Building AMERICA
U.S. Department of Energy
Research Toward Zero Energy Homes

Case Study

Project Home Again

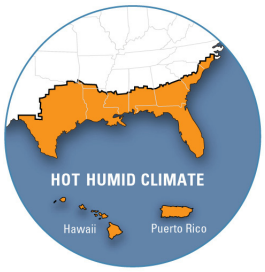
New Orleans, Louisiana

Overview

Project Home Again is a not-for-profit organization that is overseeing the construction of 20 affordable and energy efficient single detached residences in Gentilly, New Orleans. The project is managed by Green Coast Enterprises, a local real estate services firm. A local architect and builder (Sustainable Architecture, LLC. and TKTMJ, Inc., respectively) were hired in large part because of their extensive expertise and willingness to embrace Building America building practices. These single detached homes demonstrate the energy efficiency and durability upgrades that Building Science Corporation (BSC) advocates. These community homes are located on St. Bernard Avenue in Gentilly, New Orleans.

BSC recommended building upgrades that address energy efficiency, occupant comfort, affordability, sustainability, and durability. Key upgrades include an enclosure that is fully insulated and air-sealed with high density spray foam and supplemental dehumidification. Other upgrades that contributed to increased building efficiency and durability are state of the art LoE spectrally selective vinyl windows and a high efficiency HVAC system.

The development is currently on-time and meeting budget. This is a great



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Project Profile

Project Team: Project Home Again, TKTMJ, Inc., Green Coast Enterprises, Sustainable Architecture, LLC., National Renewable Energy Laboratory (NREL), Building Science Corporation

Address: St. Bernard Avenue, New Orleans, LA

Description: A mix of 1,016 ft^2 one- and 1,544 ft^2 two-story single family detached homes

Completion Date: April, 2009

Estimated Annual Energy Savings: Average 42% projected source energy savings relative to the 2008 Building America benchmark

Project Website: www.projecthomeagain.net

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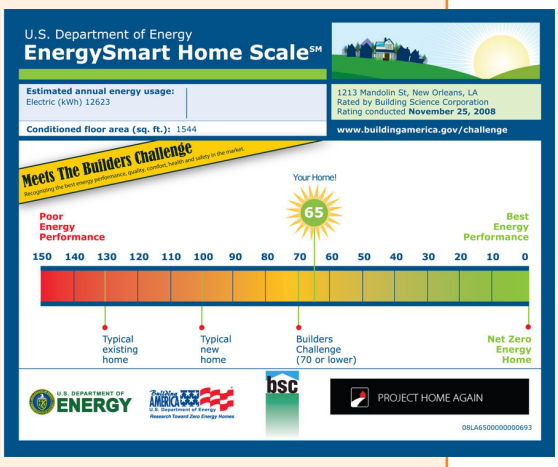
Builder Profile

PROJECT HOME AGAIN Project Home Again (PHA) is a not-for-profit development arm that was created by the Riggio Foundation. Through Project Home Again, the Riggio family will spend $20 million building homes for those families whose homes are uninhabitable or were completely destroyed during Hurricane Katrina. PHA will pilot its initiative in the Gentilly community by building 20 single-family homes, which will be energy efficient, raised above the minimum elevation guidelines, and will meet or exceed all new building code requirements.

Working along side with Project Home Again is a local builder and architect, TKTMJ Inc., and Sustainable Architecture, LLC. Project Home Again construction etc is being managed by Green Coast Enterprises, a local real estate services and sustainable urban design firm.

Participating Programs & Certifications

Building America U.S. Department of Energy Research Toward Zero Energy Homes U.S. Department of Energy's Building America Program—Builders Challenge



achievement given that the team is integrating Building America upgrades in a production environment for the first time. The Riggio Foundation will possibly consider another Building America development based on the success and occupant feedback from this endeavor.

Enclosure Design

The homes will be fully framed and will be constructed on piers. All wood is borate pressure treated for resistance to termites and mold. The framing is 2x6 at 24" o.c. however full advanced framing could not be achieved due to structural concerns. Full advanced framing could not be achieved because of prescriptive guidelines set by the 130 MPH Wood Frame Construction Manual that was adopted by the city of New Orleans. Therefore, the houses are framed with a double top plate and 3 - 4 stud corners. This is a technical gap that BSC would like to improve upon if Project Home Again continues with another development.

