Bringing it home











Surprisingly simple lessons in energy efficiency from apartments to single-family passive houses

BY EMILY KENNEDY

IF YOU'RE ASKING yourself "how can I save money on my energy bills?" you're not alone. But instead, consider asking yourself "how can I make changes to my home to become more energy efficient and cost-efficient?"

According to Natural Resources Canada, 17 per cent of all energy used in Canada goes to running our homes, which generates 15 per cent of Canada's greenhouse gas emissions.

Meeting our commitment under the Paris Agreement to reduce greenhouse gas emissions by 30 per cent from 2005 levels by 2030 is going to require some shifts in our household consumption habits. And though there may be changes to building codes in the future, there's no reason to wait; it just so happens that helping to reduce greenhouse gas emissions can also help you save money.

Here we speak to some Canadians thinking big picture and long term. Using themselves as guinea pigs, they're throwing it all at the wall (literally) to see what sticks. Although many of them run high-performance homes, solutions can be simple: shading, insulation and lifestyle habits can make it easy to reduce household GHG emissions.

From a retrofit to a vacation home, single-family dwellings to an apartment, these inspiring designs are doing their part (and then some) to reduce our collective negative impact on the planet — proving energy efficiency can be convenient, affordable when looking at the life-cycle savings of the home and not the upfront costs, and something every Canadian homeowner can improve on.



To save energy, windows make up a maximum of 50 per cent of the Athlete Village's facade.



The interior of the house is full of recycled materials.

CONDO/APARTMENT

Jeremy Murphy, Vancouver, B.C.

The LEED Gold Certified Vancouver Olympic Village was built to house athletes and officials for the 2010 Winter Olympic Games.

One of the buildings, dubbed the Athletes Village, is now a housing co-op. Jeremy Murphy lives in an apartment in the co-op with his partner and their two kids.

"It would be nice to rent or own a slightly larger single-family home in an area of town offering walkability, bikeability and complete amenities and services," he says, "but the prices for those options in Vancouver are currently out of reach for the vast majority of people who live here."

The co-op features community-oriented design, with a courtyard playground, rooftop gardens, a common room and a common kitchen. The building is close to downtown, schools, daycare, shopping amenities, the Skytrain and Canada Line, the seawall bike lane and major bus routes.

"It would be hard to find a better quality of life in a single-family-home neighbourhood almost anywhere," he says.

In-ceiling radiant hot water panels heat the apartment by zone, with each room having its own panel and control. This heating hot water (as well as the building's potable hot water) comes from an energy utility just a few blocks away, which captures heat in wastewater and uses it to heat new water going back to the buildings.



"The most energy efficient feature, however, is the wall to glazing ratio," says Murphy. Although a trend is for buildings to have glass facades, "glass is horribly energy inefficient," he says. "Our building's facades are 50 per cent glass at the most. It makes a huge difference keeping the heat in."

Although a building's facade is not in the control of tenants, Murphy says there are many things tenants can control, such as purchasing energy efficient appliances, setting them to their most efficient settings and using them sparingly.

Use behaviour is top of mind for tenants of the co-op, with energy and water use display monitors by the door. "It indicates your monthly heat, electricity, and cold and hot water use and compares each to the use in the previous month," says Murphy.

Murphy suggests using hot water sparingly, using your car less, cycling more and shopping at local stores.

"Much of the efficiency will come from simple behaviour changes that don't really affect your quality of life."

OPPOSITE PAGE: COURTESY JEREMY MURPHY. THIS PAGE: COURTESY SOLTERRE DESIGN

COTTAGE

Keith Robertson, Lunenburg, N.S.

Keith Roberston, architect and partner at Solterre Design, designed and built the "concept cottage" — a high-performance off-grid vacation property near Lunenburg, Nova Scotia — "to see what an off-grid house can be like," he says, "and demonstrate sustainability."

Google "off-grid" and you'll likely see images of remote shacks inhabited by bearded mountain men. But Robertson's concept house, as he likes to call it now, is more modern than many grid-connected getaways, with all of the usual creature comforts of Internet, TV, a dishwasher and electric appliances.

