

Addison Homes

Cobbler Lane
Simpsonville, SC



BUILDER PROFILE

Addison Homes, Greer, SC
Todd Usher todd@addison-homes.com
864-449-3900, www.addison-homes.com
Rater: Wood Insulating and Vinyl Company Inc.
Dodd Wood, dodd@woodinsulating.com

FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Cobbler Lane
- Location: Simpsonville, SC
- Layout: 4 bedrooms, 4.5 baths, 2 floors
- Conditioned Space: 4,530 ft²
- Climate Zone: IECC 3A, mixed-humid
- Completion: February 2014
- Category: Custom

Modeled Performance Data:

- HERS Index: without PV 41
- Projected Annual Utility Costs: without PV \$1,796
- Projected Annual Energy Cost Savings (compared to a home built to the 2006 IECC): without PV \$1,570
- Builder's Added Cost Over 2006 IECC: without PV \$10,000
- Annual Energy Savings: without PV 15,700 kWh

“The trades may hate us, but customers love us,” laughed Todd Usher, owner and founder of Addison Homes in Greer, South Carolina, as he explained how attention to detail has helped Addison Homes certify its custom and semi-custom homes to the exacting quality standard of the U.S. Department of Energy’s Zero Energy Ready Home program.

A chemist by trade, Usher got into the construction industry in 2002 by renovating and flipping homes. Influenced by his corporate employer, a large floor covering manufacturer who had embraced conservation, quality management, and continuous improvement, Usher began seeking ways to build more efficient new homes. “When I started my own company, I wanted to put best practices and quality standards into place,” said Usher. His search led to the U.S. Department of Energy’s Building America program. Usher began building homes qualified first to DOE Challenge Home and now to the DOE Zero Energy Ready Home program. Usher had been averaging 10 homes a year. This year he will complete 15 to 20, and he hopes to grow to 30 to 40 homes per year, with the bulk of those to be certified to the DOE Zero Energy Ready Home program.

The DOE Zero Energy Ready Home program requires homes to meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency’s Indoor airPLUS, as well as the hot water distribution requirements of the EPA’s WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. In addition, homes are required to have a solar electric system installed or have the conduit and electrical panel space in place for it.

Usher appreciates the challenge of meeting the requirements of DOE Zero Energy Ready Home program. “If I were doing it the way everyone else was, I’d be really bored. Now I get to spend my days beating my head against a wall



The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

Addison Homes of Greer, South Carolina, constructed this two-story home to the requirements of the U.S. Department of Energy's Zero Energy Ready Home program. Ceiling fans, a radiant barrier in the attic, low-emissivity coated windows, and exterior rigid foam insulation help to keep the interiors cool.



What makes a home a DOE ZERO ENERGY READY HOME?

1 BASELINE
ENERGY STAR
Certified Homes
Version 3.0

2 ENVELOPE
meets or exceeds
2012 IECC levels

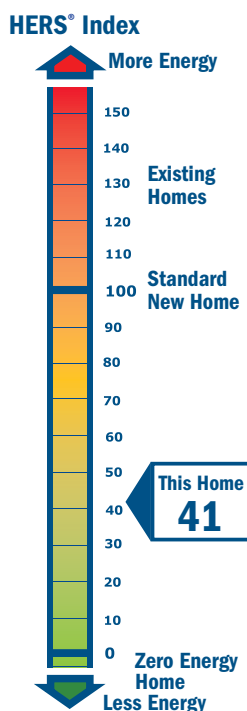
3 DUCT SYSTEM
located within the
home's thermal
boundary

4 WATER EFFICIENCY
meets or
exceeds the EPA
WaterSense
Section 3.3 specs

5 LIGHTING AND APPLIANCES
ENERGY STAR
qualified

6 INDOOR AIR QUALITY
meets or exceeds the EPA Indoor
airPLUS Verification Checklist

7 RENEWABLE READY
meets EPA Renewable Energy-
Ready Home.



explaining to trades why we need to flash and frame and install the way we do even though no one else in town does it this way,” jokes Usher, who explains “we use exterior rigid foam, which is rare here, and we have some pretty particular flashing details.”

Trades may grumble but customers are lining up, many of them brought in by word of mouth from their friends. The family that bought the award-winning home makes a point of showing guests the energy-efficiency features of their home, even including the sealed and conditioned crawlspace.

