Tim O'Brien and Matt Neumann believe in building traditional, affordable, energy-efficient homes. This Builders Challenge home makes more energy than it uses.

Builders Challenge

Recognizing Energy Leadership in Homebuilding

High Performance Builder Spotlight

Tim O'Brien Homes

Waukesha, Wisconsin

This Builders Challenge home sells its electricity to its utility

Utility bills can cost up to $400 a month in Waukesha, Wisconsin, but not for Tim O'Brien's Building America Builders Challenge home. The first month after construction was completed (August 2009), O'Brien got $400 back from the utility. The home achieved a -3 score on the HERS index, thanks to an investment in solar energy systems and attention to detail.

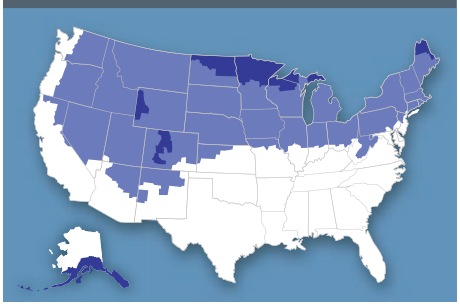
"You must be a fanatic about eliminating air infiltration. We did a tremendous amount of air sealing before insulating the house," said builder Tim O'Brien, president of Tim O'Brien Homes. O'Brien insists that, aside from this attention to air sealing and insulation detail, the reasonably priced, 3,400-square-foot home was put together with fairly traditional 2x4 16-inch-on-center stick framing methods.

The 2x4 16-inch-on-center walls include Tyvek house wrap and R-10 rigid foam under vinyl siding. Wall cavities are filled with R-15 high-density fiberglass batts. Closed-cell foam or caulking seal all penetrations in the framing. The basement perimeter is insulated with R-10 rigid foam on the exterior of the foundation walls and rim joists are sealed with 2 inches of closed-cell spray foam. The unconditioned attic is sealed from the house with closed-cell foam and then filled with R-60 blown-in fiberglass insulation. Ventilation is provided through an energy recovery ventilator (ERV) with MERV 11 HEPA filtration and supply and return ducts to each room.

A 3-ton geothermal heat pump heats and cools the house. Horizontal pipe loops are located 8 feet under ground in the backyard, where the temperature is about 54 degrees all year long. In winter, the pipes circulate a glycol solution that absorbs heat from the ground and transfers it, via a heat exchanger in the basement, to air that is ducted through the home. In summer the exchanger works in reverse transferring heat from the home and depositing it in the ground.

> "It starts with attention to detail. You must be a fanatic about eliminating air infiltration."
>
> **TIM O'BRIEN**, *president of Tim O'Brien Homes*

COLD & VERY COLD CLIMATES



BUILDER PROFILE

Builder: Tim O'Brien Homes in partnership with Mark and Matt Neumann

Founded: 2007

Employees: 10

Size: 4 bedrooms, 3 baths, basement

Square Footage: 3,408 sq. ft.

Price Range: $350,000

Building America® U.S. Department of Energy
Research Toward Zero Energy Homes

(photo at right) Tim O'Brien Homes pays extra attention to air sealing details, for example sealing the rim joists with 2 inches of spray foam.

