

THE GREEN REPORT - PART TWO



PHOTO FOR THE CITIZEN BY TARA SMITH

One of the biggest environmental challenges is improving houses that exist now, says Lorraine Gauthier, who is leading a national pilot project to retrofit a modest bungalow in Toronto.

Wartime bungalow refit signals national **victory**

VICTORY: Eco success one house at a time

The little houses that CMHC designed for returning war veterans are the perfect eco experiments for going green. Everyone will learn some basic lessons.



PHOTO FOR THE CITIZEN BY GONZALO CARDENAS

John Van Dusen's wartime bungalow will undergo a massive eco retrofit.

BY KATHRYN YOUNG

First, one tiny 60-year-old wartime bungalow. Then one community. And finally, one million homes across Canada transformed from Second World War energy hogs into near zero energy homes that produce almost as much energy as they use.

That's the plan for the Now House, one of 12 projects that won a Canada Mortgage and Housing Corp. competition to build homes that demonstrate net zero energy principles.

"One of our biggest environmental challenges is improving houses that exist," Team leader Lorraine Gauthier told a recent Ottawa conference of builders, architects, government officials and

members of the public interested in net zero housing.

Ms. Gauthier, also founding partner of the Toronto-based Work Worth Doing, took a risk entering the Now House into the competition that was aimed primarily at new construction. "We kind of took a flyer on this one," she told the Ottawa conference, which was sponsored by the Net Zero Energy Home Coalition.

Renovation of the wartime bungalow, located in the Topham Park area of East York in Toronto, will serve as a model for other wartime homes, as well as other existing houses needing an update.

"There's definitely a need out there," Ms. Gauthier says. "There's lots of room for retrofitting current houses." Because the Now House is modest, aver-

age homeowners can relate to it and see how the plan might fit their own home.

The project aims to "show homeowners and contractors how to dramatically improve the energy efficiency of existing homes with a few relatively easy modifications."

Ms. Gauthier's project impressed many conference attendees, especially green building consultant Lenard Hart of Toronto's Summerhill Group, who noted that the National Round Table on the Environment and Economy estimates that 66 per cent of buildings that will be standing in 2050 are already built — and most will need energy efficient upgrades.

"Lorraine took on the biggest challenge which is retrofits," Mr. Hart says.

Helen Goodland, who runs a sustainable building information centre in Vancouver called Light House, said it's important to target renovations in the quest for improving housing stock.

And Jeff Christian, director of Buildings Technology Center at the U.S. Oak Ridge National Laboratory, said it's hard enough to get to net zero with new construction, never mind a retrofit. His prescription for homeowners — to start with an energy audit, then plug air leaks, improve insulation, reduce energy use and then start thinking about solar hot water or photovoltaic panels — is exactly how the Now House team proceeded.

The Now House was built in 1946 as part of the federal government's plan to provide affordable homes for munitions workers and returning war veterans. The Wartime Housing Corp., which later evolved into CMHC, built

about 38,000 of these "Victory homes" between 1941 and 1947, but sold the various floor plans to builders who continued to construct them.

Ms. Gauthier says there are about one million wartime bungalows across Canada today.

While some have been renovated, the vast majority needs to be brought up to today's standards of energy efficiency, never mind net zero energy. Retrofitting the Now House will save six tonnes of greenhouse gas emissions — multiply that by one million and it's significant.

Renovations will begin this summer, with demonstrations and tours available at scheduled times throughout the project.



GONZALO CARDENAS

There are 150 Victory homes in this Toronto community. Many need energy retrofits.

