



Building America Best Practices Series

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

Case Study: William Ryan Homes

Tampa Division | Tampa, FL

William Ryan Homes' Tampa Division, used high-efficiency heat pumps and an engineered duct design to get significant energy savings in nine different home designs in central Florida.

BUILDER PROFILE

Builder: William Ryan Homes
Tampa Division, Tampa, FL
www.williamryanhomes.com

Founded: 1992

Employees: 300

Development:

Belmont, The Hammocks at Kingsway,
Camellia Estates, Bridgewater, Grand
Hampton, and Ashton Oaks
277 homes, 1,250 to 3,000 ft²
\$129,900 to \$319,000

Construction Date: 2009-2012

Changes in the Florida Building Code and a company-wide “green” initiative launched in the fall of 2008 gave William Ryan Homes' Tampa Division the push it needed to implement energy-efficient measures as standard practice in all of its new homes. The production builder drew on years of experience working with the U.S. Department of Energy's Building America program in Chicago and other divisions to design nine highly efficient home models that achieve Home Energy Rating System (HERS) scores of 65 to 70, with a current average of 68. The designs will be available in 277 units in five William Ryan Homes communities in central Florida. The homes meet the requirements of ENERGY STAR for Homes and the Florida Green Building Coalition's Florida Green Home certification, a program developed by the Florida Solar Energy Center, a DOE Building America research partner.

Building America's Consortium for Advanced Residential Buildings (CARB) operated by Steven Winter Associates, Inc., analyzed energy use in the home designs and found that they cut whole-house source energy use by 40% compared to the Building America benchmark home (a home built to the 1993 Model Energy Code). These designs are available in five William Ryan Homes communities in Tampa and Orlando: Bridgewater, Grand Hampton, Hammocks of Kingsway, Camellia Estates, and Ashton Oaks. The homes range from 1,250 to 3,000 square feet and are priced at \$129,900 to \$319,000.

Energy Efficiency Features

“We want our homeowners to open their utility bills and say ‘Wow!’” said Chris Nies, Tampa Division Manager. To deliver the “wow factor” William Ryan Homes focuses on an energy-efficient HVAC system, the



(Top) William Ryan Homes has committed to achieving ENERGY STAR and Florida's Green Home certification on every home it builds.

(Bottom) DOE's CARB team showed energy use reductions of 45% compared to a Building America benchmark home, thanks to the use of increased insulation, energy-efficient lighting, and ENERGY STAR appliances.

"The biggest surprise was that we were able to incorporate thousands of dollars in base home specifications and systems upgrades without raising the sales price of the homes one dollar."

CHRIS NIES

Tampa Division Manager

heart of which is a Lennox air source heat pump (SEER 15/8.2 HSPF) with a humidity control relay and an electronically commutated motor that is inherently variable speed for greater efficiency. The heat pump is right sized to provide adequate cooling and dehumidification. The variable speed air handler is located in conditioned space within the home. The ducts are mastic sealed and laid out in a compact engineered design to increase performance and assist in proper balancing of air pressure in the home.

"The HVAC design is the 'pole in the tent' for William Ryan Homes," said Nies.

Ducts are located in the unconditioned attic, which is vented using power roof vents that are thermostatically controlled. William Ryan Homes offers customers the option of installing a radiant barrier in the attic to shield the attic from excess solar heat gain. The Fi-foil product is applied directly to the bottom of the top truss chords and along any gable interior webs. The effectiveness of the product is dramatically displayed in the builder's selection centers using a scaled down model of the attic and heat lamps. "It really helps to sell the product," said Nies. Light, high-reflectivity asphalt shingles are another option offered to homeowners to minimize solar gain. The homes are equipped with programmable thermostats that provide both humidity and temperature controls.

Every home is duct leakage tested with average results of less than 4% duct leakage. MERV 8 filters on the air returns help maintain air quality. Every home is also blower door tested and results show whole house air leakage averaging four air changes per hour at 50 Pascals.

Between 2005 and 2009, CARB performance tested more than 650 William Ryan homes across the country for infiltration levels, duct leakage, supply air flow, and bath fan performance. CARB worked extensively with the builder and its contractors on proper design and installation of HVAC systems and saw considerable improvement in Chicago over that time. These building science lessons learned were applied in the Florida division and elsewhere.

The Florida homes use typical hurricane-resistant construction methods. They are slab on grade with foam block and frame walls. The homes' first-story walls are concrete masonry block that is filled with foam for an R-8 insulation value. Second-story walls are 2x4 framing with R-11 fiberglass batt cavity insulation. The second floor exterior walls are constructed as shear walls with 2x4 framing, 7/16-inch OSB sheathing, and Tyvek Drain Wrap. All seams in the exterior envelope are sealed then cavities are filled with R-11 batt insulation. Attic knee walls are sheathed with rigid foam on the attic side of the assembly to create a complete air barrier around upstairs rooms. The ceiling is insulated to R-38 with blown fiberglass.

