



SCC Group and WATERSHED

Mobile Bay
Inspiration Home
Fairhope, AL



BUILDER PROFILE

SCC Group/WATERSHED
Fairhope, AL; SCCGroupllc.com
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Mobile Bay Inspiration Home
- Location: Fairhope, Alabama
- Layout: 4 bdrm, 5.5 bath, 2 fl+bs, 5,750 ft²
- Climate: IECC 2A, hot-humid
- Completed: April 2022
- Category: Custom Spec

Modeled Performance Data:

- HERS INDEX: without PV: 39 with PV: 20
- Annual Energy Costs:
without PV: \$2,100; with PV: \$950
- Annual Energy Cost Savings:
without PV: \$4,000; with PV: \$5,150
- Annual Energy Savings:
without PV: 171,560 kWh, 130 therms;
with PV: 24,600 kWh, 130 therms
- Savings in the First 30 Years:
without PV: \$196,200; with PV: \$251,900

The architectural firm WATERSHED LLC partnered with builder SCC Group and energy rater Keene Living to win their first ever Housing Innovation Award from the U.S. Department of Energy's Zero Energy Ready Home program. The judges were impressed enough to give the builder-architect team a Grand Award as well, in the Custom Spec category. The DOE Zero Energy Ready certified home is a 5,750-ft², 4-bedroom, 5.5-bath, two-story single-family home coined the "Inspiration Home" in Fairhope, Alabama, which should save its owners over \$5,000 in energy costs compared to a similar sized home built to the requirements of the 2018 International Energy Conservation Code. Although the home was constructed for sale on spec, Architect Rebecca Bryant, owner of WATERSHED LLC and owner of the property, decided to keep the home as a personal residence and showcase of high-performance home features and DOE Zero Energy Ready Home construction.

Every DOE Zero Energy Ready certified home meets the requirements of ENERGY STAR Certified Homes. They must also be certified to the U.S. Environmental Protection Agency's Indoor airPLUS criteria and meet the hot water distribution requirements of the EPA's WaterSense program. DOE ZERH homes must also meet IECC 2015 insulation requirements, be blower door tested for whole house air sealing, comply with moisture management guidelines, have ducts inside conditioned space, and use ENERGY STAR-labeled windows, lighting, and appliances. Homes must also have solar electric panels installed or have the conduit and electrical panel space in place for future installation of solar panels.

Bryant noted that achieving the certification added less than 2% to the total construction costs and was primarily for the higher SEER HVAC, ventilating dehumidifiers, re-sealing the HVAC ductwork, and energy rating.



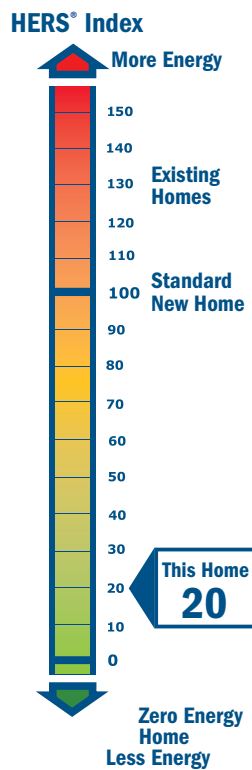
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1/3.2 for an energy-efficient home 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.

The highly efficient DOE Zero Energy Ready home will save its homeowners over \$5,000 a year, thanks to highly efficient insulation and HVAC and ENERGY STAR-rated appliances including the refrigerator, freezer, clothes washer, clothes dryer, hot water heaters, and ceiling fans. The home is also EPA WaterSense rated for water savings. All appliances except the tankless water heaters and fireplace are electric including the induction cook top. The home is equipped with an electric vehicle charging station as well.



What makes a home a DOE ZERO ENERGY READY HOME?

- 1 **BASELINE**
ENERGY STAR Certified Homes Version 3.0/3.1
- 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.



The builders installed a 5.44-kilowatt solar panel array and a 10-kW battery. The PV plus batteries cost \$31,250 after incentives. According to Bryant, the payback is 9 years for the PV alone and 6 years for the battery. According to Bryant, the battery costs \$10,000, about the same as a whole-house back-up gas generator, which has no payback. The city of Fairhope only has two other residential solar installations and did not initially install a bi-directional meter. WATERSHED is working with the city's electrical department to get one installed on the Inspiration Home and to develop the city's net metering policies for future installations.

