June 2010

Partners for Climate Protection

Greenhouse Gas Reduction Initiative of the Month

Yellowknife's ice plant heat recovery project

Municipal Profile

Population: 18,700

PCP Member since 1997

When the City of Yellowknife joined the Partners for Climate Protection in 1997, it spurred the creation of its Community Energy Plan (CEP). In 2004, a baseline energy study found that the city spends $115 million annually on energy, the majority of which is spent on space heating, leading to CO_2 emissions that are twice the national average. In 2005 the city established a planning committee to develop the CEP, which council adopted in 2007.

Background

Yellowknife allocates $500,000 annually to the CEP, funded through the federal gas tax. The funding is used for a variety of community energy and environmental projects including studying the use of renewable energy, building retrofits and greening the municipal fleet. The city estimates that it could save $319,000 annually by 2014 by investing in energy efficiency initiatives alone. One of its first projects was the installation of an ice plant heat recovery system at its Multiplex Arena.

Implementation and Approach

The city wanted to make the Multiplex a greener facility and chose Cimco Ltd.'s ECO CHILL® ice plant heat recovery system as a way to capture and reuse waste heat. The city leveraged its CEP budget to obtain funding from the Municipal Rural Infrastructure Fund, which paid for two-thirds of this $313,000 system.

The ice plant is located in the Multiplex's mechanical room. Photo courtesy of the City of Yellowknife.

Mark Henry, the city's energy coordinator, explains how the system works: "The ice plant extracts heat from the arena floor through a mechanical process, producing waste heat as a by-product. The waste heat is then used to offset space heating requirements in the facility's rink, dressing room and lobby areas."

Mr. Henry says that although the system uses more electricity—a result of the increased operating pressure of the ice plant—much of the electricity generated in Yellowknife is from emission-free hydro and costs are more than offset by the reduction in heating oil.

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Results

The city estimates the facility's oil consumption will be reduced by about 40%, which translates into annual savings of $50,000 and GHG emission reductions of 250 tonnes, a 5% overall reduction in the city's corporate emissions. Mr. Henry says that there have been no issues with the system since it was completed in December 2009. "We have an extensive monitoring system and Cimco can remotely monitor and adjust the system from anywhere in Canada."

Prior to installing the ECO CHILL® system, the city installed a lighting control system at the Multiplex, which allows the existing lighting above the rink to be dimmed without changing or altering fixtures. Previously, all 105 450-watt bulbs were turned on at the beginning of the day and remained at full intensity for an average of 19 hours per day. The new lighting control system saves the city about $14,500 a year in electricity costs.

Lessons Learned

The biggest challenge the city faced with this project was the proprietary nature of the ECO CHILL® system. "Usually when you get a pitch from a salesperson about a system like this you want a third-party evaluation, but because the system was proprietary to Cimco we had to rely on them for accurate information," says Mr. Henry. City staff spoke with other cities, such as Whitehorse and Fort Saskatchewan, which had installed ECO CHILL® to ensure that they could have confidence in the system. "Natural Resources Canada also supported Cimco in developing the technology, so we got their independent perspective," he says.

For other communities that might be interested in installing a similar system, Mr. Henry says that the key is to ensure that the ice plant operates for a certain number of hours per day. "If you have a facility that you don't use a great deal you won't get the payback that you want."

Future Direction

Currently, the ECO CHILL® system produces more waste heat than can be used at the Multiplex. The city is therefore designing an adjacent field house and soccer pitch building to take the low-grade heat. "We're designing it in advance so we can make maximum use of this resource," says Mr. Henry.

The city is also moving to implement many community energy projects, including studying the potential of a decommissioned gold mine as a geothermal heat source. It has also begun work on several building energy retrofits, such as establishing energy-efficient building standards for new residential and commercial construction and pursuing the construction of a LEED-certified recreational facility.

Further Information

Mark Henry
Energy Coordinator
City of Yellowknife
Tel: 867-920-5697
mhenry@yellowknife.ca

Download a copy of Yellowknife's Community Energy Plan at http://www.yellowknife.ca/Assets/Public+Works+$!26+Engineering/CEP+Implementation+Plan+April+2007.pdf.

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 involving 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.

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