The home is a custom home built in Simpsonville, South Carolina. Usher had been building production-scale homes in a larger community with five other builders before the recession but found it difficult to compete with the code-minimum lowest-dollar-per-square-foot construction goals of the other builders. Even so, Usher's construction costs are modest at \$135-160 per square foot with land for a 2,700 ft² home or \$110-150 per square foot without the land.

In addition to building custom homes on individual properties, Usher is now starting a community of 16 homes called Trailside, next to a popular rails-to-trails project. All of the homes at Trailside will be built to the DOE program criteria and nearly all of the home owners have chosen to install solar electric systems.

Solar orientation was not ideal for solar electric panels or solar water heating at the award-winning home's site but high-efficiency construction details still yielded a very efficient home with a Home Energy Rating System (HERS) Score of 41 without photovoltaics, far below the 100 of a typical home built to the 2006 International Energy Conservation Code. The home is expected to save its home owners \$1,750 per year compared to a home built to the 2006 IECC.

The award-winning home has 2x4 walls built with studs spaced 16-inches on-center. (In his newer homes, Usher is using 2x6 24-inch on-center walls, an advanced framing technique that provides a thicker wall cavity). The home incorporates advanced framing techniques including insulated headers and drywall clips at two-stud corners and wall intersections. The walls are insulated with unfaced fiberglass R-13 insulation plus 1 inch (R-5) of extruded polystyrene (XPS) foam board that is installed over the 7/16-inch OSB sheathing. The seams of the XPS are taped and the XPS serves as a drainage plane. Walls backing up to the unconditioned attic space are 2x6 16-inch on-center construction with R-19 unfaced fiberglass batt insulation and 1 inch of XPS foam board on the attic side. The framing is air



The unvented insulated crawlspace is so clean the home owner invites guests to take a peek. Insulation and a thick vapor barrier help to keep it temperate and dry.

sealed and the seams are taped. Behind any stone cladding, the builder installed a drainage plane of 1-inch XPS foam board covered with stucco wrap and felt paper. The walls drain to the outside via a weep screed installed above grade. Behind brick cladding, walls are constructed to provide a 1-inch air gap between the brick and the XPS; this prevents solar-driven moisture from penetrating into the walls. The XPS is covered with wrinkled house wrap, then a synthetic felt, then the wire lathe. A weep screed is installed at the bottom and the house wrap laps over this toward the outside to carry out any water that gets behind the siding.

The vented attic was constructed with an OSB roof sheathing that has a radiant barrier foil surface on the underside to minimize solar heat gain through the attic. The builder employs extensive air sealing of the ceiling plane between the vented attic and the conditioned space and he has the drywallers glue the wall drywall to the top plates. Raised heel trusses provide 12 inches of space over the top plates for the R-38 of blown fiberglass insulation installed on the flat ceilings. To keep moisture out of the attic, the builder installs ice-and-water shield on all roof pitches less than 4:12, as well as in all valleys. Kickout flashing is installed at roof-wall intersections. A metal drip edge is installed at all overhangs and butyl tape is used to flash around all roof penetrations. The roof deck is covered with 30# felt under the asphalt shingles.

The home's unvented crawlspace is constructed of concrete block and insulated with 2 inches of foil-faced polyiso foam board on the interior side of the exterior walls of the crawlspace. Because of the risk of termites, the top 4 inches of the foundation wall must be left uninsulated for termite inspection. Usher has a waterproofing company spray the outside of the foundation wall, the top of the wall, and down one course of block on the inside, as well as the tops of all piers with a spray-on water proofing. Usher notes they used to use a vapor liner over the top of the walls to serve as a capillary break between the concrete block and the sill plate but they found they got some condensation under the liner so they switched to the spray-on membrane as the capillary break. A 40-millimeter laminated liner covers the "floor" of the crawlspace and is fastened up the walls and around the piers. A perimeter footing drain provides drainage around the exterior walls. The above-grade portion of the foundation walls is covered on the exterior with brick, rock, parging, or stucco.

Usher selected high-performance, double-pane, composite-framed windows with an insulating gas filling between the panes and clear low-emissivity coatings to minimize heat transfer.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% commitment

ENERGY STAR Certified Homes Version 3.0

EPA Indoor airPLUS

National Green Building Standard, emerald

Addison Homes added a local copy writer to their staff of seven to help with public relations. Through her media outreach efforts, they have gotten articles placed in several local news outlets. They've added high-performance home building tips to their website and they make use of social media to share the message of home performance.



