



## Habitat for Humanity in Lakeland, Florida: High Performance Houses since 2000

Since 1995, The U.S. Department of Energy's Building America program has been providing technical assistance to Habitat for Humanity International and local Habitat affiliates interested in building energy efficient homes. Building America researchers help Habitat identify energy improvements that:

- are proven to be cost effective
- are readily available in the market place
- are appropriate for Habitat's volunteer construction crews
- do not place a maintenance burden on the homeowner

### Lakeland Habitat's Commitment

In 2000, Lakeland Habitat for Humanity worked with Florida H.E.R.O., a Building America sub-contractor, to build its first high performance home. Since the completion of this first home, which won a special \$20,000 grant from the Walt Disney Corporation, Lakeland HFH has built about 60 homes that exceed Energy Star requirements by 20-30%. In 2007, they built their first LEED Certified Green Home. Their standard practice (see bulleted list below) saves about 30% in whole house source energy use compared to the Building America Benchmark. The construction management team works with volunteers and the mechanical contractor to ensure the energy efficiency package is implemented in every house. Building America conducts the Thermal Bypass Inspection and tests the duct system.

### The Whole Picture

Designing, detailing, and building high performance housing requires the cooperation of decision makers, construction managers, sub-contractors, and crews. The package of high performance features in all Lakeland Habitat homes includes components for occupant health, safety, and indoor air quality; moisture control for durability; energy efficiency, and comfort (see bulleted lists below.) The components of the package work together, although each is an effective step toward improved long-term performance.

### The Bottom Line

Lakeland Habitat estimates the first cost of the package to be \$1500. Annually, this adds \$50 to a 30 year, 0% mortgage (typical financing terms for Habitat.) Estimated annual energy savings of about \$150 create positive cash flow in the first year of occupancy. For a more in-depth case study of these homes, see "Lakeland Habitat" at [www.baihp.org/habitat](http://www.baihp.org/habitat).

### Occupant Health, Safety, and Indoor Air Quality

- All electric homes – no combustion safety risks.
- *Air Flow Control*: Ducts are meticulously sealed to prevent unintentional air flow between the duct system and unconditioned spaces
- *Ventilation*: Ducted, filtered, and dampered passive outside air ventilation system with air flow of ~25 cfm. (*System not appropriate outside hot-humid climate.*)
- *Relative Humidity*: Kitchens and bathroom exhaust fans are ducted to the outside to remove humidity generated by cooking and bathing.

### Moisture Control for Improved Durability

- Controlling relative humidity levels reduces wear and tear on the air handler
- Continuous exterior air barrier (house wrap sealed at the edges and seams) keeps humid outside air away from components of the building envelope

### Energy Efficiency and Comfort

- SEER 14, HSPF 8+ Heat Pump with duct system sealed with mastic and tested
- Interior air handler closet with ducted central return
- Double pane, vinyl frame, low-E windows
- Existing shade trees preserved when possible (see photo, above right)
- Radiant Barrier below roof decking, R-30 Ceiling insulation, R-13 Wall Insulation
- Thermal Bypass Inspection and blower door test on every house
- Water heater timer, Energy Star Refrigerator, 20% CFL Lighting
- Tight ducts, reduced infiltration, and controlled relative humidity all improve comfort
- Right sized air conditioning coils (Manual J) further improves humidity control



Lakeland Habitat for Humanity home.



Wall insulation installed with no gaps or compression.



Return plenum with ventilation duct.  
~25cfm of outside air enters return plenum when air handler is operating

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For more information on Building America's Partnership with Habitat for Humanity, see [www.baihp.org/habitat](http://www.baihp.org/habitat)



U.S. Department of Energy  
Energy Efficiency  
and Renewable Energy

**Building Technologies Program**  
*Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable*

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

## Research and Development of Buildings

Our nation's buildings consume more energy than any other sector of the U.S. economy, including transportation and industry. Fortunately, the opportunities to reduce building energy use—and the associated environmental impacts—are significant.

DOE's Building Technologies Program works to improve the energy efficiency of our nation's buildings through innovative new technologies and better building practices. The program focuses on two key areas:

### • Emerging Technologies

Research and development of the next generation of energy-efficient components, materials, and equipment

### • Technology Integration

Integration of new technologies with innovative building methods to optimize building performance and savings

For more information contact  
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1-877-EERE-INF (1-877-337-3463)  
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