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### Net Zero Energy Use

by Lawrence Herzog

Inside Edmonton | Vol. 28 No. 8 | February 25, 2010



PHOTO BY DAVE ROBB

**This Edmonton home produces as much energy as it uses. It is a comfortable and healthy living environment. Quite an accomplishment for this 53 degree latitude area. But wait! This is not the only Net Zero Energy home in Edmonton!**

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### Going for EQUilibrium

by Lawrence Herzog

Inside Edmonton | Vol. 28 No. 8 | February 25, 2010



Photo by Dave Robb

**Large south facing windows will heat the concrete floor. Note the wall thickness of 16 inches.**

Building a house that produces as much energy as it uses while enhancing occupant health and comfort is no longer the stuff of science fiction, even in a 53 degree latitude city like Edmonton. That is just one of the many lessons learned from Riverdale's Netzero, a duplex constructed in 2008 under Canada Mortgage and Housing Corporation's Equilibrium Sustainable Housing Demonstration Initiative.

The initiative was launched in May 2006, when CMHC invited Canada's builders and developers to submit their ideas for Equilibrium demonstration homes. A total of 72 responded with proposals, and an evaluation committee of independent housing experts selected 12 teams to build the homes across Canada.

The Riverdale home was one of

Flooring choices included pre-finished, low-VOC hardwood, Marmoleum sheet flooring, cork and porcelain tile. All paints and finishes are water-based, low-VOC products.

The design and placement of the windows and careful attention to overhangs reduced the need for artificial lighting by providing natural light throughout the occupied spaces. The north-facing windows are quadruple-glazed with three soft, low-e coatings and argon gas between the panes, while the south-facing windows are triple-glazed, argon filled, with two soft low-e coatings.

To minimize the space-heating load, the building has an airtight, highly insulated thermal envelope. The 410 mm (16 in.) deep wall system is designed to reduce the heat loss by about 70% from a typical 38 mm x 140 mm (2 in. x 6 in.) wall. A heat recovery ventilator (HRV) controls indoor air humidity by venting kitchen and bathroom areas to the outdoors and distributing fresh air throughout the

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those selected, submitted by a team of forward-thinking Edmonton builders, who knew they could construct a home that would be healthy to live in while producing a low environmental impact and reducing energy use to a minimum. Under the leadership of Habitat Studio & Workshop Ltd, Solnorth Engineering Ltd. and Howell Mayhew Engineering Inc., a team of 40 Edmonton-area experts built a duplex that is designed to surpass the net zero energy goal.

They did it by aggressively reducing energy consumption for space heating, water heating, lighting and appliances, and by designing to take maximum advantage of solar gain from daylight. By doing so, the sun provides about 40% of the heating. The approach reduced energy consumption significantly to about one-quarter of the energy used by an equivalent conventional home.

The grid-connected solar photovoltaic system provides all of the homes' electricity for lighting and appliances, as well as the remaining space and water heating. The duplex's active solar thermal systems provide 21% of the space heating.

The home is highly insulated and airtight, with higher amounts of internal mass, which helps to regulate indoor temperatures and reduce heating requirements. High-efficiency appliances further reduce the energy draw.

The home was also designed to achieve a healthy, comfortable indoor environment with superior indoor air quality, acoustics, water quality and natural lighting. Materials used to build the home were regional, renewable and/or abundant, and selected to minimize indoor air pollutants, such as volatile organic compounds (VOCs) and other noxious chemicals.

Recycled materials include the glulam beams in the living room, salvaged from a liquor store, and hardwood flooring that came from a school gymnasium. The decorative exterior window trim is made from salvaged clear cedar bevel siding, while most of the insulation is

house through a the forced-air system.

"When we first started this project, I thought that net zero energy buildings in our climate were barely possible," says Peter Amerongen, president of Habitat Studio. "Thanks to this incredible team and with the help of CMHC's leadership, we've managed to whittle our way down to zero with a group of strategies that are, for the most part, quite practical."

The duplex was completed in October 2008 and opened to the public so that people could see first-hand just what can be done to make homes healthier, more energy efficient, and affordable.

It offers builders and developers across the country a powerful new approach to meet the growing demand for environmentally-friendly housing and to establish a reputation for building sustainable homes that will meet the needs of Canadians now and well into the future.

The experience gained from the Riverdale project helped Habitat Studio and Workshop and the Riverdale team build its second net-zero energy project, the Mill Creek NetZero home. By incorporating the conservation strategies learned on the Riverdale project, the team managed to reduce energy use by another one-third.

It's a remarkable achievement, and shows just what can be done when ingenuity and innovation are given the opportunity to flourish. We can live easier on the planet.

The lessons learned from the Edmonton projects and two others in Red Deer were the focus of the True Stories: Sustainability in Action EQUilibrium Housing Forum and 2009 Research Conference, presented by CMHC. The conference, held in Edmonton November 2nd through 4th, provided in-depth information, analysis and discussion on some of the most sustainable houses ever built in Canada.

These are the houses of tomorrow being built today, and it's exciting

made of recycled newspaper.                      and inspiring to see.

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