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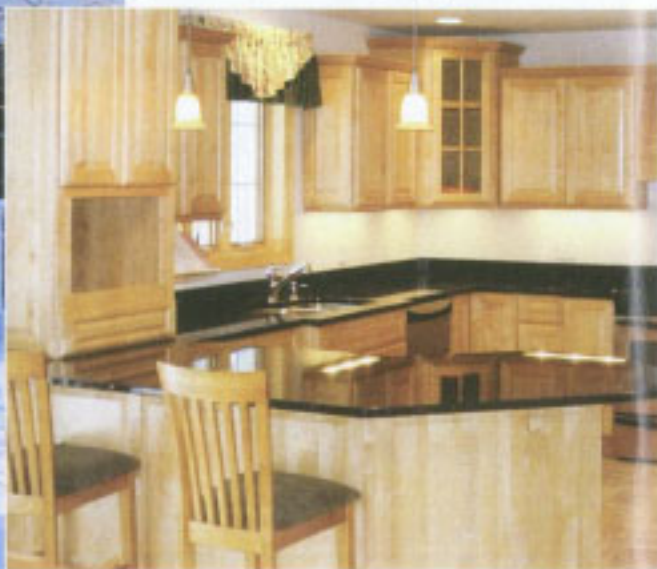
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Innovative building technologies and greenbuilding materials mix with Victorian design in this rural New Hampshire home

The driveway curls through the New Hampshire woods. As you near its end, the home's Folk Victorian details come into focus — delicate trim along the top of two gabled dormers, carefully detailed pediments above windows and more accenting trim atop the porch rails.



The 21st Century Victorian Home

BY TIM O'SULLIVAN

But peel off the outer layers of this historic reproduction and you'll find a different attention to detail. The recently completed 2,300-square foot, four-bedroom home is infused with high-performance green innovations, ranging from the geothermal heating and cooling system in the basement to the iLevel brand flooring by Weyerhaeuser and the Huber Engineered Woods ZIP wall and roof sheathing system, which

◀ Beneath the home's Folk Victorian exterior, the builder used cutting-edge technologies and the latest greenbuilding materials.

▶ While open for tours, the home was decorated with eco-friendly furnishings from local green retailers. Bamboo flooring was installed throughout the home.



seals the house's envelope. Put it all together and you have the 21st Century Victorian home.

Something Different

Steve Reddy, owner of Hopkinton, N.H.-based Zetland Homes, built the 21st Century Victorian home for the 2007 New Hampshire Parade of Homes, sponsored by the Homebuilders & Remodelers Association of New Hampshire. "We wanted to do something a little bit different that separated us from the other 32 homes on the tour, and I've had an ongoing interest in energy efficiency — what we call high-performance homes," Reddy explains. "So we signed up with the U.S. Green Building Council as a builder and agreed to do this home through the LEED certification process."

The building project turned out to be more than just "a little bit different." Despite an accelerated building schedule — four and a half months from design to completion — the home qualified for the LEED Silver rating and became just the second in New Hampshire to receive any type of LEED rating. (LEED, which stands for Leadership in Energy and Environmental Design, is a national rating system that ranks the design, construction and performance of green buildings, including homes. Certified buildings are

ranked according to the number of points awarded, with Platinum being the highest rating achievable, followed by Gold and Silver.)

The home's Frigidaire refrigerator and dishwasher, as well as the lighting throughout the home, are Energy Star rated. The toilets and faucets are low flow, the Sherwin-Williams Pro-Green paint is low-VOC (volatile organic compounds), and the universal-design carpets from local Concord, N.H., retailer W Carpenter & Wither are made with recycled materials, as is some of the trim and countertops. In addition, approximately 50 percent of the materials used to build the home are locally sourced, as defined by the LEED program (originating within a 500-mile radius).

The Folk Victorian Look

Since Reddy used cutting-edge technology and the latest greenbuilding philosophies throughout the home, the question that begs asking is: Why wrap it all in an exterior design that's reminiscent of the late 1800s?

"I just like the look of that architecture," Reddy says. "It's kind of what I grew up with in this area. I think it works for the environment we're in." That specific environment is Loudon, a town that neighbors Concord, the state capital, in central New Hampshire just south of the White Mountains and in the heart of

the Merrimack River Valley.

It's fitting that Reddy used the Folk Victorian style for this demonstration home (he's also offering a similar floor plan with Colonial, French Chateau, and Arts and Crafts exteriors). Folk Victorian was created by the lower middle class "folk" who couldn't afford a professional architect but wanted the latest in home design. So they either planned their homes themselves or relied on local carpenters. The result was a mix of the classic Victorian styles — Gothic Revival, Italianate, Second Empire, Stick Style, Romanesque Revival and Shingle Style. With his latest homebuilding project, Reddy is hoping to bring greenbuilding to the middle class majority as well.

"It's meant to showcase a lot of high-end features, even though it's not a hugely expensive home," Reddy says of the residence, which initially was listed at \$399,000. "Our take on greenbuilding was we wanted to take a conventionally built home and demonstrate how that could be made green."

More than 1,000 visitors toured the home in October and November 2007, when it was decorated with work from local artists, and furnished and supplied with green goods from retail stores like Real Green Goods and Your Home Your World, both located in Concord. Reddy even



brought in wine from Flag Hill Winery, located in the nearby town of Lee.

And those 1,000 visitors were diverse. "We've had a full range, from people looking at their first home all the way to people looking to build retirement homes or second homes," Reddy says. "It's been across the spectrum age-wise and income-level-wise."