The attic is unvented with high density spray foam installed under the roof deck. The unvented attic foam will be treated with an intumescent ignition barrier to meet the code fire protection requirement for an intermittently occupied space.

The windows are vinyl with LoE spectrally selective glass that has a very low SHGC of 0.21. Glazing is the most important enclosure element in a hot-humid climate, and this next generation glazing technology is an impressive efficiency and durability upgrade.

Mechanical Design

A high efficiency heat pump (14 SEER/8.25 HSPF) is installed in the unvented attic. An extremely well sealed duct system will be fully enclosed within conditioned space. Transfer grilles provide passive returns from the bedrooms to the main living space. A fully ducted central return will be installed on each floor in a main living area.

All 5 floor plans had the system "right sized" with Manual J8. That is, each house has the heat pump sized to 100% total load as calculated by ACCA Manual J8. Duct sizes and room CFM flows were specified for each house at its particular orientation.

A whole house dehumidifier has been installed to allow for humidity control separate from cooling. This ensures proper comfort control year round. BSC recommends that all hot-humid Building America homes have supplemental dehumidification because of the different latent/sensible load ratios in these homes. The very efficient building enclosure greatly reduces the sensible load but not the latent load as much due to the fact that most of the remaining latent load is generated by the occupants. Supplemental dehumidification is necessary to control humidity levels year round and has a positive impact on occupant comfort and building durability.

Ventilation is provided via a Central Fan Integrated Supply (CFIS) ventilation system that draws outside air via a 6" flex duct to the return plenum of the HVAC system. This allows for the introduction of outside air to the living space whenever space conditioning is already operating. The whole house dehumidifier has fan cycling included in its circuitry. Fan cycling will turn on the fan at a 33% duty cycle (10 minutes on, 20 minutes off) in order to provide outside air during periods of no space conditioning. A manual damper is installed on the 6" duct to allow the installer to reduce flow to the recommended 50 CFM if needed during commissioning. A 6" mechanical damper is also installed on the 6" outside air duct. This is controlled by the fan cycler and will close off the outside air duct during periods of consistent space conditioning to prevent over ventilation of the living space.

Building Enclosure

❶ **Roof:** Unvented conditioned attic with 4 1/2" R-30 high density spray foam installed to the underside of the roof deck on vertical gable end walls

Air Sealing: Enclosure air sealing is provided via high density spray foam being installed on all sides of the building envelope. Low expanding spray foam is installed around windows and penetrations. Sealants and adhesives used between framing components.

❷ **Framing and Insulation:** 2x6 wood framed walls at 24" o.c. with 3" R-20 high density spray foam cavity insulation on 1/2" exterior OSB sheathing

❸ **Window Specifications:** Vinyl Low-E^3; U=0.36, SHGC=0.21

❹ **Framed Floor Insulation:** 2" R-13 high density spray foam insulation installed in framed floor joists on a block pier foundation

❺ **Drainage Plane:** Woven vapor permeable housewrap serves as a drainage plane behind fiber cement clapboard siding

Infiltration: 2.5 in^2 leakage area per 100 ft^2 envelope

Mechanical Design

HERS Index Score: 65-67

Heating: 8.25 HSPF heat pump

Cooling: 14 SEER heat pump

Ventilation: Central Fan Integrated Supply (CFIS) ventilation controlled by an Aprilaire dehumidifier

❶ **Supplemental Dehumidification:** Aprilaire Model 1750 whole house dehumidifier configured to draw air from main living space and supply dehumidified air to the supply plenum. This allows for dehumidified air to be distributed throughout the house and for the dehumidifier to run only when dehumidification is needed.

