



**As owner and developer, Kostadin Demirov is taking a different approach to the HVAC system for his 68-unit apartment complex.**

## *Multi-unit* RESIDENTIAL GEOTHERMAL

Ontario projects draw attention to benefits of ground source heating and cooling

*By Bruce Nagy*

The portfolio of successful multi-unit residential geothermal projects keeps expanding in Ontario, emboldening others to consider the technologies and the business cases for new construction and retrofits.

A handful of projects were drilled this summer, each requiring minor innovations to meet individual project needs. What they all had in common was the expected low operating cost and the opportunity to meet tightening carbon regulations in Ontario cities.

### **A developer/owner approach**

Kostadin Demirov has spent years building fine custom homes in the eastern Beach area of Toronto, recently dabbling in multi-unit projects and finally going ‘all the way’ with a 68-unit rental apartment project at Main and Kingston Road, an iconic intersection in that part of the city.

Demirov explains that he will own and operate the project and, as a result, is looking at its HVAC systems differently than a typical developer might. He has to make the numbers and the Toronto Green Standard work, and in that part of the Beach a certain quality level is a key consideration.

The [Toronto Green Standard](#) is a set of guidelines used by the city’s planning department when approving projects. For the city, it is a tool to move developers gradually into decarbonization. Evolving voluntary tiers become mandatory every five years. The expectation is that by 2030 fossil fuels will not be specified in new Toronto construction projects.

“Geothermal is a long-term investment,” says Demirov. “We will also have solar PV on the roof – 62 panels or 150 square metres producing



A worker prepares geothermal tubing as it is fed into the boreholes at Demirov's building.



Geothermal heating and cooling are being used in some very large projects. This is an artist's concept of a 542-unit condo complex currently under construction in Toronto.

23 kilowatts. The system should handle all the power needs of the building, including the entire HVAC load of about 100 tons. We may add a battery later (for peak shaving), but it's not currently in the plan."

### Central heat pump

A central [Mitsubishi heat pump](#) with variable refrigerant flow (VRF) will draw from the geothermal heat via heat exchanger during the winter and for cooling in the summer. During the shoulder seasons the VRF is designed to operate as an air source heat pump. Each well-insulated unit is equipped with a Mitsubishi energy recovery ventilator (ERV), which provides fresh air while retaining heating and cooling energy and managing humidity.

The HVAC load requires 35 geothermal boreholes, each at 600 feet deep; however, they are actually drilled at about 620 or 630 feet. That's because there will be two levels of below-grade parking, but the boreholes were drilled before the excavation for the parking takes place. During the excavation process the borehole piping is adjusted to feed into

manifolds at the lowest level of the garage. This approach is being repeated in at least two other Ontario projects this year.

### Other projects

In Cambridge, Ont., on Hespeler Road, two buildings totaling 128 units are being constructed. One is six floors high and the other is eight storeys, with three below grade parking levels.

Again, it's a mix of affordable and market rate apartments heated and cooled by

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geothermal. Cambridge uses individual Omega vertically stacked water source heat pumps models 040, 060, 080 and 100 with energy efficiency ratios (EER) around 13, COP above 4.0, BTUs 11,600-26,400 and usage of 847 to 2031 watts.

### Snow melt heat sink

And back in Toronto, as we first reported last year, geothermal is now underneath The Plant, a condo building which has now risen from the ground and features large terraces and ground level outdoor expanses.

For these, snowmelt via the geothermal becomes part of the heat sink equation. This makes it possible to balance the load, so that the earth underground does not suffer long-term effects from the geothermal. The project is a 95,000 square foot, 10-floor mixed use building with a couple of floors of office and retail at the ground level, and three more levels for parking below ground.

“We integrate the snowmelt system for

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## ■ Building Green

# A utility model for geothermal

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underground parking ramps and outdoor terraces with the geothermal,” says Connor Stewart, director of sales at [Diverso Energy](#), the geothermal system designer. “They’re cooling-dominant buildings and the snowmelt rejects into the ground, adding cooling capacity.”

Similar to the East Beaches project, at The Plant and in Cambridge, boreholes were about 630 feet originally, then adjusted to 600, while the parking garage excavation was underway.

The Plant is also ‘dry-cooler-ready,’ in case the office/residential proportions in the building change at some point in the future. “It’s compliant with Tier 2 of the Toronto Green Standard,” said Stewart. “That’s voluntary, so it represents a forward-looking approach.”

Stewart’s company cares about the long-term, because in addition to designing and managing installation of the system, it has set up a utility model to service and operate the



The Plant project coordinator Patrick Amorim displays the manifold for the geothermal system.



Diverso Energy’s Connor Stewart in front of The Plant, a large project featuring geothermal in Toronto’s Liberty Village.

geothermal, like a gas company.

The building contains two-bedroom and three-bedroom residential suites and is designed to attract upwardly mobile creative professionals. As young artists they may have moved into one of the myriad Liberty Village starter condos and have since flourished, along with a community that has transformed from a low rent bohemian neighborhood to a more affluent Toronto area.

It is now populated by IT professionals, architects, entrepreneurs, media people, restaurateurs, fashion leaders and other members of Toronto’s expanding creative class. The building’s theme is urban agriculture, so in addition to sustainable features, it offers self-watering aeroponic plant stands on terraces, kitchen carts for organic compost, seedling germination, a communal greenhouse, herb kitchen, vegetable garden and green roof, all based on the ground source system.

### The ‘go-to’ clean system

Geothermal is also being selected for some very large developments in Ontario. In Mississauga, Ont., two buildings known as the Shores of Port Credit on Lakeshore Boulevard will use geo to condition 141 adult rental units and 161 units of senior living. In uptown Toronto drilling is underway for Lillian Park, a 542-unit condo, again two buildings. And there are more projects coming soon.

Geothermal has long been known as the Rolls

Royce of heating and cooling for big country houses owned by wealthy people, or farmers with their own backhoes. That it would grow in popularity for urban multi-unit residential was still unlikely a few short years ago.

Things have changed. Cities like Toronto are tightening up sustainability requirements. Design-build and vertical integration are growing. Some developers like Kosta Demirov or third parties like Diverso are becoming more involved with the extended life of projects in ways that impact the original design and business case for building operations. Affordable developments are especially sensitive to the potential benefits of electrified HVAC systems and predictable energy costs.

It may be too soon to call it a significant trend, but geothermal has definitely cracked the commercial market in Ontario, and a variety of project configurations are being tested. If you’re not already involved, it could be a good time to take a second look at the big leagues of geothermal. +



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