The battery can serve as an emergency generator in the hurricane-prone region. The home's solar array reports energy usage and consumption in real time to the homeowner and automatically switches into maximum battery charging mode when a storm is predicted. The battery is tied into the electric panel for the main floor and can power appliances, lighting, hot water ignition, and even HVAC when used non-simultaneously in emergency power mode. The homeowners hope to expand the solar array to reach net zero in coming years. With the current set up, the home achieves a Home Energy Rating System score of 20 when counting the PV, or 39 if the solar is not included, far better than the HERS 80 to 90 of typical just-to-code homes.

To achieve this high performance, the builders constructed a highly insulated shell that included 2x6 framed walls with the studs spaced 16 inches on center. The wall cavities were dense packed with 5.5 inches of cellulose. The walls were sheathed with an engineered wood sheathing, then covered with a liquid-applied weather resistant barrier wrapped with a continuous 2-inch-thick layer of mineral wool insulation and synthetic stucco cladding. The mineral wool is part of the synthetic stucco product, which was actually less expensive than a non-insulated traditional 3-coat cementitious stucco.

To increase wind resistance, threaded rods are used in the exterior walls to tie the top plate of the second floor down to the top of the concrete basement walls. The stairway is wrapped in plywood sheathing and works with the elevator core inside the house to provide additional shear capacity to the entire home. Locally sourced southern yellow pine was specified for all of the framing.

The home's truss roof uses a wind-resistant hip roof design. The unvented attic is insulated with 10.5 inches of open-cell spray foam sprayed to the underside of the engineered wood roof deck to achieve R-38. The spray foam covers the exterior wall top plates and completely encapsulates the roof trusses to minimize thermal bridging.



The long, narrow infill lot turned a design challenge into a benefit for the homeowners as daylight easily enters the home's interiors from the long sides of the three-story Cape Dutch and French Colonial-inspired home. A single skylight turned the interior stairway into a light well. This skylight is operable and has a motorized opener powered by its own small solar panel. It can be opened in conjunction with screened windows on the lowest level to create a thermal chimney to quickly cool and ventilate the home.

A rubberized asphaltic underlayment covers the entire roof deck providing a continuous moisture barrier and “second roof” should any rain get past the asphalt shingle roofing and clay ridge tiles. The roof design exceeds the gold level requirements of the Insurance Institute for Business & Home Safety’s Fortified program. Plumbing vents and outside air intakes exit through the top of wall between the rafters, in order to limit roof penetrations, and reduce the likelihood of leaks.

The asphalt roof shingles are made with a polymer-modified asphalt utilizing recycled plastic from rubber tires and plastic bags. The shingles utilize smog-reducing granules that chemically react with the air to reduce smog. The air purifying performance of each roof with these shingles is estimated to be equivalent to two trees.

The home's lowest level is part carport, part enclosed basement. The basement level consists of 12-inch cast-in-place concrete walls with a 40% fly-ash mix. The exterior of the walls was covered with a liquid-applied bituminous waterproofing membrane and 1.5 inches of mineral wool board insulation within the brick cavity and a brick veneer. A 1-inch air gap behind the brick face prevents vapor drive into the walls.

The ENERGY STAR windows are double-pane, argon-filled, fiberglass-framed windows with low-emissivity coatings, a U-factor of 0.3, and a Solar Heat Gain Coefficient (SHGC) of 0.19. All of the windows have pultruded fiberglass exterior frames and sealed wood (pine) interior frames. The windows and exterior doors are impact rated for the high wind zone locale.

The large home was blower door tested and achieved a whole home air leakage of only 1.5 air changes per hour at 50 Pascals (ACH 50). This was achieved by using spray foam at the roofline and band joists, as well as canned spray foam around the windows and at all building penetrations. Sill gasket was installed under the bottom plates. All joints and penetrations in the sheathing were completely sealed with a liquid-applied weather-resistant membrane. After duct leakage was discovered inside inaccessible floor ceiling assemblies, the duct work was sealed with an aerosolized acrylic sealant procedure.

Two gas tankless water heaters provide hot water through insulated PEX piping that uses a central manifold for faster distribution. A leak detection system monitors water use in real time and will automatically shut off the water supply if a leak is detected. The whole house is certified to the EPA’s WaterSense program, which specifies the use of low-flow fixtures and moisture-sensing and drip irrigation.

