U.S. Department of Energy

Builders Challenge Technology Information Packages

Photo: Habitat for Humanity

Hot-Humid Climate: New Orleans

The U.S. Department of Energy's Builders Challenge recognizes quality homes that also save you money.

U.S. homebuilders from all areas of the country report growing buyer interest in energy-efficient houses, yet buyers often lack basic information that can help them make informed decisions. How can homebuyers tell exceptional energy performance from average energy performance? And how do they figure out just what that difference will mean in their energy bills?

Spearheaded by the U.S. Department of Energy (DOE), the Builders Challenge is a voluntary effort to address these consumer questions. The Builders Challenge seeks to galvanize the housing industry to move 220,000 high-performance homes into the marketplace by 2012, and to spur consumer demand for these homes. Through the Builders Challenge, participating homebuilders can differentiate their best energy-performing homes from other products in the marketplace. The Challenge highlights homes that provide substantial reductions in energy use and home-owner utility bills and recognizes the best practices for quality, comfort, health, and safety in the market.

DOE's ultimate vision is that, by 2030, a consumer will have the option to buy an affordable net-zero energy home anywhere in the United States—a home that, over the course of a year, produces as much energy as it uses. The Builders Challenge establishes a framework for continuous improvement that will help propel the market toward net-zero energy performance.

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

Builders Challenge
Recognizing Energy Leadership in Homebuilding

Builders Challenge Technology Information Packages (BC TIPs) provide climate-specific guidance for builders wishing to meet the Builders Challenge.

Pathways to Meeting the Challenge

Builders can meet the Builders Challenge by choosing one of three pathways that best matches their business needs:

Eligible Candidates	Ways to Meet the Challenge	Design and Performance Analysis	Minimum Required Performance	Verification Process
Any U.S. builder of new single-family detached, attached, or low-rise multi-family homes	BC TIPs	Build to the Builders Challenge Technology Information Package (BC TIP) for your climate	Meet all BC TIP criteria for the location plus Quality Criteria	Third-party verification through a Home Energy Rating System (HERS) rater or other qualified professional
	Performance	Model high-performance design using approved software	Build to a HERS Index of 70 or lower and meet Quality Criteria	Third-party verification through a HERS rater or other qualified professional
	Partner program	Achieve an equivalent level of performance within a partner program	Equivalent performance as defined by the partner program and agreed upon by DOE	Partner-specified quality assurance/quality control (QA/QC) procedure

Builders Challenge Technology Information Packages (BC TIPs)

The Prescriptive pathway to meeting the Builders Challenge involves using the energy measures in Builders Challenge Technology Information Packages (BC TIPs) designed for each climate. Packages shown qualify for Builders Challenge participation, or a "premium" efficiency level that exceeds the minimum Challenge level, and achieves maximum cost-neutral energy savings where monthly utility bill savings are intended to offset the cost of energy upgrades rolled into a mortgage.

Climate Region: Hot-Humid Location: New Orleans Foundation Type: Crawlspace	Minimum Builders Challenge Level		Premium Efficiency Level	
Heating Fuel:	Gas	Electric	Gas	Electric
Insulation				
Walls[1]	2×4 R-15	2×4 R-15	2×4 R-15	2×4 R-15
Roof	R-30	R-30	R-30	R-30
Crawlspace	Sealed, R-10/R-13[4]	Sealed, R-10/R-13[4]	Sealed, R-10/R-13[4]	Sealed, R-10/R-13[4]
Windows[2]				
	Double-Glazed, Low-E	Double-Glazed, Low-E	Double-Glazed, Low-E	Double-Glazed, Low-E
U-Factor	0.35	0.35	0.32	0.32
Solar Heat Gain Coefficient	0.35	0.35	0.27	0.27
Lighting				
% Fluorescent Fixtures[3]	90%	90%	100%	100%
Heating				
Furnace, Efficiency Rating, AFUE	82		92.5	
Air-Source Heat Pump, HSPF		8.8		8.8
Air Conditioning				
Efficiency Rating, SEER	14		17	
Air-Source Heat Pump, SEER		15		15
(Builder-Supplied) Appliances				
	ENERGY STAR®	ENERGY STAR®	ENERGY STAR®	ENERGY STAR®
Water Heater				
	Tankless/Gas	Tank/Electric	Tankless/Gas	Tank/Electric
Energy Factor, EF	0.77	0.95	0.77	0.95
Solar				64sf Closed-Loop
Air Tightness				
ACH50	5.0	5.0	3.0	3.0
Ducts				
Location	Inside Conditioned Space	Inside Conditioned Space	Inside Conditioned Space	Inside Conditioned Space

[1] Framing factor shall not exceed 23%.
[2] Window area shall not exceed 18% of conditioned, above-grade floor area.
[3] Pin-based fluorescent fixtures or compact fluorescent lamps.
[4] The first R-value applies to continuous insulation, the second to framing cavity insulation; either meets the requirement.

BC TIP Qualification Process

Step 1
Comply with measures in BC Quality Criteria

→

Step 2
Verify use of energy options listed in BC TIP for your climate region

→

Step 3
Complete certification on BC Web site

1. Are there other requirements besides using the energy options in BC TIPs?
   Yes. Regardless of the pathway used to qualify for the Builders Challenge, all builders must also use the measures listed on the Builders Challenge Quality Criteria, found on the Builders Challenge Web site. Measures include mechanical ventilation, insulation installation, sealed combustion appliances, and moisture management.

