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Tapping sun for water heat

Lost in the hype over solar electricity is the fact there are much easier ways to capture and use the sun's ample energy

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MICHAEL STUPARYK/TORONTO STAR
Scale of project atop Coatsworth Ave. seniors residence is apparent as Alex Winch of Mondial Energy Inc., in his hard hat, stands between the rooftop installations of solar panels his company has had installed.

On the rooftop of the Cecilia Murphy seniors' residence in Toronto's east end, it's difficult to ignore two imposing solar installations reaching awkwardly into the sky.

Each array, tilted south at a 45-degree angle, contains 60 solar panels that face and worship the sun. But unlike their photovoltaic cousins, which exist to convert sunlight into electricity, these panels are designed to capture the sun's heat.

Alex Winch, founder and president of Toronto-based Mondial Energy Inc., the company that owns and maintains the system, stands wearing a hardhat beside one of the arrays and points out and down to the surrounding community below — a mix of homes, apartment buildings, schools, and community centres.

"There are easily 200 rooftops from here that I could service," says Winch, a former hedge fund manager turned solar energy entrepreneur. "I don't think it's as sexy as making electricity with a panel, but solar thermal is the industry's low-hanging fruit."

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As headlines buzz and venture capitalists rave about the potential of today's high-priced and subsidy-dependent solar PV systems, solar thermal continues to be the industry's best-kept secret, an economical way of offsetting our use of natural gas and electricity for water heating.

Consider that solar thermal is five to 10 times less expensive than solar PV based on comparable energy returns over the life cycle of a system. Also consider that roughly a fifth of a home's energy consumption can be attributed to heating up water for showers, dishwashers, and washing machines. If you rely on hot water for space heating or keeping your pool warm, that percentage can rise significantly.

"The capital markets are just falling all over themselves to finance PV companies," says Jim Fletcher, managing director of Vancouver-based venture capital firm Chrysalix Energy Management.

"But in terms of paybacks PV requires several times larger subsidies than solar thermal, and solar thermal you can argue doesn't need any subsidies at all, or very little if any."

A decent solar thermal system can provide more than 75 per cent of a household's hot water in the summer and 25 per cent in the winter. Blended over four seasons, the sun can supply 35 to 55 per cent of a household's hot water needs, meaning less money spent on natural gas or electricity.

Fletcher says North America has been a laggard in the use of solar thermal, whereas Europe and some Asian countries have led the pack. In developing countries such as market leader China, where many lack access to natural gas infrastructure or even electricity, use of the technology is a no-brainer.

The Worldwatch Institute, an environmental think tank in Washington, D.C., estimates that more than 30 million households in China use a low-tech solar thermal system to heat their hot water. The systems are now so common that many Chinese view them as a standard appliance, no different than a dishwasher or refrigerator.

Over at the 205-resident Cecilia Murphy Building on Coatsworth Ave., just southeast of Danforth and Coxwell Avenues, the sun beats down relentlessly on the army of panels just recently put into service.

The system, installed by Taylor Munro Energy Systems of Vancouver, is simple in design. Heat from the sun is absorbed and transferred to a glycol-based fluid flowing behind the solar panels. Pipes collect the heated fluid and carry it into the building, where it gets stored and circulated inside eight large plastic tanks.

Within each tank sits a coil of copper piping that carries water for residential consumption. As cold municipal water moves through the coils it absorbs the heat stored in the tanks and begins to warm up.

A conventional hot water boiler is still necessary — it just doesn't have to work as hard. The solar thermal system acts as a complement, pre-heating what would otherwise be cold water before it goes to the boiler. This means less natural gas is needed to reach the desired temperature.

"The physics is as boring as your car getting hot on a blazing summer day," says Winch, whose first foray into solar thermal was the conversion of a laundromat in Toronto's Beach district. "We simply put fluid in that takes away that heat."

If it's a cloudy day in the winter, the system will be heavily dependent on natural gas. On sunny days in the summer, hardly any natural gas will be needed.

Software keeps track of how much natural gas the solar heat is displacing and Winch can monitor the performance of the system from a website.

Most interesting about the project is that Neighbourhood Link Homes, the non-profit social service agency that manages the Cecilia Murphy Building, didn't have to pay a cent for the system and the agency took on little risk.

Mondial, which retains all ownership and risk, designed its service to break down the upfront cost barrier associated with solar. The company signed a 10-year contract with Neighbourhood Link Homes, which has agreed to pay Mondial a fixed rate for any natural gas that is offset by the system. This is expected to average about $10,200 a year.

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Alex Winch, Mondial Energy Inc.

The agency benefits in two ways: First, there is the obvious environmental benefit of relying less on a fossil fuel; second, by signing a competitive, 10-year fixed contract it will slightly lower its energy bill over the years and is sheltered from expected increases in natural gas prices over the next decade.

Mondial and its 50 shareholders, meanwhile, will get a guaranteed return on their investment.

The system cost was $131,000, but Mondial gets more than $25,000 of that back from the federal government's Renewable Energy Deployment Initiative, or REDI program.

"A year ago, we were from Mars. People didn't know what we were talking about," says Winch.

But business is now booming. Last month, Mondial announced it would be commissioning an even larger system for Toronto's WoodGreen Community Housing Inc. Winch also has a number of other projects in negotiation, including a hotel in Atlanta, a casino in Nevada and a building in Honolulu, Hawaii.

"I'm hugely pumped about it," he says.

The government incentive is what allows Mondial to offer its service at a profit, but building- or home-owners willing to pay the upfront cost on their own — and take on the risk involved — could see a payback in as little as 10 years with little reliance on subsidies.

Meanwhile, there is tremendous opportunity to install solar thermal systems in new homes. Marshall Homes, for example, gave customers the option this year of adding a combined solar and geothermal system to homes at its Copperfield development in Oshawa. The added cost can be included with the home's mortgage, eliminating the pain of upfront payment.

"One of our key areas of focus is to get this into new home construction," says Michael Noble, founder and president of Dorchester, Ont.-based EnerWorks Inc., a maker of solar hot-water heating systems for residential and commercial markets. "Where we see growth is work on new subdivision projects."

EnerWorks' solar thermal technology is behind the Marshall Homes system. Noble wouldn't reveal details, but said the company is also in talks with other, larger home developers in Ontario about offering solar thermal as an option to homebuyers.

The opportunity is attracting investment. EnerWorks secured $3.25 million in venture capital financing this fall from Chrysalix and Investeco Capital. The money will be used to scale up production of its products and to fund expansion into the United States, where state and federal incentives are boosting demand for both solar thermal and PV systems.

Steve Harrison, who heads research and development at the Solar Calorimetry Laboratory at Queen's University, says concern over climate change is drawing increased attention to the benefits of solar thermal.

He points to countries such as Spain, which next year will require by law that all new or renovated buildings cover 30 to 70 per cent of their hot water needs using solar thermal technology.

"The near-term economics over the next 10 years are going to be very strongly in favour of solar thermal," said Harrison, whose lab is collaborating with EnerWorks on the development next-generation solar thermal technologies.

He wonders why the Ontario government neglected to establish a standard offer program — similar to the one developed for small wind, biomass, hydro and solar photovoltaic projects — that would pay individuals a premium for offsetting their use of electricity or natural gas with solar thermal.

"They failed to realize that solar thermal could have a significant impact on the (electricity system) by displacing conventional energy loads," says Harrison.

"If you can displace a kilowatt-hour of energy, it's darn near as good as producing it."

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