Building America Case Study
Whole-House Solutions for New Homes

Tindall Homes

The Legends at Mansfield | Columbus, NJ

PROJECT INFORMATION

Construction: New home

Type: Single-family

Builder: Tindall Homes

Size: 20 homes, 3,800 to 6,000 ft^2

Price Range: $700,000 to $900,000

Date Completed: 2010

Climate Zone: Mixed humid

Team: IBACOS

PERFORMANCE DATA

HERS Index: 58 without PV, 52 with PV

Projected annual energy cost savings: $3,240 (Morgan model)

Incremental cost of energy-efficiency measures: $17,630

Annual mortgage payment increase: $1,699

Annual net cash flow to homeowner: $1,541

Billing data: Not available

Tindall Homes partnered with the Building America research team IBACOS (Integrated Building and Construction Solutions) to build 20 luxury homes in northern New Jersey that were more energy efficient than ENERGY STAR and met the 50% energy savings requirements of the federal tax credit for new homes. IBACOS contributed design recommendations and analysis. IBACOS calculated annual energy savings of $1,541 to the homeowner for one design, and post-construction testing showed a HERS score of 58.

To build a higher-performance home, Tindall focused first on building an air-tight building shell with superior insulation fully aligned with the air barrier. A precast concrete foundation system with integrated R-12.5 rigid insulation provides an airtight and insulated basement. The 2x6, 24-inch-on-center walls are insulated and air sealed with 3 inches of closed-cell polyurethane spray foam (R-18). The R-49 vented attic contains a combination of R-30 kraft-faced fiberglass batts and R-19 blown cellulose. Any cantilevered floors are air sealed and insulated with 2 inches of urethane foam (R-12) and insulated with an additional R-30 kraft-faced fiberglass batts to equal R-42. Blower door testing results of 3.2 ACH50 confirm the high-performance building shell. A heat recovery ventilator connected to the return plenum on the homes' two furnaces provides fresh conditioned air. With the improved building enclosure, Tindall was able to reduce the size of the two 92% AFUE direct vent natural gas furnaces and two 13.5 SEER air conditioners for the 6,000-ft^2 homes, reducing the cost to the builder by $800 and contributing to the energy savings of the homeowner.

Building America U.S. Department of Energy

(Photo top left) Insulated precast concrete foundation walls, spray foam-filled frame walls, and R-49 of attic insulation keep the Tindall homes in Columbus, New Jersey, warm in winter and cool in summer.

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- Two 92% AFUE gas furnaces
- 13.5 SEER air-conditioner
- Four independent temperature zones
- HRV connected to the return plenum on both furnaces
- Ducts in conditioned space with less than 6% leakage

Envelope and Windows:

- R-18 closed-cell polyurethane spray insulation in 2x6, 24-inch on-center walls
- R-30 kraft-faced batt and R-19 blown cellulose insulation in vented attic
- R-12 urethane foam and R-30 kraft-faced batt insulation in cantilevered floors
- Precast concrete foundation system with integral R-12.5 foam insulation
- Window U=0.36, SHGC=0.33
- Blower door test = 3.2 ACH50

Lighting, Appliances, and Water Heating:

- 95% CFLs
- Two tankless gas water heaters (0.85 EF)
- 2.64-kW grid-connected photovoltaic system available

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Tindall Homes installed their optional grid-tied solar photovoltaic systems on backyard garden sheds, situated for maximum solar gain. Wiring for the systems runs underground from the shed to the home's basement.

Lessons Learned

- The improved building enclosure enabled Tindall to reduce the size of the heating and cooling equipment, reducing the cost to the builder by $800 and contributing to the energy savings of the homeowner.
- Tindall used open-web floor trusses for the second floor. This enabled the builder to run plumbing and ductwork through the conditioned space.
- Through a careful commitment to air seal and insulate complex designs, such as cantilevered floors, Tindell achieved significant air tightness at 3.2 ACH50 for homes of 3,800 to 6,000 ft^2.
- Tindall Homes chose a variety of insulation types based on suitability for each application (e.g., insulated precast concrete for basement walls, spray-foam for framed walls, and batt-plus-blown insulation in the attic) to achieve high performance at a reasonable cost.
- When the housing market dropped in 2008 Tindall had difficulty competing with local builders selling smaller, lower-priced homes as buyers sought up-front bargains over long-term energy savings.

"If all builders built to save 50% on energy use, we could make a big difference."

Mark Bergman, former owner of Tindall Homes

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

For more information, visit:
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PNNL-SA-87329 April 2012

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