

Partners for Climate Protection

Greenhouse Gas Reduction Initiative of the Month

Fredericton's Ammonia Heat Recovery System



Municipal Profile

Population: 50,535

PCP member since 2001

The Federation of Canadian Municipalities (FCM) named the City of Fredericton a national leader in the Partners for Climate Protection (PCP) program in September 2009. Fredericton became one of only a handful of Canadian cities to achieve the highest level of program requirements for greenhouse gas (GHG) measurement and reduction in municipal operations. Its corporate action plan, adopted in 2006, aims to cut GHG emissions by 20 per cent below 2000 levels by 2010.

Background

Between 2000 and 2008, the city's emissions decreased by more than 17 per cent. The decrease resulted from emissions reduction strategies, policies and practices. A key element of the city's corporate plan to reduce GHG emissions is its building retrofit policy. Under that policy, the city has refurbished a number of municipal buildings, including replacing several inefficient heating systems with more energy-efficient ones.

One such building is the Lady Beaverbrook Rink (LBR). Following a refurbishment of this 56-year-old building in 2007, the city installed an ammonia heat recovery system in LBR in 2010, to reduce energy costs and emissions.



*Lady Beaverbrook Rink
Photo courtesy of the City of Fredericton*

Implementation and Approach

Jihad Elzamer, the city's energy analyst, explains that Fredericton was aware of the opportunity to implement the heat recovery system system early in 2010. An energy audit was completed in July 2010 to determine the exact energy savings. The implementation contract was then awarded to Electrical & Refrigeration Services Ltd.

Efficiency New Brunswick (NB), a provincial government program that helps the residential, commercial, industrial and municipal sectors become more energy efficient, offset the audit with funding of \$2,000. Efficiency NB also provided a rebate of almost \$7,000 once the system was installed. The audit revealed that the system could reduce costs by as much as \$12,000 and cut GHG emissions by about 27 tonnes each year.

"It only took 15 days to install, and we've had no problems with it to date," says Elzamer.



*Water tank with d heat exchanger coil
Photo courtesy of the City of Fredericton.*

Elzamer explains that the ammonia used to make ice at the rink passes through a heat exchanger coil embedded in a water-holding tank, so that it releases some of its heat to the water. The preheated water is then fed to the rink's natural gas boiler to augment heating and raise domestic hot water to the required temperature.

Results

The city spent approximately \$76,000 to install the system, the bulk (\$63,000) of which was for equipment costs. "Based on today's natural gas prices, we expect to save more than \$13,000 a year in energy costs, which gives us a payback of about 5.6 years," says Elzamer. GHG emission reductions are also higher than expected, and the city expects the ammonia heat recovery system will cut emissions by almost 35 tonnes every year.

Elzamer says that because the system also reduces the load on existing evaporating condensers, the amount of water used has also been reduced.

Lessons Learned

Elzamer reports that the ammonia heat recovery system has been a good investment. "The installation was simple and straightforward, and the system is not expensive. There is minimal maintenance and no staff training was required," he says. "I will definitely keep it in mind for future projects wherever it may be applicable."

On the wider issue of building retrofits, Elzamer says municipalities should consider all components of its building portfolio (e.g., the interior and exterior lighting systems, appliances such as furnaces and boilers, and building control systems), to reap the most from their investments.

Future Direction

The city is working on its urban forestry inventory to calculate the carbon sequestration ability of Fredericton's urban forest. This information will not only be used to set conservation goals, but perhaps also to test new means of building urban residential, commercial and industrial developments. The new building approach would reduce the loss of forest cover and employs the contours of the landscape and the existing vegetative structure to buffer new buildings from winter winds and summer sun. As a result, heating and cooling costs would be reduced.

Further Information

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Read more about Fredericton's building retrofit policy in the November 2009 GHG Initiative of the Month ([click here](#)).

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 900 communities worldwide. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI – Local Governments for Sustainability. PCP receives financial support from FCM's Green Municipal Fund.