

The New American Home® 2009

Las Vegas, Nevada



Specifications

- Insulated concrete wall system (R 21.7)
- Unvented, sealed attic
- Open-cell spray foam insulation at the underside of the roof deck (R-20), closed cell spray polyurethane foam insulation on the exterior side of the roof deck (R-7)
- Gas-engine driven heat, mini-split system (heating and cooling COP 1.5)
- Natural gas-fueled tankless water heaters, EF 0.82
- Aluminum clad, wood-framed, low-emissivity windows, U 0.34, SHGC 0.23 or better
- 40% of all interior lamps are light-emitting diode (LED) or compact fluorescent
- 10.64 kW photovoltaic (PV) system, consisting of 56 solar panels
- 49% whole-house energy savings (73% with PV system contribution) with respect to code (IRC).

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
- Meet or exceed the requirements for NAHB Model Green Home Guidelines and improve the U.S. Department of Energy's research toward zero energy homes



The New American Home® 2009, Las Vegas, Nevada IBACOS

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 5 minutes from Las Vegas Airport and "The Strip," The New American Home 2009 is set in a celebrity estate neighborhood that carries a rich history and "Old Vegas" cache. A desert contemporary architecture, the home features 8,721 square feet of living space, a subterranean courtyard at the basement level, sky deck, and wine cellar. The home will serve as a model home to the new community of Marquis Las Vegas. The project is a collaborative effort between architect Danielian Associates, builder/developer Blue Heron, interior design firm Robb & Stucky, and landscape architect Somers/Murphy & Partners.

To ensure energy efficiency and innovation, IBACOS, Inc., a Building America team, has worked closely with the National

Council of the Housing Industry to provide design and engineering support. As a result, the home reaches a high level of energy efficiency. The home's three stories are conditioned using a gas-engine driven heat pump, mini-split system, that uses air handlers contained within the ceiling assembly for individual zone air distribution. The heat pumps have a performance value for heating and cooling of COP 1.5. Tankless water heaters, which are fueled by natural gas, provide hot water to the home, while a solar thermal hot water system heats swimming pool water. A 10.64 kW photovoltaic system, consisting of 56 solar panels that capture solar energy from both panel faces, generates electricity. LED and compact fluorescent lighting further add to the home's efficiency.

Most exterior walls and basement foundation walls were constructed using an insulated concrete form system (R-21.7). The attic is unvented, sealed, and indirectly conditioned. Open-cell spray foam insulation was used at the underside of the roof deck (R-20), and closed cell spray polyurethane foam insulation was used on the exterior side of the roof deck (R-7). These features combined result in 49 percent whole-house energy savings with respect to code (IRC).

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



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Building Technologies Program



Energy Features and Benefits

Performance Features

Thermal Shell

- Basement walls and most exterior walls consist of an R-21.7 insulated concrete form system
- Unvented and sealed attic
- An open-cell spray foam insulation (R-20 minimum) at the underside of the roof deck, closed cell spray polyurethane foam insulation on the exterior side of the roof deck (R-7)
- Aluminum clad, wood-framed, low-e windows limit solar heat gain
- Permanent shading of windows and doors

Airtightness

- Penetrations and openings sealed to achieve 0.21 natural air changes
- Spray foam insulation creates airtight attic space

Moisture Control

- Windows and doors effectively flashed to shed water

HVAC

- Gas-engine driven heat pump, mini-split system (heating and cooling COP=1.5) with zone control
- Air distribution system within conditioned space

Hot Water

- Natural gas fueled tankless water heaters
- Solar thermal hot water system heats swimming pool water

Electrical

- 10.64 kW (DC) photovoltaic system
- ENERGY STAR®-rated dishwasher, clothes washer, refrigerator
- 40% LED or compact fluorescent lighting

For more information, contact:

- Blue Heron, Inc.: 702-256-8866
- National Council of the Housing Industry: 1-800-368-5242 ext. 8519
- IBACOS: 1-800-611-7052

Energy efficiency is among the top benefits of The New American Home 2009. The home uses approximately 70% less energy for heating and 61% less energy for cooling compared to a house of comparable size in the Hot Dry climate zone. 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 the right insulation materials and specifications, and designing the ductwork to fit within the conditioned space.



Most of the exterior walls and the basement foundation walls consist of an airtight, energy-efficient insulated concrete form system, shown here braced.



Spray foam insulation at the underside of the roof creates an airtight attic space for ductwork, HVAC equipment, and lighting.



The photovoltaic system should provide for a majority of the electrical needs of the home.



