

PROJECT DETAILS

Project: Private Residence, Orefield, Pa.
Size: 4,768 square feet; 7,365 with basement
Cost: Undisclosed
Completed: July 2008
Certifications: NAHB-Gold
HERS rating: 54
Architect: Alan Mascord Design Assoc., Portland, Ore., and studio26 homes
General Contractor/Interior Designer: studio26 homes
Kitchen: Kitchens by WIPCO, Allentown, Pa.

CASE STUDY BY CHERYL WEBER

Striking Gold

PENNSYLVANIA-BASED STUDIO26 HOMES JOINS IBACOS AND THE DOE'S BUILDING AMERICA PROGRAM TO TACKLE COLD-CLIMATE PERFORMANCE.

When the Bakers—father James and sons Scott and Brian—launched studio26 homes five years ago, green was still just a buzzword in Eastern Pennsylvania's Lehigh Valley. But the trio saw the deepening shift in consumer awareness and decided to make super-energy-efficient houses their calling card. For starters, their goal was to reduce energy use by at least 40% compared to other homes built to code.

The Bakers tapped the brain trust at Building America, a research program sponsored by the U.S. Department of Energy. And to make sure their best practices keep hitting the benchmarks, every studio26 project is analyzed by Integrated Building and Construction Solutions (IBACOS), a Building America partner consortium that offers energy modeling. "They do takeoffs of our plans and specs and also work through a general HVAC design," says Brian, studio26 homes' vice president of marketing and design.

The latest result of that collaboration is a house in Orefield that earned a Gold rating under NAHB's Model Green Home Building Guidelines. Its 542 points, earned primarily through indoor air quality and an airtight building envelope that

PHOTO: JOHN STERLING RUTH PHOTOGRAPHY

CASE STUDY
PENNSYLVANIA RESIDENCE



SEPARATED FROM SMOKE

A sunroom/smoking room with a ceramic tile floor on the house's southwest side soaks up solar rays. It's sealed off from the rest of the house with gasketed exterior wood doors, insulation, and polyethylene sheeting, and is served by a separate Mitsubishi MUZ-A12NA variable-speed ductless mini-split system with R410A refrigerant and a Panasonic WhisperCeiling exhaust fan for adequate room ventilation. Mitsubishi: 800.433.4822. www.mrslim.com. Circle 313. Panasonic: 800.405.0652. www.panasonic.com. Circle 314.

ERV AND AIR CLEANER

Due to its ultra-tight construction, this home "breathes" through its Trane FreshEffects energy recovery ventilator, which continuously exchanges stale air with fresh air and transfers heat and moisture between incoming and outgoing air via a dual-chamber pipe. Before the incoming air is distributed through the home, a Trane CleanEffects air cleaner removes up to 99.98% of airborne allergens, according to the company. 903.581.3660. www.trane.com. Circle 311.



WINDOWS

The house's 120 aluminum-clad-wood triple-pane windows and patio doors are Energy Star-rated Pella Designer Series with between-the-glass blinds, providing a U-value of 0.23 and an SHGC of 0.26. 800.374.4758. www.pella.com. Circle 312.



minimizes thermal bridging, far exceeded the Gold minimum of 395 points.

In this case, the design team began with a significant asset on its side: The 1.2-acre parcel's gentle, south-facing down slope provided the ideal conditions for passive solar heating and daylighting. To ensure sufficient sun exposure throughout the day, not only for passive solar gain but for a future PV installation, the Bakers rotated the house to within 20 degrees of due south. With the long axis running east-west and the rear facing south, all three levels are open to solar gain and are filled with natural light. The contemporary

Craftsman style also plays into passive cooling with deep overhangs, porches, and a long Trex deck across the back that shades the walk-out basement.

Given Pennsylvania's cold winters, super-insulating the walls was a top priority. The builders installed an Xi concrete-and-Styrofoam foundation system from Superior Walls made of 10¼-inch-thick, 10-foot-high sections pre-insulated to R-12.5.

And to increase the energy performance of the foundation walls, the crew installed R-21 formaldehyde-free Johns Manville fiberglass batts into the stud cavities, which raised the basement walls' overall R-value to 33.5.