ENERGY LOADS

DOMESTIC HOT WATER

PRINCIPLES

Retain existing efficient gas hot water heater, as back-up system
 Utilize conservation measures
 Install a solar thermal hot water heater with storage tank
 Install a grey water heat recovery system

EXISTING GAS HOT WATER HEATER

Existing gas-fired hot water heater to be retained
 Existing gas-fired, direct-vent, hot water heater by GSW, 38,000 BTU, 40 gallon tank
 Serving a 2-bedroom house with 2 bathrooms

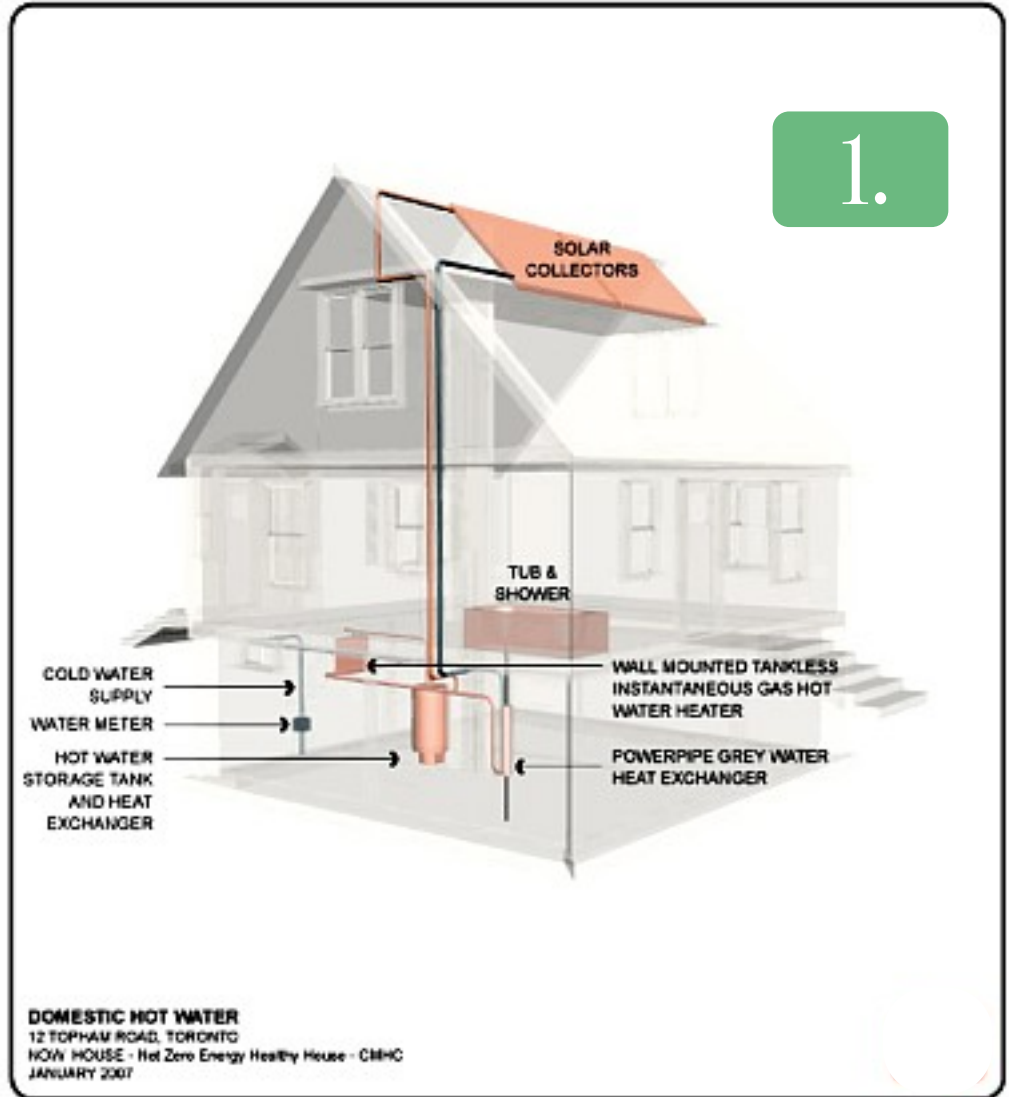
HOT WATER CONSERVATION

Install low-flow fixture heads
 Replace laundry machine for new Energy Star appliance, when replacement becomes necessary
 No dishwasher is existing, install an Energy Star appliance if desired

