Building America Case Study
Whole-House Solutions for New Homes

Treasure Homes

Fallen Leaf at Riverbend | Sacramento, CA

PROJECT INFORMATION

Construction: New home

Type: Single-family

Builder: Treasure Homes
Sacramento, CA

Size: 1,000 to 2,300 ft^2

Price Range: TBD

Date Completed: 2008

Climate Zone: Hot-Dry, IECC 3B

Team: ConSol

PERFORMANCE DATA

HERS Index: 69 without PV, 54 with PV

Projected annual energy cost savings: $766

Added first cost of efficiency measures (without PV): $5,640

Annual mortgage increase: $395

Annual net cash flow to homeowner: $371

Billing data: not available

Treasure Homes' Fallen Leaf at Riverbend, a 32-home development started in 2006, is the first solar community built in Sacramento. Homes in Fallen Leaf save their homeowners as much as 50% on their utility costs. Treasure Homes worked with Sacramento Municipal Utility District (SMUD), the U.S. Department of Energy's Building America program, the National Renewable Energy Laboratory (NREL), and consultant ConSol, a Building America team lead on the project.

The home's energy-efficient building enclosure includes R-13 insulation in the wall cavities plus 1-inch (R-4) of EPS rigid foam insulation that is installed over the sheathing to provide a continuous thermal barrier around the home's exterior. The attic is vented. The HVAC ducts, which are sealed and insulated at R-4.2, rest on the ceiling deck and are covered with R-38 of blown insulation, a technique that works well in dry climates but is not recommended in humid climates unless the ducts are encased in spray foam. The roof sheathing OSB is coated on the underside with a foil radiant barrier to reflect solar heat, minimizing solar heat gain through the attic. The floor above the garage is insulated to R-30.

The right-sized HVAC system features a 90% AFUE furnace and SEER 13 air conditioning, as well as compact duct design and zoned heating and cooling. To reduce the need for air conditioning, Treasure Homes installed a SmartVent cooling system designed with assistance from Building America. The system combines a fresh air intake with an intake filter, temperature-sensor-controlled dampers and timers connected to the central air handler to draw in fresh, filtered air when cooling is desired and the outside air is cooler than the inside air. By taking advantage of this free cooling to reduce inside temperatures, homeowners can save considerably on their cooling costs. The system is ideal for parts of the country with relatively low humidity and significant day-night temperature differences during the summer.

(Photo top left) Treasure Homes' Fallen Leaf project was named a California Green Builder Community by the California Building Industry Association for its energy efficient and green building practices.

Building America® U.S. Department of Energy

Treasure Homes chose a low-profile 2.0 kW solar photovoltaic system that can meet nearly 70% of the energy needs of a typical family.

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- 90% AFUE variable speed furnace
- Ducts buried in attic insulation
- SmartVent automatic night ventilation cooling

Envelope:

- R-38 blown cellulose insulation in vented attic, radiant barrier roof sheathing
- R-13 blown fiberglass in 2x4 wall cavities plus 1-inch (R-4) rigid foam wall sheathing
- Double-pane, low-e, vinyl-framed windows, U=0.38, SHGC=0.29

Lighting, Appliances, and Water Heating:

- ENERGY STAR® appliances and lighting
- 2.40 kw roof-top photovoltaic system
- Tankless gas hot water heater

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The dual-pane, vinyl-framed windows are coated with a low-emissivity clear glazing to reduce radiant heat gain.

Hot water is provided by a tankless water heater. Low-flow plumbing fixtures and dual-flush toilets, and smaller plumbing pipes add to water savings. The homes are equipped with energy-efficient light fixtures. ENERGY STAR appliances contribute to utility bill savings.

Treasure Homes installed low-profile 2.4-kW solar photovoltaic panels to the asphalt shingle roofs. The PV systems came from the manufacturer with a 25-year warranty and were expected to meet nearly 70% of the energy needs of the homes.

Lessons Learned

- Treasure Homes converted the garage of a model home into an energy-efficiency consumer education center where buyers followed a path of "fallen leaves" to different displays showcasing the energy-efficient features of the homes and their financial and environmental benefits.
- ConSol found that cooling accounted for 43% of savings, contributing $262 of the $766 in calculated energy savings (not counting PV). Annual utility bill savings were estimated to be $999 when PV savings were included.
- With help from Building America, Treasure Homes met all of its objectives at the Fallen Leaf development: to design and build a project that would be cost effective; and would use technology that was reliable, readily available, and easily installed in a production building environment.

"Our initial objective was to meet the requirements of the top tier of the Sacramento Municipal Utility District (SMUD) energy efficiency program. ConSol, a Building America partner, showed us how we could take the next step to meet the standards of the California Green Builder program. Once we were there, we met all of the Building America requirements as well."

Jim Bayless, President of Treasure Homes

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

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