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

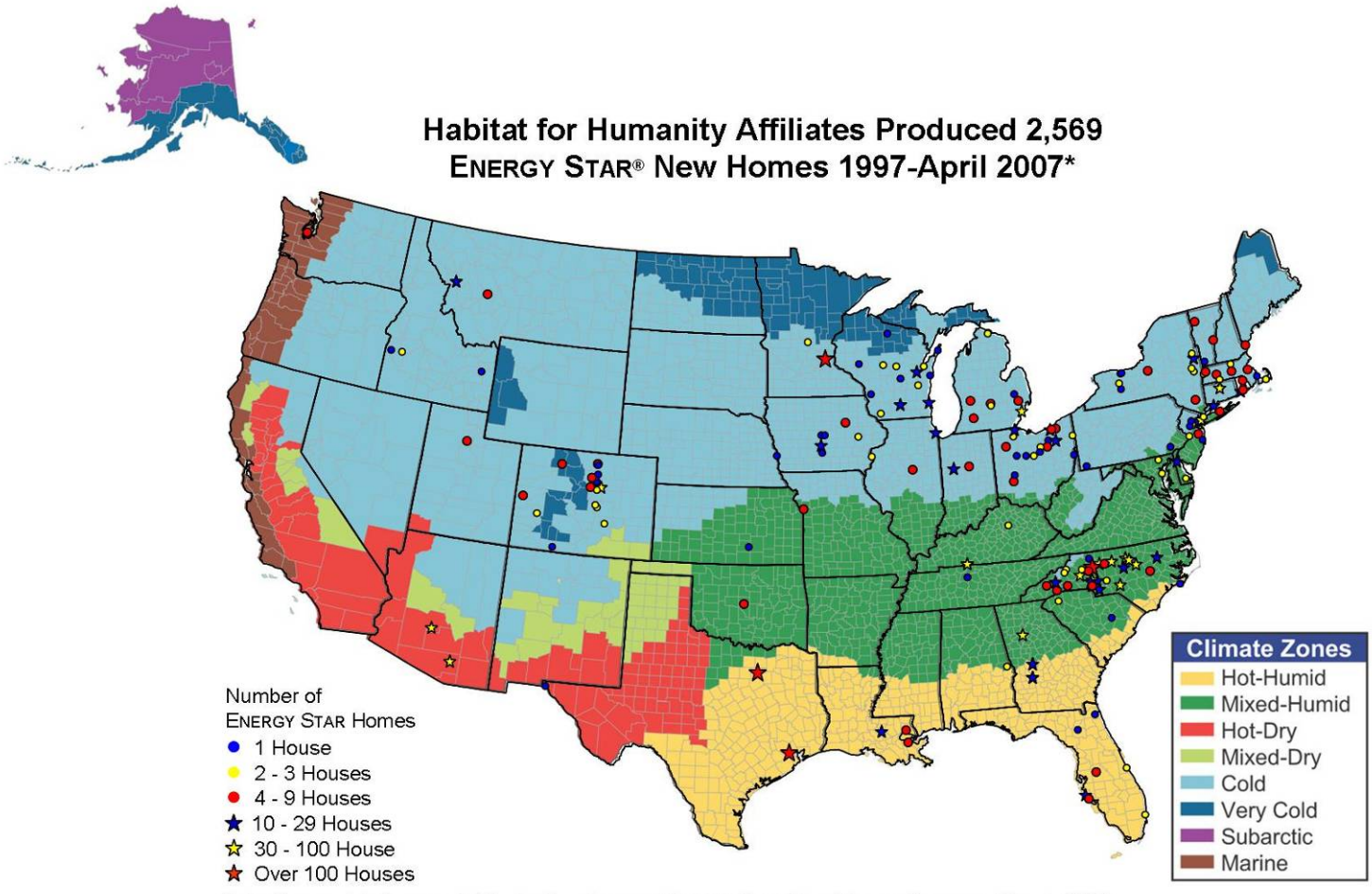
Research that Works
www.buildingamerica.gov

Building America – Habitat for Humanity Partnership Update July 2007

Habitat ENERGY STARS Shine

In the late 1990's, Habitat International made Energy Star construction a "Best Practice" for its domestic affiliates. Based on the national partnership database kept by the EPA Energy Star New Homes program, 178 Habitat affiliates have built at least one Energy Star home. Together these affiliates have built more than 2,500 Energy Star homes (see map below.) Monthly energy savings translate into improved cash flow for Habitat home owners.

Many of these affiliates have received technical assistance from the U.S. Department of Energy's Building America program, a public-private partnership that brings builders and building scientists together in pursuit of high performance housing. Through the Building America-Habitat partnership, formed in 1995, Habitat affiliates gain access to technical assistance as well as training opportunities at Habitat conferences and workshops.



