

Habitat for Humanity South Sarasota

The Saragossa
Innovation Home
Venice, FL



BUILDER PROFILE

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Venice, FL

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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: The Saragossa Innovation Home
- Location: Venice, FL
- Layout: 3 bdrm, 2 bath, 1 fl, 1,290 ft²
- Climate Zone: IECC 2A, hot-humid
- Completion: May 2016
- Category: Affordable

Modeled Performance Data:

- HERS Index: without PV 51
- Projected Annual Energy Costs: without PV \$838
- Projected Annual Energy Cost Savings (vs home built to 2009 IECC): without PV \$660
- Projected Annual Energy Savings: without PV 5,496 kWh
- Added Construction Cost: without PV \$2,300

Low-income Americans face a disproportionate energy burden, spending 17% to 50% of their incomes on heating and cooling bills while other U.S. households spend an average of just 4% of their income on energy. “These families are the ones who would benefit the most from home energy upgrades but they are the least able to afford them,” said Michael Sollitto, Habitat for Humanity South Sarasota County’s Director of Construction. This is one of the primary reasons that the Venice, Florida, based Habitat affiliate is now constructing all of its homes to the high energy efficiency and durability levels of the U.S. Department of Energy’s Zero Energy Ready Home program.

The South Sarasota Habitat affiliate has constructed 21 DOE Zero Energy Ready-labeled homes to date including one home, the Saragossa Innovation Home in Venice, Florida, that won a 2016 DOE Housing Innovation Award. “In the beginning, I thought it would be hard to comply with the requirements,” said Sollitto. “Now it’s just second nature to do what needs to be done to comply.” The simple, one-level, three-bedroom, two-bath, 1,200-ft² homes are true to Habitat’s mission to provide safe, decent, and affordable homes to those in need but they go even further by providing home owners with low energy bills for the long term. The award-winning home this year is expected to cost its owners about \$838 per year in energy bills, or roughly \$70 per month.

The home achieves this by meeting the construction requirements of the DOE Zero Energy Ready Home program. Every home is certified to ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency’s Indoor airPLUS Program. Each home meets the hot water distribution requirements of the EPA’s WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place for it.



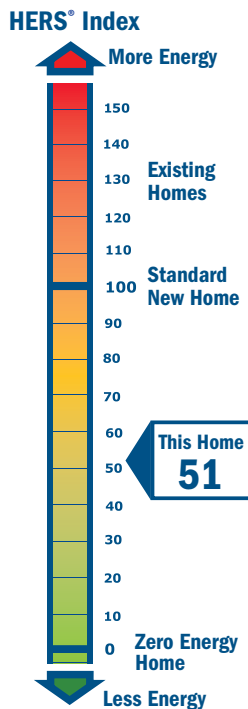
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

Habitat for Humanity, South Sarasota County, built this 1,290-ft² home in Venice, Florida, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. ENERGY STAR appliances and ceiling fans, CFL and LED lighting, and low-flow plumbing fixtures add to the energy and water efficiency of the home.



What makes a home a DOE ZERO ENERGY READY HOME?

- 1 **BASELINE**
ENERGY STAR Certified Homes Version 3.0
- 2 **ENVELOPE**
meets or exceeds 2012 IECC levels
- 3 **DUCT SYSTEM**
located within the home's thermal boundary
- 4 **WATER EFFICIENCY**
meets or exceeds the EPA WaterSense Section 3.3 specs
- 5 **LIGHTING AND APPLIANCES**
ENERGY STAR qualified
- 6 **INDOOR AIR QUALITY**
meets or exceeds the EPA Indoor airPLUS Verification Checklist
- 7 **RENEWABLE READY**
meets EPA Renewable Energy-Ready Home.



“Our affiliate has totally embraced the concept of building homes better than code and employing energy-efficient and green building techniques,” said Sollitto.

The home has an uninsulated slab-on-grade foundation with proper grading of the site to allow for drainage away from the structure. The concrete slab is raised 8 inches above grade per local code requirements. Gutters, downspouts, and rain barrels keep rainwater from pooling around the foundation.

