Building America Efficient Solutions for New Homes

Case Study: Heritage Buildings, Inc. and Energy Smart Home Plans

Leland, North Carolina

PROJECT INFORMATION

Construction: New home

Type: Single-family

Partners:

Pacific Northwest National Laboratory
www.pnnl.gov

Energy Smart Home Plans
www.energysmarthomeplans.com

Florida H.E.R.O. www.floridahero.com

Builder: Heritage Buildings, Inc.

Size: 2,434 ft^2

Date Completed: 2011

Climate Zone: Hot-Humid, IECC 3A

PERFORMANCE DATA

HERS Index: 56

Projected annual energy cost savings: $843

Added first cost of energy-efficiency measures: $5,000

Annual mortgage increase: $250

Annual net cash flow to homeowner: $1,984

Billing Data: $75/month

Building America U.S. Department of Energy

Building America partners Pacific Northwest National Laboratory, Energy Smart Home Plans, and Florida H.E.R.O. worked with North Carolina-based builder Heritage Buildings, Inc., to make the conversion to high-performance building in the hot-humid region of the Atlantic seaboard. Searching for new marketing opportunities, Heritage purchased a home plan from Energy Smart Home Plans and built a home achieving 56 on the HERS Index with only minor additional costs, despite having little on-site technical assistance.

The result was so successful that Heritage now offers high-performance upgrades to its clients on a regular basis, for $5,000 per home. These additional energy efficiency measures will also result in significant savings on energy costs. The Heritage home is projected to save $843 annually in energy bills, compared to a neighboring home that is representative of a home built to the 2009 International Energy Conservation Code (IECC), which North Carolina recently adopted as a basis for its state residential energy code.

Code-built homes in North Carolina typically achieve HERS Index scores of around 85. The neighboring home, which had a HERS score of 86, had projected energy costs of $2,308 compared to $1,465 for the Heritage home. The Heritage home employed significant air sealing to cut whole house air leakage from 5.38 ACH50 to 3.41 ACH50. Ducts were mastic sealed to cut leakage from 157 cfm at 25 Pascals to the outside to 46 cfm outside. Higher insulation levels and a radiant barrier in the attic, better performing windows, and a tankless propane water heater rather than a 50-gallon electric storage heater added to the savings.

Many of the high-performance improvements did not come with significant additional costs, but did require more attention to detail—for example, following the air sealing requirements on the ENERGY STAR Thermal Bypass Checklist. To make sure air sealing details were not overlooked in the field, Heritage builder Vic Sikka routinely returned to

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- 16 SEER/9 HSPF heat pump
- Air handler and ducts in conditioned space sealed to 46 CFM/100 ft^2 @25 Pa
- Fresh air intake and balanced ventilation

Envelope:

- Wall Insulation: 2x6 advanced framed walls with R-15 cavity insulation or concrete block walls
- Attic Insulation: R-38 with radiant barrier and raised heel trusses
- Windows: double-pane, low-e, fibrex-framed
- Whole-House Sealing: 3.41 ACH 50

Lighting, Appliances, and Water Heating:

- Water heater: tankless propane 0.82 EF

For more information, please visit: www.buildingamerica.gov

the construction site to personally seal any holes created by electrical and plumbing installations.

Other features that improved the home's durability and comfort included starting with a slab foundation, raised heel energy trusses to allow full coverage for the R-38 attic insulation, deep overhangs to shade large windows, advanced 2x6 framing or concrete block construction, locating the ducts and air handler in conditioned space, providing right-sized HVAC equipment with a filtered fresh air intake, and testing to ensure that supply and returns were balanced and that temperatures were even from room to room.

(top) Holes for electrical boxes and wiring and plumbing pipes were sealed with spray foam. Seams at corner framing and bottom plates were caulked.

(bottom) Sill plate gasketing was used to form an air-tight seal between sheetrock and the top plates.

Marketing high-performance homes involves helping buyers understand the value of energy efficiency. Heritage Buildings found that understanding the total cost of home ownership was important to selling the value of high-performance improvements.

Lessons Learned

- Low utility bills and great customer satisfaction can help builders differentiate their product in the market.
- The builder estimated that the high-performance features added just 1% to 2% to the total cost of construction.
- All of house plans produced by Energy Smart Home Plans, Inc., have been designed to be net-zero energy ready, but even when solar panels are not included (as was the case on this house), the homes still typically achieve scores below HERS 60.

"The builder's commitment to improving their product is seen in the results they achieve."

Vic Sikka,Heritage Buildings, Inc.

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

For more information, visit: www.buildingamerica.gov

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