Robertson started with a passive house design, adding photovoltaic panels that provide electricity to a battery supply. In addition to meeting passive house standards, the cottage is also LEED for Homes Platinum Certified and received the Nova Scotia Lieutenant Governor Award of Merit for architectural design.

"Even though we have solar hot water and solar photovoltaic for all of our electricity, that's not what makes it energy efficient," he says. "It's really the design, the orientation, the passive solar, the thermal mass built into it — those are the things that make it efficient."

It also has many recycled elements: the showers are lined with old vinyl signage, walls were recycled from

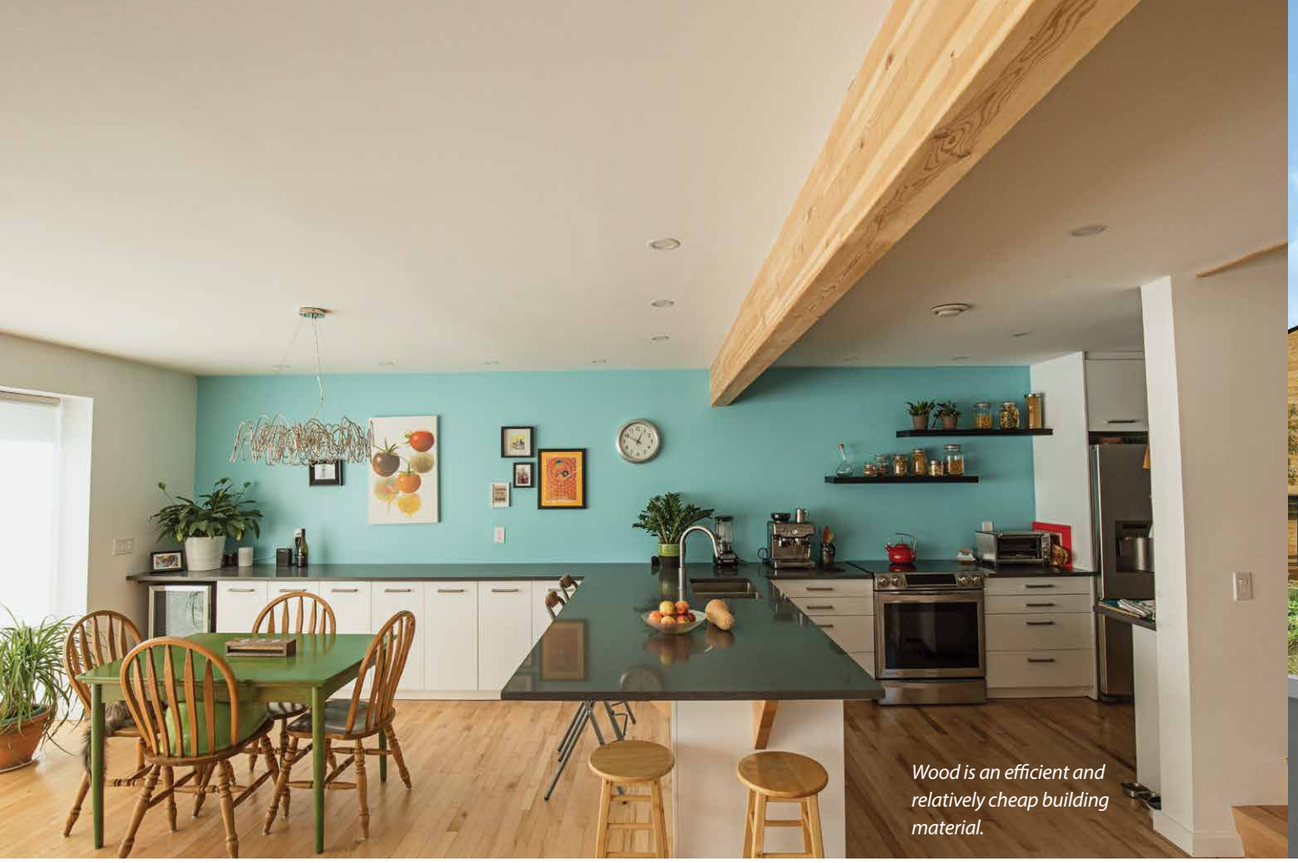


a movie set, and the kitchen sink and stainless fireplace surroundings were once used in a seniors' residence.