ROOFING AND SIDING

CertainTeed Independence lifetime asphalt shingles earned green points for the home's proximity to the manufacturing plant. James Hardie integrally colored fiber-cement siding offers durability while saving the need for on-site painting. CertainTeed: 800.233.8990. www.certainteed.com. Circle 315. James Hardie: 888.542.7343. www.jameshardie.com. Circle 316.

MOISTURE MANAGEMENT

Given its location in a climate where moisture levels are significant for most of the year, the house has a CertainTeed MemBrain vapor barrier between the insulation and drywall. It's engineered to let walls breathe by allowing water vapor to pass through when humidity levels reach 30% or more. 800.233.8990. www.certainteed.com. Circle 317.

INSULATION

First- and second-floor walls are blanketed in formaldehyde-free Johns Manville Spider blown-in insulation, which provides an R-value of 23 in the 2x6 walls. Closed-cell spray-foam insulation by Tiger Foam seals up hard-to-reach corners, headers, sill plates, and band joists. Johns Manville: 800.654.3103. www.specjm.com. Circle 318. Tiger Foam: 800.664.0063. www.tigerfoam.com. Circle 319.

FAR LEFT PHOTOS: JOHN STERLING RUTH PHOTOGRAPHY; TOP AND RIGHT PHOTOS: BARRY HALKIN

The builders tightened the 2x6 wood-framed envelope by adding 1-inch extruded polystyrene to the exterior. All the wood-framed walls were tightly insulated with blown-in, R-23 Johns Manville Spider Custom Insulation, installed at 1.8 pounds per square foot to fill gaps. Using these measures, studio26 was able to beat Building America targets for air leakage. A blower-door test showed 0.101 NACH (natural air exchanges per house), compared to the benchmark 0.131 NACH. A duct-blaster test resulted in 0.5% air leakage, an improvement over Building America's 1% target.

No humidifier or dehumidifier is

needed in the house, Baker says, thanks in part to the use of CertainTeed's MemBrain, a "smart" vapor retarder stapled to the studs between the insulation and drywall. "When there's a certain level of humidity in the wall, the pores of the vapor retarder will begin to open and allow vapor to emit into the house, where it can be flushed out and absorbed by the ventilation system," he says.

Indoor air quality was clearly at the center of the mechanical equipment choices and techniques. The project earned indoor environmental quality points with the use of a Trane energy recovery ventilator that exchanges heat between stale air being exhausted and

PROFILE:

James C. Baker
Brian M. Baker
Scott A. Baker
STUDIO 26 HOMES

One benefit of a green startup is that there are no old standards to purge. When James Baker, president, and sons Brian, vice president of marketing and design, and Scott, vice president of operations, set up their design/build/develop company in 2004, they spent months assembling a core subcontractor team. "We said our houses will be different than any you've built before," says Brian. "We turned away some [subs] who were talented but not open-minded enough for what we were trying to do."

The builder's test run—a team effort with IBACOS—was a Building America Demonstration Home that Brian built for his family. Pennsylvania's first LEED-Silver home, it served not only as field training for the subcontractor team, but is also a model for prospective clients. Eighteen months of energy monitoring showed it to be 49% more efficient than a standard code-compliant house. With just the three partners on staff and a subcontractor team numbering about 50, studio26 is currently working on a 44-acre conservation community with a dozen dwellings.

In addition to applying the latest building-science practices, the company includes solar-ready wiring standard. "Our goal is to be the leader in Eastern Pennsylvania for green building and design, and eventually to get to net-zero energy," Baker says. In 2007, the Pennsylvania Builder's Association recognized their progress with a Building Innovation Award. —C.W.



