubreuil, director of material resources for the school board, says, "Doing the work in phases allows us to make sure savings are realized every step of the way. We don't want to do more than six schools at a time. The follow-up on this work takes people and resources."

As part of phase one, the school board spent over $2 million to manage and implement a variety of retrofits. Annual energy savings were forecast to be $252,170. In

École secondaire De Mortagne

fact, the savings so far are working out to be even higher than the amount projected by Johnson Controls, the energy management firm hired by the school board.

"We're saving about 5 to 40 percent more than was originally predicted," says Mr. Dubreuil.

Those extra savings mean the phase one retrofit investment should have a pay-back period of 8 years instead of the budgeted 10 years.

"We took so much time to plan phase one that it went well, necessitating very few changes for phase two," says Mr. Dubreuil. To date, over $2 million in retrofits implemented in six more schools as part of phase two are almost complete.

Lighting retrofits

Significant energy savings for the school board are a result of lighting retrofits. In phase one, the board spent $559,000 on lighting upgrades, saving $56,749, or 775 157 kilowatt hours, per year with annual reductions in GHG emissions of 0.77 tonnes of carbon dioxide (CO_2).

The school board has replaced incandescent lights with T-8 fluorescent tubes, which have a higher colour-rendering index and last a long time (24 000 hours, based on three hours per start). New electronic ballasts were chosen because they are more efficient than electromagnetic ones, do not lead to lamp flicker and last up to 25 years.

Other savings have come from simply removing fixtures or turning lights off.

"Most of our schools were over-lit," says Mr. Dubreuil. "People were getting headaches, and we thought it was because there wasn't enough light. But in fact, there was too much."

As part of phase one, the school board is also taking full advantage of natural light. Lights can be turned on or off in rows, so that on sunny days the lights along the windows can be left off even if other lights in the classroom need to be turned on.

Centralized control systems

Another major energy saver is the improvement of building controls to manage comfort levels and control operating costs. By keeping track of how heating, ventilating and air-conditioning (HVAC) systems are working, the school board can make sure they are as efficient as possible.

"Our systems work only when they're needed," says Mr. Dubreuil.

Table 1 illustrates how installing building controls can lead to impressive energy and cost savings and to reductions in GHG emissions.

Another upgrade that has resulted in impressive energy savings was switching to automatic controls for the boiler-water temperature. Temperature requirements for heating water vary considerably, depending on the outdoor temperature. Boiler-water temperatures can be lowered manually, but most building operators adjust the control only a few times a year due to the associated labour costs. Automatic controls provide maximum energy savings by continuously adjusting the boiler-water temperature based on the outdoor temperature.

Boiler retrofits

With 67 schools in its jurisdiction, the school board has to tailor retrofits to suit the age and condition of each school. In phase one, for example, three of the five schools received boiler upgrades.

At École Père-Marquette, oil-burning boilers were replaced at a cost of $69,197, saving $7,826 and reducing GHGs by 43.85 tonnes of CO_2 per year. At École de la Passerelle, a more efficient boiler was installed in the older part of the school at a cost of $28,412, saving $1,271 and reducing GHGs by 6.02 tonnes of CO_2 every year. Meanwhile, at École secondaire De Mortagne, two high-efficiency boilers costing $210,289 were installed, which will save $42,341 and reduce GHGs by an impressive 130.62 tonnes of CO_2 every year.

SOLARWALL® cladding

Harnessing the sun's energy is an excellent way to ease the financial burden of rising and volatile energy costs. After the capital costs are paid, renewable energy sources such as the sun or wind are almost free. To take advantage of solar energy, the school board installed SOLARWALL® cladding at École de la Passerelle. The SOLARWALL®, which cost $48,300 to install, will save the school $4,200 in energy costs and reduce GHGs by 19.74 tonnes of CO_2 per year.

SOLARWALL® technology is a patented system that is not only environmentally responsible, it's economical as well. SOLARWALL® technology uses solar energy to preheat ventilation air for buildings. Outside air is drawn in through small holes in a building's exterior cladding

A classroom in École secondaire De Mortagne

Furnace

and heated by solar radiation. The warm air rises to the top of the wall, where it gets sucked through a fan and distributed throughout the building. The SOLARWALL® also reduces heat loss in the winter, because the heat that passes outside the building to the metal panels is captured by the incoming air and returned to the building.

The power of education

Recognizing that the success of technological upgrades often depends on the people using the new systems, the school board trained its maintenance staff on the use of the new energy-efficient systems. It also wanted to make sure teachers cooperate by keeping windows closed in the winter, turning unnecessary lights off and closing outside doors when they leave for recess.

"I estimate that about 10 to 15 percent of savings are related to behaviour," says Mr. Dubreuil. "It's very, very important."

The school board is also planning to develop a program called Energy Academy to teach energy efficiency in the classroom. The program, which is for students from kindergarten through high school, will help students understand the importance of energy efficiency and reducing GHG emissions.

Of course, the school board is already teaching valuable lessons about energy efficiency by example. Cutting energy use by 30 percent will also provide the school board's 33 000 students with a more comfortable and healthier learning environment. At the same time, the financial savings achieved by becoming more energy efficient will free up additional resources for education.

Table 1. Building controls

Savings Achieved Through Controls				
School	Investment cost	Annual cost savings	Annual energy savings	Annual GHG reductions (tonnes CO_2)
École secondaire De Mortagne	$404,499	$59,107	113 000 m^3 274 299 kWh	212.50 0.28
École Père-Marquette	$15,522	$3,195	7 800 L	22.10
École aux Quatre-Vents	$43,246	$9,803	157 000 kWh	0.05
École Le Sablier	$45,000	$5,300	59 077 kWh	0.05
École de la Passerelle	$50,500	$4,600	3 000 m^3 64 746 kWh	5.06 0.08

For more information

Energy Innovators Initiative
Office of Energy Efficiency
Natural Resources Canada
580 Booth Street, 18th Floor
Ottawa ON K1A 0E4
Tel.: 1 877 360-5500 (toll-free)
TTY : 613-996-4397 (Teletype for the hearing-impaired)
Fax: (613) 947-4121
E-mail: info.services@nrcan.gc.ca
Web site: oee.nrcan.gc.ca/eii

André Dubreuil
Director, Material Resources
Commission scolaire des Patriotes
1740 Roberval Street
Saint-Bruno-de-Montarville QC J3V 3R3
Tel.: (450) 441-2919
Fax: (450) 441-0838
E-mail: andre.dubreuil@csp.qc.ca
Web site: www.csp.qc.ca

Leading Canadians to Energy Efficiency at Home, at Work and on the Road

The Office of Energy Efficiency of Natural Resources Canada strengthens and expands Canada's commitment to energy efficiency in order to help address the challenges of climate change.

Cat. No. M144-33/2004E
ISBN 0-662-36290-X
Aussi disponible en français sous le titre : Commission scolaire des Patriotes : Une excellente note en matière d'efficacité énergétique

Canada