



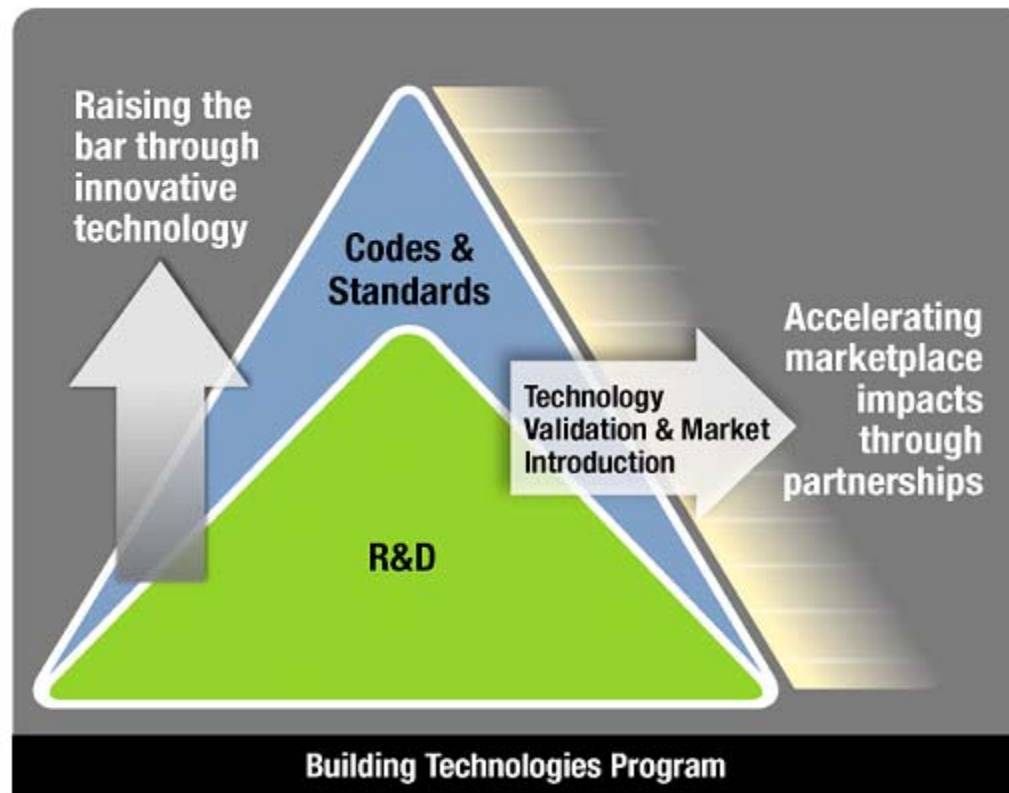
DOE Residential Buildings Program

RESNET 2009

Edward Pollock
February 16, 2008

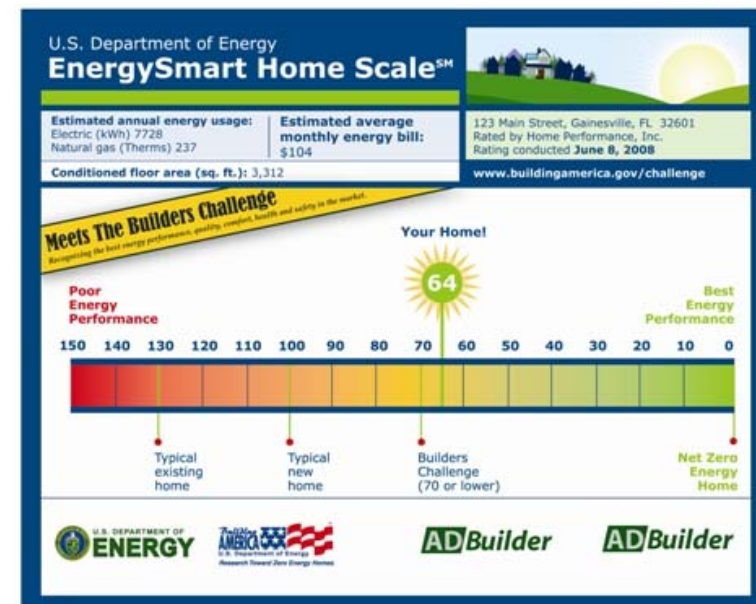
Building Technologies Mission

Develop technologies, tools, and standards for making residential and commercial buildings and appliances more energy-efficient, productive, and affordable.



