

## The New American Home® 2007 Orlando, Florida

Each year, The New American Home® demonstrates use of innovative building materials, cutting-edge design, and the latest construction techniques, providing production homebuilders with an example for producing more energy efficient, durable homes without sacrificing style. Cosponsored by The National Council of the Housing Industry and *BUILDER Magazine*, The New American Home® is not only the official showcase house of the annual International Builders' Show, but is also a for-sale product. The majority of features and innovations in the home are accessible to both builders and consumers for integration into their own homes.

Located in Orlando's Lake Eola historic district, The New American Home is within walking distance of downtown Orlando and is surrounded by upscale contemporary lofts, condominiums, and vibrant social and cultural activities. A modern interpretation of historic bungalow architecture, the three-story urban loft home is designed in a way that takes full advantage of the views, captures the favoring climatic factors, and provides a sense of privacy and comfort, while also paying homage to the social thread that binds the community. The project is a collaborative effort between custom homebuilder Homes by Carmen Dominguez, Bloodgood Sharp Buster Architects & Planners, and interior design firm Robb & Stucky Furniture and Design Studio. It features 3,733 ft<sup>2</sup> of living area, a shallow basement, a roof plaza, and a detached two-car garage with additional living space.

To ensure energy efficiency and innovation, two Building America teams have worked closely with the National Council of the Housing Industry. IBACOS Inc. provided design and engineering support, and the Industrial Housing Partnership provided performance testing and consulted with the builder regarding the use of solar photovoltaic systems. As a result, the home's three stories are conditioned using three strategically placed, high-performance HVAC systems. The shallow basement, first floor, and second floor are served by two heat pumps with 17.8 SEER performance, while the third floor is served by a 15 SEER gas/electric unit. Each unit and its associated ductwork are within conditioned space. A solar thermal hot water system preheats incoming water for tankless water heaters, which are fueled by natural gas – further adding to efficiency and comfort. A 2.4-kW photovoltaic system lightens the electric energy load by 9 kilowatt hours per day on average.

Other prominent features further contribute to energy efficiency and durability. The exterior was constructed with pre-cast, insulated concrete sandwich walls (equivalent thermal performance to R-26



James F. Wilson/PXI 4897

wood-framed walls), and the home is built on a solid foundation of pre-cast concrete walls with R-5 exterior insulation. All of the windows and sliding doors are impact resistant and have low-emissivity coating to limit solar heat gain and provide storm protection. In addition, windows on the south- and west-facing sides are covered by overhangs that include a layer of vegetation (green roof concept). Last, but not least, fluorescent lighting and lower wattage incandescent lamps are saving electricity and providing cooler indoor conditions.

The energy features in The New American Home can be used in homes at any price point with equivalent energy savings.

### Specifications

- Pre-cast, insulated structural concrete wall system
- Three high-efficiency heating and cooling units; heat pumps 9.0 HSPF
- Air-conditioning systems between 15 and 17.8 SEER
- Air-distribution system entirely within conditioned space
- Low-emissivity impact-resistant windows, U-value = 0.33, SHGC = 0.32
- 4-foot overhangs over most south- and west-facing windows
- Natural-gas-fueled instantaneous water heaters, EF = 0.82
- 2.4-kW solar photovoltaic system
- 49% whole-house energy savings (58% with PV system contribution)

### Primary Project Goals

- Build a high-profile show home for the International Builders' Show by implementing Building America strategies to conserve energy and materials
- Introduce production builders to advanced HVAC strategies and advanced insulation and airtightness details

## Performance Features

### Thermal Shell

- Low solar gain windows with 4-ft overhangs on south and west orientations
- Pre-cast exterior concrete walls with STYROFOAM T-MASS technology
- Poured concrete foundation walls with R-5 exterior insulation
- Flat, unvented roof insulated to R-20 with layer of vegetation

### Airtightness

- Penetrations and openings sealed to achieve 0.30 natural air changes
- Limited seams in concrete wall system add to airtightness

### Moisture Control

- Shallow basement with waterproof membrane

### HVAC

- Two air-source heat pumps, 9.0 HSPF and 17.7 SEER, serving basement, first, and second floors
- 15 SEER gas/electric unit serving third floor
- All ductwork within conditioned space

### Hot Water

- Solar thermal system preheats natural-gas-fueled, instantaneous water heaters (EF = 0.082), which minimize piping and reduce standby losses

### Electrical

- Solar PV systems lighten the load by 9 kilowatt hours per day on average
- ENERGY STAR®-rated dishwasher, clothes washer, refrigerator
- 29% fluorescent lighting

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- IBACOS  
1-800-611-7052
- Industrial Housing Partnership (IHP)  
407-384-2048

## Energy Features and Benefits

Energy efficiency is among the top benefits of The New American Home® 2007. The home uses approximately 73% less energy for heating and cooling and 54% less energy for water heating compared to a house of comparable size in the Hot Humid climate region. Each component of the home was selected and integrated into the project through a systems approach of designing, testing,

and redesigning. All of its components work together to achieve maximum performance. For example, the home's thermal qualities are achieved by properly sizing the mechanical equipment, using the right insulation materials and specifications, and designing the ductwork to fit within the conditioned space.