Insulate hot and cold water piping

RENEWABLE ENERGY

Install a solar thermal hot water heat system with storage tank
 2 panels, each 32 sq. ft. glazed flat platesolar collector, 1604 kWh, 11.5 GJ total output
 Closed loop system, with glycol, pump, pipe, valves, expansion tank, controls
 70 gallon storage tank, heat exchanger
 Install a grey water heat recovery system, connect to shower/bath drain



ARCHITECTURAL DRAWING BY DAVID FUJIWARA

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The one-and-a-half-storey home is a modest 1,200 square feet, including the basement, with 2-by-4 wood stud framing, 1-by-8 wood plank roof sheathing, asphalt building paper and paper-faced cellulose batt insulation on a poured concrete foundation. The owner, John Van Dusen, recently added a metal roof and high-efficiency furnace.

The Now House team found Mr. Van Dusen by going door-to-

door asking if people were interested in taking part in the CMHC project. The Topham Park neighbourhood, named for Corporal Frederick George Topham who was born in the area and received the Victoria Cross, has about 150 homeowners, from retirees to young families. Street names include Warvet Crescent and Valor Road.

“We stopped after one street because we got such a great response,” Ms. Gauthier says.

Mr. Van Dusen, who lives by himself and has always been an

energy conscious homeowner, will continue to live in the house during the renovation, which will involve mainly the basement and exterior walls — no interior walls will be changed.

Renovations include plugging air leaks, upgrading roof and wall insulation, enlarging a south-facing window, digging out the basement to make it deeper and adding insulation and solar-powered in-floor radiant heat. They will keep the furnace but add a Heat Recovery Ventilator to improve air quality, recover heat

from greywater, install a solar domestic hot water system and generate electricity with a solar photovoltaic system.

Electricity use will be reduced by installing Energy Star appliances, using compact fluorescent light bulbs, using more day lighting and installing kill switches which turn off appliances like microwaves and TVs that draw power even when they’re turned off. Water will be saved through low-

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**GENERATING ENERGY
SOLAR WATER HEATER**