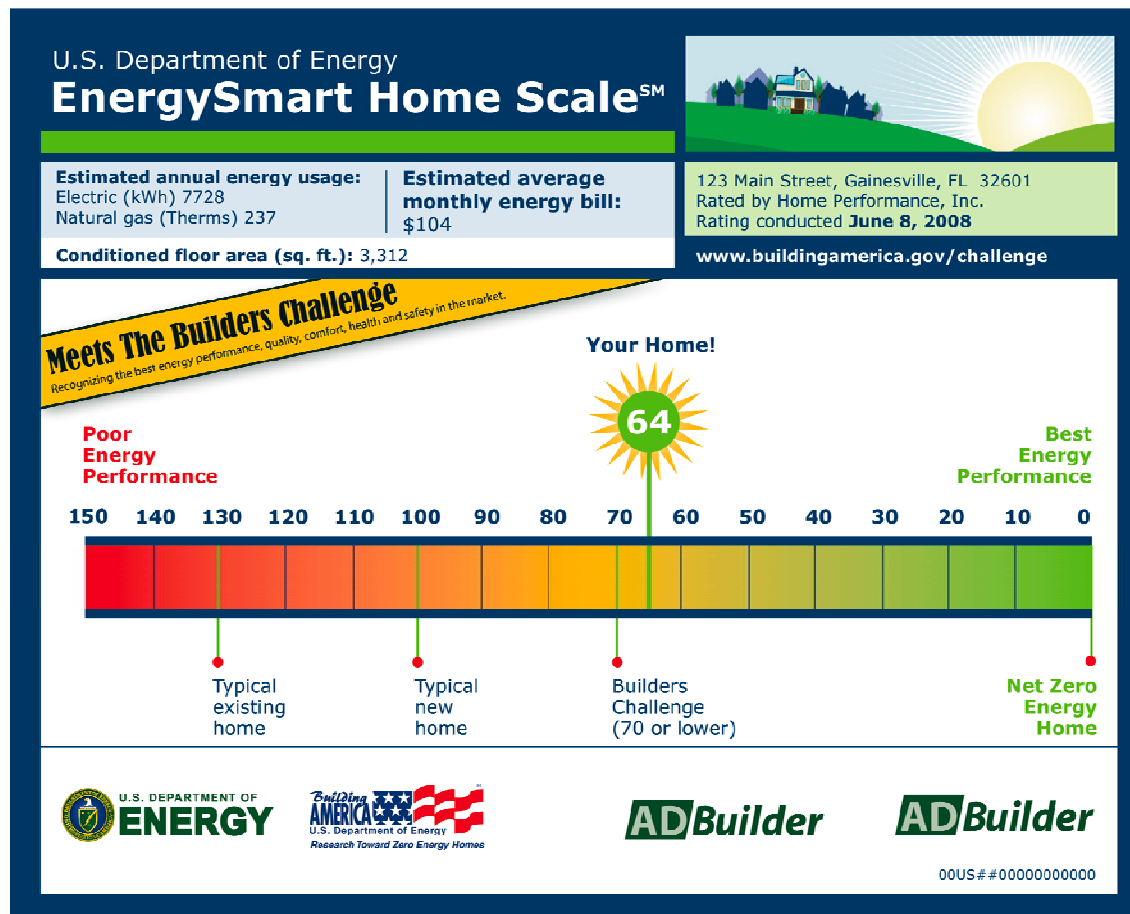
Builders Challenge Progress

- Secretary Bodman announced at the International Builders' Show on February 14, 2008
- Builders commit to constructing homes that rate 70 or less on the EnergySmart Home Scale
- 1000 labeled homes
- Over 200 Homebuilders registered
- 82 Verifiers registered
- 68 Program and Resource Partners registered





Builders Challenge



Drive demand:
Help homebuyers recognize that homes that meet the Builders Challenge represent the best energy performance, quality, comfort, health and safety available in the current housing market.