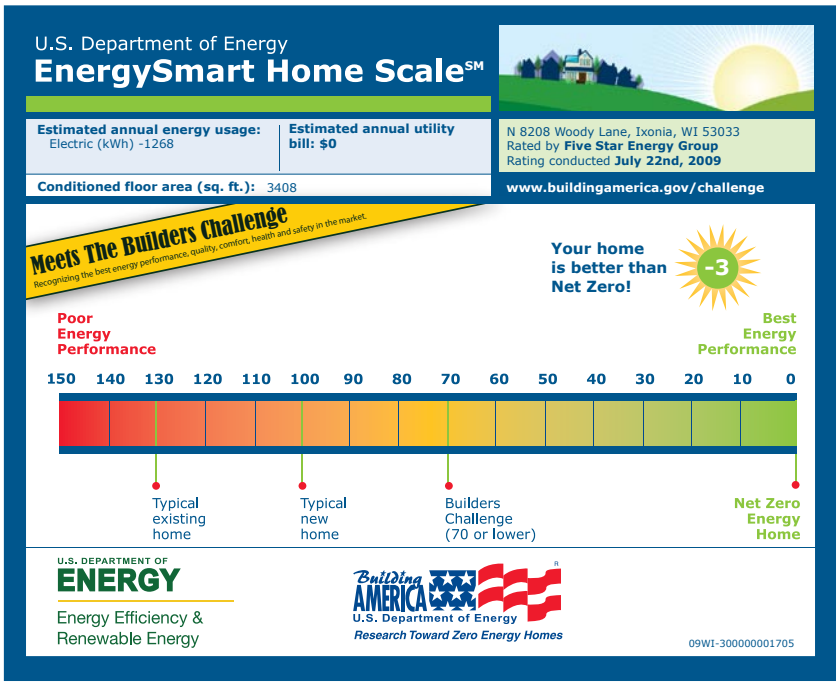
An 11.44-kW photovoltaic system is mounted on the roof, and a 2.96 kW Wattsun Tracker System is set up in the backyard. The roof-mounted system produces up to 14,700 kWh of electricity per year and the yard system produces up to 4,600 kWh per year. The home is also equipped with solar thermal water heating and a back-up electric water heater.

The Upgrade that Saves you Money

O'Brien is so sure of the home's energy performance, he is guaranteeing zero utility costs for 5 years. O'Brien compared his energy efficiency upgrades (PV, solar hot water, geothermal heat pump, added insulation) to typical home upgrades (granite countertops, wood and tile flooring, spa tub, cabinet and trim upgrades) and found, despite increased mortgage costs, the energy efficiency upgrades saved homeowners $185 a month ($2,220 per year).

U.S. Department of Energy Builders Challenge

DOE seeks to give every consumer the opportunity to buy a cost-neutral, net-zero energy home anywhere in the U.S. by 2030. Homes that qualify for this Builders Challenge must achieve a 70 or less on the EnergySmart Home Scale (E-Scale) which is based on the Home Energy Rating System (HERS) index (www.natresnet.org). The E-Scale allows homebuyers to understand—at a glance—how the energy performance of a particular home compares with others.



To learn more about the Builders Challenge and find tools to help market your homes, visit www.buildingamerica.gov/challenge.

Energy-Efficient Features

- **HERS:** -3
- **Walls:** 2x4 16-inch on center
- **Attic Insulation:** R-50 blown-in fiberglass, closed-cell foam air sealing
- **Wall insulation:** 2-inch rigid foam (R-10) sheathing, R-15 high-density fiberglass batts
- **Roofing Material:** 30-year shingles
- **Foundation:** 2-inch rigid foam (R-10) basement walls, closed-cell spray foam rim joists
- **Ducts:** In conditioned basement; supplies and returns to each room
- **Air Sealing:** Closed-cell foam all penetrations, top plate, box sill; blower door test = 759 cfm 50 (or 1.7 air changes per hour at 50 Pascals)
- **HVAC:** 3-ton geothermal heat pump
- **Windows:** Low-e, argon-filled vinyl, U=0.31
- **Water Heating:** Solar thermal with electric tank water heater backup
- **Ventilation:** ERV with HEPA MERV 11 filter
- **Lighting and Appliances:** 100% CFL bulbs, sealed combustion ENERGY STAR wood-burning fireplace, ENERGY STAR appliances
- **Solar:** 11.44-kW roof-mounted PV, yard-placed 2.96 kW Wattsun Tracker System; solar hot water
- **Commissioning/Certification:** ENERGY STAR, Builders Challenge, NAHB Green, and Green Built

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov/informationcenter

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For information on **Building America** visit **www.buildingamerica.gov**. The website contains expanded case studies, technical reports, and best practices guides.