2. What is the next step after I complete the Quality Criteria?
   After verifying that you are using all the measures in the criteria, you will need to verify that you are also using the minimum energy options in the BC TIP for your climate region. A HERS rater can help you determine your climate zone and BC TIP and can confirm that the required energy options have been installed. For more information about climate zones, go to *www1.eere.energy.gov/buildings/building_america/climate_zones.html*.

3. How do BC TIPs differ from the other pathways to meet the Challenge?
   The BC TIPs are designed to introduce builders to getting started in the Builders Challenge based on predetermined energy options. BC TIPs are not intended to cover all possible energy saving options and approaches.

For more information, see *www.buildingamerica.gov/challenge*.

Builders Challenge draws on the best practices developed by DOE's Building America R&D program.
www.buildingamerica.gov

Development of BC TIPs

The prototype building used to develop the BC TIPs is a 2,500 ft^2, two-story, single-family home on a climate-appropriate foundation—slab, crawlspace, or unconditioned basement—with a glazing area equal to 18% of the conditioned floor area.

Energy models of prototypical, single-family homes are used to develop BC TIPs. The models are analyzed with BEopt, a software tool developed by DOE to evaluate cost/performance tradeoffs. BEopt is used to identify least-cost approaches to meet two performance goals: (1) a minimum package intended to meet the Builders Challenge (Builders Challenge Level), and (2) an energy package designed to achieve maximum cost-effective energy savings (Premium Efficiency Level).

The BC TIPs that define the minimum requirements for the Builders Challenge are then analyzed with home energy rating software to ensure the recommendations are consistent with performance-based approaches to achieve the E-Scale index of 70 or lower for the prototype homes.

Builders using BC TIPs cannot take advantage of performance tradeoffs based on floor or window area, or on window or building orientation. Builders interested in receiving full credit for specific building designs are encouraged to use the performance path rather than a BC TIP. A BC TIP is a *technology package*, not a point on the E-Scale. Homes built to comply with a BC TIP and the Quality Criteria for the appropriate climate will automatically qualify as a Builders Challenge home.

Benefits of Owning a Builders Challenge Home

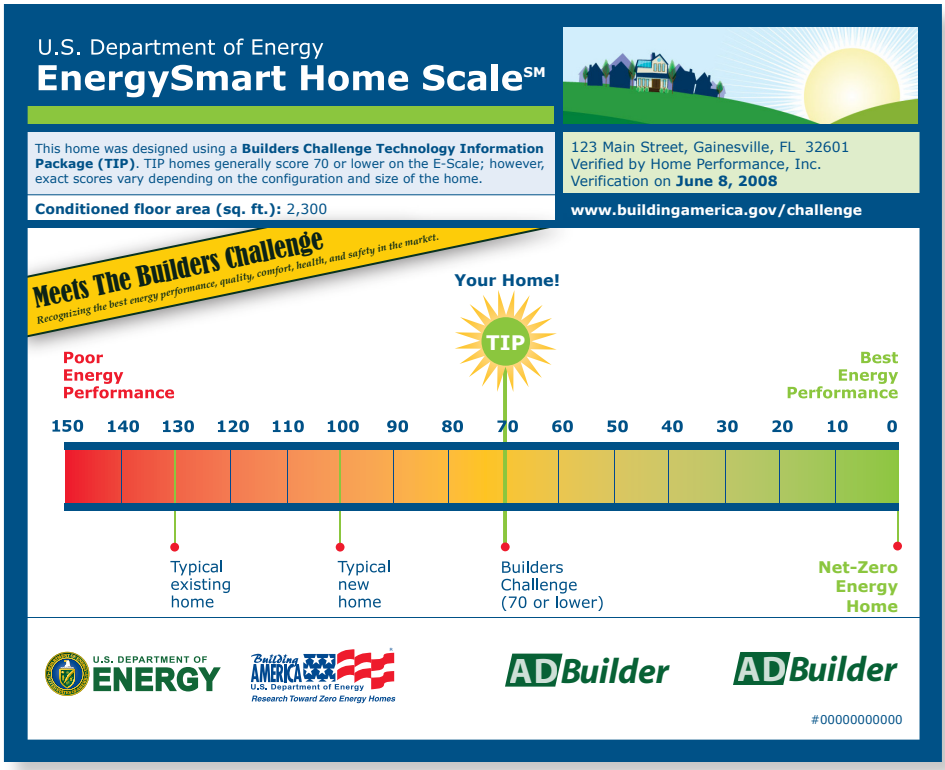
For a 2,500 ft² home using a Builders Challenge Technology Information Package:

Upgraded Energy Savings Levels	Minimum Builders Challenge Level		Premium Efficiency Level	
	Gas	Electric	Gas	Electric
Savings on annual utility bill[1]	$467	$419	$631	$671
Increase in annual mortgage payment from energy upgrades[2]	$185	$194	$300	$465
Net annual savings	$282	$225	$331	$206

[1] Evaluated relative to the 2006 International Energy Conservation Code, using average utility rates and climate data for this location. Specific savings will vary.
[2] Based on a 30-year mortgage at 7% APR.

Using the E-Scale to Market Your Homes

The EnergySmart Home Scale (E-Scale) may be used by builders who use BC TIPs to qualify their homes for the Builders Challenge. The E-Scale also helps homebuyers recognize that homes meeting the Builders Challenge represent the best **energy performance**, **quality**, **comfort**, **health**, and **safety** available.



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 the EERE Information Center:
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

For more information about the Builders Challenge: www.buildingamerica.gov/challenge

An electronic copy of this publication is available on the Building America Web site at **www.buildingamerica.gov**.

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