Quality Criteria List

— Establishes

- Requirements
- Responsibilities

— 29 criteria

- 15 required, 14 recommended
- Focus on comfort, IEQ, durability
- Organized by design/construction phase
- Developed by industry experts under DOE leadership

Builders Challenge
Recognizing Energy Leadership in Homebuilding

Builders Challenge Quality Criteria Guide – Version 1.3

The Builders Challenge Quality Criteria homeowners alike benefit from reduced energy costs, regardless of compliance path.

This version of the Quality Criteria is updated criteria. Items which are not available on the Builders Challenge website.

Relationship to Codes & Manufacturers
The Quality Criteria are not intended to replace applicable codes. In cases where applicable codes apply, in cases where many of the provisions noted below at Challenge is focusing attention on the Additionally, where a quality provision

Roles and Responsibilities
The Quality Criteria require different responsibilities. Builders must establish the responsibilities are noted below. Third-party verifiers must verify that the builder is following the Builders Challenge Quality Criteria. QC inspectors for homes (architects or employees of an organization) to use building.

Builders Challenge Quality Criteria V1.3 – June 4, 2008
For more information on the Builders Challenge, visit: www.builderschallenge.com

Builders Challenge
Recognizing Energy Leadership in Homebuilding

Trade contractors must implement quality practices in accordance with the Builders Challenge website.

Resources
A technical resource guide with background on each of the QC provisions. Links to the Building America Best Practice Guides, as well as other resources.

Quality Criteria
The Quality Criteria are listed in three phases:
The **Design Phase** requires design, planning and documentation.
The **Construction Phase** requires the builder to implement the design.
The **Verification Phase** requires a third-party verifier to review the construction.