Extra measures were taken to ensure the foundation and shallow basement were waterproof.



Openings for windows and any other penetrations required careful design and placement in the pre-cast concrete system.



Steel framing was used for faster installation into concrete exterior, floors, and ceilings.



Pre-cast exterior concrete walls allow for faster building enclosure construction and a tighter envelope.



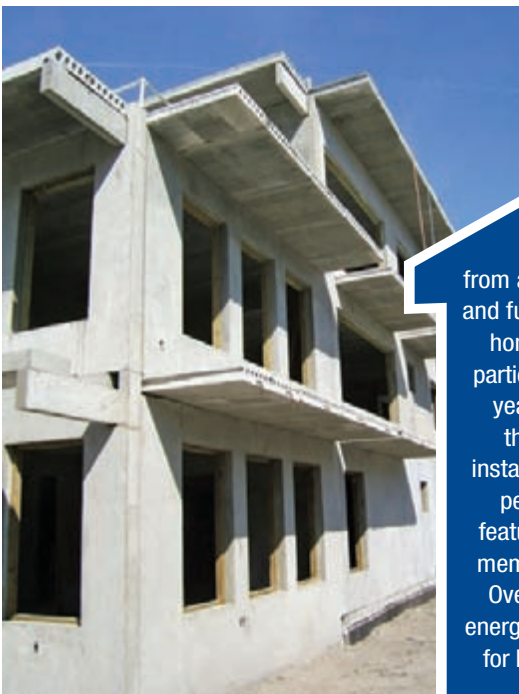
IBACOS/PX14852

*A shallow basement cleverly conceals mechanical equipment.*



IBACOS/PX14853

*Fiber cement siding and stucco add warmth to the bungalow's exterior.*



IBACOS, Inc./PX14854

*Pre-cast concrete overhangs provide area for vegetation and shade to reduce solar heat gain.*

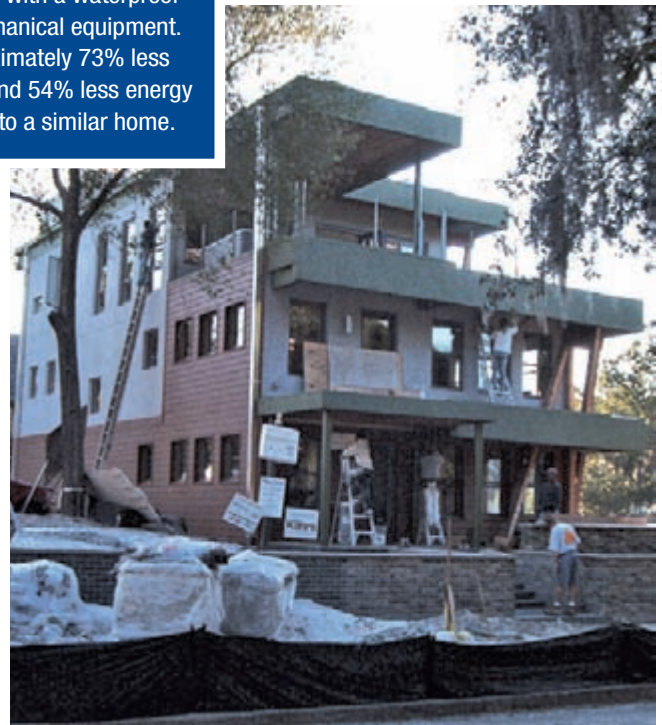
Each year for the International Builders' Show, The New American Home® transforms from a graded plot into a truly unique home in style and function. The one characteristic shared by each home since the Building America Program has participated in the project is energy efficiency. This year's home achieves high levels of efficiency through advanced HVAC equipment, careful installation of insulation and air sealing, and high-performance windows. Among its interesting features is a shallow basement with a waterproof membrane, which houses mechanical equipment. Overall, the home uses approximately 73% less energy for heating and cooling and 54% less energy for hot water, when compared to a similar home.

