

Operation Helping Hands Green Dream 1 Home

Case Study

New Orleans, Louisiana

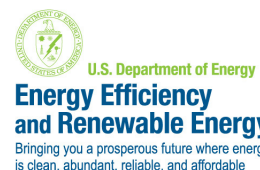
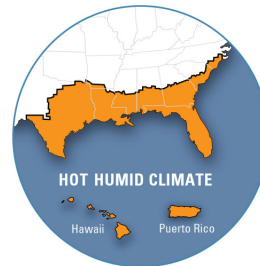


OVERVIEW

The Green Dream 1 house is a joint project between Catholic Charities Archdiocese New Orleans' program Operation Helping Hands (OHH), the Louisiana State University AgCenter's Louisiana House Project (LaHouse), and Building Science Corporation (BSC) working with the Department of Energy's Building America Program.

The Green Dream 1 home has been built on property owned by the family before Hurricane Katrina. The property is located in the primarily residential St. Bernard planning district of New Orleans – below Lake Pontchartrain and near to City Park. The area is in a 130 mph wind zone and a hot-humid climate zone.

The intense solar radiation in this climate imposes a large thermal load on the house that can increase cooling costs and affect comfort. The approach presented in this case study minimizes the impact of solar radiation on the building, its mechanical system, and its occupants. Moisture is a significant problem in this climate, more so in those areas that receive more than 40 inches of annual precipitation. The ambient air has significant levels of moisture most of the year. Because air conditioning is installed in most new homes, cold surfaces are present on which condensation can occur. Controlling the infiltration of this moisture-laden air into the building



PROJECT PROFILE

Project Team:

Catholic Charities Archdiocese New Orleans' program Operation Helping Hands (OHH), Louisiana State University AgCenter's Louisiana House Projects (LaHouse), Building Science Corporation

Location:

New Orleans, Louisiana

Description:

1,400 ft² 3 bedroom, one-and-a-half story single family home

Estimated Completion Date:

December 2008

Estimated Annual Energy Savings:

41% over Building America Benchmark with solar DHW (36% without solar DHW)



Building Science Corporation
30 Forest Street
Somerville, MA 02143
www.buildingscience.com

BUILDER PROFILE



Catholic Charities Archdiocese New Orleans – Operation Helping Hands brings volunteers from across the country together to help rebuild New Orleans by rebuilding homes of elderly, disabled or uninsured homeowners. The flooding in the aftermath of Hurricane Katrina severely damaged as many as 200,000 homes in the Greater New Orleans area. Hurricane Rita’s effects exacerbated the damage already done by Katrina.

Operation Helping Hands has used more than 16,000 volunteers to gut and mold remediate 2,000 homes. Forty-seven homes have been repaired and repainted and 45 are under construction.

For more information, see: www.ccano.org/OHHprogram.htm

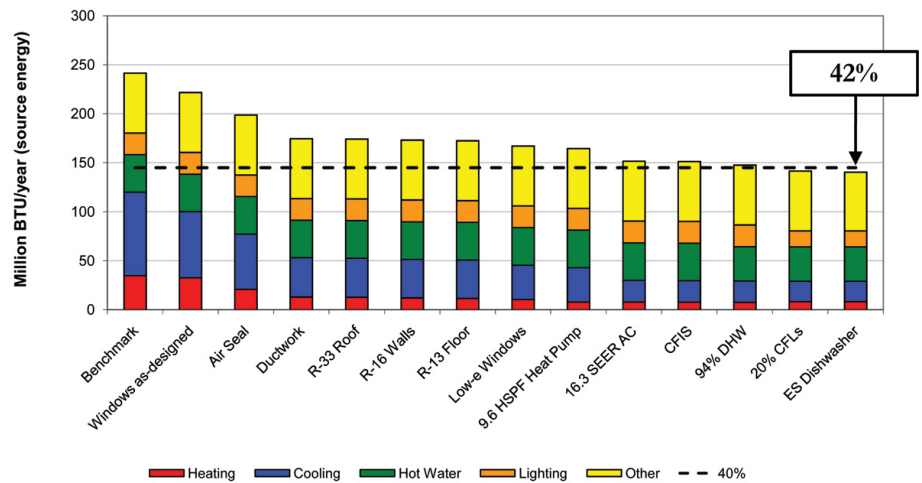
PARTICIPATING PROGRAMS & CERTIFICATIONS

U.S. Department of Energy’s Building America Program



U.S. Environmental Protection Agency ENERGY STAR® Program

PARAMETRIC STUDY



envelope and keeping moisture away from cold surfaces are major goals of design and construction.