Builders Challenge Quality Criteria

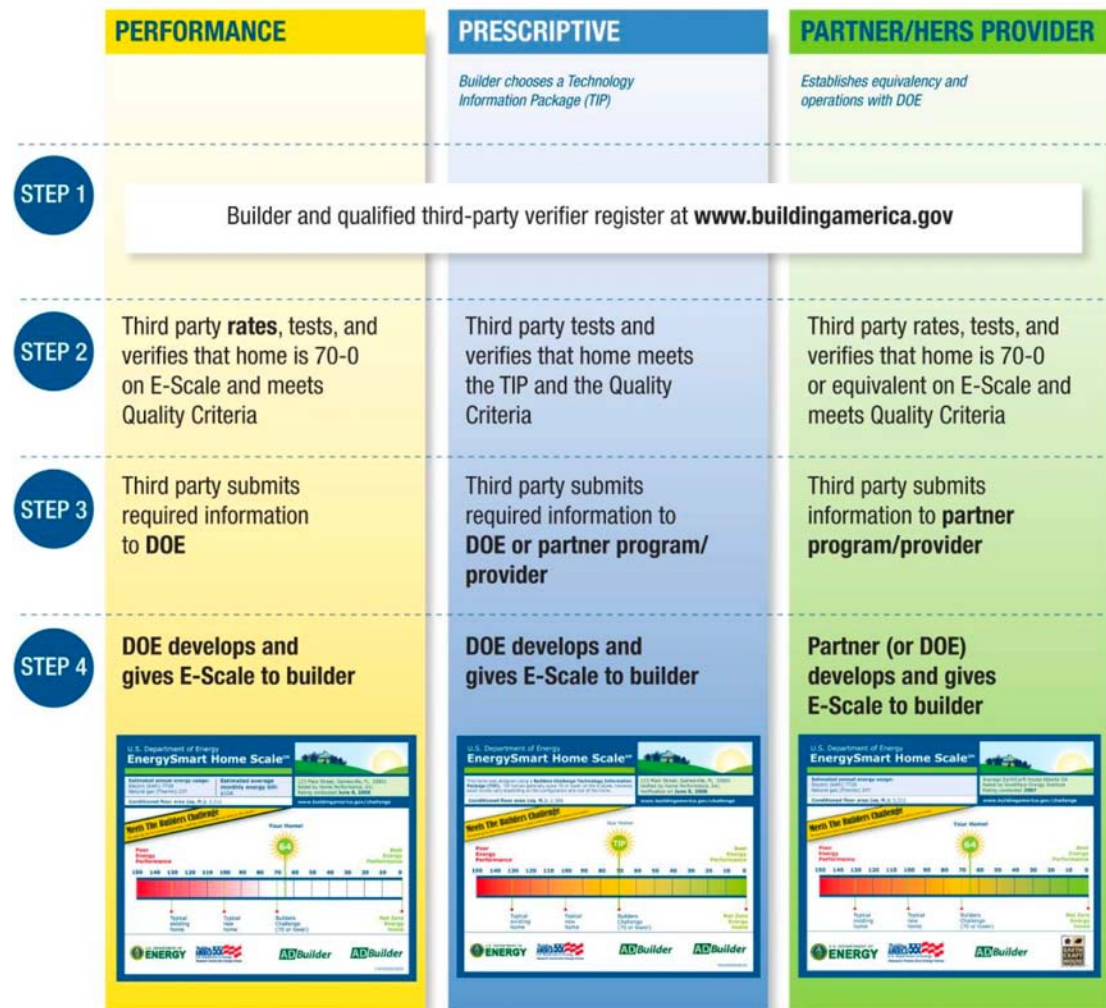
Builders Challenge Quality Criteria	Builder Documentation & Verification Requirements	Third-Party Verification Requirements
1. Project Documentation – Required Construction/design documentation (e.g., plans, details, specifications, job requirements, complete checklists, and trade scopes of work and/or agreements) will include and quality provisions needed to meet the Builders Challenge criteria.	specification, and drainage space specification (if applicable) Include requirements for flashing, foundation details, and wall system in contractor's construction/design documentation.	
2. Building Envelope Moisture Management – Design Phase – Required In the design phase, include details for integrating the weather barrier system. Flashing components in the construction plans. Specify window and door flashing details.	Specify climate appropriate vapor retarder or barrier per locally applicable IECC. (Reference IECC Section 402.5) When using water absorbent cladding, including brick, stone (real or manufactured), stucco, and fiber cement, provide a pathway for bulk water that enters the wall assembly from the exterior to drain to the exterior. Typically this involves specifying a drainage space or pathway provided by furring strips, an air gap, contoured house wrap, or other products that create a vertical drainage channel behind the cladding and exit the wall horizontally. Cladding installation per manufacturer's recommendations is also permitted.	
3. Material Efficient Framing – Recommended Design building dimensions and layouts to minimize material cuts and waste for wall, floor, and roof system structural components and sheathing. Size all headers for actual structural loads, and insulate to the fullest extent possible. To the extent possible use building systems which minimize on-site waste, such as panelized walls, pre-cut framing packages, and engineered wood products. Incorporate these measures in the framing.	Develop framing layout plan and keep in project records.	
4. Construction Waste Management – Recommended Develop, post at the jobsite and implement a Construction Waste Management Plan. The plan should document the diversion pathways for major waste stream components including cardboard, lumber, land-clearing debris, and drywall. The plan should also document efforts to request minimized packaging from suppliers. Goals for waste diversion should be at least 25% (by weight) for construction and land-clearing waste.	Develop Construction Waste Management Plan and keep in project records.	
5. Space Conditioning Design – Required Right-size space conditioning system for heating/cooling loads based on ACCA Manual J Version 8 or comparable load sizing analysis (reference 2006 IRC M1401.3, 2006 IECC Section 403.6). The maximum over-sizing limit for cooling equipment is 15%, with the exception of heat pumps in Climate Zones 5 - 8 where the maximum over-sizing limit is 25%. Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data. Indoor temperatures shall be 75 F for cooling; infiltration rate shall be selected as "tight", or the equivalent term. In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.	Analyze load-sizing and duct-sizing and keep in project records.	Review the load-sizing and duct-sizing analyses to ensure that sizing criteria stated in the requirements were used for the home.
6. Space Conditioning Design – Recommended Identify the whole building ventilation strategy and equipment in the mechanical system design (see the 2 other Quality Criteria: Whole Building Ventilation I and II for requirements).		

