



Sunroc Builders

Morton Road
Lakeland, FL



BUILDER PROFILE

Sunroc Builders, Lakeland, FL
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Rater: Calcs Plus
Dennis Stroer
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Morton Road
- Location: Lakeland, FL
- Layout: 3 bdrm, 2 bath, 1 fl, 1,407 ft²
- Climate Zone: IECC 2A, hot-humid
- Completion: October 2015
- Category: affordable

Modeled Performance Data:

- HERS Index: without PV 48
- Projected Annual Energy Costs: without PV \$817
- Projected Annual Energy Cost Savings (vs home built to 2010 FBC) without PV \$695
- Projected Annual Energy Savings: without PV 6,066 kWh
- Added Construction Cost: without PV \$10,000

The family living in builder Scott Willemsen's latest high-performance home are "more than pleased" with their monthly utility bills. The utilities in their new 1,407-ft² all-electric home in Lakeland, Florida, average less than \$70/month. In previous homes, they had seen bills as high as \$400 a month and according to the home owners those homes weren't as comfortable as their new home, which was built to the high performance criteria of the U.S. Department of Energy's Zero Energy Ready Home program.

This is the third home that Willemsen has certified since joining the program in 2015 and the third home his company, Sunroc Builders LLC, has constructed. Willemsen began building houses to replace the older homes on his rental properties, which included several 30- and 40-year old low-cost rental homes. He sought out energy-efficient construction ideas after hearing too many complaints from renters who could afford his low rents but couldn't afford their high utility bills. An internet search led him to Ted Clifton, a DOE Housing Innovation Award-winning builder and owner of Zero-Energy Home Plans, who ended up designing Willemsen's first DOE Zero Energy Ready home, a 2015 Housing Innovation Award winning home in Haven, Florida.

Like that home, Willemsen's 2016 award-winning home in Lakeland was certified through the DOE Zero Energy Ready Home program. Homes in the program must meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS program, as well as 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.



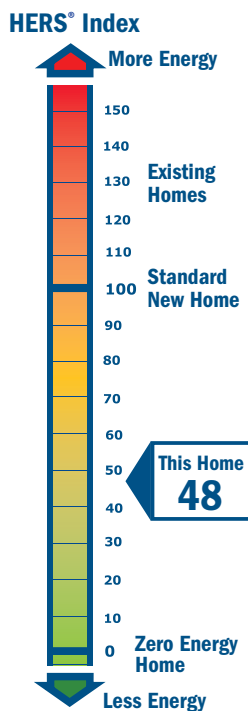
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 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.

Sunroc Builders built this 1,407-ft² home in Lakeland, Florida, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. The home is equipped with EPA WaterSense certified plumbing fixtures, a heat pump water heater, 100% LED lighting, ENERGY STAR appliances, and low- or no-VOC cabinets, flooring, and finishes.



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.



Willemsen's first DOE ZERH home was built with structural insulated panels (SIPs). However, he chose concrete block for the single-story Lakeland home, a more common construction type in Florida.

Willemsen filled the concrete block with spray foam and attached foil-faced rigid foam to the interior face of the block with furring strips, which provided a nailing surface for the drywall. The garage-house wall was wood-framed and insulated with R-13 fiberglass batt with a kraft paper facing on the side toward the home's interior. The exterior of the home was sided with stucco.

The Lakeland home was built on a monolithic concrete slab that was raised above the natural grade surrounding the house. The slab was poured over a 6-mil polyethylene sheet that was taped and sealed at all joints and penetrations to provide a continuous vapor barrier. The ground under the slab was treated for termites prior to pouring the concrete and a perimeter termite treatment was applied around the house after construction. The ground, the driveway, the patios, and sidewalks were all graded to slope away from the house to promote drainage.

Willemsen selected a hip roof design, which is more resistant to uplift in high winds than a gable roof design. The hip roof design also distributes water runoff more equally around the perimeter of the house. The roof was covered with ENERGY STAR Cool Roof-certified asphalt shingles. The vented attic was constructed with cantilevered trusses that increase the height of the roof over the exterior wall top plates allowing the full depth of R-38 blown fiberglass insulation to completely cover the attic floor.

In addition, the Lakeland home was built to be "solar ready" as required by the DOE Zero Energy Ready Home program, with multiple roof surfaces facing west and south for solar photovoltaic installation. Conduit was installed for electrical wiring from the roof to the electric panel and space was provided for future hook up of inverters to the panel. The house design minimized south- and west-facing windows and included overhangs that shade and protect all of the windows. The front and back doors are protected by porch roofs.

The vinyl-framed windows have double panes with low-emissivity coatings and an argon gas fill between the panes to reduce heat transfer. The windows have an



Willemsen worked with his HVAC designer Dennis Stroer of Calcs Plus to come up with a plan to install the ducts in conditioned space below the ceiling plane by hiding them in arches. Drywall was installed in those places to provide an air barrier above the dropped arches.

insulation U-factor of 0.3 and a solar heat gain coefficient of 0.31. Around all doors and windows the builder installed a liquid-applied sealant that provides a seamless seal between the windows and the wall openings.

