

# FLORIDA GREEN BUILDING

Official Magazine of the Florida Green Building Coalition



SPRING 2009 ISSUE 2 VOL 3

THE SIXTH ANNUAL  
**GREEN  
TRENDS  
CONFERENCE**  
June 10-20, 2009  
Hilton Bayfront  
St. Petersburg, Fla.

Treasure Island's  
**ZERO-ENERGY HOME:**  
A Prototype for the Future?

How to Choose a  
**GREEN BUILDING  
CONSULTANT**

Taylor County Plans for  
**A GREEN 2060**



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PHOTO BY FRANK BAPTIE.

Published by: INSIGHT CUSTOM PUBLISHING

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*Florida Green Building* is printed with soy-based ink on recycled fiber content paper with a minimum of 10 percent post-consumer waste.

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**BEYOND  
ENERGY-EFFICIENT**

*Despite having 2,567 square feet of air-conditioned space, Cynthia Faulhaber's home actually produces energy for use by others.*

# Treasure Island's Zero-Energy Home

An owner and her team of designers and builders bring a green residence from concept to creation. BY KEN PLONSKI







**SOLELY SOLAR**  
Solar panels on the roof generate 3kW of electricity, and the remaining 11kW needed to power the home are generated from panels on the roof of the cabana.

When Cynthia Faulhaber decided to build a new home, she set two goals: 1. the house would use minimal fossil fuel for energy, and 2. the house should be as sustainable as possible without sacrificing its aesthetic appeal. As a result, her new 3,925 square foot home on Treasure Island, near St. Petersburg, Fla., may be a prototype for homes to come in our increasingly energy-conscious society.

With 2,567 square feet of air-conditioned space, the most impressive feature of the home is that it was designed to be energy self-sufficient. That design goal was not only confirmed, but exceeded, when the home received a Home Energy Score (HERS) of -9, meaning that it will actually produce energy for use by others. To put that rating into perspective, a HERS rating of 90 complies with current codes; a rating of 85 qualifies a house as “Energy Star.” According to Cynthia, much of the credit for designing and building such an energy-efficient home lies with the team she assembled, and how they cooperated to achieve her vision.

### The Architects

The process of building a super-sustainable and zero-energy home began in the Fall of 2005 when Cynthia identified Jon Sarkesian Architects of Royal Oak Michigan—a firm with extensive experience in sustainable design—to lead her team. Architect Jon Sarkesian and Project Manager Harold Remlinger met with Cynthia every month for more than two

years to discuss, review, and evaluate the myriad design details associated with this home.

“When Cynthia began to describe her goals with respect to the sustainability of the home, and I saw the passion she had for this project, I knew this would be a unique opportunity,” Sarkesian says. “We were able to draw upon our experience in this area of design to not only achieve Cynthia’s goals, but in many respects, raise the bar of sustainability in residential design. It was a phenomenal process for everyone involved.”

The amount of planning that went into Cynthia’s home cannot be understated. “It’s critically important to work through every element of design right from the start,” says Remlinger. “When you take this approach, you minimize the need for design modifications once construction begins,” he adds.

### Blending Form and Function

An excellent example of that planning process was the way the architects blended the owner’s aesthetic requirements with the imperatives of sustainability and zero-energy. In most American homes, approximately 20 percent of the square footage includes long hallways and oversized entry foyers. The design plan for Cynthia’s home eliminated these spaces, and in the process, the home used 20 percent less construction materials than a typical home of similar size. It also reduced energy consumption by a similar percentage.

“It’s not uncommon in our industry to find that in a quest for energy efficiency, design suffers,” Sarkesian says. “At our firm, we believe energy efficiency and eye-pleasing design can be compatible.” To illustrate this, they point to the way features such as the photovoltaics, solar hot water system, HVAC system, remote-controlled hurricane shutters, and water conserving cistern are imperceptibly integrated into the home’s design.

The architectural team also used its experience, combined with a good deal of research, to ensure the sustainability of the mechanical equipment and different products and materials that would be used in Cynthia’s home. At the completion of the design process, the majority of the home’s sustainable specifications were already incorporated into the final construction documents.

The architects’ experience with solar power and design prepared them well for the Treasure Island home. In the earliest stages of design, they spent considerable time determining how the home would be situated on its lot. Cynthia wanted to ensure that every room would have views of the canal at the front of the home. At the same time, the home’s position on the lot had to take into account considerations for passive lighting and shading, heat gain, and photovoltaic placement. Once these calculations were completed, they used digital modeling technology to test the calculations, and where necessary, design adjustments were made to achieve the

owner’s program requirements.

### The Builders

After two-and-a-half years of planning, it came time to select a contractor. Cynthia interviewed six different builders before she selected Jeffery Wolf. “I could see the excitement he had for this project,” she says. Wolf is an experienced green-certified contractor and was tasked with managing the large number of subcontractors who would be installing a variety of green products in the home.

“I consider myself a student of green building,” Wolf acknowledges. “But Cynthia’s home exposed me to a lot of new products that up to this point had limited use and application in the Tampa Bay area. That fact posed some interesting challenges for our construction team, and in many respects, furthered our education in green building.”

That’s when Wolf brought Dr. Jennifer Languell, owner of Ft. Myers-based Tri-fecta Construction Solutions, onto the project team. “I had attended several green building classes that Jennifer taught and I knew she would be a tremendous asset to the team,” Wolf says.

Together with the architects and interior designer Marilyn Whitney, owner of Whitney Interiors of Savannah, Ga., who integrated universal design and sustainable material selections into the home, the team met frequently with Cynthia. On the agenda were subjects such as the home’s energy optimization program,

or reviews of the specific products and designs that would help achieve her sustainability goals.

“The energy optimization program for this home was evolutionary,” says Dr. Languell. “As the team continued to meet, we explored a variety of ways to enhance the home’s sustainability and further reduce its energy consumption. Every piece of equipment, every appliance, and even the lifestyle of the owner had to be factored into the energy optimization model.”

### Solar Challenges

The application of photovoltaic technology in the home provided some of the learning experiences for the team. “Our supplier did not have a frame of reference with respect to powering the entire home. It was not something he had ever been asked to do,” Wolf says.

When it was determined that Cynthia’s existing home site could not accommodate the number of photovoltaic panels needed to run the home, she purchased an adjacent lot and planned a pool area and cabana to solve the problem. The team decided to install panels on the roof of Cynthia’s home that would generate approximately three kilowatts of electricity; the remaining 11 kilowatts of electricity needed to power the home would be generated from panels on the roof of her cabana where that system’s inverters and batteries were located. The team installed two different products, each

of which achieves optimum efficiency at different temperature and light levels. One is a Unisolar amorphous laminate PVL on the roof of the house; the other is a Kyocera multi-crystalline KD210 in the pool area.

The batteries and inverters for a system of this size required a good deal of space, another of the home’s design challenges. Since the home is in a flood zone, the electrical equipment had to be placed above the Base Flood Elevation (BFE), which in this case was seven feet above the ground floor slab. The team decided to house part of the equipment in the second floor pool bath, with the batteries for the house unit placed on a rack in the garage that sits above BFE. That unit’s battery chargers and inverters are located in an electric room on the main floor of the home.

### Taking It to Zero

For the home’s heating and cooling system, Wolf researched and recommended a high-performance Daikin unit for the residence. The system is R410-A and does not use refrigerants that could be harmful to the Earth’s ozone layer. The system itself is approximately four times more efficient than the units found in most residential construction. Because of its design, it will pull far less power at start-up than more conventional units. After a thorough evaluation by the architects and HVAC subcontractor, they decided to install the unit.

To minimize electricity requirements, the lighting in the home is 100 percent





#### HIGH-TECH GREEN

The home uses low-flow faucets and a water filtration system with infrared activation. It also has a greywater recycling system that captures and filters water from the showers, laundry, and bathtub to rinse out the dual-flush, low-water toilets.

light emitting diodes (LED), making it one of the first homes in Florida to fully utilize this energy-efficient technology. The total connected lighting load is estimated at about 2,080 watts. If incandescent fixtures had been used, the load would have been about 8,400 watts.

The LED lighting also uses about half the electricity as compact fluorescent bulbs, and the LED fixtures can be dimmed. They also feature warm white and cool white temperatures, and some of them can be programmed to allow Cynthia to adjust the color range. In terms of bulb life, the incandescent will provide only 2,000 hours of use, compared to as much as 100,000 hours for the LED. Another benefit of the LED lighting is its extremely low level of heat output compared to incandescent and even compact fluorescent lighting—a consideration that was factored into the home's energy models.

Inside the home, almost all of the materials are reused, renewable, or recycled, and they provide for a healthy interior environment. For example, the wooden beams that accent the home's interior are locally harvested cypress or sustainable beech wood. The main living area features a fish oil-stained concrete floor. Bamboo floors in the bedrooms and other areas of the home, as well as the kitchen cabinets, are not only renewable, but also formaldehyde-free. None of the paints used in the home emit volatile organic compounds (VOCs). Detritus tile, made from a variety of reclaimed materials, is used

throughout the home. The kitchen and powder room feature concrete countertops.

Another resource-saving feature of the home is its Certified Water Star Gold pipes. Cynthia can expect to save as much as 40 percent on her annual water bill. The home uses low-flow faucets and a water filtration system with infrared activation. It also has been plumbed with a whole-house grey water recycling system that captures and filters water from the showers, laundry, and bath tub to rinse out the dual-flush, low-water toilets. The home features a 2,500 gallon cistern that collects rainwater from the cabana roof to provide irrigation for the predominately native landscaping. The paver driveway has a stone and pea gravel sub-base to allow for enhanced drainage on the site.

The skeleton of the Faulhaber home was created with just as much attention to sustainability as the rest of the home. Built from locally produced concrete block that's treated to be water resistant, the home's internal framing used steel made from 87 percent recycled content. To remain true to the home's sustainable nature, the steel waste and all other construction debris at the site were sorted and sent to the appropriate recycling center for reuse.

Great care was also given to prevent moisture intrusion in the home, which often leads to mold-related problems. A water management system incorporated two layers of water-proofing membrane

and weep screed drainage holes at the bottom of the stucco walls to allow any water that did penetrate the system to escape. The drywall was also treated to be moisture and mold resistant. "Every measure was taken to make sure that water would not get into the home and, if it did, it would quickly find its way out. In our hot and humid environment, these steps are very important to maintaining the health of the house," Wolf said.

#### Other Green Goodies

The home features Icynene insulation, which is also mold and mildew resistant, in the wall spaces and roof. The insulation is sprayed and expands to create a tight seal, reducing air infiltration. The roof has a rating of between R-30 and R-38, which will also reduce heating and cooling costs.

Easy, low-cost maintenance was also high on Cynthia's list of sustainable design considerations. Portions of the exterior feature a fully recyclable Rheinzink siding material, a zinc-titanium alloy that is certified by the Association for Environmentally Proofed Building Products and is extremely durable. The paint colors for the home were mixed into the stucco, and as a result, the home will not need to be repainted for at least 20 years.

With guidance from the architects and interior designer Marilyn Whitney, the home features many Universal Design features that are planned to accommodate a person's needs at various stages of life. Doorways are 36 inches wide, and the

home's tilt and turn windows, that enhance ventilation, can be operated by a person who has limited hand motion. Some of the counter heights are also at a height of 30 inches to allow easier access for people with mobility challenges. Marilyn also assisted Cynthia with material and fabric selections in the home, to further integrate her quest for sustainability. "Marilyn was an important member of the team and her input can be seen throughout the home," Cynthia said.

The home includes a number of other sustainable features such as hurricane shutters that can be used to reduce thermal heat gain; a low-energy induction cooktop; chlorine-free pool filtration system; and a built-in recycling system for different types of materials. An automated Crestron touch panel system in the home can remotely control all of the lighting, adjust temperature settings, arm the security system, and raise and lower the home's hurricane shutters.

#### Time to Move In

For Cynthia, what began with a 2005 meeting with her architects in Michigan culminated with a certificate of occupancy in April 2009. Actual construction of the home required 24 months. "I am completely satisfied with the process and my home," she said. "I am proud of the teamwork that was displayed, and I'm grateful for the contributions from everyone who worked on this project," she adds.

She also hopes that the experiences

gained from this project will help advance the practical applications of sustainability in more and more homes. Jeff Wolf believes it will. "The process of building a truly sustainable home taught us a lot about the capabilities of the products we used, and it will ultimately help bring even better products to the marketplace," he states. "We're working in an area that is still in its infancy, yet every advance brings us closer to the goal of sustainability. I see this as an important accomplishment."

Dr. Languell, who has used the Florida Green Home Designation standards developed by the Florida Green Building Coalition to certify a large number of the homes in Florida, says she has never been involved in a project quite like the Faulhaber residence. "This home was not created as an experiment. It serves as an example of how we can transform our residential building practices to have a minimal impact upon our environment."

Sarkesian and Remlinger are both pleased with the outcome of a project that has occupied almost five years of their lives. "The time we spent in the planning process paid important dividends," Sarkesian says. "This home serves as a model for what we can achieve in the area of sustainability." 🌱

KEN PLONSKI is a 28-year veteran of the home-building industry, having worked at the Del Webb Corporation and WCI Communities. He is now a partner in Master Planned Communications in Ft. Myers, Florida.

#### LEARN MORE

Visit this advanced technology home during the GreenTrends Conference scheduled for June 10-12, 2009, in St. Petersburg. For more information visit: [www.GreenTrends.org](http://www.GreenTrends.org).

#### HOME FACTS

The following is a list of distinguishing green features that characterize the Faulhaber residence.

- ✦ 2,567 square feet of conditioned space
- ✦ 3,925 square feet total
- ✦ Zero Energy Home
- ✦ HERS Index -9 (energy producing home)
- ✦ Florida Green Building Coalition Certified Green Home Designation (Score = 248)
- ✦ EPA Energy Star
- ✦ Certified Water Star Gold
- ✦ 14 kW of photovoltaic panels installed
- ✦ 100% LED lighting—reduced the lighting load from 8,400 to 2,080 watts
- ✦ Greywater system uses filtered shower and laundry water to flush toilets
- ✦ 2,500 gallon cistern used to harvest rainwater for watering the plants