CASE STUDY

PENNSYLVANIA RESIDENCE

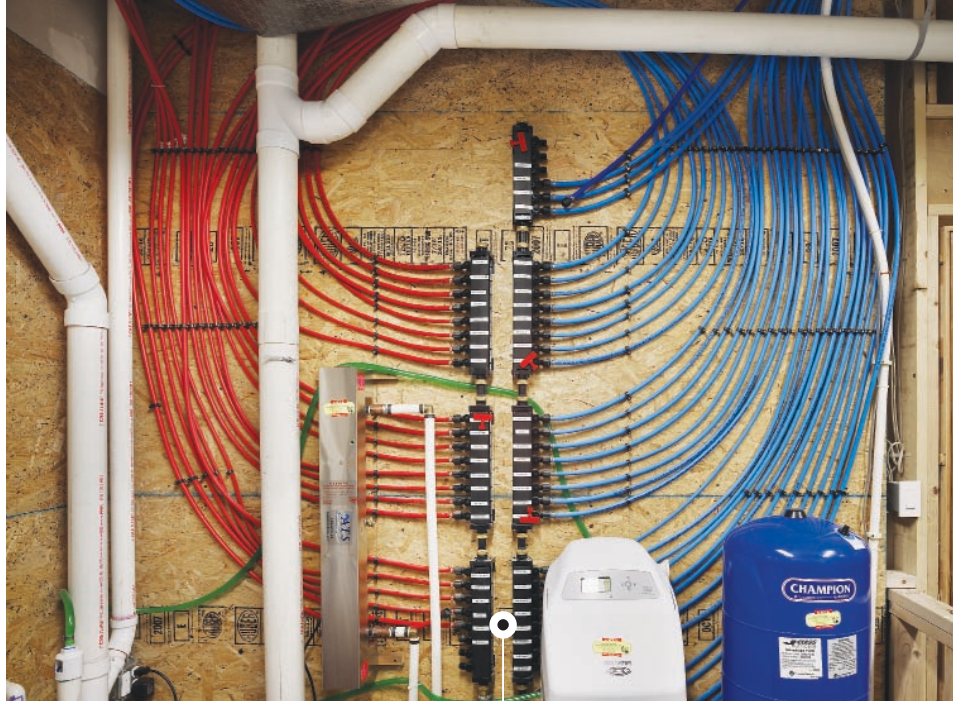
cooler fresh air being introduced to the system, a Trane CleanEffects whole-house air cleaner, and a separate HVAC system in the sun room on the house's southwest corner, where one of the owners enjoys the occasional cigar.

The interior materials marry craftsmanship, cleanliness, and sustainability. MAB Enviro-Pure paints emit no VOCs, oak floors and birch cabinetry were sourced in Pennsylvania, and the appliances are Energy Star certified.

Finally, like each of studio26's projects, the house is pre-wired for future addition of solar panels. It's one more component of a smart, sophisticated home designed to reduce energy costs and provide a healthy, comfortable atmosphere.

Cheryl Weber is a freelance writer in Lancaster, Pa.

✱ For more case studies, visit ecohomemagazine.com.



PLUMBING

A PEX manifold system from Watts delivers heated water directly from tank to tap rather than filling the entire piping system with water, and PEX tubing resists corrosion and retains heat better than copper. The plumbing manifold, located in a central utility room, is a control center for hot and cold water that feeds flexible supply lines (red for hot, blue for cold) directly to individual fixtures. The cold-water manifold is fed from the main water supply line and the hot-water manifold is fed from the water heater. Two propane-fueled 0751 Series Noritz tankless water heaters work in tandem to supply hot water. Watts: 978.688.1811. www.watts.com. Circle 320. Noritz: 866.766.7489. www.noritz.com. Circle 321.

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OVERSET

FOUNDATION WALLS

The precast foundation, Xi from Superior Walls, consists of high-strength concrete and Styrofoam panels reinforced with steel rebar and polypropylene fibers. It insulates to R-12.5 and meets or exceeds IECC and IRC energy conservation standards. 800.452.9255. www.superiorwalls.com. Circle xxx.

HEAT PUMP

Trane's XL16i two-stage heat pump has a SEER rating of up to 17 and an HSPF of 9.2. The 4-ton Energy Star-rated unit, which heats and cools the home's 7,365 square feet (including basement) in four zones, is about half the size of that required by a similar house built to code minimum, Baker estimates. The metal ducts are in conditioned space and sealed with Mastic all the way to the registers, then covered in R-5 blanket insulation. The home achieved zero duct leakage to the outside. 903.581.3660. www.trane.com. Circle xxx.