



Smart Home Plans, LLC

Building America Best Practices Series

Volume 15. Builders Challenge Guide to 40% Whole-House Energy Savings in the Hot-Humid Climate

Case Study: Tommy Williams Homes

Gainesville, FL

Tommy Williams Homes, a production builder in Gainesville, Florida, built 36 homes in 2010, all of which achieved HERS scores under 60. The Building America Industrialized Housing Partnership has worked with Tommy Williams Homes since 2004 to meet the company's goal of building high-performance, energy-efficient homes.

BUILDER PROFILE

Builder: Tommy Williams Homes
Gainesville, FL

www.tommywilliamshomes.com

Founded: 1978

Employees: 11

Development: Belmont (136 homes)
and Longleaf Village (275 homes)
1,470 to 3,045 ft²
\$190,000 to \$370,000

Construction Date: 2007-2011

“The market has spoken. Energy efficiency sells,” said Todd Louis, vice-president of Tommy Williams Homes in Gainesville, Florida. Since partnering with the U.S. Department of Energy’s Building America program in 2004, Tommy Williams’ production homes have outsold the competition, with sales increasing year after year in spite of the recession. The key, Louis said, is the systems-engineering approach that produces high levels of energy efficiency, comfort, and indoor air quality. The company is so confident in its homes’ energy savings that it offers to pay the buyer’s energy bill for the first year.

In 2010 Tommy Williams built 36 homes, and every one has a Home Energy Rating System (HERS) score under 60. By comparison, a home built to minimum Florida code will have a HERS score as high as 85. The company’s expertise was developed in partnership with Florida HERO, an energy consulting firm, and other members of the Building America Industrialized Housing Partnership. The team provided systems engineering support, energy simulations with cost data, and hands-on construction education.

“Building high-performance homes is not expensive,” said Florida HERO president Ken Fonorow. “In fact, these methods are so cost-effective that there’s absolutely no reason for a builder to build a less energy-efficient home.”

Energy-Efficiency Features

Tommy Williams’ homes are in the Longleaf Village and Belmont developments in the hot-humid climate of Gainesville, Florida. The one- and two-story homes have three to five bedrooms, range from 1,470 to 3,045 ft², and sell for \$190,000 to \$370,000.



(Top) Tommy Williams Homes uses formaldehyde-free blown fiberglass insulation for R-15 in the walls and R-30 in the attics.

(Bottom) Fresh air intakes are installed in the roof soffit or porch ceiling and ducted to the air handler's return plenum to bring filtered fresh air to the house.

The tight thermal envelope in Tommy Williams' homes is achieved with walls and attics that are sealed and insulated. Wall cavities of the 2x4 16-inch on-center framed walls are filled with R-15, formaldehyde-free, blown fiberglass insulation. Ladder T framing creates extra room for insulation. A foam gasket is used to seal the air gap between the drywall and top plate of the walls. Holes around pipes and wiring in the exterior walls are sealed with expanding foam. The vented attic has R-30 blown-in insulation with kneewall air barriers, foam gaskets, and a radiant barrier on the underside of the roof decking. Blower-door tests show 2.7 air changes per hour at 50 Pascals.

Because a hot, humid climate can pose air quality problems, the HVAC system must be carefully designed. Since air conditioning removes humidity in summertime, the air conditioner must be sized correctly for the home, said Fonorow of Florida HERO. An overly large system will cool the home and cycle off too quickly, allowing humidity to build up. Tommy Williams Homes used ACCA Manual J to size the SEER 16, HSPF 9.5 heat pump with a MERV 8 air filter.

In the wintertime, humidity problems are caused by internally generated moisture from cooking and bathing. The problem is solved in Tommy Williams' homes with a positive pressure ventilation system in which drier outdoor air is drawn to the return side of the air handler, downstream from the return air filter. The system supplies fresh air only when the air handler is running. When fresh air is introduced, Fonorow said, the positive pressure in the house pushes stale air out of the home. For additional humidity control, bathroom fans are equipped with a moisture sensor. The fans run automatically, venting moist air to the outside, until the humidity is reduced to a set point.

Louis said the positive pressure ventilation system has been used successfully for more than a decade, but too few builders take advantage of it.

"There isn't a person in the country who is not interested in having a lower energy bill. It costs less to spend a few thousand dollars up front and have a lower utility bill for the life of the home."

TODD LOUIS
Vice-President, Tommy Williams Homes

The houses' ducts, sized according to ACCA Manual D, are sealed with mastic at joints and located in the attic. The attic's radiant barrier protects the cool air in the ducts from heat gain in the hot, humid climate. Duct tests show 4% air leakage at 25 Pascals. Tommy Williams is working on designs that move the ducts into conditioned space. Tommy Williams uses covered porches to protect the large window areas from solar heat gain. The low-emissivity vinyl-framed windows are U=0.35, SHGC=0.25. Energy savings also come from a tankless gas water heater that is 0.83 EF.