The Habitat affiliate chose a common central Florida construction type—concrete masonry block walls. To increase the insulation value of the walls, the hollow cores are filled with a two-part foam product that hardens as it dries to provide insulation and sound proofing. On the interior side of the walls, the affiliate installs a ¾-inch layer of rigid expanded polystyrene (EPS) foam board. On the inside-facing side of the foam board, they install ¾-inch furring strips. This provides an air space between the concrete block walls and the foil-faced insulation, which is a rolled-sheet vapor retarder product combining layers of perforated foil and kraft paper that is nailed directly to the furring strips with the paper side facing the drywall, which is installed next. The wall has a total insulation R-value of 17.5. The walls’ exterior surface is covered with stucco.

The roof framing and trusses are made of borate-treated lumber for protection against termites. The soffit is also treated for termite and mold resistance. A self-adhering underlayment covers the entire plywood roof deck. The roof is topped with ENERGY STAR-rated reflective shingles in a light grey color to reduce solar heat gain in the attic. The attic is unvented, sealed, and conditioned to provide a protected space for the home’s HVAC equipment and ducts. A 5.5-inch-thick layer of open-cell polyurethane spray foam coats the underside of the roof deck, providing an R-20 insulated, cool, conditioned attic space.

The affiliate installs locally made double-paned single-hung impact-rated windows with thermally insulated vinyl frames. The windows have a low-emissivity coating to reduce heat transfer and are ENERGY STAR rated with an insulation U-factor of 0.33 and a solar heat gain coefficient of 0.19.

“There are two major factors that need to be addressed when building a home in our part of the country—high winds and moisture,” said Sollitto. The affiliate employs moisture-resistant practices including slab-on-grade construction with a raised slab, concrete block walls, borate-treated trusses and framing, a secondary water barrier on the roof, and sealed exterior soffits to prevent moisture, dust,



The unvented attic is insulated with 5.5 inches of R-20 polyurethane spray foam which provides an insulated space for the central heat pump's cooling and heating system ducts. The borate-treated roof trusses and concrete block walls are insect resistant.

and insects from entering the home. "All of our homes are built with durability in mind," said Sollitto. The structures are built to withstand winds up to 130 mph with concrete block walls and metal tie downs that provide a continuous connection from the footers to the truss straps. The closed-cell spray foam insulation that covers the underside of the roof decking also has a gluing effect, helping to hold the roof pieces together. A special nailing pattern is used on the roof sheathing and shingles with an increased number of fasteners. Impact-resistant windows and doors are installed. The walls are clad with fire-resistant stucco and fiber cement. The sealed soffits help to keep out sparks as well as wind-driven rain. Studs and trusses are treated with borate for termite resistance. Inside the home, the rigid foam and tile flooring provide more moisture resistance than fibrous insulation and carpet or wood floor coverings. "Our homes meet the Habitat for Humanity 'Habitat Strong' program requirements for durability," said Sollitto.

Comprehensive air sealing helps to keep humidity, pollen, and dust out of the home. Like all DOE Zero Energy Ready certified homes, the home was tested for air tightness and showed an air leakage rate of 2.8 air changes per hour at 50 Pascals (meeting the air tightness limits required by the 2015 International Energy Conservation Code of 3 ACH 50 for homes in climate zones 1 and 2). To remove moisture produced in the home (for example, from showering and cooking), the home is equipped with a run-time ventilation system that uses electronic controllers to operate the bathroom exhaust fans in coordination with the home's central HVAC fan. A fresh air intake brings in outside air through a dampered duct and filter. The controller is set for an hourly run time and will turn the air handler fan on for several minutes every hour to cycle fresh air through the home even if the thermostat does not call for heating and cooling. The bath fans and range hood fan vent outside. The garage is also equipped with an exhaust fan with an occupancy sensor to pull car exhaust and other pollutants out of the garage.

The home is equipped with a high-efficiency 1.2-ton ducted, mini-split air source heat pump with a cooling efficiency of SEER 15. The heat pump and ducts are located in the conditioned attic.