Recycled glass was used as aggregate in the slab concrete floor — one of the key design aspects of the house. "A lot of the energy is going into the concrete," says Robertson. "It keeps the house from overheating when the sun is shining, but it also stores the heat and helps the house stay warm."

This is particularly important for a vacation property. "Typically for a cottage you would either have to winterize it or open it up again in the spring. Or you've got somebody that's looking after it on a regular basis," Robertson says. "We don't have that concern here. We never have to worry about this house freezing."

See for yourself. The concept cottage is available for vacation rentals via www.solterre.com/concept-cottage.



Wood is an efficient and relatively cheap building material.

SEMI-DETACHED

Chris Straka, Ottawa, Ont.

On one side, Chris Straka, founder of VERT custom home design, was building a side-by-side with the best-case scenario: a south-facing lot for his new passive house construction. On the other, it was the worst-case: an old house without sun exposure that he was attempting to retrofit to the same standard as the new half.

With his work cut out for him, Straka started looking for positives. He found one in the nature of semi-detached design: "At least it's got something insulating it on one of its sides," he says. "Anytime you share a wall with another building, you're putting the most incredible amount of insulation between you and the outside world: another house."

On the new design side, Straka built all three floors with concrete, an energy efficient material, but in the process, he learned he would rather build with wood.

"Wood is the most cost-effective way to build a high-performance house," says Straka. "It's also something that many people, at least in our country, are familiar with…. I would recommend that anybody taking on either a renovation, or the construction of a new home, use materials that are readily available here in Canada."

On both sides of the project, Straka stresses the importance of airtightness. Whether working proactively



during new construction or retroactively on an update, Straka says to look for leaks where two different materials meet. Some classic spots are where the foundation and the upper floors come together and around windows and doors.

Overall, he admits "there is no magic bullet" when it comes to building energy efficient houses, "but there certainly are some pretty good rules of thumb," namely simplicity. "Keep the detailing simple, so you don't have many protrusions that can lose heat. Build with wood; it's cheaper. Use a simple heating and cooling ventilation system. Insulate as much as makes sense to meet your goals. And make your building as absolutely airtight as you possibly can."



An artist's rendering of the cedar-clad Nanaimo Aboriginal Centre.

OPPOSITE PAGE, FROM TOP: THOMAS HALL; CHRIS SYRAKA. THIS PAGE: COURTESY DYS ARCHITECTURE

PASSIVE HOUSE

Mark Ashby, Nanaimo, B.C.

Clad in western red cedar, the Nanaimo Aboriginal Centre will reflect First Nations culture and heritage upon first sight.

This 25-unit building, which is being built this year, will offer affordable housing suites for the local Indigenous community. Not only will it reference traditional First Nations architecture and village design, but it will also embody cultural principles of environmental stewardship for generations to come.

At its core, passive house design considers orientation to the sun, uses shading mixed with triple-glazed windows, eliminates thermal bridges and has excellent insulation and airtight detailing and construction, all in an effort to heat the building using ambient heat sources.

Because of its airtightness, the only required mechanical equipment is a heat recovery ventilator to keep fresh air moving through.

Overall, this reduced energy consumption lowers the tenant's monthly costs. For the Nanaimo Aboriginal Centre, it's about more than costs — it's also about health.

"By starting from a foundation of really good building science, the issues that have historically occurred in some poorly constructed buildings — like condensation



in walls and mould growth — are avoided," says Mark Ashby, the passive house consultant on the project.

Critically, Ashby says, the architects from Dys Architecture were able to marry passive house design with the social considerations of the community that will live there.

For example, an open common space allows solar access to the back row of buildings. "But by doing that, they created a courtyard that in the winter will be flooded with sunshine," says Ashby. Considering the project site is next to a busy arterial road, the courtyard design doubles as an area where families can play safely.

