

## Energy savings from the ground up

### Ontario company first in Canada to outfit large warehouse with geothermal system, JAY SOMERSET reports

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Eric Lange does his part for the planet. He drives a hybrid vehicle, recycles his trash and always turns off the lights when he leaves a room.

"I try to do the easy, little things," said Mr. Lange, 51, president of Lange Transportation and Storage Ltd. in Mississauga, Ont., a logistics company that moves trade shows and medical equipment.

Reduce, reuse, recycle; nothing remarkable there. But Mr. Lange's relationship with the planet goes deeper than simply doing good -- 110 metres deep, to be precise.

Six months ago, Lange Transportation became the first company in Canada to retrofit a large warehouse with geothermal technology. Geothermal systems are normally installed in new buildings, not a 30-year-old energy glutton.

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But Mr. Lange was spurred by more than feel-good environmentalism for his \$540,000 project.

"When I purchased the building in July, 2006, I knew it was in rough shape, but I had no idea how bad it was until I received my first energy bill -- \$3,800," he recalls. "We hadn't even moved in yet and already our energy costs were out of control."

His two-storey, 70,000-square-foot building (60,000-square-foot warehouse with 10,000-square-foot office) is heated and cooled with renewable geothermal energy, which converts heat from the ground and turns it into energy through a heat pump.

The Lange building, in fact, uses four heat pumps and 28 pipes (seven per pump) that run 110 metres below ground. Water circulates through the pipe systems, taking on the temperature of the ground. When the water reaches the heat pump, it is cooled and the heat generated by the pump is blown throughout the building.

"Think of it like a fridge," said Stan Marco, president of GeoSmart Energy, the Cambridge, Ont.-based company that designed and installed Mr. Lange's system. "As you cool the inside of your fridge, the back gets hot. We take this heat and spread it throughout the building."

During warmer months, the opposite happens. "For cooling, it's like you're defrosting your fridge. Now the coils are cold, and this coolness is spread throughout the building," said Mr. Marco. Temperature is maintained with thermostats, so the system can start and stop like a furnace.

The Lange building's pipes run 110 metres deep because that's how far the water must travel to get back to the ground's temperature before returning to the heat pump. "We ran the tubes down because there wasn't room to run them horizontally," noted Mr. Marco. Geothermal tubes can also be run horizontally, set about four metres below ground, if there aren't any buildings nearby, such as in a rural area. "We installed Mr. Lange's pipes about 15 feet from the building because there was space, but in a downtown setting, we'd drill the holes and put the tubes right underneath the building," said Mr. Marco.

Unlike other renewable energy sources such as solar panels or wind turbines, geothermal energy doesn't fluctuate with above-ground conditions; whether the sun is shining or the wind is blowing, the temperature below remains the same, as does the energy output.

The geothermal system allows Lange's 50 employees to adjust the temperature in specific areas of the building; if one area of the warehouse tends to be cooler than another, the heat can be turned up in that spot without affecting the rest of the building. "I'm away from the office for two weeks, so my area is a cool 65 degrees [Fahrenheit], while the rest of the office is warm," notes Mr. Lange.

And then there's the environmental benefit: a geothermal system this size will do away with about 158,000 tonnes of carbon-dioxide emissions over 20 years, the system's estimated lifespan.

According to a study done by the Canadian GeoExchange Coalition, which helps promote, regulate and develop geothermal technology and training for government and industry, sales of industrial-sized geothermal systems across Canada are growing. Sales for 2006 totalled about \$37.9-million, an increase of 88 per cent over 2004 figures.

Before having the geothermal system installed, Mr. Lange dealt with smaller energy conservation measures. He replaced the building's windows with double-paned glass, installed motion detectors on lights in the bathrooms and kitchen, and replaced light fixtures to use efficient florescent lights. He also changed the office lighting system from one bank to three, so that the whole office doesn't need to be illuminated when one person is working.

"Right away we saw an energy savings of 35 per cent," said Mr. Lange.

He also installed three solar tubes, at a cost of \$1,800 each, in the building's roof. The tubes magnify natural light and diffuse it throughout the office, providing enough ambient light to walk around the office without turning on a light.

When Mr. Lange turned his attention to the heating and cooling unit ("It was well past its prime and I knew it would fail me on the first cold day"), he researched renewable energy systems. "We're close to the airport, so wind power was out of the question, and solar power still requires you to work through the utility company, so geothermal seemed the perfect fit," he said.

The \$540,000 setup cost may seem high, he said, "but when you see an immediate savings of \$5,631 in one month, you realize you can be a smart business person and an environmentalist at the same time."

While Mr. Lange wasn't shocked by the cost of the system, he was surprised by the lack of federal, provincial, or municipal government aid.

"You'd think there'd be some sort of program to help small- to medium-sized businesses get off the power grid and do what's right for the environment," he said. "I guess I was naive to think the government would promote renewable energy for businesses."

The Ontario government did waive the provincial sales tax on the equipment cost as part of the province's energy conservation program, but the bulk of Mr. Lange's bill came from boring the 110-metre deep holes for the 28 pipes.

"Ontario used to offer an incentive program for businesses that wanted to install geothermal systems, but every heating and cooling guy started putting 'geothermal specialist' on the side of their truck, so there were a lot of failed systems and the

government stopped its program," said Ted Kantrowitz, director of business development for Canadian GeoExchange Coalition.

With or without government aid, Mr. Lange knew he was doing the right thing, for his business and the planet. "I did this for three reasons: it's the right thing to do from an environmental standpoint; it creates a healthier workplace; and if I can invest a dollar with a return of 10 cents a year, then it's a smart business move."

Unfortunately, his enthusiasm flagged during a recent cold snap in which the building wasn't fully heated. GeoSmart attributed the problem to a miscommunication in the design process and set about fixing it. "I've been in this business for more than 25 years," said Mr. Marco. "I started in Winnipeg, and if geothermal systems work there in winter, it can work in Ontario."

Mr. Lange, meanwhile, was philosophical about the temporary setback. "When Mr. Ford took his first Model T for a ride, and his hair was blowing in the wind and everything was wonderful, and then he hit a pothole -- that's when he realized it's one thing to build it and quite another to make it operate in the real world."