Sarasota Habitat homes are all built to the Florida Water Star guidelines, which are similar to the WaterSense program and require 1.28-gallon-per-flush toilets, low-flow shower heads, and low-flow faucets. Hot water is provided by a 50-gallon air-source heat-pump hot water heater with a 3.25 energy factor. The refrigerator and dishwasher are ENERGY STAR labeled. Irrigation is not installed and the

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% commitment

ENERGY STAR Certified Homes Version 3.1

EPA Indoor airPLUS

Florida Green Building Coalition, Platinum

Florida Water Star



Every DOE Zero Energy Ready Home combines a building science baseline specified by ENERGY STAR Certified Homes with advanced technologies and practices from DOE's Building America research program.



Impact-resistant windows and doors, a hip roof design with sealed soffits, and steel tied-down concrete block walls add to the home's storm resistance.

home is landscaped with plants and drought-resistant turf rated as "Florida-Friendly" by the University of Florida Institute of Food and Agricultural Sciences Extension.

All of the home's lighting is energy efficient. About half of the fixtures are ultra-efficient LED-based lights, while the other half of the fixtures use compact fluorescent light sources. The home has five ENERGY STAR-rated ceiling fans that are equipped with CFL lamps, which save energy and don't heat up like older bulbs. The cooling effect of the fans' air flow allows home owners to set the thermostat higher for additional energy savings.

To ensure quality construction, Habitat for Humanity projects are implemented with Team

Leaders and Crew Leaders that manage the jobsites. "Each week we meet to discuss the progress of the jobs, the schedule and materials, and any difficulties or issues that need to be resolved. Each member of our team has totally embraced our goal to build affordable, durable, sustainable and efficient homes within our limited budget. Quality control comes from the commitment of our volunteers and staff to provide the best built home within our budget. Our volunteers and staff go through intensive training on the safety, techniques, and products that are used in our homes. From the first shovel of dirt to the last stroke of a brush, we are committed to providing our first-time homebuyers a truly once in a lifetime experience!" said Sollitto.

All of these measures helped the home achieve a Home Energy Rating System (HERS) score of 51. For comparison, typical new homes built to code would score about 80 to 100. No solar panels are included as part of the construction, but each home built by the Habitat affiliate is equipped to be "solar ready" with conduit and electrical panel space installed for future solar panel installation as required by the DOE Zero Energy Ready Home program.

To help its home owners get the most benefit from these high-performance homes, the South Sarasota Habitat offers intensive training sessions for new home owners that include information on operation and maintenance of the systems in their homes. "The DOE Zero Energy Ready Home program has taken us to a new level of efficiency, quality, and commitment to our families. Our affiliate has totally embraced the concept of building homes better than code and employing energy efficient and green building techniques in them. Our homes now offer a high-performance, affordable option for low-income families who are seeking an alternative to poorly constructed homes with high rent and outrageous energy bills," said Sollitto. "We want to ensure that our families have a safe, decent, and affordable place to live for many years to come."

Photos courtesy of Habitat for Humanity South Sarasota

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** R-17.5 total wall R: concrete block filled with foam; on interior: ¾" EPS, ¾" furring strips, perforated foil insulation sheet, ½" gypsum board.
- **Roof:** ⅝" sheathing, fiberglass-reinforced asphalt self-adhering underlayment, ENERGY STAR light asphalt shingles.
- **Attic:** Unvented, insulated under roof deck with 5.5" R-20 polyurethane spray foam: borate-treated trusses.
- **Foundation:** Uninsulated raised slab on grade.
- **Windows:** Vinyl-framed, impact-rated double-paned, low-e, U=0.33, SHGC=0.19.
- **Air Sealing:** 2.8 ACH 50.
- **Ventilation:** Timer-controlled fresh air intake tied to bath fan.
- **HVAC:** Ducted mini-split heat pump in conditioned attic, 15.5 SEER.
- **Hot Water:** 50-gal heat pump water heater, 3.25 energy factor.
- **Lighting:** 50% LED, 50% CFL, ENERGY STAR ceiling fans.
- **Appliances:** ENERGY STAR refrigerator, dishwasher.
- **Solar:** N/A
- **Water Conservation Features:** Florida Water Star compliant; low-flow fixtures.
- **Energy Management System:** N/A
- **Other:** No-VOC paint, drought-resistant plants.