

## Partners for Climate Protection

### Greenhouse Gas Reduction Initiative of the Month

#### Aldergrove water treatment plant geothermal project



#### Municipal Profile

Population: 93,726

Partners for Climate Protection (PCP) member since 2001

#### Background

In 2006, as a result of its PCP membership, the Township of Langley, British Columbia implemented an emission reduction plan. The goal was to reduce corporate greenhouse gas (GHG) levels by 10 per cent by 2010. Langley also adopted a Sustainability Charter in 2008. The charter informs all of its policies and programs. In addition, the township signed onto the Climate Action Charter, a joint initiative among the province, the Union of British Columbia Municipalities and individual communities, to become carbon neutral by 2012.

#### Implementation and Approach

In 2010, a geothermal system was installed at the Aldergrove water treatment plant. The system uses energy from groundwater to heat and cool the 750-square-metre building (see photo on right).

The geothermal project began with a casual conversation between Timo Siira – Langley's Water Operations superintendent – and a consulting engineer from Associated Engineering. The engineer was working for the township on another project at the time. "Within a couple of months, the engineer came back to us and said geothermal could work," recalls Siira.

A feasibility study found that a water-to-air heat pump and a heat exchanger could be installed using the energy from the Aldergrove aquifer. Design work began in the summer of 2009. Construction was completed by April 2010.

Geothermal technology uses the heat from the earth or a body of water, such as the Aldergrove aquifer. The aquifer made a perfect heating and cooling source: it remains relatively constant at about 9.5 to 11.5°C year round.



Courtesy of the Township of Langley



“Most of the infrastructure was already in place,” says Siira. “We’re already pumping groundwater into the plant, so this was an opportunity to recover the energy from it.”

Treated water first flows through a heat exchanger—a double-walled plate with water on one side and glycol on the other (*see photo on left*). The double-walled feature ensures no glycol contaminates the treated water should plate failure

occur. The other side of the heat exchanger uses a 10 per cent glycol solution to prevent freezing. A heat pump then uses a low-pressure liquid refrigerant to pick up heat from the groundwater – vaporizing and condensing the refrigerant before forwarding it to a fan coil. The heat from the now-condensed vapor is then released at a higher temperature to heat the building. In summer, the process is reversed for cooling.

## Results

The geothermal project cost \$136,000. About \$91,000 was spent on construction. The balance went toward engineering design and major equipment. About one-half (\$66,000) of the budget came from a Building Canada Fund grant. The township provided the remaining \$70,000.

Based on the plant’s energy use between 2005 and 2007, Langley estimates it will avoid using about 1,300 gigajoules of natural gas each year. Annually, Langley will save more than \$8,500 in energy costs and will reduce emissions by about 70 tonnes.

“In the first six months of 2010 we’ve already saved \$6,400, which includes the cost of energy and the B.C. carbon tax,” reports Ryan Schmidt, Langley’s Environmental Coordinator. “If we begin purchasing offsets at \$25/tonne in 2012, the system will drive down costs even more.”

## Lessons Learned

Siira reports no significant problems arose during construction. Nor have issues arisen since the geothermal system began operating. “We brought in our stakeholders early and lined up the funding before going forward,” he says. Schmidt adds that this project offers a tremendous opportunity to reduce GHGs – although water treatment plants typically don’t offer many such opportunities. “The Aldergrove plant represents 1.5 per cent of the township’s total carbon footprint and 15 per cent of the total reduction we need to meet our 2010 GHG reduction target.”

An innovative aspect of this project was how the township factored in current and future costs -- including energy, carbon taxes and carbon offsets. (To date, B.C. is the only province to levy a carbon tax on GHG-producing activities.)

“Currently, B.C. is paying \$25/tonne to offset carbon emissions from air travel, and that could escalate to \$30/tonne by 2012,” explains Schmidt. “Because we signed on to the Climate Action Charter, we too will have to start paying for offsets in 2013. So this helped strengthen the business case for the project.”

**Future Direction**

Langley recently completed a study on tying multiple sites in the neighborhood of Murrayville to a district energy system, using renewable energy. The sites include a hospital, fire hall, recreation centre, RCMP headquarters, future town homes and properties owned by the local school board. “All of those buildings are based on hydronic heat,” says Schmidt, “so there’s a good opportunity to retrofit.” The township is considering biomass and geothermal energy sources – as well as “green” gas, such as methane from landfill or composting operations. Langley is consulting with stakeholders on these options.

**Further Information**

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