Return Pathways: Transfer grilles at bedrooms

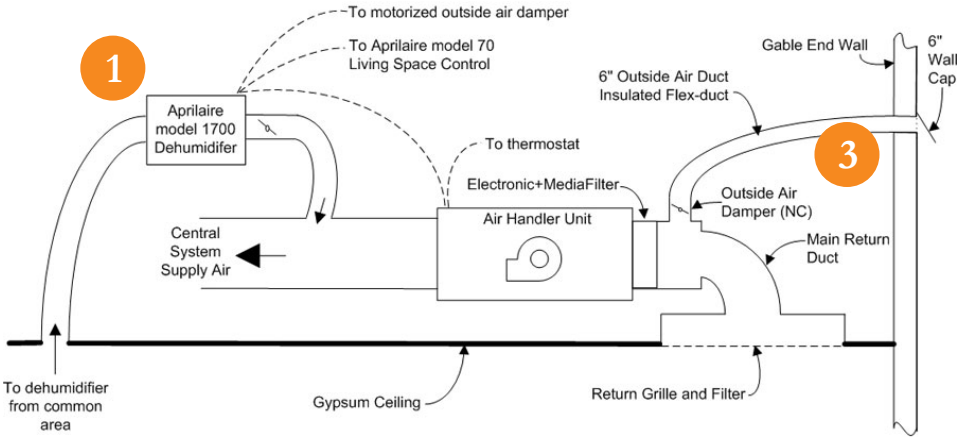
❷ **Ducts:** R-8 flex ducts in unvented conditioned attic; leak-free to outside (3% or less)

DHW: 0.92 EF 50-gallon electric water heater

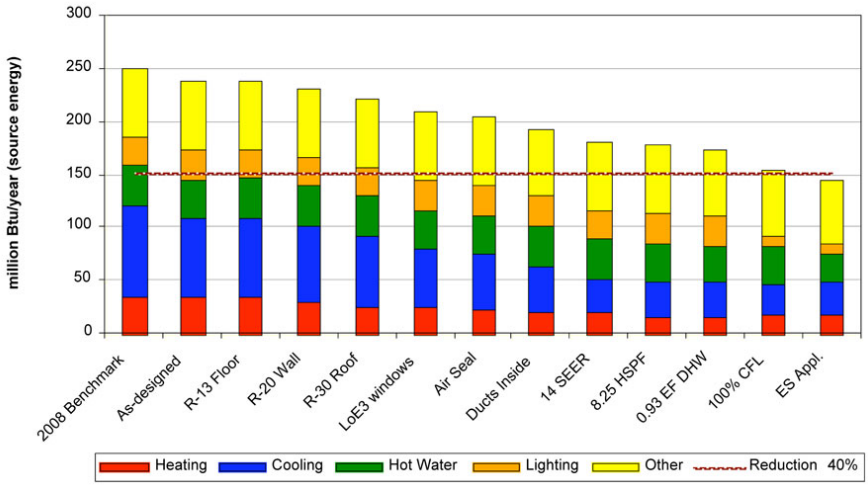
Appliances: Energy Star dishwasher, refrigerator and clothes washer

Lighting: 100% Energy Star CFLs

Site Generated Power: Solar DHW system may be offered to potential homeowners



Parametric Study



Bathroom exhaust fans plus a kitchen hood are installed to provide spot ventilation when necessary. These are all routed to the outside and are not re-circulating fans. One of the bathroom fans is rated to provide ASHRAE 62.2 ventilation so that the house can be operated at that rate if needed by the occupant.

Project Home Again is currently in discussions to offer a solar hot water package to potential homeowners.

Quality Assurance & Quality Control

- Design follows BSC Building America Performance Criteria (QA)
- Manual J8 analysis ensures right sized mechanical systems ductwork

System Testing

Testing and commissioning of the building enclosure and mechanical systems were performed to ensure the house will operate as designed. The following tests were performed by a local tester:

- Air leakage
- Duct leakage

BSC will test for the following:

- Local air flows
- System external static pressure
- Outside air duct air flow
- Proper configuration ventilation system

Monitoring

Project Home Again is working on a plan to collect monthly utility bills from each house.

Lessons Learned & Future Projects

BSC learned that close support is needed for the installation of the supplemental dehumidification system. This is because BSC recommends installing the whole house dehumidifier in a different configuration than listed in the manual. This required the HVAC installer to go back and fix some initial installations.

Technology Gaps & Barriers

• Full advanced framing: BSC will work to integrate full advanced framing technique (single top plate, two stud energy corners) in future communities with Project Home Again.

• Adding insulating sheathing: Typical structural design calls for a fully sheathed wall assembly for structural reasons. Adding insulating sheathing would reduce thermal bridging of the enclosure framing member and increase the overall U-value of the walls.

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.

For more information about Building America go to www.buildingamerica.gov

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