Builders Challenge Quality Criteria V1.3 – June 4, 2008
For more information on the Builders Challenge, visit: www.builderschallenge.com

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How does it work?





BC-TIP for Phoenix, AZ

- 7 TIPs available online
- More coming for other systems and cities
- Send us suggestions!

Climate Region: Hot-Dry Location: Phoenix Foundation Type: Slab	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
Slab	Uninsulated	Uninsulated	Uninsulated	Uninsulated
Windows²				
	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		8.2		9.2
Air Conditioning				
Efficiency Rating, SEER	14		17	
Air-Source Heat Pump, SEER		14		18
(Builder-Supplied) Appliances				
	ENERGY STAR®	ENERGY STAR®	ENERGY STAR®	ENERGY STAR®
Water Heater				
	Tank/Gas	Tank/Electric	Tankless/Gas	Tank/Electric
Energy Factor, EF	0.59	0.95	0.77	0.95
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.

Technical Resources

Building Technologies Program: Building America - Windows Internet Explorer

U.S. Department of Energy
Energy Efficiency and Renewable Energy

Building Technologies Program

About the Program | Information Resources | Financial Opportunities | Technologies | Development | Home

Search Help | Home Search Options

Site Map | EERE Information Center

News

2008 Buildings Energy Data Book is Now Available
September 30, 2008

California Adopts a Long-Term Energy Efficiency Plan
September 24, 2008

Subscribe to EERE News Updates

Publications

Volume 1: Hot-Humid Climate Best Practices Guide (PDF 7.0 MB) +

Volume 2: Hot-Dry & Mixed-Dry Climates Best Practices Guide (PDF 4.7 MB) +

Volume 3: Cold & Very Cold Climate Best Practices Guide (PDF 5.6 MB) +

Volume 4: Mixed-Humid Climate Best Practices Guide (PDF 5.9 MB) +

Volume 5: Marine Climate Best Practices Guide (PDF 5.5 MB) +

Quick Links

- Sign up for email updates.
- Find projects in your area.
- Search all publications.

For additional information about Building America, see the Program Overview (PDF 1.3 MB) - Download Adobe Reader.

41,190 Homes Built in Building America Research Projects

See Current Projects

www.buildingamerica.gov

Building America Best Practices Series: Volume 1
Buildings and Systems Handbook for Improving Home Energy Efficiency, Comfort, and Resiliency in the Hot and Humid Climate

Better Duct Systems for Home Heating and Cooling

Duct Sealing

AIR SEALING DRYWALL

Solar Thermal Photovoltaic Systems

Buyer-Focused Brochure



Take Control of Your Energy Future

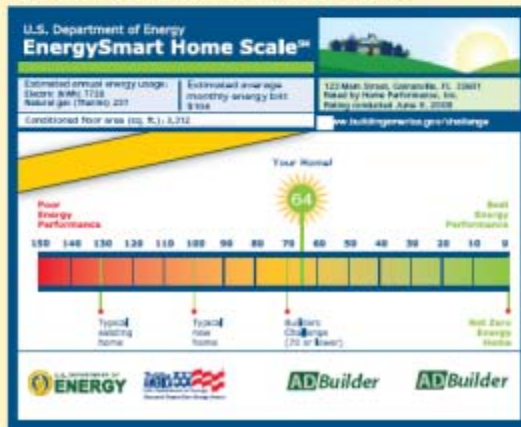
Choosing a new home is all about making the right decisions for you and your loved ones — selecting a neighborhood, a high-quality builder, and the features you value. You compare, ask questions, and make informed decisions about what matters most to you.