Every DOE Zero Energy Ready Home combines a building science baseline specified by ENERGY STAR Certified Homes with advanced technologies and practices from DOE's Building America research program.



No- and low-VOC paints, adhesives, and polyurethane finishes, and cabinets that have earned a green label from the Kitchen Cabinet Manufacturers Association (KCMA) help to reduce indoor air pollutants in the tightly constructed home.

located in the conditioned crawlspace and the second-floor ducts were located in open-web floor trusses between the first and second floor.

Usher noted that he offers ductless heat pumps as an option and used to install them but his trained installer retired so he has gone back to the central ducted units for now. The central air handler is also part of the home's fresh air system, distributing air that is brought in through a dampered fresh air intake duct. The air is pulled through a MERV 16 filter. An air cycler controller controls the minutes per hour that fresh air is brought into the home when the system is operating for heating or cooling or in fan mode. The home's programmable thermostat can be operated remotely with an internet-connected device.

Two 98% efficient tankless gas water heaters supply the 4,530-ft² home's 4.5 bathrooms and kitchen. The home's high-efficiency lighting includes 25% LED-based lighting and 60% CFL-based lighting. The five ceiling fans are all ENERGY STAR rated for additional energy savings.

In addition to energy benefits, the home owners got a home that is more comfortable and healthier than their old home. "Living in a certified Zero Energy Ready Home has exceeded our expectations for energy efficiency, air quality, and comfort – plus, it's a lovely place we are happy to call home! Our utility bills are significantly lower than before, even though we have 44% more space. In fact, while our old 2,500-ft² house was on the market – *and vacant* – the electric bill was 20% higher than what we paid at the same time in our new – and occupied – 4,500-ft² home. Isn't that remarkable? So while our power bill is lower, our comfort, our well-being, and our quality of life are all much, much higher," said the home owners.

Photos courtesy of Addison Homes

Usher was particular about air sealing details to achieve a whole-house air leakage rate of only 1.65 air changes per hour at 50 Pascals pressure (ACH 50), tighter than the maximum of 3 ACH 50 required by the DOE Zero Energy Ready Home program. Air tightness is one of several items checked by the third-party energy rater to certify a home to the program.

A high-efficiency air source heat pump with a cooling efficiency of 17.0 SEER and a heating efficiency of 9.2 HSPF was installed in the home. (These efficiencies are well above the minimum federal requirement of 13 SEER and 7.7 HSPF.) The duct system uses rigid trunk lines with short flex duct branches insulated to R-8. All of the ducts were located in conditioned space so any heat losses would stay within the home. The main floor ducts were

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** 2x4; 16" on center; 1" XPS (R-5) over OSB and fiberglass batt (R-13).
- **Roof:** Ice-and-water shield on low pitches, edges, and valleys; 30# felt; asphalt shingles.
- **Attic:** Vented attic; blown-in fiberglass (R-38); raised-heel trusses; air-sealed top plates.
- **Foundation:** Conditioned crawlspace; 2" foil-faced polyiso foam board on interior walls; 40-mil vapor barrier; spray-on waterproofing on exterior and top of foundation walls, and piers.
- **Windows:** Double-pane; low-e; U=0.29; SHGC=0.21.
- **Air Sealing:** 1.65 ACH 50.
- **Ventilation:** Fresh air ducted to return side of air handler; MERV 16 filter.
- **HVAC:** Air-source heat pump; ducts in conditioned space; 17 SEER; 9.2 HSPF.
- **Hot Water:** Tankless gas water heater.
- **Lighting:** 25% LED; 60% CFL.
- **Appliances:** ENERGY STAR-rated refrigerator, clothes washer, and dishwasher.
- **Solar:** None.
- **Water Conservation:** Most EPA WaterSense-rated fixtures.
- **Other:** Energy management system; low-VOC.

"The owner told us their 15-year-old house was half the square footage and had twice the power bills of this house. They had a lot of comfort complaints in the old house and they all suffered from allergies. I think they've just been ecstatic with the experience of their new home so far."

—Todd Usher, Addison Homes