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Hudson Valley Project Demonstrates the Ultra-Efficient Practices of Passive House

A barn-like aesthetic combines with modern materials and smart design to achieve the ultimate in energy efficiency.

By: [Katy Tomasulo](#)

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Hudson Passive House
Renderings, images, and floor plans from this ultra-efficient home.

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The exterior of the [Hudson Passive Project](#) may exude the traditional barn-like stylings of the historic New York Hudson Valley, but behind the wood and stone cladding is an ultra-tight, super-insulated home that meets the stringent certification requirements of the Passive House program.

Originating in Germany as "Passivhaus" and now gaining followers in the United States, the rigorous standard relies on super-insulated, virtually air-tight construction techniques along with passive solar design features to reduce heating-energy consumption by up to 90%. The practices, developed and continually evolving through energy modeling research, rely primarily on design principles rather than supplemental mechanical technologies. The result? A Passive House uses about

15 million BTUs a year, according to the [Passive House Institute](#), compared to about 94.6 million BTUs for the average new U.S. home.

Building on their years of experience with high-performance homes, architect [Dennis Wedlick](#) and [Bill Stratton Building Co.](#) embarked on the project to demonstrate the performance potential of ultra-tight construction.

To achieve efficiency goals for the 1,650-square-foot, three-bedroom, two-bath house, Wedlick focused on five core areas: a compact shape, continuous insulation and elimination of thermal breaks, passive solar gain, air circulation with heat recovery, and air leak prevention.

The timberframe structure features glulam beams and SIPs, chosen as an easier method for minimizing thermal bridging versus double-stud walls. The 12 1/4-inch-thick [Timberline SIPs](#) provide an R-value of 50 for the walls and 53 for the roof. The team insulated the foundation to R-60 using six layers of EPS foam beneath the slab and XPS foam on the interior and exterior of the walls.

Wedlick says maximizing insulation performance and minimizing leakage relies on techniques that are simple but that require close supervision. The efforts paid off: In a blower-door test, the house measured 0.149 ACH@50 Pascals, well below the Passive House requirement of 0.6.

Though barn-inspired in shape and cladding materials, the structure's south-facing glass wall provides for a modern feel as well as ample daylighting; the R-7 triple-pane windows from Serious Materials are shaded in summer by the A-frame overhang.

Just four structure bays enclose the useable space, simplifying construction and minimizing material use and waste.

With no drafts, the inside air moves "gracefully," Wedlick describes, aided by the open, loft-like floor plan and a Zehnder heat recovery ventilator.

Though the high-performance wall system costs more than traditional structures, the lower HVAC requirements, which Wedlick estimates cost about one-quarter of that in a typical new home, helped keep construction costs between \$200 to \$250 per square foot, a figure he says is comparable to typical homes in the area.

The architect will monitor the demonstration house, which was completed last October, for a year to measure the energy performance brought about by smart design.

"It's not the technology, it's the architecture," says Wedlick. "We want to empower industry practitioners and homeowners with the understanding that better-built, better-designed homes can be a powerful and relatively

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Katy Tomasulo is Deputy Editor for EcoHome.

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