But what about energy? Today, more and more buyers value energy efficiency in their new homes — as a way to control their energy bills, reduce carbon emissions, and help preserve our natural environment. Yet, until now, there has been no easy way to compare the energy performance of different homes.

That is where the EnergySmart Home Scale (E-Scale) comes in. Brought to you by the U.S. Department of Energy, the E-Scale lets you compare the energy performance of homes on the market, simply by comparing a number rating. And like your car's MPG, it is a number worth knowing — a number that can put you in control of your energy future.

Make smart choices with the E-Scale

Look for the EnergySmart Home Scale (E-Scale) to compare the energy performance of home models. The lower the number, the more energy — and energy dollars — you'll save.



Sample Consumer Ad



House Proud

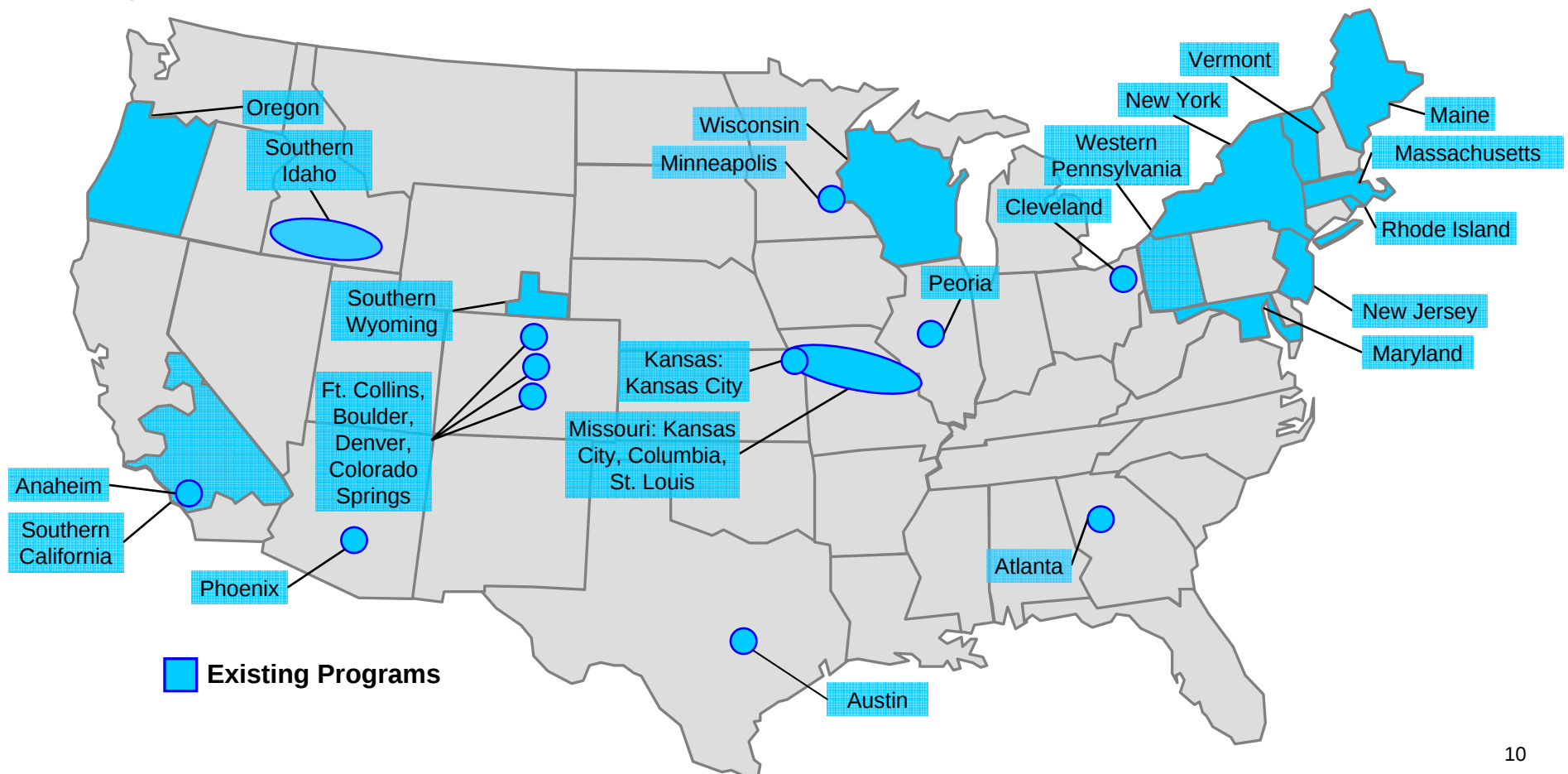
Her flowers win awards. His DIY projects are envied. And both are house proud when it comes to energy savings. By choosing a high-performance house between 0 and 70 on the EnergySmart Home Scale (E-Scale), these neighbors enjoy lower energy bills and help the environment.

