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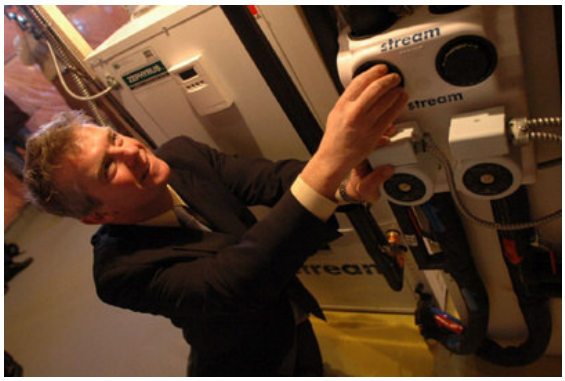
Wind and solar technologies may hog the spotlight (and subsidies) in Ontario, but behind the scene geo-exchange heating and cooling systems are being quietly deployed by the thousands across the province every year.

In fact, Ontario dominates when it comes to deploying these systems, according to a just released national report from the Canadian GeoExchange Coalition, a non-profit organization representing the industry.

The province saw more than 7,000 geothermal heat pump units installed in 2010. This is down from more than 9,000 in each of 2009 and 2008, but far higher than next-best ranking Quebec and British Columbia, which have only installed between 1,000 and 2,000 units annually between 2008 and 2010.

Put another way, Ontario represents nearly two-thirds of the Canadian market in 2010.



Some of the equipment inside a Durham Region house (and attached to the furnace) that enables geothermal heating and cooling. Ontario has led in installations across the country.

Paul Irish/Toronto Star

Heat pumps are the core part of a geo-exchange system. These devices transfer thermal energy from a warm place — the “source” — to a cooler place — the “sink” — via ethanol-filled plastic tubing laid two metres or deeper underground.

In the winter, the source tends to be the ground (which holds heat from the sun) and the sink is the inside of a building. The system works in reverse in the summer. Heat is carried from a building and dumped into a cooler underground sink.

The ethanol or “working fluid” inside the plastic tubing is what absorbs and carries the heat to its destination.

It has been about 60 years since the first system of this kind was installed in Canada. Credit for that effort goes to Frank Hooper, professor emeritus of mechanical engineering at the University of Toronto, who as a university lecturer in the late 1940s worked with the former Ontario Hydro to equip a house in Port Credit with its own geothermal heating and cooling system.

Hooper was fascinated with the efficiency of such systems. Rather than make heat by burning fuel or creating electrical resistance in metal wires, Hooper realized that it made more sense and required less energy to simply shift already existing heat around.

Some electricity is required to run a geo-exchange system, but, in the case of heating, more than two-thirds of the thermal energy that is delivered comes from the ground. This is why the most efficient geo-exchange systems are as much as 50 per cent more efficient than the best natural gas furnaces and more than 75 per cent more efficient than oil furnaces.

“I was enthusiastic about its potential,” Hooper recalled in a chat we had last year. “I could see, in my mind, streets full of houses using heat pumps. But I can’t say Canadians came rushing to replace their heating systems with this.”

At the time, it made little economic sense. Electricity and fossil fuels (coal at the time) were so inexpensive that it wasn’t worthwhile to make the switch. Indeed, the technology only started to gain traction 10 years ago as hydro bills and oil prices kept rising.

In 2000, for example, there were about 1,000 heat pump units installed cross Canada. That figure rose to nearly 6,000 in 2006 and spiked to a high of 16,000 just three years later.

Significant rebates from both the Ontario and federal governments helped give a boost to geo-exchange system sales in the province, but it remains a hard sell for homeowners and building owners, which are enjoying historically low natural gas prices.

Of all units sold between 2008 and 2010 in Ontario, 79 per cent displaced the use of fuel oil and electricity — only 6 per cent displaced

natural gas.

Ontario has since discontinued its rebate and the federal government is poised to do the same, so it remains unclear how steady the growth will be in 2012 and beyond, absent new policies or programs.

“The residential market has definitely shrunk,” says Stanley Reitsma, president of Caledonia, Ont.-based Geosource Energy Inc. “But the commercial market in Ontario is a different story. It’s still strong.”

Geosource has been busy installing systems in midrise and highrise buildings. It’s not fuelled by incentives. Instead developers are increasingly seeing the long-term financial and environmental benefits of moving in this direction.

Changes to the province’s building code in 2011 that require buildings to be 25 per cent more efficient has further boosted interest in the technology.

It’s the savings that come from cooling, not heating, that are proving most attractive to large building owners, says Reitsma. “Heating costs (from natural gas) are small compared to cooling costs (from electricity).”

Meanwhile, more building developers are choosing to play the role of energy supplier. They install the geo-exchange systems and sell the resulting heat or cool air to the building owner or tenant under fixed-priced, long-term contracts.

“It’s competitive and eliminates price volatility,” Reitsma says. “It’s also part of their green marketing.”

The caveat is that developers and building owners are still finding it challenging to get upfront financing for such installations. The banks aren’t particularly excited about these projects, assuming they even understand their value.

“It’s probably the one thing holding these projects back,” says Reitsma, adding that government programs that help make financing more accessible would go a long way to stimulating market growth.

Tyler Hamilton, author of Mad Like Tesla, writes weekly about green energy and clean technologies.