Building America partner Florida HERO conducts midpoint and final inspections on every home built by Tommy Williams. In addition to duct leakage and blower door tests, the independent consultant conducts the ENERGY STAR thermal bypass inspection and pressure mapping. Florida HERO also measures the mechanical ventilation flow, the supply air flow, the HVAC system static pressure, and temperature differences across the HVAC coil exhaust.

Health, Durability, Sustainability

All of Tommy Williams' homes meet or exceed the standards for ENERGY STAR certification and certification by the Florida Green Building Coalition. The builder uses zero-VOC paint. The duct board is anti-microbial. Moisture-resistant brick and fiber-cement siding add to the homes' durability.

Innovation

“The most important innovation we use is taking a whole house approach,” Louis said. “We’re not just giving customers a few energy-efficient options to choose from like low-e windows, the radiant barrier, the interior duct system, or advanced framing techniques. We’re putting them all together to create a much better home.”

The company's innovations don't stop there. Tommy Williams has worked with the Building America team BAIHP to build two net-zero-energy homes with photovoltaic panels and solar hot water systems. The homes have a HERS score of -2, which means they produce more energy than they consume. The company is constructing a third zero-energy home and has developed a set of net-zero-energy “ready made” home plans.

“These homes are becoming more affordable,” Louis said. He expects to see “a tipping point coming very soon where we’ll be selling more zero-energy homes than standard homes. It’s just the right thing to do for our kids and grandkids.”

Dollars and Sense

The energy-efficient features of a Tommy Williams home increase its cost, on average, by about \$3,300, compared to a similar home built to minimum Florida code. When financed as part of a 30-year mortgage, this means a cost to the homeowner of about \$265 a year. But the reduction in energy bills averages \$930 a year. The buyer wins.

To underscore how low the home's energy bill will be, Tommy Williams Homes offers to pay it for the first year. “This is more than a sales incentive,” said Louis. “It tells customers that we stand behind our energy-efficient features.”

Energy-Efficient Features

- HERS scores: 48-58
- Foundation: Slab-on-grade
- Siding: Brick and fiber cement
- Wall insulation: R-15, formaldehyde-free, blown fiberglass
- Attic: Radiant barrier, R-30 blown-in insulation, kneewall air barriers, foam gasket sealing
- HVAC: ACCA Manual J sizing, variable speed air handler, SEER 16, HSPF 9.5 heat pump
- Ventilation: Fresh-air, intake to the return side of the air handler, MERV 8 air filter, moisture-sensor-controlled exhaust fans
- Duct system: ACCA Manual D sized, anti-microbial duct board, mastic sealed
- Water heating: Tankless gas, 0.83 EF
- Windows: Low-E, double-pane insulated vinyl windows, U=0.35, SHGC=0.25
- Lighting: 100% CFL
- Appliances: ENERGY STAR dishwasher



Tommy Williams Homes' first zero energy home was completed in January 2010 and had a tested HERS score of -2.

Table 1. Calculated Costs and Savings of Energy-Efficiency Features for Tommy Williams Homes, Gainesville, Florida

Total Energy Savings vs. Benchmark ¹	42%
Total Added Builder Cost ²	\$3,314
Annual Utility Bill savings	\$930
Annual Mortgage Payment Increase ^{2, 3}	\$265
Annual Net Cash Flow to the Homeowner	\$665

¹ Savings are in comparison to the Building America benchmark (a home built to the 1993 Model Energy Code)

² Builder costs were estimated by builders and Building America team. Costs include a 10% markup. Incentives and rebates are not included.

³ Mortgage costs are based on a 30-yr fixed mortgage at 7% interest; inflation is not considered.

Tommy Williams Homes' Recipe for High-Performance Homes in a Hot-Humid Climate

- Create a tight thermal envelope.
- Install a positive pressure ventilation system.
- Right-size the HVAC equipment and duct system.
- Place the air handler in conditioned space.
- Design the house with passive strategies to reduce solar heat gain.
- Install low-emissivity windows.
- Employ independent testing for quality assurance.

The Bottom Line

Tommy Williams Homes has proven to buyers that they can save money and have a better home, Louis said. Sales figures confirm this. In Longleaf Village, Tommy Williams and a competitor each own half of the 550 lots. But Tommy Williams' houses are selling faster. In 2010, Tommy Williams sold 23 homes in the development, the competitor just 16, even though the energy-efficiency features of a Tommy Williams house mean a higher price per square foot – \$139.13 compared to the competitor's \$126.34. Clearly, customers are willing to pay extra for the benefits of a high-performance, energy-efficient home.

For Fonorow, what's most exciting is that Tommy Williams Homes demonstrates unequivocally that companies can build production homes with HERS scores in the 50s and utility bills under \$100 a month using off-the-shelf products, installed by standard contractors. "And Tommy Williams Homes has reaped the rewards of increased sales and quicker turnaround times," said Fonorow.

For More Information

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 eere.energy.gov/informationcenter