DESIGN

The proposed house is a 1.5 story, three bedroom single-family building on a raised pier foundation. The house design is similar to houses that have been built by BSC in many parts of the country.

The Green Dream 1 house is an example of best practice energy efficient and environmentally responsible homebuilding that is flood recoverable and affordable.

The Green Dream 1 prototype house was an effective demonstration of affordable, energy efficient construction approaching the target of 40% reduction in whole house energy savings relative to the Building America Benchmark.

The estimated construction cost of \$120 per square foot was only a marginal increase on the typical construction costs for this builder in this area. The increased capital expenditure on durability and energy efficiency measures was shown to be well within the dollar savings over the service life of the building created by reduced utility bills to the homeowner.

The reduced utility costs, reduced maintenance, and flood-recoverable benefits developed by this project will be a major benefit to Operation Helping Hands’ core client group of elderly, disabled or uninsured homeowners. It is expected that the technology package developed for the Green Dream 1 house will be used by OHH in future new construction of single family homes in New Orleans.

CONSTRUCTION

The attic is designed as an unvented attic, which can have superior performance for moisture control reasons, overall airtightness results, and moving the ductwork within the conditioned space. With unvented attics such as this, the plane of air tightness is located at the plane of roof, and not at the ceiling plane as is common with vented attic designs.

The fully-adhered SBS membrane, not only provides a waterproofing layer under the shingles, but also has a perm rating of less than 0.1 perms, making it a Class I vapor retarder (as per the 2007 Supplement to the International Residential Code, ICC, 2007). This membrane will prevent exterior humidity or water absorbed by the shingles from diffusing into the roof construction from the exterior.

Spray foam was used extensively on this home to increase the home’s

U.S. Department of Energy
EnergySmart Home ScaleSM

Estimated annual energy usage: Electric (kWh) 9998
Estimated energy cost: Monthly: \$92

1248 Caton Street, New Orleans, LA 70122
Rated by Building Science Corporation
Rating conducted April 2, 2009
www.buildingamerica.gov/challenge

Conditioned floor area (sq. ft.): 1,404

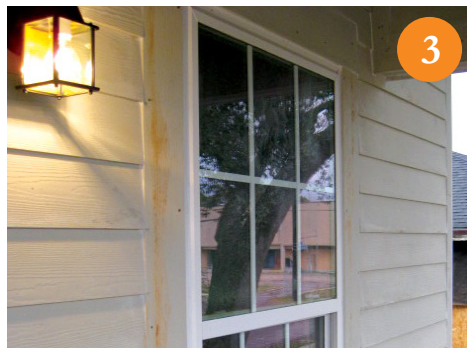
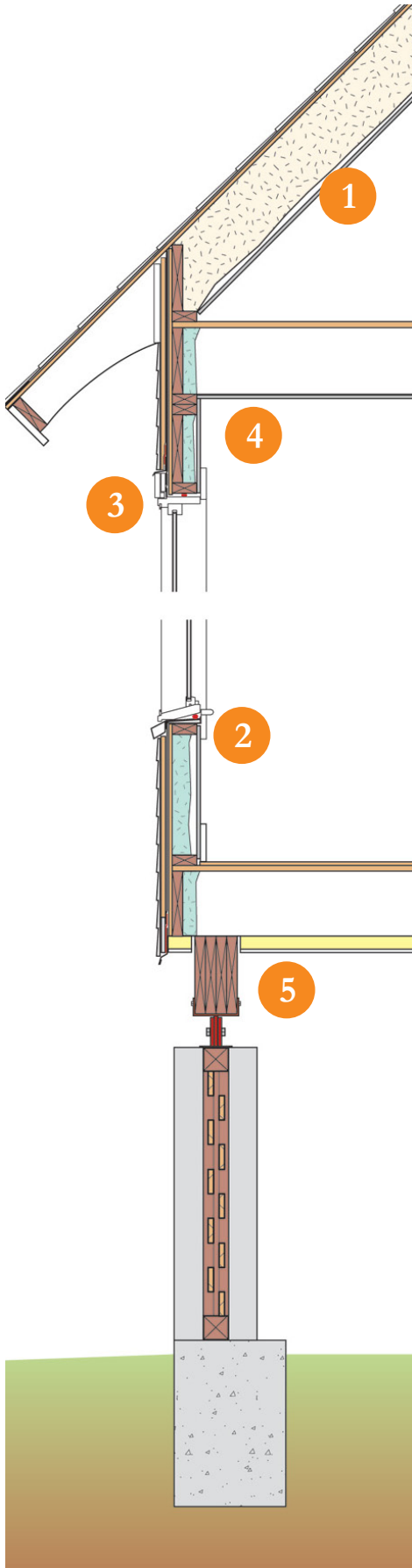
Meets The Builders Challenge
Meets the U.S. energy performance quality, cost, and energy goals.

