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KEEWATIN-PATRICIA DISTRICT SCHOOL BOARD: Managing Change with Energy Efficiency in Mind

Introduction

In the past few years, public school boards in Ontario have faced substantial changes in the way they are structured and the way education is funded. In January 1998, three school boards in northwestern Ontario were amalgamated to form the Keewatin-Patricia District School Board (KPDSB).

Soon after amalgamating, the KPDSB joined Natural Resources Canada's (NRCan's) Energy Innovators Initiative. The board's goal was to find innovative, cost-effective and environmentally sensitive ways to undertake its several proposed renovation and new building projects.

A Financial Incentive for a Pilot Retrofit

In August 1998, with help from the Energy Innovators Initiative, the KPDSB proposed a pilot retrofit incentive project. The plan was to undertake a complete energy retrofit of Ignace School in the town of Ignace, near Dryden, Ontario. This 7060 m² (76 000 sq. ft.) facility was heated entirely by electricity and consumed 1 594 000 kWh of electricity annually at a cost of nearly \$147,000. The Ignace project was to retrofit the school's lighting fixtures, its heating, ventilation and air-conditioning (HVAC) equipment, other building controls, and the building envelope (see Table 1).

Table 1. Proposed Building Modifications for the KPDSB's Pilot Retrofit Project

Category	Modification
Lighting	<ul style="list-style-type: none"> • T-8 lamps and ballasts • Ballast reflectors • Occupancy sensors
HVAC	<ul style="list-style-type: none"> • Vertical ground-loop field (4500 m/15 000 ft.) • Exhaust-air heat recovery • Solar panel (ground-loop regeneration) • Ventilation air upgrades • Water-to-water heat pumps for heating and cooling • Electrical heating devices replaced with hydronic baseboard radiation • Domestic hot water heating using heat pumps
Controls	<ul style="list-style-type: none"> • Trending of devices for maximum energy efficiency • Record keeping and troubleshooting for all analogue points in the system • Alarm recording and notification
Envelope	<ul style="list-style-type: none"> • Roof replacement

Table 2. Planned Retrofits for Schools of the Keewatin-Patricia District School Board

School	Lighting Upgrades	Installation of Ground-Source Heat Pumps	Installation of Automatic Controls	HVAC Upgrades
Golden Learning Centre	✓	✓	✓	
Red Lake High School	✓	✓	✓	
Queen Elizabeth High School	✓	✓	✓	
Dryden High School	✓		✓	✓
Evergreen Public School	✓	✓	✓	✓
Lillian Berg Public School	✓			✓
Lakewood Public School	✓			

After its initial planning for the pilot project, the KPDSB decided to retrofit a large secondary school – Queen Elizabeth District High School in Sioux Lookout, Ontario.

Two heating options were considered for the Queen Elizabeth District High School project: an oil-fired boiler and a combined solar/ground-source heat pump system. The two sources of energy would incur similar operating costs. The board opted for the solar/ground-source heat pump system.

A heat pump system was also chosen to heat Ignace School. The other option was natural gas, at a capital cost of approximately \$1 million. Although the capital cost of the heat pump was \$1.5 million, the board decided to install the heat pump system because of its qualitative, environmental and energy consumption benefits.

Energy Savings

NRCan's Energy Innovators Initiative subsidized the KPDSB's Ignace School retrofit with a grant of \$331,700. This agreement was based on the board undertaking similar energy-saving measures in seven of its other schools. Table 2 outlines the retrofits that are being undertaken in these other schools.

The total capital cost of heat pump system in the Ignace project was \$1.5 million. With the Energy Innovators Initiative contribution, the net capital cost was lowered to \$1.2 million.

Project tender cost	\$1,200,000
Ground-source drilling	110,000
Professional fees	140,000
Contingency	30,000
Taxes	20,000
Total project cost	\$1,500,000
Energy Innovators Initiative contribution	300,000
Net project cost	\$1,200,000

Note: Figures are rounded.

Replications began in August 1999 and, as of May 2000, all of the board's energy-saving targets had been achieved.

Before these energy-saving initiatives were implemented, Ignace School was spending almost \$147,000 annually on energy. Once the retrofit is complete, this cost is expected to fall to approximately \$39,000 – a saving of almost \$108,000 a year, or 73 percent. The project's payback period is approximately 12 years.

Protecting the Environment

The retrofits at Ignace School will make an enormous difference in the amount of energy it consumes. The school previously consumed 1 594 000 kWh of electricity annually, equivalent to 287 tonnes of greenhouse gas emissions. The retrofit project is expected to reduce electrical consumption to 523 000 kWh – an annual saving of 1 071 000 kWh, or 193 tonnes of greenhouse gas emissions. This is a 67 percent decrease in energy consumption.

To further promote energy efficiency, the school has raised awareness of the retrofit project. It has also promoted environmental sensitivity among students and staff through a poster contest promoting recycling and the development of related board policy.

The building operations staff's knowledge of energy-efficient equipment and practices will be assessed in order to provide appropriate training. In addition, school principals will report on the energy efficiency initiatives at respective schools so that building occupants will be aware of decreased energy consumption.

Conclusion

By improving energy management and reducing energy consumption at several of its schools, the KPDSB is saving energy, saving money and is helping Canada to fulfil its goal of reducing its greenhouse gas emissions. Students will also benefit from more comfortable and improved learning facilities, more financial resources for educational programs and, of course, a healthier environment.

Contact Details:

Mr Dan McNeil
Chief Operations Officer
Keewatin-Patricia District School Board
79 Casimir Avenue
Dryden ON P8N 2Z6
Tel.: (807) 223-5311
Fax: (807) 223-4703
E-mail: dan.mcneill@kpdsb.on.ca

Energy Innovators Initiative
Office of Energy Efficiency
Natural Resources Canada
580 Booth Street, 18th Floor
Ottawa ON K1A 0E4
Tel.: (613) 995-6950
Fax: (613) 947-4121
Web Site: <http://oeef.nrcan.gc.ca>



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