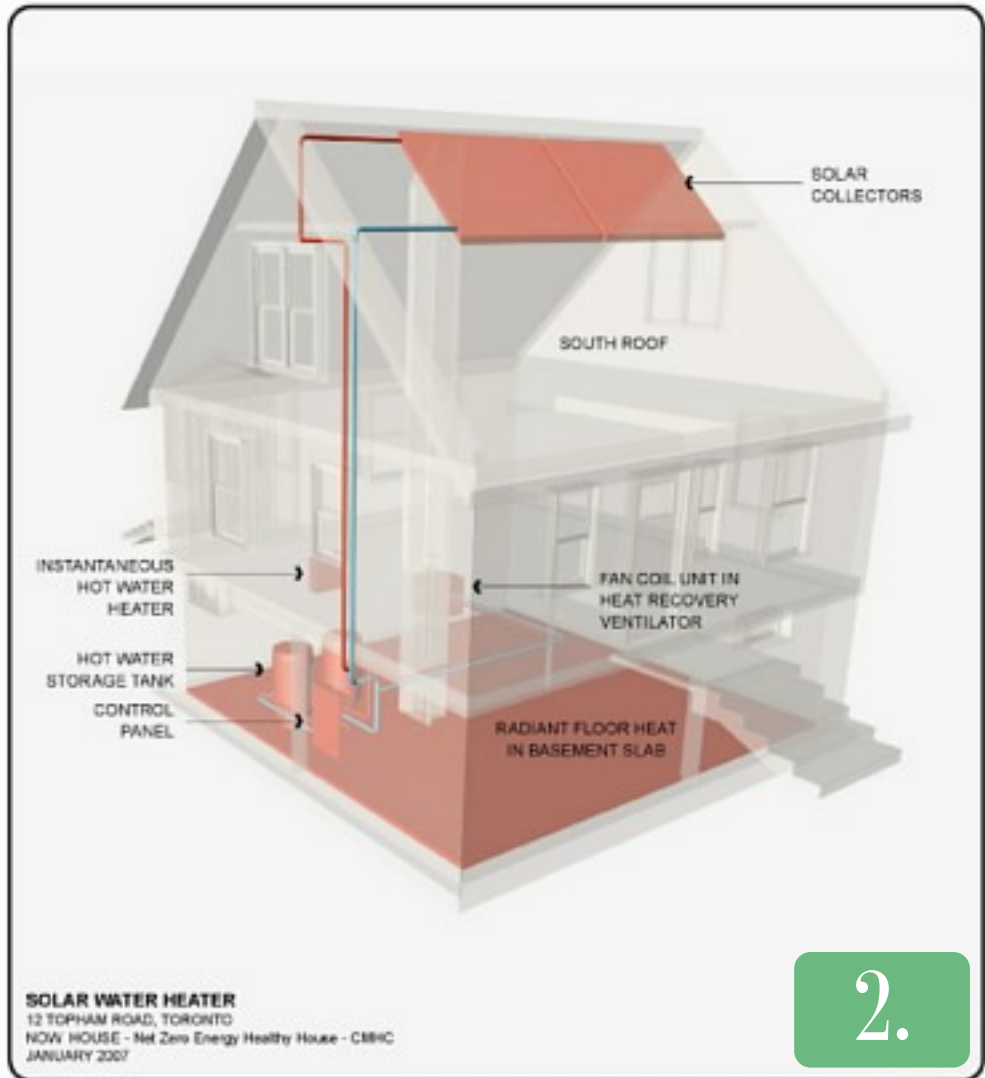
PRINCIPLES

Supplement fuel-burning domestic hot water heater load with renewable hot water energy system
 Supplement fuel-burning space heating load with renewable hot water energy system
 Minimize new electrical load
 Utilize existing roof slope and house orientation

SOLAR WATER HEAT SYSTEM

Install a solar thermal hot water heat system to supply domestic hot water pre-heat system, radiant floor heat system and ducted space heating system

2 panels, each 32 sq. ft. glazed flat plate solar collector, 1604 kWh, 11.5 GJ output
 Closed loop system, with glycol, pump, pipe, valves, expansion tank, controls, heat exchanger
 Re-use existing gas-fired hot water tank as pre-heat storage tank
 Augment system with high efficiency tankless gas water heater



ARCHITECTURAL DRAWING BY DAVID FUJIWARA

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flow showerheads and faucets. Waste materials will be recycled or ground up for compost. Siding will be removed and reused.

Mr. Van Dusen's natural gas bill will be reduced from \$1,266.58 annually to a mere \$276.71. Because the home will generate more than enough electricity to supply his needs, Mr. Van Dusen can sell electricity back to the grid for 42-cents per kWh, making enough money to offset his natural gas bill and bring his net energy cost

down to near zero.

The team initially had more grandiose plans involving geothermal energy and more solar power that would have brought net energy costs to zero. But they realized they had to scale back to meet the reality of a real-life customer, so the house is technically "near zero."

The house is worth about \$250,000 and renovations will total \$80,000.

"We still have to bring the renovation cost down," Ms. Gauthier says, but she's confident that will happen for future renovations of

this type as technology gets cheaper and as they learn through the project.

"Our phone has really been ringing off the hook. I think people are ready to do this."

But her small company can't handle it all. They need partners and are willing to share their knowledge with builders, renovators or contractors who are interested in learning how to renovate to produce a net zero house.

Ms. Gauthier says the team will write a book about the process and is trying to interest the National Film Board in the project

since it had made a film in 1947 about wartime homes.

"It's called the Now House because we really feel like the time for it is right now," she says. "I think people are ready to put their money where their mouths are."

Contact Lorraine Gauthier at www.workworthdoing.com or 1-416-534-6609.

Also visit: www.nowhouseproject.com

Kathryn Young is an Ottawa writer.



PAT MCGRATH, THE OTTAWA CITIZEN

Marc Pawlowsky and Peiying Zhu moved into their daring Innova House in 1994. Their daughters Julia, left, and Amanda have grown up in the house which operates on rock bottom energy bills.