An emerging, energy-efficient lighting option, LED lighting was used under the kitchen cabinets as pathway lighting among other places..

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 active and passive solar design, an insulated concrete wall system, and high-performance hot water equipment. Overall, the home uses approximately 70% less energy for heating and 61% less energy for cooling when compared to a similar home.



Solar panels installed above the master bedroom suite provide hot water for the pool.

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Bifacial solar panels receive sunlight from above and below simultaneously, converting it to electricity.

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Eyebrows integrated into the walls block the intense rays of summer's late afternoon sun.

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Horizontal louvers extend across the windows to provide shading.

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The home is landscaped with drought-resistant, native species.

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Advantages

Advantages to the Consumer

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



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Advantages to the Builder

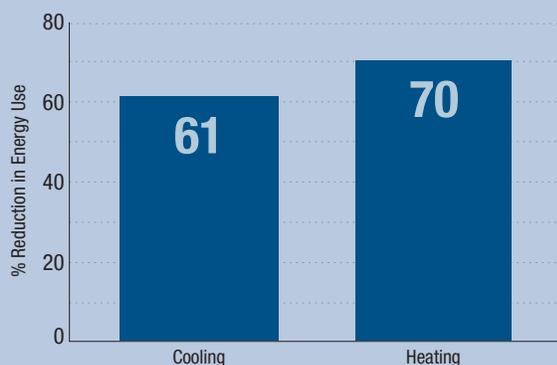
- Reduces construction costs
- Improves productivity
- Improves building performance
- Reduces callbacks and warranty problems
- Allows innovative financing as a result of predictably lower utility bills
- Gives builder a competitive advantage

Systems Engineering Cost Saving Tradeoffs

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



First floor rendering for The New American Home 2009.



Percentage of Energy Reduction

- 61% reduction in cooling energy use
- 70% reduction in heating 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, reanalysis, 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.



The gas-fired heat pump efficiently provides heating and cooling to the home.



High-efficiency tankless water heaters save heating energy and provide ample amounts of hot water.



Builders Challenge

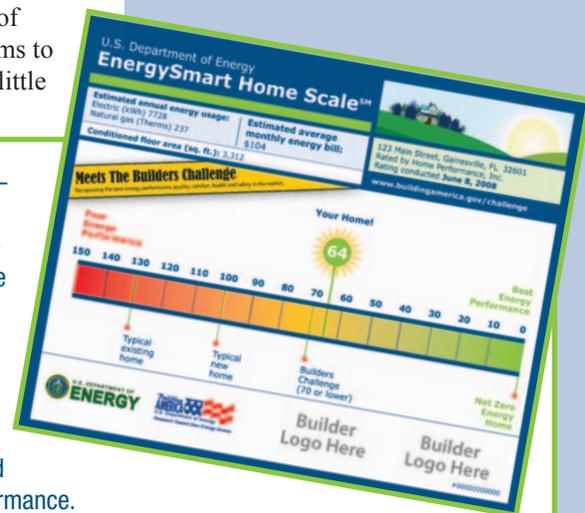
U.S. Department of Energy
EnergySmart Home ScaleSM

energy-performing homes from other products in the marketplace, and to make the benefits clear to buyers. Homes that qualify must meet a 70 or better on the EnergySmart Home Scale (E-Scale). The E-Scale is an easy-to-understand tool that helps homebuyers and homeowners make smart energy decisions when purchasing, renting, or updating a home (see figure at right).

DOE's ultimate vision is that by 2030 a consumer will have the opportunity to buy an affordable net zero energy home—a grid-connected home that produces as much energy as it uses over the

course of a year—anywhere in the United States. The Builders Challenge establishes a framework for continuous improvement that will help propel the market toward zero energy performance.

The program aims to increase use of existing proven and cost-effective technologies that reduce energy consumption, provide resources and case studies on field implementation of these new technologies in homes, and spur strong consumer demand. The Builders Challenge is based on lessons learned from the Building America Research Program - a private/public partnership that develops energy solutions for new and existing homes. For more information, visit www.buildingamerica.gov/challenge.



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.

Sponsored by the U.S. Department of Energy, Building America is an industry-driven research program designed to accelerate the development and adoption of advanced energy technologies in homes. Building America forms research partnerships with all facets of the residential building industry to improve the quality and energy efficiency of homes. The strategic goal is to create technologies and design approaches that lead to marketable net zero energy homes, which produce as much energy as they use, by 2020.

For more information contact:
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov



U.S. Department of Energy

Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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