

Bring on the Elements

Hawkins House, now under construction in Hubley, N.S., is an ideal example of how energy efficient a typical residential dwelling can be. Designed by engineer Natalie Leonard to Passivhaus standards, it will reduce its owners' energy costs by up to 90%

by Marjorie Simmins



According to Natalie Leonard, some people think that Passive Houses look like a “spaceship crashed into the side of a mountain.” Leonard is a civil engineer and Canada’s first certified Passive House consultant. It’s a mild summer morning, and she is standing at the threshold of Nova Scotia’s first Passive House, in the heavily forested subdivision of Hubley, half an hour west of Halifax. A Passive House is a well-insulated, virtually air-tight building heated primarily by passive solar gain and secondarily by heat from human bodies, electrical equipment, and household appliances. “You can heat the house on the coldest, cloudiest day of the year with the equivalent heat of two hair dryers,” says Leonard.

The “Passivhaus” was pioneered in Darmstadt, Germany, in 1990. Today there are anywhere between 15,000 and 30,000 Passive Houses in the world, chiefly in German-speaking countries and Scandinavia, and 12 in North America. Canada’s first Passive House was Austria House, built during the 2010 Vancouver Olympics. “The interest in Passive Housing has exploded in the past two or three months,” says Leonard, who receives frequent requests for information via her website, www.passivedesign.ca.

The term Passive House simply means that the structure heats and cools itself without active systems, resulting in an 80% to 90% reduction in energy use. There is no traditional furnace, but there is a heat-recovery ventilator, which captures 80% of the heat in the stale outbound air and transfers it to the incoming fresh air. None of these inner workings are yet in place on this particular morning, in the half-built house into which Leonard strides; it looks like any other wood-frame house under construction in the Atlantic region. The Hawkins House, named for the street it fronts, is a south-facing, 1,650-square-foot, open-concept bungalow with standard siding. With generous windows and a sunroom, the presentation is attractive and reassuringly mainstream, but bring on Nova Scotia’s cold winters and you can gloat over your power bills.

“Most people realize that energy costs are only going in one direction,” says Leonard, “and they want that energy security, especially heading into their retirement years.” Hawkins House will cost 5% to 7% more to build, or \$12,000 to \$15,000 extra, but its yearly heating cost will only be \$200, calculated using Nova Scotia Power’s time of use rates.

If the homeowner saves \$2,000 a year, the extra cost is recovered in seven years. “After that, you’re actually making money,” says Leonard. Better yet, Nova Scotia provides financial support for greener

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house choices. “Efficiency Nova Scotia will give us a \$10,000 rebate incentive for the new house. As soon as you finish construction and are judged by the Ener-Guide System, you get the money.” That virtually eliminates the extra construction cost.

Hawkins House is intended to be the greenest certified house in Nova Scotia, with both Passive House certification and LEED Canada for Homes gold certification. Passive House certification currently serves as the most ambitious energy-conservation standard for buildings. LEED, or Leadership in Energy and Environmental Design, is an internationally recognized green-building certification system, gold being its second-highest level.

The house will also feature the U.K.-developed Lifetime Homes Standard. This set of 16 design criteria creates adaptable, accessible homes that allow aging owners with health-related mobility issues to remain in their residences. “Building homes that provide more support of aging ‘in place’ is a current trend,” says Leonard.

For the materials and inspections on the Hawkins House, Leonard has partnered with two local companies, Halifax’s ThermalWise and Dartmouth’s Truefoam. ThermalWise, a building performance company, offers LEED Canada for Homes services, as well as thermal imaging and energy auditing practices, throughout Atlantic Canada. “ThermalWise was excited when we were approached by Natalie to work as the LEED for Homes provider on the project,” says president Jordan MacDonald. “We feel that Hawkins House is an ideal example of what a green energy-efficient building should be. The combination of Passive House and LEED certification targets means that potential homeowners will know they’re getting a third-party-inspected, performance-tested, and certified home that will perform better and be healthier than a conventional home.”

Truefoam, which supplies the 100% recyclable white-foam insulation so crucial to the house’s successful functioning, is a *Progress* TOP 101 company. Technical salesman Denis McCulloch first met with Leonard at the office of Solterre Design. It was soon clear to McCulloch that Leonard and Solterre hoped to use a local company for their Passive House projects, but only if the company could meet the exact requirements. Says McCulloch: “I told them, ‘We have the machines that can cut whatever you draw on paper, and we can manufacture whatever Natalie draws on paper.’ It was brilliant!” Truefoam is now the supplier of all of Leonard’s and Solterre’s projects.