Data Source: Environmental Protection Agency, ENERGY STAR New Homes Program. May 1, 2007.
Map produced by U.S. Department of Energy Building America program www.builingamerica.gov
Map includes only homes officially registered with the ENERGY STAR New Homes program.

Building America – Habitat for Humanity Partnership Update July 2007

What is Building America?

Building America is a private/public partnership that develops energy efficiency solutions for new and existing homes and combines the knowledge and resources of industry leaders with the U.S. Department of Energy's technical capabilities to act as a catalyst for change. To date there are over 33,000 high performance Building America houses.

How efficient are Building America houses? Savings are measured in comparison to a set of benchmark criteria and range from 30% to 100% (zero energy houses). For each climate zone (see map), DOE has set goals of saving 30%, 40%, or 50% of whole house energy use. Habitat affiliates have partnered with Building America teams and met the 30% and 40% savings goals. Case studies of these Habitat homes are available online (links in table below) so other affiliates can see what it takes to reach this performance level.

Affiliate City	Climate & % Savings	Partnering Building America Team
Lakeland (FL)	Hot-Humid 30%	BAIHP
Montgomery County (MD)	Mixed-Humid 40%	BSC
Greater Newburgh (NY)	Cold 30%	CARB
Pittsburgh (PA)	Cold 40%	IBACOS

Ultimately, Building America seeks *cost effective* paths for building zero energy homes (ZEH) - 70% energy savings plus 30% onsite renewable power generation with wind and/or solar. Two Habitat affiliates have worked with DOE's National Labs to build ZEHs:

ZEH Affiliate	Climate	Partnering DOE Lab
HFH of Metro Denver	Cold	National Renewable Energy Lab
Loudon County, TN	Mixed Humid	Oak Ridge National Lab

Lakeland Habitat Hot, Humid Case Study

Since building their first Energy Star home in 2000, Lakeland (FL) Habitat for Humanity has built 51 and will complete another six by the end of 2007 (photo above.) These homes actually exceeded the 1999 Energy Star standard and met the new 2006 Energy Star standards, including the Thermal Bypass Inspection – a new component of the Energy Star New Homes program.

In addition to energy improvements, Lakeland HFH also incorporates outside air ventilation using an inexpensive, passive strategy that can be implemented by any builder in the hot humid climate. This summer, Lakeland HFH has undertake building a certified LEED home with Building America technical support.

Full Lakeland Habitat for Humanity Case Study
More Hot-Humid Climate Guidance:
1. Building America Best Practice Series: Vol 1 – Hot-Humid Climate Zone
2. Building Science Corp. Designs and Plans for Affordable Housing

Building America – Habitat for Humanity Partnership Update July 2007

The reHABITAT Guide: For Energy- and Resource-Efficient Retrofit Strategies

Habitat affiliates embarking on rehab projects will find a wealth of practical guidance on applying the "whole building" approach to renovation projects. Grounded in the Building America *systems engineering* approach, the concepts and strategies are equally applicable to new construction in the cold climate. The handbook was produced by Building America's Consortium for Advanced Residential Buildings (CARB) who thanked Chesapeake HFH (MD) and HFH Philadelphia (PA) for contributions and especially HFH of Greater Newburgh (NY) for their extensive partnership.

More Cold Climate Guidance:

1. *Energy and Indoor Air Quality Recommendations for Cold Climate Habitat for Humanity Homes (BAIHP)*
2. *Building America Best Practice Series: Volume 3 – Cold and Very Cold Climates*
3. *Pittsburgh (PA) Habitat's Building America Project (IBACOS)*
4. *Building Science Corp. Designs and Plans for Affordable Housing (BSC)*

Congratulations Houston Habitat!

On March 21, 2007, EPA and DOE announced that Houston (TX) Habitat (and six other organizations) would receive an Excellence in Energy-Efficient Affordable Housing award for their Energy Star homes. Houston Habitat has spent a decade refining the energy efficiency features of their homes since their creation of the Energy Affordable Home in 1995 and construction of the first Habitat Energy Star home in the America that same year.

In 1998, Houston Habitat built 100 Energy Star homes with thousands of volunteers at the 1998 Jimmy Carter Work Project in partnership with a crew of energy monitors that made sure all the specs were met and tested the houses at the end of the week (photo, left.) Now, 10 years later, the affiliate plays a leadership role in Habitat and in the Houston builder community working to develop the local green building scene. Congratulations Houston Habitat for setting a great example for increasing affordability through energy efficiency and durability!