Your Home: **64**

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Poor Energy Performance (150-100)
Typical existing home (130)
Typical new home (100)
Builders Challenge (70 or lower)
Best Energy Performance (0-70)
Net Zero Energy Home (0)

U.S. DEPARTMENT OF ENERGY
U.S. BUILDING AMERICA
Catholic Charities Archdiocese of New Orleans
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ENCLOSURE DESIGN

1 Roof Assembly: Rafter-framed unvented attic with R-33 roof insulation: 9.25" low-density spray foam in rafter bay, 1/2" treated plywood, fully-adhered membrane, high wind-rated asphalt shingles installed over the rafters, 1/2" paperless drywall installed below rafters.

2 Wall Assembly: 2x4 walls at 16" o.c. with R-16 wall insulation: 2.5" high-density spray foam in stud bay, 1/2" treated plywood, draining housewrap, 3/4" treated furring strips, fiber cement siding installed on outside face of studs, 1/2" paperless drywall installed on inside face of studs.

3 Window Specifications: General Aluminum single-hung double pane vinyl spectrally selective Low-E: U=0.37, SHGC=0.33.

4 Air Sealing: Maximum 2.5 in² leakage area per 100 ft² of enclosure area. Critical seal air sealing approach with primary air barrier maintained at interior drywall of both walls and ceiling. Secondary air barrier maintained at spray foam in both walls and roof. Adhesives and sealants used between framing members, around windows and doors, and at all mechanical and electrical penetrations through the enclosure.

5 Foundation and Floor Assembly: Concrete grade beam and adjustable pier foundation, joist-framed floor on sill beam with R-13 floor insulation: 2" foil-faced polyisocyanurate insulating sheathing installed below floor joists (all joints taped to maintain air barrier), 1/2" fiber cement protection board installed below insulating sheathing.

MECHANICAL DESIGN

1 Heating, Cooling and Dehumidification: 9.6 HSPF/16.3 SEER air source heat pump with integrated dehumidification (AAON ACDM—air conditioner/heat pump with dehumidification mode). Interior unit installed in conditioned space with MERV 12 filter.

Ventilation: Central fan-integrated with supply only ventilation system controlled with Aprilaire controller. Outside air intake ducted to the return side of the air handler with both motorized and manual dampers.

2 Local Exhaust Ventilation: Intermittent spot exhaust provided in bathrooms and kitchen.

Space Conditioning Distribution: Air handler with **3 4** insulated sheet metal trunks and R-4.2 flex duct run-outs installed in conditioned space. **5** Ducted return from first floor with transfer grilles above bedroom doors.

6 Thermostat: RobertShaw temperature and humidification/dehumidification control

DHW: 0.94 EF electric tank water heater



airtightness and provide gap- and void-free insulation of the framing cavities.

The windows exceed the IECC thermal (U value) requirements by 50% and almost 25% for solar heat gains.

The fiber cement is held off of the rigid insulation with 1x4 furring strips. These furring strips provide for an air gap that acts both as a drainage gap and ventilation gap. This allows water that penetrates past the siding to drain to

the exterior; it also allows for air flow behind the cladding to help with drying of the cavity (“ventilation drying”). The drainage plane for the assembly is the housewrap installed over the structural sheathing.

LESSONS LEARNED

Lessons learned on this project include: increased efforts are needed to train trades and volunteer labor in proposed construction methods, more time needs to be spend to coordination prior to construction, clearer specification of materials and support for product selection where specified products do not exist

This case study has been prepared by Building Science Corporation for the Department of Energy’s Building America Program, a private/public partnership that develops energy solutions for new and existing homes. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.



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Energy Efficiency & Renewable Energy