

Payback Time

SPECS

Bedrooms: 3

Bathrooms: 2

Size: 1500 sq. ft.

Cost: \$240 per sq. ft.

Completed: 2009

Location: Burlington, Vt.

Designers: Sam Gardner,
Jim Kemp, Stephanie Lind

Builder: Red House Inc.

BIG ANNUAL ENERGY SAVINGS

Made from a sandwich of OSB and polyiso insulation, the 6½-in.-thick structural insulated panels (SIPs) provide an R-value of 38 without the conductive heat loss (thermal bridging) of conventional framing.

Energy costs 2006 code minimum (estimated) **\$1775**

Energy costs with \$16k upgrades (estimated) **\$911**

Energy costs 2010 (actual) **\$767**



A small house in Vermont goes above code to cut energy bills by more than half

BY DUNBAR OEHMIG

When I tell people what it costs to heat and light the house my company recently built in Burlington, Vt., I don't think they believe me, and I can see why they're skeptical. With natural-gas and electric bills totaling \$767 in 2010, this home's energy costs less than half of what you'd expect to pay for utilities in the same house built to code-minimum standards.

Even more surprising is that this house cost only about \$16,500 more than the same house built to code minimums. If energy costs stay the same, the energy upgrades should pay for themselves in a little over 16 years. Of course, the payback will be quicker if energy costs rise as predicted.

Tight shell reduces heat loss

The SIP construction and the attention to air-sealing by our crew and our insulator created a supertight house. The final blower-door test by the LEED certifier came in at 150 cubic feet per minute at 50 pascals (150 cfm50). At the time, it was the tightest house (by a factor of two) ever tested by the certifier.

In most weather, the supertight shell means the heating load is met before the boiler shifts to a more powerful but less efficient firing mode. For domestic hot water, the Prestige modulating, wall-hung boiler from Triangle Tube has a built-in 14-gal. indirect tank that operates in an on-demand mode when its storage capacity is exhausted.



Narrow house, narrow kitchen. The home's narrow footprint is a natural fit for a galley kitchen. The cabinets are hickory with slate-look Paperstone countertops.

A heat-recovery device captures the warmth in the drain water coming from the second-floor bath and uses this otherwise wasted heat to warm cold water going to the hot-water tank. Extra effort went into routing the pipes so that they'd provide hot water quickly without the energy use and heat loss of a recirculation system.

To supply the house with fresh air, there's a Venmar Eko heat-recovery ventilator (HRV) with a high-efficiency ECM blower. Stale air is drawn from the kitchen and baths, and fresh air is supplied to the bedrooms and to the living areas.

Durable materials keep maintenance costs low

To minimize exterior maintenance, we used aluminum-clad windows and cellular PVC trim, and we installed the fiber-cement siding over an airspace. Often described as rain-screen siding, this assembly reduces peeling paint and discourages rot.

A green roof assembly from Hydrotech outside the third-floor office uses a lightweight growing medium over a filter fabric and root barrier. Underneath is a liquid-applied roofing membrane. Plants were selected for drought-tolerance and hardiness. □

Dunbar Oehmig is the president of Red House Inc. in Burlington, Vt. Photos by Patrick McCombe, except where noted.

ENERGY-SAVING INGREDIENTS

- **Supertight SIP shell** made from oriented strand board (OSB) and 5½ in. of polyisocyanurate insulation.

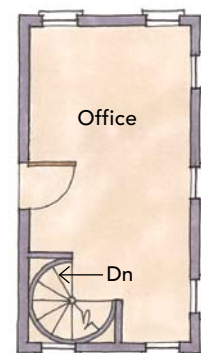
- **Triangle Tube high-efficiency modulating, condensing boiler** with 14-gal. indirect tank for domestic hot water (triangletube.com).

- **Wastewater heat-recovery device** (gfxtechnology.com) that warms the cold-water supply before it reaches the indirect hot-water system.

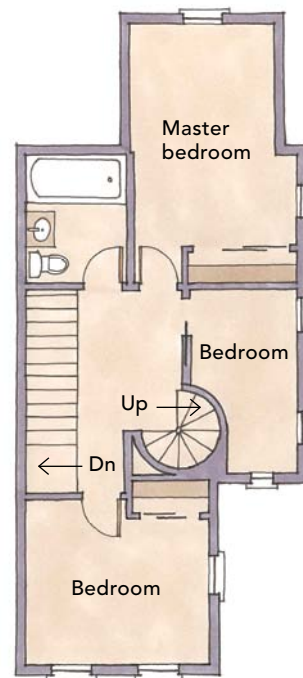
- **Fluorescent and LED lights** throughout the home. Commonly used lights are also dimmer-controlled.

- **Venmar Eko heat-recovery ventilator** (venmarces.com) with intake registers in the kitchen and bath, and fresh-air registers in the bedrooms and living room.

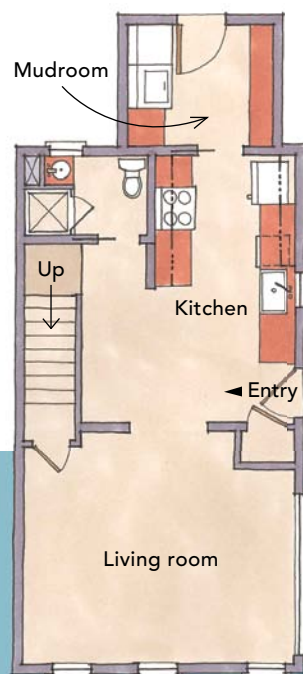
- **Energy Star appliances** that reduce energy consumption up to 70% compared to conventional models.



Third floor



Second floor



First floor