It's this synergy of culture, environment and design that Ashby is most looking forward to seeing come to life. "The thing I'm most excited for is the way the architects were able to synthesize together the cultural ambitions using material and the building form with the energy efficiency aspects using passive house techniques," he says.



A house can look simple but be full of energy saving technology.



Ten of the 20 acres of the Roberts Creek co-housing project is devoted to park land or covenanted.

SINGLE-FAMILY DWELLING

Chris Weissflog, Merrickville, Ont.



Co-owner of EcoGen Energy, a design and construction firm that specializes in ultra-efficient buildings, Chris Weissflog wanted to roll everything he knew into his own home "and prove a point that we could live without having to burn carbon," he says. "The passive house was a good place to start."

Two solar panel networks were added: one for general electricity needs that is tied to the public power grid and another off-grid system that is used to power what Weissflog calls "life-support" systems such as the fridge and the well-pump.

Weissflog installed ground loops to drastically reduce energy needs for heating and cooling. To help heat the home in winter, a series of tubes runs two metres underground, circulating glycol, which is heated by the earth to about 10 C. It is then used to warm the constant stream of fresh air that enters the house decreasing the amount of energy required to keep the heat recovery ventilator from freezing with the sub-zero incoming air. The second loop is used to cool the house. Water runs through pipes that are three metres underground before circulating through the floors of the house, drawing heat away in the summer. He also recaptures heat in the shower. Cold water runs up to the shower through copper pipes that wrap around the shower's drain pipe, capturing the heat from the drain water running down. The result is less hot water is needed when adjusting the shower's hot-cold mix.

Despite seemingly complex systems, Weissflog's home is actually about simplicity. The power drawn by electrical devices when they're off is reduced by having convenient "kill switches" that turn off power to the outlets in rooms with things that spend a lot of time off, such as the TV room.

Another switch turns on a hot water "racetrack," a hot water recirculation system that keeps hot water flowing through the pipes, so you get instant hot water when you need it. No water is wasted waiting for the tap to run hot, and the switch means the circulation system is on for only five minutes at a time so no energy is lost by unnecessarily circulating hot water.

"It's easy to adopt a behaviour if that behaviour is easy to do," he says.

OPPOSITE PAGE: COURTESY CHRIS WEISSFLOG. THIS PAGE, FROM TOP: ALAN BURNS; COURTESY MOBIUS ARCHITECTURE

CO-HOUSING

Gary Kent, Roberts Creek, B.C.



When Gary Kent set out to build a co-housing community in Roberts Creek, it was an uphill battle. Co-housing and sustainable building design were not the norm in the late 1990s, and getting a rural city council's approval wasn't easy.

"The nature of home ownership makes it difficult to shift the paradigm," says Kent.

Completed in 2004, the community is made up of 31 homes, ranging from 693-square-foot duplexes to 1,450-square-foot four-bedroom detached homes. The project is Canada's first intentional rural co-housing development, and Kent says it paved the way for future projects. Houses occupy just 10 of the 20 acres, with the rest covenanted or designated as parkland.

Kent and his wife, Stacia Leech, live in a three-bedroom, 1,450-square-foot detached home. They have in-floor radiant heating with a gas boiler assisted by solar hot water panels.

But the efficiencies and energy savings go beyond bricks and mortar.

Kent says it's simple things that reduce consumption — for example, a smaller footprint when it comes to land use and consumables. Instead of each homeowner having a shed, the community has a workshop with shared ladders, woodworking tools and more. Vehicles too are reduced. "People are less inclined to have two vehicles in a co-housing community," says Kent. "You can always borrow someone else's car here."

The community comes together once or twice a week for dinner, in a shared kitchen/dining area, and in the summer many of the ingredients come from the community garden.

Tool libraries, car sharing and similar programs are taking off across the country. Kent says at least six other co-housing communities have opened in B.C. alone since theirs was completed.

For the founding owners of Roberts Creek Co-housing, climate change and ecosystem collapse are a symptom of a social problem rooted in large-footprint, individuated lifestyles. ■