

## Partners for Climate Protection

### Greenhouse Gas Reduction Initiative of the Month

#### Saskatoon's Solar Hot Water Installations



#### Municipal Profile

Population: 222,189

PCP Member since 2004

When the City of Saskatoon joined Partners for Climate Protection, it made a commitment to reduce its GHG emissions, and in 2005 prepared an inventory of corporate energy and emissions. This inventory showed that municipally owned buildings comprised the largest proportion of the city's emissions (39%). The city accordingly decided to focus on these facilities.

#### Background

As a result of its 2005 energy and emissions inventory, the city hired a consultant to help it prepare an action plan. The plan made a number of recommendations, including the use of solar hot water heating at the city's two public swimming pools.

"We started investigating our options and found that there were grants available for solar heating, but learned that the grant programs were soon going to expire," recalls Chris Richards, the city's Energy & Sustainability Project Engineer. While there was still time, the city applied for and received two grants: one from Natural Resources Canada, and one from the Province of Saskatchewan. The city contributed the remaining funds for the two solar hot water installations.

#### Implementation and Approach

The city began its preliminary analysis in February 2010. "We needed to make sure that the business case made sense," says Richards, noting that the economics for solar thermal installations are significantly influenced by the size, duration and temperature of the water-heating load. The low temperature load of the city's community pools was ideal. "We then issued an RFP in the early summer, and awarded a design-build contract in late summer." By October, the city had the permits to proceed, and commissioned the projects in December 2010.

Solar panels were installed at the Lawson Civic Centre (LCC) and at the Harry Bailey Aquatic Centre (HBAC), pictured at right (*photo courtesy of the City of Saskatoon*). To date, these are the largest municipally owned installations in Saskatchewan, and include 90 solar panels at the LCC, and 72 solar panels at the HBAC. The panels supply approximately 20–25% of the energy needed to heat the pools.



South-facing solar collectors were mounted on each building's roof, and were angled to maximize solar collection throughout the year. The Sun's rays produce energy that is transferred to a non-toxic glycol solution, which is circulated within the panels, then through a heat exchanger, finally transferring the heat to water in the pool. The panels have an expected lifecycle of 25 years.

According to NRCan's solar resource maps (<https://glfc.cfsnet.nfis.org/mapserver/pv/index.php?lang=e&m=r>), Saskatoon is among the top Canadian cities in the amount of solar radiation it receives each year.

Initially, the monitoring equipment installed to track performance of the panels seemed to suggest that the systems were underperforming. "Each pool-heating system operates at a different flow rate," explains Richards, "so the rate of pool water flowing through the heat exchanger is different for each. That resulted in very different temperature changes, and we needed to create different setpoints for each system."

## Results

Total project costs for both buildings came to \$453,473—comprising equipment, including the panels themselves; consultants; labour; design; and a communications budget—of which \$273,902 was grant money from the federal and provincial governments. Together, the two projects are estimated to save the city approximately \$17,700 each year in natural gas costs, for a payback of 10.1 years. Annual GHG emission reductions are 120 tonnes.

"These two projects are very visible displays of the city's environmental leadership, and they're generating discussion," says Richards. "People ask our staff at the buildings about using solar thermal at their own homes. Both buildings have an FAQ [frequently asked questions] sheet, so we have that information for them on hand. We have also given several presentations on the panels to different community groups.

"Reducing the operating costs of the public facilities makes them more affordable for all residents," adds Richards. "We also have that extra heating capacity, so the pools heat up faster. The panels should also reduce the run-time of the boiler, which should in turn reduce maintenance costs."

## Lessons Learned

Richards says that the only real challenge the city faced was meeting the grant deadlines. "Other than that, we spent a very small amount from our contingency fund and, considering that the work was done in the winter, both projects went very smoothly."

Using a design-build approach worked well for the city. "It's valuable to include someone in the design process who is familiar with these systems," says Richards. "Our contractors had completed large projects before."



He adds that the contractors ensured that the sensors were in the right locations. "A lot of air is expelled from the buildings via exhaust systems, and some of the panels can get warm in the winter from that exhaust," Richards explains. "If the sensor that turned the system on was in one of the panels close to the air exhaust, the panel wouldn't work as well—or at all—so you need to pay attention to those kinds of details."

A clean solar panel is one that performs at an optimal level, so regular maintenance was also a question with which the city had to contend. "One of the buildings is near a park and a parking lot, so the panels are very clean and we may only need to clean them once every five years, if at all," says Richards. "The other building is close to flour mill and a four-lane road, so the panels get dirtier, and cleaning them would likely improve their performance." *Pictured at left are the panels atop the Lawson Civic Centre. Photo courtesy of the City of Saskatoon.*

## Future Directions

The solar projects are only one part of the city's Greenhouse Gas Management Plan. Saskatoon is also considering the use of combined heat and power at other pool facilities, as well as installation of a district energy system. "We did a district energy feasibility study to heat a new development in the city as well," reports Richards, "and we're also working on energy audits of our own facilities to assess potential reductions in energy and emissions."

Richards also says that the city is conducting a pilot project with SaskPower (the province's largest electrical utility) to study the efficacy of "Icemax", a product created by Johnson Controls. This product can be added to the water in a Zamboni so that the water freezes at a higher-than-average temperature. This higher temperature allows rink operators to raise the temperature of the glycol or brine solution, while lowering the flood-water temperature, resulting in reduced energy loads on chillers, pumps, water heaters and dehumidifiers—all of which extend the life of the equipment.

## Further Information

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See a video of this project at: <http://www.youtube.com/watch?v=TFYA0fWoQM8>

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 1,200 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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