*Balconies and overhangs expand the outdoor living space and provide additional shade.*



IBACOS/PX14855

*A PV system powers the refrigerator directly, and the excess energy is either used elsewhere in the home or stored.*



IBACOS/PX14856

## Advantages to the Consumer

- Increases quality without increasing cost
- Increases comfort and performance
- Reduces utility bills
- Allows greater financing options



IBACOS/PX12942

## Advantages to the Builder

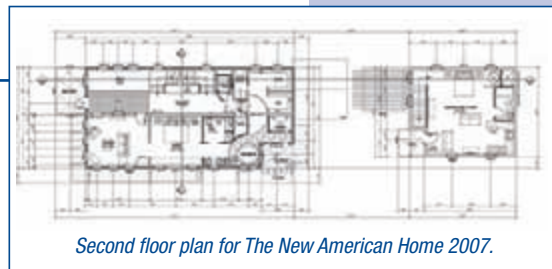
- Reduces construction costs
- Improves productivity
- Improves building performance
- Reduces callback and warranty problems
- Allows innovative financing as a result of predictably lower utility bills
- Gives builder a competitive advantage



IBACOS, Inc./PX14238

## Systems Engineering Cost Saving Trade-Offs

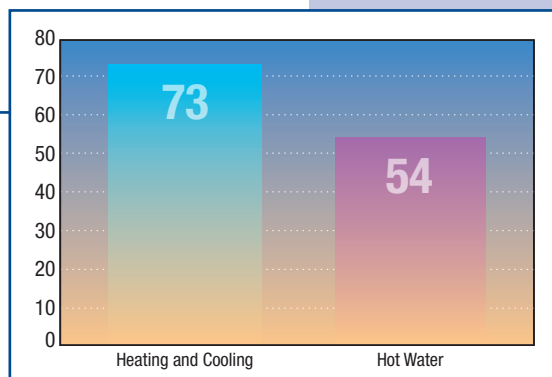
- Advanced framing systems
- Tightly sealed house envelopes
- Shorter, less costly ductwork
- Engineered and planned infrastructure
- Smaller, less expensive mechanical systems
- Modular construction



Second floor plan for The New American Home 2007.

## Percentage of Energy Reduction

- 73% reduction in heating and cooling energy use
- 54% reduction in hot water energy use



# Systems-Engineering Approach

Building America's systems-engineering approach unites segments of the building industry that have traditionally worked independently of one another. Building America forms teams of architects, engineers, builders, equipment manufacturers, material suppliers, community planners, mortgage lenders, and contractor trades.

The concept is simple: systems-engineering can make America's new homes cost effective to build and energy efficient to live in. Energy consumption of new houses can be reduced by as much as 50% with little or no impact on the cost of construction.

To reach this goal, Building America teams work to produce houses that incorporate energy- and material-saving strategies from design through construction.

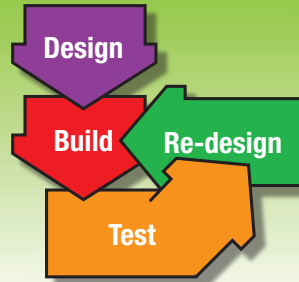
First, teams analyze and select cost-effective strategies for improving home performance. Next, teams evaluate design, business, and construction practices within individual builder partnerships to identify cost savings.

Cost savings can then be reinvested to improve energy performance and product quality. For example, a design that incorporates new techniques for tightening the building envelope may enable builders to install smaller, less expensive heating and cooling systems. The savings generated in this process can then be reinvested in high-performance windows to further reduce energy use and costs.

The "pilot" or "test" home is the field application of solution design. Teams build prototype homes according to strategic

design, then test each system for efficiency, and make any necessary changes to increase efficiency and cost effectiveness. Before additional houses are built, these changes are incorporated into the design. This process of analysis, field implementation, re-analysis, and design alteration facilitates ultimate home performance once a design is ready for use in production or community-scale housing.

Understanding the interaction between each component in the home is paramount to the systems-engineering approach. Throughout design and construction, the relationship between building site, envelope, mechanical systems, and other factors is carefully considered. Recognizing that features of one component can dramatically affect the performance of others enables Building America teams to engineer energy-saving strategies at little or no extra cost.



Well-sealed, fiberglass ductboard is completely enclosed in conditioned space.



A solar thermal hot water system preheats incoming water.

# Achieving High Performance Using a Systems-Engineering Approach



Air-flow testing ensures that the home's comfort meets the standards set during the design process.



High efficiency water heaters save heating energy, while still providing ample amounts of hot water.



Home airtightness is tested with a blower door.

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IBACOS, Inc./PIX14859

IBACOS, Inc./PIX14860

IBACOS, Inc./PIX12906

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

## Research and Development of Buildings

Our nation's buildings consume more energy than any other sector of the U.S. economy, including transportation and industry. Fortunately, the opportunities to reduce building energy use—and the associated environmental impacts—are significant.

DOE's Building Technologies Program works to improve the energy efficiency of our nation's buildings through innovative new technologies and better building practices. The program focuses on two key areas:

### • Emerging Technologies

Research and development of the next generation of energy-efficient components, materials, and equipment

### • Technology Integration

Integration of new technologies with innovative building methods to optimize building performance and savings

For more information contact  
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