Building America – Habitat for Humanity Partnership Update July 2007

Sill seal – keeps air and bugs out

House wrap applied to gable end before raising truss into place

Team work makes wrapping easier

Seal air barrier at edges and seams

HFHI National Construction Leadership Training

Gautier, Mississippi (February 2007)

At the invitation of HFHI's Construction and Environmental Resources Department, Building America participated in classroom and hands-on training (*photos, left and next page*) to help participants sharpen their understanding of building science concepts - a core element of construction leadership.

Often, supervisors are working from construction drawings that are not fully detailed. A strong building science background ensures that decisions made on site, on the spot will support (not hinder) durability, good indoor air quality, energy efficiency, and comfort.

The "whole house" approach to building science and high performance housing is grounded in fundamental physics of air, water, and heat movement. Participants got building science lessons in how the building enclosure and mechanical systems work together to control movement of water, air, and heat (download the presentation)- working with full scale building assemblies and materials:

Hands-on lessons (photos, left) included:

- Air (and insect!) infiltration with a continuous air barrier
- Drainage plane integrity
- Window flashing
- Wall insulation and ventilation baffles

Classroom training covered:

- Building science concepts of air, water, and heat flow
- New Energy Star program
- Window characteristics (by Global Green)

Since the training focused on leadership development, Building America researchers shared ways of fostering volunteer leadership on energy related tasks by encouraging curiosity, reinforcing successful completion of tasks, building a sense of mastery, and generating enthusiasm for the positive impact these tasks will have on the homeowners life – energy savings, improved indoor air quality, durability, and comfort.

Join us, October 2007, at the Focus on the Future: Advanced Topics for Growing Affiliates & National Executive Director Conference in New Orleans.

Building America – Habitat for Humanity Partnership Update July 2007

Habitat National Construction Leadership Training, *continued,*
Photos from hands-on window flashing exercises

Important Notice

To avoid warranty issues and code violations, always follow window manufacturer and code body flashing directions.

Cutting "Modified I" or "Inverted Y" opening in house wrap

Sill flashing with wide flashing tape. (Alt: adhesive back membrane, pre-formed pan flashing, felt.)

Apply long life sealant to back of nailing flange

Set window, pressing to set sealant against house wrap

Shiplap side flashing over nailing flange and sill flashing, under house wrap "flap"

Long life sealant under flap

Also see "Installing Windows with Foam Sheathing on a Wood Frame Wall" (BSC)

Building America – Habitat for Humanity Partnership Update July 2007

Where are you? And where are you headed?

Refer to the map of Habitat Energy Stars on page 1 and find your affiliate on the Climate Zone map. This is your key to unlocking Building America resources for your affiliate – such as the Best Practices series and the Houses that Work series (links to all below). These guides can help you plot a course toward higher performing homes that is right for your climate, such as Energy Star or the Building America goal of 30-50% whole house savings.

Each **Best Practice** guide offers climate-appropriate, practical, field tested recommendations that Habitat affiliates can use to build healthier, more efficient, durable, and comfortable homes. Don't miss the case studies at the back – see how other builders in your climate zone have implemented the best practices.

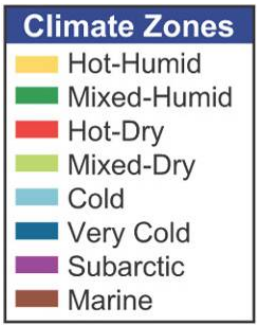
The Building Science Consortium (a Building America team) has developed a series called "Houses that Work" which are packages of house plans and specifications that show how to integrate the best practices. These are available for free online and BSC has developed set of "Houses that Work" specifically for Affordable Housing – check it out!

Having trouble finding your climate zone on the map?

Send your county and state to Janet McIlvaine (contact info below) for assistance.

Building America Best Practice Series:
Volume 1: Hot-Humid Climate Best Practices Guide
Volume 2: Hot-Dry and Mixed-Dry Climate Best Practices Guide
Volume 3: Cold and Very Cold Climate Best Practices Guide
Volume 4: Mixed-Humid Climate Best Practices Guide
Volume 5: Marine Climate Zone

Houses that Work Series:
Designs and Plans for Affordable Housing (select your climate)



We want to hear from you!

Send us your high performance housing story on a single page with a bulleted list features and we will share your story with others on our Building America-Habitat Partnership page:
www.baihp.org/habitat

Building science and energy efficiency questions, contact: Janet McIlvaine (janet@fsec.ucf.edu)

RESNET members that want volunteer with Habitat, see the Habitat - Building America - RESNET Partnership page and send your contact info to: David@fsec.ucf.edu

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Building America Industrialized Housing Partnership

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