Tranquil Heat

Reddy appreciates the diversity implicit in the greenbuilding specifications set forth by the U.S. Green Building Council. "The nice thing about the LEED program is it gives you a fair amount of leeway, so you can implement the things that are important to you and disregard the things that aren't," he points out. "For instance, in this climate, water conservation isn't the issue that it is in Atlanta or Arizona."

Of course, a major component of any home built in New England is the heating system. The 21st Century Victorian home will efficiently combat New Hampshire winters with geothermal heat provided by a Tranquility two-speed heat pump from ClimateMaster. The system piggybacks on a well that had to be drilled for domestic water. It pulls in water at a temperature of approximately 50 degrees Fahrenheit, heats

it another 18 to 20 degrees, then uses that heat to run forced hot air through the home.

The Tranquility pump is "the latest and greatest" in geothermal technology, according to Reddy. Its two speeds enable it to be efficient in both winter, when it runs at high speed, and summer, when it runs at low speed. Perhaps most impressively, it has a COP (coefficient of performance) rating of five, meaning that for every one unit of energy put into the pump, it generates five units.

"The bottom line for this house, according to the computer modeling, is between \$800 and \$900 a year for heat, \$200 to \$300 a year for domestic hot water and under \$100 a year for air conditioning," Reddy says. "So for \$1,200 to \$1,300 [annually], you have heating, cooling and domestic hot water for a 2,300-square-foot home."

Walls in a ZIP

All that efficient warm air is kept dry and kept inside with help from a ZIP wall and roof system, a recently developed technology from Huber Engineered Woods, based in Charlotte, N.C. The ZIP system consists of 4-by-8-foot engineered wood (oriented strand board) panels at a thickness of 7/16 of an inch. Each structural panel has a built-in water- and air-resistive barrier, which eliminates the need for housewrap and speeds installation.

Once the wall and roof panels — which have the strength and durability of other high-performance wall panel systems — are installed and taped, the home is essentially sheathed and work can begin on the interior "before the roofer even arrives," Reddy says. Plus, the dark

▲ **TOP to BOTTOM:** The builder was among the first in New Hampshire to use Huber's green panel ZIP wall and roof system, which creates a tight building envelope; high-density plastic pipes are the main components of the Enviro-Septic system from Presby; Weyerhaeuser's iLevel flooring system resists warping, shrinking and twisting; CertainTeed's Optima Blow-In-Blanket fiberglass insulation stops air infiltration.

► A two-speed Tranquility heat pump from ClimateMaster provides geothermal heat for the home, and actually generates more energy than it uses.



green ZIP panels look good on the home before being covered with exterior cladding.

"My biggest complaint is you drive by building sites and you see the Tyvar Tyvek flapping in the breeze," Reddy says. "It's rarely, if ever, applied properly, so it's not doing what it's supposed to do on the [building] envelope, which is keep water out. The ZIP wall eliminates that because it's very easy for the framers to tape it when they're building the walls."

The panels can be assembled flat on the deck and taped there as well. Once the walls are raised, the only taping that needs to be done is at the corners and between the stories.

Floors and More

Inside, Reddy used environmentally friendly bamboo for the surface of the floors and an innovative technology for the floor frame. Weyerhaeuser's iLevel floor system is made of oriented strand board (OSB) lumber, which reduces its environmental impact because the builder doesn't have to purchase 2-inch-by-12-foot pieces of lumber, which are cut from whole logs, for the joists.

"It's about the same money and it's a far superior floor," Reddy says of the iLevel floor system. "You don't get the squeaks, you don't get the bounce. People could be walking right above you and you could barely hear them." And like the ZIP system, the iLevel floor is easy to install.

Reddy has incorporated a number

of other green features in his 21st Century Victorian home. There's the New Hampshire-made Presby Enviro-Septic system, which treats effluent contaminants before releasing leachate (the liquid that leaches from the system) into the surrounding soils. The home's Drainvac central vacuum system earned one LEED point. A Lennox gas fireplace sits in one corner of the airy and sunny main room, which is wired for surround sound. A Lifebreath heat recovery ventilation system keeps the home's indoor air filtered and fresh.

It's all surrounded by a 1-inch barrier of polyurethane closed-cell foam insulation, which expands to fill gaps in the building envelope and stops 70 percent of heat loss through the walls and roof. Reddy also used CertainTeed Optima Blow-In-Blanket fiberglass insulation inside the walls, for a total insulation R-value of 25 to 26 with no air infiltration, all at an acceptable price-to-performance ratio.

Now all that's left for Reddy to do is to sell more homes like this one to some of the 1,000 people who visited the home, or anyone else eager to mix Victorian design with green features. "We're talking to several people who are looking at projects, hopefully as soon as this spring," Reddy says. "But it's a process. It's not like selling a widget."

Tim O'Sullivan wrote about disaster-proof homes in the July/August 2007 issue. He's based in Concord, N.H.

21st Century Victorian Home Resources

The 21st Century Victorian Home/
Zetland Homes
603-746-3556 or 877-666-0476
www.zetlandparade.com
www.zetlandhomes.com

Frigidaire Appliances
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Sherwin-Williams ProGreen/
GreenSure Paint
216-566-2000
www.sherwin-williams.com

Carpets/W Carpenter & Wither
603-225-2832

Tranquility Heat Pumps/ClimateMaster
800-299-9747
www.climatemaster.com

ZIP Wall and Roof System
Huber Engineered Woods
800-933-9220
www.huberwood.com

iLevel Floor System/Weyerhaeuser
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www.ilevel.com

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Drainvac Central Vacuum System
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