Windows are tinted, double-pane, and aluminum-framed with a U-value of 0.68 and an SHGC of 0.53. The lighting is 100% fluorescent. ENERGY STAR dishwashers are installed, as are low-flow plumbing fixtures.

In addition to the radiant barrier in the attic, William Ryan Homes offers other upgrade options to increase energy efficiency beyond the baseline features including tankless water heaters and 20 SEER heat pumps. Optional appliances include ENERGY STAR refrigerators and washers and dryers that are green qualified. All lighting fixture upgrade options are ENERGY STAR-rated.

Health, Durability, Sustainability

From mold prevention to the use of low-VOC paints, William Ryan Homes meets the health and durability requirements of the Florida Green Building Coalition's Certified Florida Green Home Standard and ENERGY STAR certifications. For its efforts, the builder received the ENERGY STAR Leadership in Housing Award in 2010.

To ensure all homes meet the intended specifications, William Ryan Homes has every home tested and provides that documentation to the homeowner in the form of a certificate and label for their electric panel. Building America partner CARB/Steven Winter Associates, Inc., conducted the performance testing initially. Since 2009, William Ryan Homes has contracted with local certifiers to provide third-party duct blaster and blower door testing.

Dollars and Sense

Certainly the last two years have presented the real estate market with some economic challenges. Given the downturn of the economy, William Ryan Homes focused on ensuring the sales price of their homes were no higher than standard construction homes.

"The decision was part of a corporate initiative that was primarily prompted by market indicators. For example, the number of internet searches for 'Green Homes' outpaced 'New Homes' searches 4 to 1," said Nies. "Our entire organization saw these programs as a clear market demand and we felt we could drive cost efficiencies to enable us to be competitive with standard 'code built' homes at the higher specification levels."

To cover the cost of the energy efficiency features, William Ryan Homes chose not to increase the price of their homes; instead, they concentrated on streamlining their construction costs and training their employees and subcontractors to help them become more efficient.

Energy-Efficient Features

- HVAC System Lennox Air Source heat pump (SEER 15/8.2 HSPF) with ECM and humidity control relay
- MERV 8 return air filters
- Programmable thermostat with humidity controls
- Engineered duct layout
- Every home is duct leakage tested with average leakage results of 4% or less
- Blower door testing on every home with an average of 4 ACH50
- Attic vented using thermostatically controlled power roof vents
- Roof: 30-year fungus-resistant architectural shingles, radiant barrier upgrade offered; light roof colors offered
- R-8 foam-filled concrete block first-story walls
- 2x4 wood-framed second-floor walls with R-11 batt insulation
- Vented attics with blown-in fiberglass to R-38
- Tinted, double pane, U=0.68, SHGC=0.53, aluminum-framed windows
- Appliances: ENERGY STAR dishwasher
- Lighting: All fluorescent, ENERGY STAR upgrade package offered
- Plumbing/Water Heating: 0.93 EF 50-gallon water heater, optional gas tankless or electric heat pump hybrid water heater upgrade
- Energy efficient plumbing fixtures



Xeriscape landscaping and native plants outside and low-flow plumbing fixtures inside help homeowners minimize water use.

Cost-neutral energy savings (giving homeowners lower energy bills without a net increase in the cost of housing) is an important goal of the Building America program. Energy modeling by CARB showed electricity savings of over \$1,615 per year relative to the Building America benchmark for William Ryan Home's Siesta house plan. When the estimated \$7,889 of added builder cost is added into a 30-year mortgage at 7% interest, the homeowner still has a net positive cash flow of \$916 per year.

Table 1. Calculated Costs and Savings of Energy-Efficiency Features for William Ryan Homes, Tampa, Florida

Total Energy Savings ¹	46%
Total Added Builder Costs ²	\$7,889
Annual Utility Savings ³	\$1,615
Annual Mortgage Payment Increase ^{3, 2}	\$699
Annual Net Cash Flow to the Homeowner	\$916

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.

William Ryan Homes' own analysis of one of its home models showed a 2,500 ft² home built to code in 1998 would cost about \$2,200 in annual utility bills (for cooling, heating, water heating, lighting, appliances and electronics combined). The same model home built to code in 2003 would cost about \$1,800 in utility bills. In comparison, William Ryan Homes' 2,500-ft² 2010 Jacaranda green home model would cost only \$1,200 in annual energy bills. Compared to similar sized homes built to today's Florida energy code, homeowners of William Ryan Homes would cut annual electricity bills by \$400 to \$500 per year, a savings of 15% to 20%, for very little additional first cost.

The Bottom Line

"You can't use 'rules of thumb' because these homes don't function like the homes of past generations. Instead, by taking time during initial design stages to design a sound approach (right-sized HVAC, proper detailing requirements for a tight building shell and ductwork, etc.) and by implementing a stringent quality control plan, we've shown this level of energy-efficient homes is achievable on a community scale throughout the region," said Nies. "I am very proud of those choices because it reflects our commitment to look at the home from the standpoint of all the components—insulation, load, and cooling. This is the best practice method to optimize energy savings and healthy indoor air quality."

For More Information

www.buildingamerica.gov
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
eere.energy.gov/informationcenter

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