The Innova House 13 years later

There have been only minor problems, including hungry squirrels, for the family that dared to buy an experimental house with energy smarts

BY KATHRYN YOUNG

Squirrels ate through the solar panel wires and one cold winter the hot water tank conked out for several months, but half of the compact light bulbs still work 13 years after Marc Pawlowsky and Peiying Zhu moved into the daring Innova House.

"Overall we've been very happy," Pawlowsky says about the Minto-built home that took R-

2000 standards and added more features. "Now that we've had an R-2000 house, I wouldn't switch to anything else."

The high-tech demonstration home was built in 1993 along with nine others across the country as part of Natural Resources Canada's Advanced Houses program.

The goal was to push the building industry to develop new products and methods to reduce energy consumption, im-

prove indoor climate and reduce the home's impact on the environment.

Pawlowsky and Zhu bought the 2,200-square-foot home in Kanata in February 1994, agreeing to have its energy-efficient elements monitored for a year. Thirteen years later, they're still pleased with the purchase.

"That really speaks for itself," says Minto architect Bill Ritcey, adding that Innova House was a successful demonstration of technologies, some of which eventually appeared in regular Minto homes: better insulation, heat recovery ventilators and the heating system in particular. Innova House also led to Minto

building a number of R-2000 homes in the mid-1990s, although the company eventually got out of that.

"The house is always comfortable," Pawlowsky says, without the drafts and cold spots they feel in their friends' homes. The air tightness and high insulation that comes with the R-2000 design helps save energy and the solar photovoltaic panels on the roof make free electricity for even more energy savings. Although Pawlowsky hasn't examined his bills lately, he knows that air conditioning costs about

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\$20 a month and total energy bills are low.

"Things that were at the time state-of-the-art or really weird are now pretty much standard," he says, pointing to the commercial-style compact fluorescent lighting that was installed throughout the house. Initially, they had to go to commercial lighting stores for replacement bulbs. But now, with the growing popularity of this type of light, they head to Home Depot for an even greater variety of bulbs. However, that doesn't happen often because so many of the bulbs are original.

Other features were also ahead of their time: the heat recovery ventilator that keeps moisture off their triple-paned low-e argon windows, clear plastic water pipes, soft air ducts instead of metal, the gas fireplace, and the roof shingles — a recycled wood product meant to look like cedar shakes. Apparently, the squirrels love it and chewed their way under the solar photovoltaic panels on the roof through some wires and into the attic.

"We've had them in the attic twice," he says. "That was a real pain."

An electrician easily replaced the solar panel wires and they continue to make electricity from the sun — about three kilowatts during peak periods. Other than squirrel repairs, the panels need no maintenance and work well. "There's no moving parts, so there's no reason why the system would degrade."

Ritcey says Minto learned many lessons from Innova House — including the need for a steeper roof for the solar panels to work well. That's why Minto's latest technological demonstration home — Net Zero home in Manotick — will have a steeper roof line.

"It was worthwhile, because it took R-2000 principles and moved beyond them," he says. "It was the best use of available technologies."

After Innova's obligatory monitoring period was over, all the

meters and other monitoring equipment were removed, so Pawlowsky can't see how the house is performing now.

"There's really nothing radical about the house from a day-to-day point of view," Pawlowsky says. Visitors can still find the bathroom once they know it's a Minto floor plan but the layout — which is what initially attracted them to the home rather than all the technological goodies — still works for their growing family that now includes Julia, 10 and Amanda, 7.

There are elements they don't

like — including the heating equipment which is in the middle of the basement, limiting renovation plans, craftsmanship problems around the back door that had to be replaced, and flexible ductwork that can't be cleaned.

The biggest headache happened one February when the heating equipment died and, because it was unusual, it wasn't fixed until April. There isn't a conventional furnace — instead, an air blower heats the air using the ultra-high-efficiency gas hot water tank, and then circulates it through the vents. It turns out

the heating plate in the tank had cracked.

However with the superior insulation of an R-2000 house, they managed to keep their home warm using just electric space heaters and the gas fireplace. When the warranty on the hot water tank runs out, they plan to replace it with the same type of equipment.

"The concept itself works."