HOME CERTIFICATIONS

IBHS Fortified Home

DOE Zero Energy Ready Home Program
- 100% Commitment

ENERGY STAR Certified Homes
Version 3.0

EPA Indoor airPLUS

EPA WaterSense

National Wildlife Foundation Backyard
Wildlife Habitat program,

South Alabama Land Trust

“When people ask about our solar panels and we explain that our solar array is our backup generator, they get really excited. We’re in hurricane country. People here understand the need for back-up power. That sometimes feels like a more pressing need than energy savings.”

—Homeowners



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.



All of the exterior walls are wrapped in 2 inches of rigid mineral wool insulation.

To manage run off from the heavy rainfalls, the back yard is dedicated to a rain garden that captures runoff from the yard, downspouts, and foundation drains and can percolate runoff from a 6-inch rain storm in less than 12 hours. The gardens are planted with fruit and nut trees and edible plants and the yard is a Certified Backyard Wildlife Habitat.

A central air-source heat pump with a variable speed compressor provides heating with heating efficient of 9 HSPF and cooling with an efficiency of 17.5 SEER for the two upper floors. The central systems use hard piped, rigid metal ducts for the trunk lines with flex duct to each register. A mini-split heat pump with a 19.7 SEER services the partial basement. Ventilating dehumidifiers were integrated with the

heating and cooling ductwork to bring in fresh air and dehumidify it and to manage moisture when there is no cooling load.

Daylighting and views were a priority for this project. All rooms have daylight from at least two sides except for one windowless bathroom on the basement level. Dimming is provided on all lights, so homeowners only use the light they need. LED lighting with a “warm dim” function was used throughout the first floor, where all primary living spaces are located, to support healthy circadian rhythms by mimicking the color of sunlight at dusk and dawn.

Bryant said the home’s design is inspired by the Arts and Crafts movement and incorporates elements of Cape Dutch and French Colonial traditional styles adapted to a hot-humid climate. The home also includes many aging-in-place and multi-generation options including a ground-floor flex space and second-floor second master suite that could accommodate aging parents or returning adult children.

So far the Inspiration Home has lived up to its name. Over 1,500 potential home buyers visited the home, another 1,100 have visited the website, 17,300 have viewed social media posts, and the home has been the subject of local news articles reaching thousands more. WATERSHED and the energy rater Keene Living are monitoring the home's energy usage, which they will share via the website and they hope to continue to use the home as a location for training activities for homeowners and contractors.

Photos courtesy of SCC Group and WATERSHED

KEY FEATURES

- **Walls:** 2x6, 16" o.c., R-28 total: advanced framed, dense-packed cellulose, engineered plywood, liquid-applied weather barrier, 2" rigid mineral wool; stucco.
- **Roof:** Truss hip roof: ¾" engineered plywood, rubberized asphalt underlayment; asphalt shingles with clay ridge tiles. All vents through walls.
- **Attic:** Unvented attic, 10.5" R-38 open-cell spray-foam on underside of roof deck.
- **Foundation:** Insulated basement: concrete walls covered with liquid-applied bituminous waterproofing, 1.5" mineral wool insulation, 1" grout, brick.
- **Windows:** Double-pane, argon-filled, fiberglass-framed, low-e, U=0.3, SHGC=0.19.
- **Air Sealing:** 1.5 ACH50; spray foam at top plates, band joists, all attic and floor penetrations; sill gasket under bottom plates. Ducts sealed with aerosolized acrylic sealant.
- **Ventilation:** Supply only; ventilating dehumidifiers to HVAC ducts. MERV 13 filters.
- **HVAC:** Two heat pumps, 9 HSPF, 17.5 SEER; one mini-split (19.7 SEER).
- **Hot Water:** Tankless gas water heaters, 0.95 UEF; central manifold, PEX pipes.
- **Lighting:** 100% LED, warm dimming in evening. Skylight in stairwell.
- **Appliances:** ENERGY STAR clothes washer, dryer, freezer, refrigerator, ceiling fans.
- **Solar:** 5.44-kW rooftop panels, 10-kW battery.
- **Water Conservation:** EPA WaterSense-rated fixtures. Rain garden for storm runoff.
- **Energy Management System:** PV app measures usage and production; charges battery if a storm is predicted. Smart thermostats. Leak detection on plumbing.
- **Other:** Low-emission products. Recycled-content concrete, countertops, mineral wool, roofing, cellulose insulation. Electric vehicle charging station installed.