Careful selection of materials is vital, and it can have serious health implications in tightly sealed indoor spaces. “There are so many components of green where you really have to do your research,” says Leonard. “Green may only mean a product has recycled content, not that it’s good for your health. LEED has helped substantially on non-toxic products.” She knows about the toxicity issues firsthand, from her experience with the passive solar home in Hubley that she designed and built for herself and her partner, Mara Vizzutti, a coach facilitator, seven years ago.

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“Mara got quite sick at our new house,” says Leonard. The lacquer on the new kitchen cupboards “off-gassed”—released a steady stream of toxic gases—as did the carpets throughout the house. The carpets affected the cement floors, which also became toxic. In the end, they had to remove all the carpets and replace the floors and cupboards, at considerable cost. “It taught me a very good lesson about using good ventilation in new house construction,” says Leonard.

Today Leonard and Vizzutti enjoy their lakeside home exactly as they had hoped to. Sited on an acre, the house has a vista of mile-long Lake Frederick. The on-grade home opens from the living areas onto a paving-stone deck, which is dotted with flowerpots; beyond this, a perennial garden blooms. The loudest noise you might hear is nesting loons. “We wanted a cottage lifestyle for our primary residence,” says Leonard.

Leonard, 48, was born and raised in Sydney, N.S., to a family who owned both a house and a cottage. Knowing how much work it took to maintain two residences, she and Vizzutti decided to keep things simple. They also wanted to be close to the city, but it was the character of the community and the quality of its environs that sealed the deal for the couple, who love the outdoors and sports. In fact, Leonard was named Athlete of the Year at the Technical University of Nova Scotia in 1984, where she played on the university’s first women’s varsity volleyball team.

“I am really kinesthetic,” says Leonard, her hands circling the air. Whether she’s tearing around on a job site, playing sports, or making art such as painting and pottery, she would rather move than sit. “I don’t consider myself an artist; I’ve always thought that I was a ‘crafty’ kind of person. But I do have a strong desire to be creative. That’s why I love building houses—to me, building a house is just a great big craft project. Even as a kid, I didn’t play with Barbies; I built them beds and houses and cars.”

Leonard’s father, Walter, and brother, Charles, are also engineers; her sister, Jan, a physiotherapist, married an engineer. Leonard’s mother, Ruth, was artistic; she enjoyed writing while raising her family. “My mother always said her primary job was to teach us to be independent,” says Leonard. Both parents encouraged their children to be confident and self-reliant.

Today Leonard’s home in Hubley is surrounded by Crown land that has been converted into a wilderness area. “There are 32 kilometres of trails and access for skiing, walking, cycling, snow-shoeing, canoeing, and swimming,” she says. “People here are very environmentally conscious and community oriented. It’s what you could call an eco-village.”

It was a perfect location for Hawkins House, which Leonard started designing in January. Everyone she had talked to about building Passives Houses recommended starting with a demonstration “spec” house to establish a market for Passive Homes in a new area. As she began the design, Leonard listed the house. Three weeks later, it sold—for the list price of \$385,000. “I hadn’t even finished the plans!” says Leonard, laughing.

Sue Atkinson, the buyer, wasn’t taking any chances. “This was a dream come true,” says Atkinson, who is a physician. “Living an energy-efficient life and making a smaller carbon imprint is very important to me.” When a mutual friend of theirs mentioned Leonard’s Passive House, Atkinson went straight home to look at the MLS listing and contacted Leonard immediately. Atkinson is currently renting in Hubley and enjoys being near the work site and conferring frequently with Leonard over various design decisions. “Economically, this type of house makes so much sense,” says Atkinson. “But I also feel good about conserving energy and water and taking advantage of natural ways of heating.”

Leonard takes her work seriously. “You can’t mess up when you’re building someone else’s home,” she says. “I think that piece of my parents saying, ‘You can do whatever you put your mind to’ is critical. It’s risky, complicated, leading-edge work, but that can-do attitude helps me solve my own problems. My parents always said, ‘You are able.’ So my point of view has always been ‘I can do anything—even when I’m not sure I can!’ ”

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Leonard is working on three Passive Homes this year, the other two in Fall River and East Bay. She has also partnered with Halifax architectural firm Solterre Design to construct an 8,000-square-foot commercial Passive House building in Kentville. The project, the Valley Waste Management Administration Building, is managed by Halifax architect Sydney Dumaresq.

“Overall, everything we need [for Passive Houses] to succeed is here,” says Leonard. “We are breaking through barriers to the public now. Growing consumer confidence will drive the builders.” More and more, the public is realizing that Passive Houses are not “ugly, expensive, and complicated,” adds Leonard. Instead, they’re all about good, simple, environmentally friendly design. Consumers are learning they can save money, live in comfort, and be kind to the planet. “People want to live responsibly as global citizens,” says Leonard. She hopes to help them by creating more cost-effective, beautiful, ultra-low-energy homes for the future.