The HRV had to be replaced a few years ago, long past its expected lifespan. They noticed its passing when there was moisture on their windows for the first time.

Zhu loves the upstairs carpeting which is made from recycled pop bottles and still looks new despite their girls running around, playing with toys and dancing on it.

Pawlowsky and Zhu, both software designers, haven't had their home officially evaluated, but estimate it's worth about \$330,000. They paid \$220,000 in 1994, about \$20,000 more than a standard Minto house at the time, but they got the hardwood and ceramic flooring on the main level, better kitchen cabinets, the R-2000 features and the solar panels — none of which was standard then.

"We were ahead of the game," he says, adding that Minto should have taken more of a lead in putting all these features into the thousands of homes they've built. "But most of the stuff now has become standard."

He wishes more people would see the value in putting up solar panels.

"It just makes so much sense," he says. "If it wasn't for the Ontario government artificially lowering the electricity prices, you would have seen solar cells going up like crazy in the neighbourhood."

But don't ask if the family plans to stay there — apparently someone is rooting for more space.

"It's a family debate," he says with a laugh. "I'm happy here. I would have no hesitation about recommending it again to anybody. Definitely it was a good decision at the time and it's still a good decision."

MUNICIPAL ENVIRO-LOANS

Pilot project will help owners borrow money to update their homes

Borrowing money to make your home more environmentally friendly may soon get easier.

The City of Ottawa is designing a new pilot project to help homeowners borrow money in the name of their property, not themselves, for energy efficient renovations and alternative energy technology.

The exciting feature is that the money is loaned to the property, not to the owner, so that when the home is sold, the loan stays with the property and is taken over by the next owner, says Natividad Urquiza, a City of Ottawa planner in the environmental sustainability division.

This would remove a major disincentive to making improvements that have a relatively long payback period, she says.

For example, if a homeowner wanted to install a solar hot water system, but the payback time is seven years and he plans to move within three years, there's not much incentive to make the improvement. However under this plan, the next owner simply continues to pay back the loan. Meanwhile, both owners save on energy costs and reduce greenhouse gas emissions.

"We're at the very early stages," says Ms. Urquiza, adding that market research will begin next month and the first loans may be available by next fall. "We are feeling very impatient. We had this idea two years ago but it just didn't gain support. Right now, the environment is right."

Home energy audits would be required before and after the loan to show the improvement.

The City, which would be the guarantor on the loan for a more favourable rate, has put \$70,000 into the program's development for 2007. The program will depend on finding private partnerships and also on the Ontario government making some property tax changes and putting regulations into effect to approve transferring the debt.

—Kathryn Young

Bright idea

Many consumers finally see light when it comes to compact fluorescent bulbs

BY ERIC SHACKLETON

When Darven Smetaniuk and his family moved into their home 13 years ago, they put a compact fluorescent lightbulb in the kitchen as a nightlight so the house wouldn't be pitch-dark for the kids.

"I finally replaced it two years ago," says Smetaniuk, the customer-production manager at Custom Lighting Ltd. in Edmonton, which specializes in energy-saving lights.

Smetaniuk got more than a decade of use from that one bulb and has been promoting the energy efficiency of compact fluorescents for years, but many Canadians are just beginning to realize the switch from incandescents is inevitable.