For more about the E-Scale, see <http://www.buildingamerica.gov/challenge>



Home Performance with Energy Star

- Currently approximately 12,000 homes improved a year





Benefits of an Aggressive Residential Energy Efficiency Program

- Goal is to develop the infrastructure to enable retrofit of 5 to 10 million homes a year
- Employ 250,000 to 500,000 well paying green jobs that cannot be exported
 - Train 100,000 contractor/home energy analysts and 200,000 ancillary services trades
- Provide an economic stimulus of \$50 to \$100 billion per year
- Increase savings by 0.25 to 0.50 quads per year (Goal of 3 quads per year by 2020)
- Estimated savings of \$36 billion annually for America's home owners by 2020
- Reduction of carbon emissions by 180 million metric tons compounded annually by 2020



Recovery Act of 2009

- \$1,500 tax credit for home retrofit
- \$5 billion for Weatherization Assistance
- \$3.1 billion for State Energy Program
- \$3.2 billion for EE block grants
 - \$2.8 billion based on existing formula
 - \$400 million for competitive awards
- \$6 billion for HUD grants
- \$6 billion for innovative technology loan guarantees
- \$500 million for green job training
- \$2.5 billion for energy efficiency research



What can we do to help States use these funds effectively?

- Funds go to States as grants
- Complete work on retrofit standards
- Templates for various approaches
- Guides for establishing a program
- Technical support to the State offices, financial institutions and trades
- Training
- Business development
- Marketing to homeowners
- Most important is a sustainable national program

BESTEST-EX Objective



- **Test ability of analysis methods with utility bill true-up to predict energy savings.**
 - **Method to be basis for software certification**
- **Compare energy savings predictions based on:**

Approximately-known
base-case inputs
calibrated to pre-
retrofit utility bills

versus

Explicitly-known base-
case inputs used to
generate “utility bill
truth standard”

Where ... to calculate savings predictions, explicitly known inputs for specific energy savings measures are applied to both base cases.

Forms at RESNET

- Bestest- EX
 - Monday 6:30 - 9:30p.m., in room Toulouse A
- Recovery Act – metrics, definitions and opportunities
 - Monday 7:30 – 9:00p.m., in room St. Charles B
- Recovery Act – Discussion of ways to help States use grant funds effectively
 - Tuesday 7:30 – 9:00p.m., in room St. Charles B



Residential Policy Recommendations

- Increased funding for:
 - Component research
 - Building America research in all climate zones simultaneously
 - Training for designers, builders, trades and marketing
- Policy changes:
 - National change in home assessment to include values of energy savings
 - Energy efficient mortgages
 - EnergySmart Home Scale and other energy efficiency metrics included in Multiple Listing Service
 - Require audits at time of sale to upgrade to minimum efficiency level
 - Direct DOE to do a study on the most effective way to promote and finance energy efficiency in bulk (loan guarantees, tax credits, utility bills, etc.)