A split-system central air-to-air heat pump was installed to provide heating and cooling to the home. Instead of installing the ducts in the unheated, uncooled attic, Willemsen worked with his HVAC designer Dennis Stroer of Calcs Plus to install the ducts within the conditioned space of the home below the ceiling, concealing them in arches that also add architectural interest to the home. This technique did require additional coordination with the framer, drywall installer, and HVAC installer as some of the work had to be done out of the normal construction sequence; for example, drywall had to be installed in ceiling areas above locations where ductwork would be installed to provide air sealing of these dropped soffits before the ducts were installed. Stroer, who also served as the HERS rater on the project, participated in meetings with the builder, engineer, and other contractors prior to construction to review plans and confirm that the home would qualify for ENERGY STAR and DOE Zero Energy Ready Home.

Hot water was supplied by a 50-gallon hybrid heat pump water heater. The insulated hot water circulation loop is in the slab. An on-demand push button hot water recirculation system was installed with push buttons at all sinks. EPA WaterSense-rated plumbing fixtures add to water savings. Willemsen also landscaped with Florida-friendly, drought-tolerant plants and grasses, which enabled him to avoid the added cost of installing an irrigation system.

In addition to its energy- and water-saving features, the home was also built with universal design features including large doorways, no-step entries, a roll-in shower, a side-by-side refrigerator, blocking in the walls for future grab bars in all bathrooms, rocker switches, and ADA (Americans with Disabilities Act) compliant faucets.

All of the home's lighting is supplied by LEDs. All fixtures are surface-mounted. There are no recessed can lights, which could lose energy through air leakage even if equipped with LED lamps. ENERGY STAR ceiling fans are installed in the living room, bedrooms, and patio. The home's refrigerator, dishwasher, and water heater are also ENERGY STAR rated.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes
Version 3.1

EPA Indoor airPLUS



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.



A paint-on waterproofing compound provides seamless protection around doors and windows.

The home is provided with fresh air through an energy recovery ventilator (ERV), which operates continually to draw in outside air that is ducted from outside to the return side of the central air handler, while simultaneously pulling stale air from the house and exhausting it outside through separate ducts. The intake and exhaust air flows cross in a heat exchanger, which transfers heat and humidity from the warmer air stream to the cooler one, warming incoming air in the winter and cooling incoming air in the summer. The incoming air is pulled through a MERV 11-rated filter before reaching the air handler. The kitchen range hood is equipped with an exhaust fan for spot ventilation. The bathrooms are also equipped with exhaust fans that are ENERGY STAR-rated and controlled by automatic timers. All three fans vent to the outdoors.

The home achieved a Home Energy Rating System (HERS) score of 48 without roof-mounted solar panels. A standard new home built to code would typically achieve a HERS score of 80 to 100. The home's utility bills average \$68 per month, for a savings of \$695 annually compared to a similar sized home built to just meet code.

Willemsen emphasizes affordability in marketing efforts, along with energy efficiency, certifications, indoor air quality, universal design, comfort, quality construction, and water conservation. "Buyers easily find our website through ENERGY STAR, DOE Zero Energy Ready, and Google," said Willemsen. To meet local buyers, Willemsen also attends "green" fairs, where his booth proudly displays Sunroc's certifications and partnerships, along with examples of the construction materials and energy-efficient technologies he uses. Consumer education continues after purchase. Each new home owner receives a home owner's manual explaining the certifications, construction, warranty, and maintenance of their new home.

The family in the Lakeland home have certainly been pleased with the results in their Sunroc DOE Zero Energy Ready home, noting "there is not a single thing [we] dislike about this home. We love the quality of the construction!"

Photos courtesy of Sunroc Builders

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Foam-filled concrete block with $\frac{3}{4}$ " R-5 rigid foam and furring on interior, stucco exterior, paint-on window sealer.
- **Roof:** ENERGY STAR certified asphalt shingles, hip roof.
- **Attic:** Vented, R-38 blown insulation, raised-heel trusses.
- **Foundation:** Raised monolithic slab over 6-mil poly. Termite treatment under and around slab.
- **Windows:** Double-pane low-e, argon-filled, vinyl-framed, U=0.3, SHGC=0.31.
- **Air Sealing:** 4.53 ACH 50.
- **Ventilation:** ERV, timered exhaust, MERV 11 filters.
- **HVAC:** Central heat pump, 8.20 HSPF, 15 SEER, ducts in conditioned space, programmable thermostat.
- **Hot Water:** 50-gal heat pump water heater.
- **Lighting:** 100% LED, ENERGY STAR ceiling fans.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, water heater.
- **Solar:** Solar ready.
- **Water Conservation:** Push button hot water recirculation. Florida-friendly, drought-tolerant landscaping.
- **Energy Management System:** Programmable thermostat.
- **Other:** Low-/no-VOC paints, WaterSense toilets & fixtures.