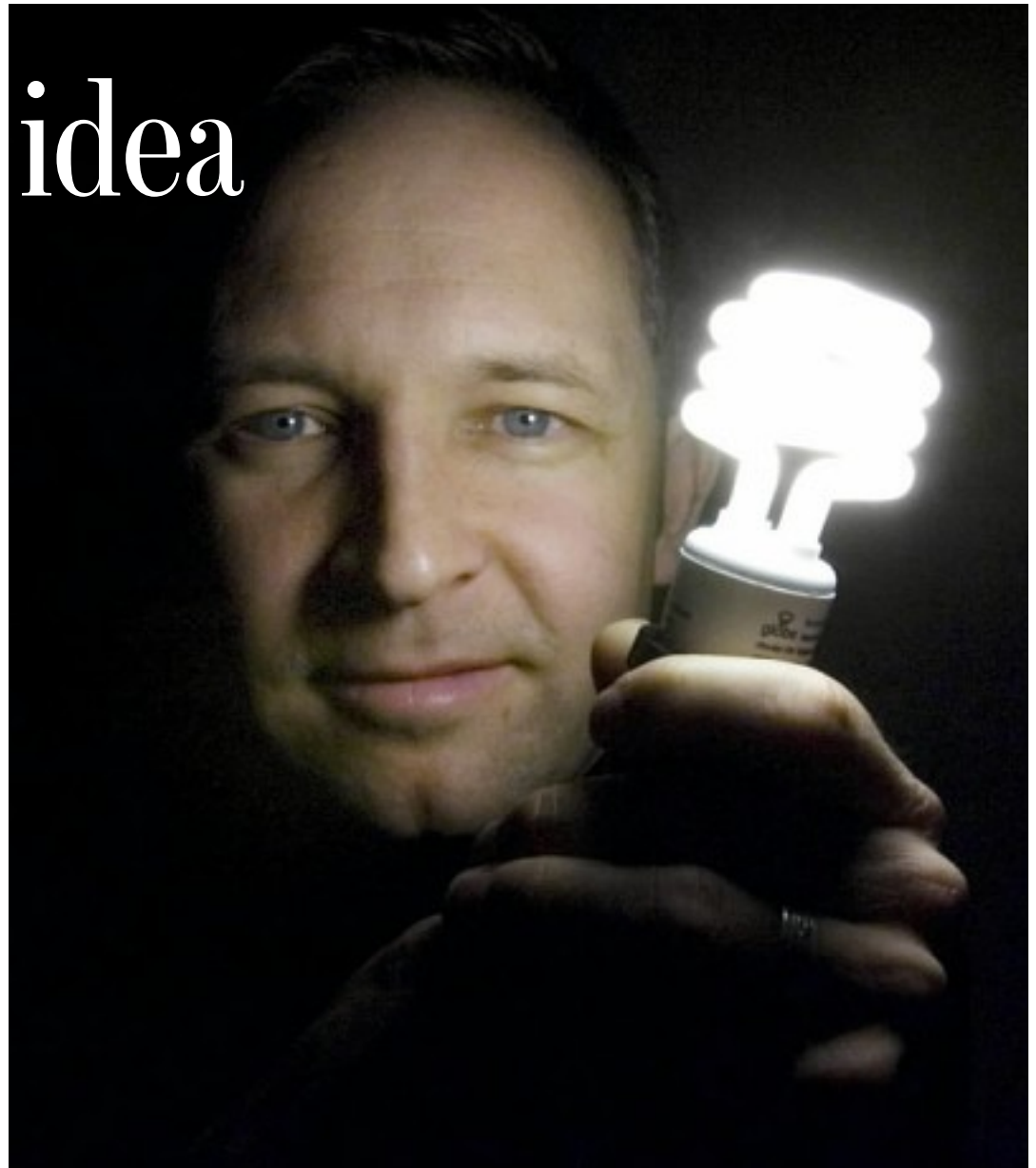
Nova Scotia's energy minister says the province plans to give retailers four or five years to prepare for a ban on incandescent light bulbs, and Ontario is considering phasing them out as well.

Project Porchlight, a campaign organized by the not-for-profit energy conservation group One Change, is working to deliver one compact fluorescent bulb to every household in Canada.

The bulbs are even being distributed by dogsled in the Yukon, said executive director Stuart Hickox.

"We feel we have a really good concept," he said. "If you can get someone to change one light bulb, the person is instantly engaged in taking action on climate change."

A quarter of a million bulbs were distributed in Ottawa last year, and 10,000 have just been handed out in



JONATHAN HAYWARD, THE CANADIAN PRESS

Guelph, Ont.

The group is also delivering 40,000 bulbs in Thunder Bay, Ont., and 10,000 lightbulbs in the Yukon — "not just Whitehorse but small First Nations communities reached by dogsled," Hickox said.

