

Home Energy Score

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U.S. Department of Energy

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Recovery thru Retrofit: Identified 3 Major Market Barriers

Consumer Information

Consumers do not have access to straightforward and reliable information.

Worker Certification & Training

Consumers and industry want access to consistent workforce standards and a national certification.

Financing

Homeowners need access to financing to pursue investments in energy efficiency.

Objectives

- Strengthen the home energy retrofit market
- Provide an affordable and credible means for --
 - Homeowners to understand their home's energy performance, how they compare to others in their area and how to take action to improve its efficiency
- Build on and complement existing home energy improvement efforts
- Facilitate the ability of trained workers to enter the private sector retrofit market as Weatherization work funded by the Recovery Act ramps down

Phase 1: Developing the Home Energy Score

December 2009 thru October 2010

- Analyzed other rating programs – both domestic and international
- Analyzed various software tools
- Significant outreach (webinars, discussions with interest groups, Request for Information)
- Conducted 12 focus groups in 6 cities
- Reviewed social science research on consumer behavior and ability to process information
- Assessed how different home characteristics affect overall energy use (2 million+ model runs)

**Go to www.homeenergyscore.gov for more information
on findings from these analyses.**

DOE Established Guiding Principles

- Information must be credible, reliable, and replicable.
- Information must be transparent and easy to understand.
- Implementation costs must be affordable.
- Program must include effective quality assurance.

Requested Input on Major Issues

- Guiding Principles
- Basic Metric
- Rating
- Scales and Reference Points
- Recommendations for Improvements
- Presenting Information to the Consumer
- National Home Energy Registry
- Quality Assurance

Received input from 130+ individuals and 35+ organizations

What We Found...

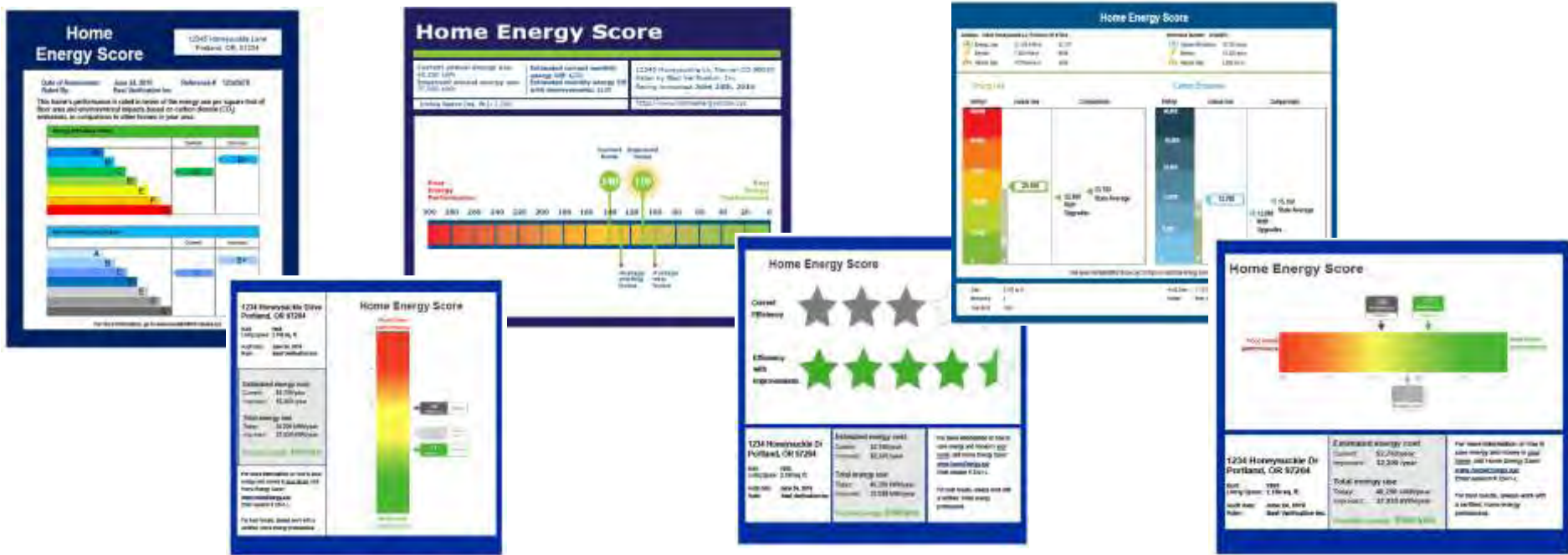
- Variety of rating methods (and tools) in the marketplace or under development
 - Growing interest among states and localities in rating programs and disclosure policies
 - Interest in a national system to provide consistency
- Significant concern among many realtors that ratings could further stymie housing transactions
- Concern among contractors that providing simplified recommendations and national cost information to consumers could undermine their work

Many different views on a wide spectrum on issues.

- **Good arguments for variety of approaches**
- **Complicated issues did not lend themselves to one “right” answer**

Focus Groups

- Conducted six focus groups across the country
- Examined what information influences homeowners and how to best convey this information
- Used different labels and supplemental information to solicit input from homeowners



Key Findings from Focus Groups and Social Science Review

- Homeowners appreciate straightforward, simple information...at least initially
 - Clear, simple, colorful graphics that make sense at a glance
- As supplemental information, they want customized recommendations with information on costs and savings
- People are influenced by how they compare to their peers, neighbors
- Reference points matter
 - If you a homeowner how they compare to the average home, they will be satisfied with being anywhere above average
 - If you give them a motivational point of comparison (top X percent), they are likely to be motivated to do more

Key Findings from Focus Groups and Social Science Review

- Consumers ultimately care most about the bottom line
 - However, many are misinformed about what investments will pay off most quickly and save the most energy
 - Many don't realize that energy improvements can also improve the comfort of their homes as well as health and safety
- Consumers like to see government seal on information provided
 - Co-branding with local provider can be effective

Phase 2: Testing & Refining the Home Energy Score

- Vice President Biden announcement -- November 9, 2010
- Home Energy Score
 - 10 Point scale, recommendations, tips
- Home Energy Scoring Tool
- Pilot program
 - Partnering with cities, utilities, non-profits in different climate zones

Home Energy Score: What is it?

- Standard method for quickly assessing a home's major energy systems and envelope
 - About 45 data points required
- Produces an asset rating
 - Incorporates standard behavioral assumptions
- Allows comparison between homes regardless of location in U.S.
 - Compares homes of similar size
 - Takes into account local climate

Home Energy Score: Who provides it?

- Qualified assessors
- Must be a HERS rater working under a RESNET-certified provider or a BPI Building Analyst or Home Energy Survey Professional
 - Currently, only raters/analysts working as part of a pilot are being certified as qualified assessor
- Must also take DOE on-line training and test (80% grade needed to pass and gain access to tool)

Home Energy Score: How do you generate it?

- Simplified software tool allows the assessor to --
 - Collect and input information about the house, and
 - Produce a score and upgrade recommendations...
...in an hour or less
- While designed to be minimally demanding, the assessment requires an understanding of home characterization.
 - Some input choices don't exactly match the homes so judgment is required.
 - Example: Attic type – only one choice is possible so UA calculations may be required.

Home Energy Scoring Tool

- Features pull-down menus
- Includes guidance information for most inputs
- APIs (Application Programming Interface) available to link to other software tools

1731 E. Carson St
Pittsburgh, PA 15203

- ✓ About this Home
- ✓ **Roof, Attic & Foundation**
- ✓ walls
- ