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Overview

Located in Escondido

Home to Nigel (physicist) and Rhonda Farrar (former analytical chemist)

Construction began in the Spring of 2010, Completed in the Summer of 2011
Sustainability Mission

Model home for green design and building and model Farm for local sustainable family farming.

Net Zero Carbon Footprint – net zero amount of CO2 emitted individually in any one-year period

Based on:
- Amount of energy consumed
- Travel habits (Car, flights, public transportation)
- Eating choices (White meat, red meat, organic, etc.)

- Net zero building- total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site.
- Uses 54.7% less energy than the Title 24 standard

Links to all documentation provided for LEED Platinum certification:
http://www.farrargreenhome.org/LEED.html
Farrar House Partners

General contractor: Gaitaud Construction

Interior Designer

Green pool contractor

Exterior coating

HVAC Contractor: Mountain Air

Cool Roof Contractor

Soil and septic consulting

Landscape architect/ plant consultant

Geothermal Contractor

Green tech consultant

Green tech consultant
The Farm

- 2 acre flat area all planted with edible trees and plats
- Sloped areas planted with low maintenance, drought tolerant plants and trees
- Unusual and heritage fruits and vegetables not found in supermarkets
- Chicken coop
- Farm important in making home carbon neutral
The House

- 3,058 SF home
- 2 Story
- 4 bedroom | 3.5 baths
- Scenic view of Lake Hodges
- Separate guest house

Pricing:

- Zillow estimate: $847,000
- Assessed value: $810,000
- Construction cost: Approximately $270 per SF or $825,660 (Per architect)
Features

- Solar Thermal Chimney
  - Passive ventilation strategy
- Solar Panels
- Cool roof
- Smart home technology
- Orientation of the house
  - Maximizes views, breeze, and solar capture
- Ground source
  - Geothermal Heat Pump
- Infinite pool heated by
  - Geothermal system
- View deck over entry of house acts as cool roof to reflect solar heat before it can enter the home, doubles as place to relax and enjoy views
- Separate guest house
- Instead of formal living room inside of house the collects dust, created outdoor patio area to be living room
- Recycled materials used throughout the house
- LED lights and Non-VOC paints
- Constructed with insulated concrete form blocks and styrofoam

Smartly designed to be energy efficient and easy to use
Home Features: Passive solar design

**Thermal Chimney**

**Window shading**
Decks and roofs extend over western facing windows to shade windows from direct sunlight.

**Windows**

**Insulating Materials**
Thermal broken aluminum for windows facing east – double the thickness of most windows, providing superior thermal and sound ratings. Virtually maintenance free.

Well insulated home – 1ft thick walls

See “Insulation” and “Cool Roof” sections
Home Features: Smart Home

Controls entire house remotely from iPhone, iPad, or computer. Cortexa Smart Home System manages home’s climate, lighting, security, audio, and irrigation systems.

Advantages

- Convenience – access to all home systems remotely
- Security – advanced security systems
- Accessibility- for disabled or elderly residents, voice command systems available
- Efficiency – energy savings (lights shut off when no one is in room, thermostat can be automated, etc.)
- Resale – potential to sell for much more than comparable homes without smart home features

Cost: Approximately $1,450 - $5,550*

*According to Cortexa website
Home Features: Recycled | Sustainable Materials

Cost: No cost premium, comparable to non-green counterparts
Home Feature: Geothermal Heating & Cooling

• Heats & cools the home air & master bathroom floor, guest house, swimming pool and spa

• Common in the Midwest & other colder parts of the world

• Powered by PV solar panels on the roof

• Uses only 1/3 power of traditional heating/cooling systems

• Clean—100% emission free

• Quiet

• Virtually no maintenance

• A path to Net Zero energy home

“Most energy-efficient, environmentally clean, and cost-effective space conditioning systems available” – EPA
Home Feature: Insulated Concrete Form (ICF)

ICF Construction- 1 ft thick concrete walls made from recycled concrete & Styrofoam, Two built-in layers of foam insulation²

Cost comparable to building with 2x6 wood framed house, but better construction:

- 10x more sound insulative
- 7x stronger in earthquakes
- 4x more heat insulative
- Superior fire resistance
- Termite proof
- Mold resistant

* Forethought allowed residual concrete to be used for landscape walls

Increased R-value without increasing in thickness

R-value = measure of insulation's ability to resist heat traveling through it
Home Feature: Standing Seam Metal “Cool” Roof

“All metal roofing in general is considered a "cool roof" by the US EPA. This is because metal roofing can be painted any color, including colors on the lighter end of the spectrum which will prevent solar heat gain.”

“Homeowners find that the higher initial cost of this type of roofing will pay off in the end because of its greater durability and reliability.”

Advantages
• Seams or potential points of entry for moisture are raised up higher than conventional asphalt shingles and are fewer in number.
• Metal roof material better withstands weight of PV cells and allows them to snap in easily
• Easier to clean
• Quiet when installed with solid sheathing
• Never re-roof again, 30-50yr warranties adds to resale value
• 2-3x longer than asphalt
• Never decomposes

Disadvantages
• Fewer Metal Roofers = longer search for good roofer, higher total project costs possibly due to lack of competition
• Not good for flatter roofs
• Considered moderately expensive
  • 2-3x more than conventional shingles, comparable to tile or cedar shake, but less than high-end slate or copper

“cool roof”
Home Feature: PV Solar Cells

Existing home equivalent of Farrar House would have required 12kW (kilowatt) system or more, but Farrar House built with energy efficiency in mind only requires 8.46kW system.

Advantages
- No fossil fuels needed
- Emission free
- Reduces electricity needed from Power Plant by 130%
- Clean and quiet
- No maintenance
Home Feature: Well & Water Efficiency

Water Efficiency

- All water used in manufacturing process of floor and wall tiles was 100% recycled
- Small Pool Design & Swim Gym Pump installation required less pool water
- Dual flush water efficient toilets
- $30 water bill per month

Well

- 15 gal/min Well water used to irrigate farm; automated by Cortexa
- Construction of efficient well on-site allows for pumping costs and energy consumption to go down – lower water bill.

Cost Well Construction: $20,000
Cost Comparison

Traditional (Non energy efficient) Tract Home construction cost

$200 PSF

Energy Efficient Tract Home Asking Price
(KB Home Rancho Santalina Haciendas)

$240 PSF

Farrar House Custom Home construction cost

$270 PSF
Federal and State Incentives in 2011

Federal:
- 30% of costs of solar electric systems, solar hot water heaters, and geothermal heat pumps.
- 10% of costs of energy efficiency improvements including insulation, energy-efficient exterior windows and doors and certain roofs. Limit of $500, of which $200 used for windows.

California:
- California Solar Incentives Rebate: provides incentives for the construction of new, energy efficient homes that install solar panels.
  - Two types of incentives through CSI program:
    - Expected Performance-Based Buydown: $0.00 - $3.50 / W based on systems performance, one time paydown
    - Performance-Based Incentives: $0.00 - $0.60 / kWh monthly payments for 5 years based on actual performance (output) of the system as measured by a separate performance meter.
Lessons Learned

• Going green is easier than you think and can create a more comfortable living environment.

• Building a green home can cost more upfront than a traditional home, but with life-cycle costing, can cost as much as or less than a traditional home.

• All features in Farrar home were off the shelf and is available to general public.
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