The use of compact fluorescents by homeowners has been slowed by several factors.

The bulbs "never used to be able to fit into regular lamps," says Marriek Engel of Toronto-based Engelite lighting, one of the country's oldest manufacturers of lighting fixtures.

"But now they're short enough that they can get in with the harp — that's what holds the shade onto the

lamp," says Engel.

These days, there is a "humongous surge" in demand, especially for the screw-in type compact fluorescents, says Howard Bernstein, vice-president of ArtCraft Lighting (Electric Ltd.) in Brampton, north of Toronto.

The beauty of the screw-in Pro-Light bulbs is they can be used in any fixture made for incandescent bulbs, he said.

"There's nothing much for you to do other than to spend the \$2 to \$3 that the bulb will cost you."

Stuart Hickox, executive director of Project Porchlight, holds a compact fluorescent bulb. His group distributed a quarter of a million bulbs in Ottawa last year.

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And the Pro-Light bulbs, also called compact fluorescents, have a longer life and will save the buyer money.

"The PL lasts 15,000 hours and an incandescent lasts just 1,500 hours," said Bernstein.

Compact fluorescent bulbs use the same technology as linear fluorescent lamps.

They are also environmentally friendly because less energy is used.

The Ottawa lightbulb campaign, for instance, could mean as much as \$10 million in energy savings for the people of Ottawa over five years, says Hickox, taking some pressure off the need to build more costly electricity generating stations.

There are some downsides, though, to the compact fluorescent

bulbs. They contain small amounts of mercury, a toxic silvery-white heavy liquid metallic element. Many people also complain that the light is "too cool."

Hickox says older compact fluorescents, such as T3s, contain about five to seven milligrams of mercury.

But later models, such as the T2 13-watt bulb that Porchlight volunteers are handing out, have between two and three milligrams, he said.

"It's all a matter of size," he says. The smaller the bulb, "the less mercury as well as less environmental footprint, period."

Gary Taylor, president of the Toronto-based Living Lighting retail chain, says some suppliers are moving to mercury-free bulbs.

"They've found a way to produce these compact fluorescents without it."

Retailers and industry have used

fluorescent lighting for years and have recycling programs to take away burned-out bulbs to recapture the mercury. But not much is available for homeowners.

"We are now dealing with a scenario where we're replacing millions of incandescent light bulbs in homes with these little compact fluorescents and they're eventually going to find their way into landfill sites," says Taylor.

Another concern involves the quality of the light itself.

While Engel's company makes fixtures that are compact-fluorescent friendly, he's not a fan of the bulbs. They're "too cool," he says. "It's not a nice warm light like the old incandescent."

Bernstein's company is working to solve the "cool" problem by modifying the shades.

"If you marry the PL or put it inside a glass shade that is coloured

or decorated — white, cream or amber — it actually looks very nice," says Bernstein.

"The glass diffuses the coolness of the bulb and transforms it."

Some of the latest models, available at retail chains such as Canadian Tire, also resemble incandescent bulbs. They give off a much warmer light than the spiral type, and are guaranteed to last 10,000 hours

But they are pricey — about \$8 a shot.

Smetaniuk notes that 13 years ago, most people would have screwed in a 69-cent 40 or 60 watt incandescent, and it would have lasted a few months.

But his little kitchen compact fluorescent lightbulb was only running seven watts.

"Some simple math," he says. "Twice the light, half the energy."

The Canadian Press

LIGHTING OPTIONS

Some varieties of compact fluorescent bulbs available:

T2: 13 watt, a mini-spiral that screws into any socket that uses a 60-watt incandescent bulb.

Floodlight bulbs:

23 to 26 watts replacing 65-watt incandescents Dimmable bulbs — 26 watts replacing 65-watt incandescents



Incandescent-style bulbs:

13 watts, soft white light, replacing 60-watt incandescents

Chandelier light bulb:

Seven watts replacing 40-watt incandescents. Prices range from about \$7 to as high as \$20.



Most are said to last for 6,000 to 10,000 hours or four to eight years. Manufacturers include Noma and General Electric.

