







# Systems Engineering Saves Energy in Southwest

Pulte Homes — Tucson, Arizona

Building America is sponsored by the U.S. Department of Energy. The program aims to:

- Reduce energy use by 50% and reduce construction time and waste
- Improve indoor air quality and comfort
- Encourage a systems-engineering approach for design and construction of new homes
- Develop system cost/performance tradeoffs that improve housing quality and performance without increasing cost
- Conduct cost-shared research to accelerate development and adoption of innovative building systems.

Houses built by Pulte Homes as part of the U.S. Department of Energy's Building America program in Tucson, Arizona, save money for the home owners by reducing electric air-conditioning bills and gas-heating bills with little or no additional first cost. Pulte selected the following package of features to achieve 30%–50% heating and cooling energy savings relative to the 1995 Model Energy Code (MEC) in the hot, dry Tucson climate:

-  **Windows** — Spectrally selective glass, which lets visible light through but keeps solar heat out. This lowers the cooling load during the summer and reduces the fading of furniture caused by direct sunlight. The smaller cooling load resulting from the use of spectrally selective glass allows the purchase of a smaller, less expensive air conditioner.
-  **Roofing System** — Unvented attic, which changes the home's thermal barrier from the ceiling to the roof deck. Ductwork for air conditioning and heating is located inside the conditioned space.
-  **Heating and Cooling Systems** — The high-efficiency furnace saves energy and its sealed-combustion design prevents the leakage of potentially harmful combustion products. In addition, windows with spectrally selective glass allow the air conditioner to be downsized by 30%.
-  **Comfort** — Improved comfort resulting from less solar heat gain and greater insulation. The highly insulated wall assembly includes 2" x 6" framing, 24" on-center, a construction practice that conserves wood and reduces labor costs. The wall cavities are filled with sprayed-in cellulose insulation, which is a nontoxic material made from recycled newspaper.



Chris Mooney/PIX07746

*This Building America house built by Pulte Homes in Tucson exceeds Energy Star requirements and features an unvented attic, spectrally selective windows, and a high-efficiency heating system.*

Pulte Homes is working with the Building Science Consortium (BSC), one of the five Building America industry teams, and is currently constructing houses to these Building America standards in several Tucson communities. Similar houses built by Pulte's Las Vegas division with the same package of features received an Energy Value Housing Gold Award in 1999 from the National Association of Home Builders. All Building America houses built in Tucson by Pulte receive an ENERGY STAR® label, which certifies that the energy efficiency of these houses is at least 30% better than typical construction. The ENERGY STAR program is a cooperative effort of the U.S. Department of Energy and the Environmental Protection Agency.





## BUILDINGS FOR THE 21ST CENTURY

Buildings that are more energy-efficient, comfortable, and affordable ... that's the goal of DOE's Office of Building Technology, State and Community Programs (BTS). To accelerate the development and wide application of energy efficiency measures, BTS:

- Conducts R&D on technologies and concepts for energy efficiency, working closely with the building industry and with manufacturers of materials, equipment, and appliances
- Promotes energy- and money-saving opportunities to builders and buyers of homes and commercial buildings
- Works with state and local regulatory groups to improve building codes, appliance standards, and guidelines for efficient energy use
- Provides support and grants to states and communities for deployment of energy-efficient technologies and practices.

## The Approach

Building America's systems-engineering approach unites segments of the building industry that have traditionally worked independently of one another. It forms teams of architects, engineers, builders, equipment manufacturers, material suppliers, community planners, mortgage lenders, and contractor trades. More than 230 different companies make up the five Building America teams:

- ✓ Building Science Consortium (BSC)
- ✓ Consortium for Advanced Residential Buildings (CARB)
- ✓ Hickory Consortium
- ✓ Industrialized Housing Partnership
- ✓ Integrated Building and Construction Solutions (IBACOS) Consortium

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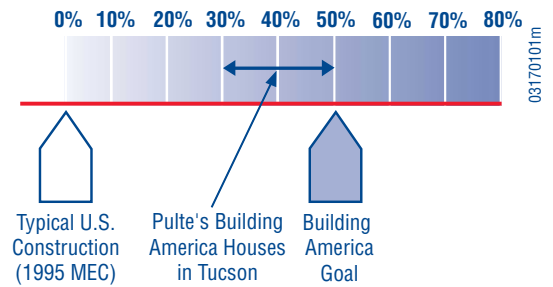
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An electronic copy of this document is available on the Building America Web site:  
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## Building America Performance Goal (Heating and Cooling Energy Savings)



The Building America teams design houses from the ground up, considering the interaction between the site, building envelope, mechanical systems, and other factors. With this approach, the teams can incorporate energy-saving strategies at little or no extra cost.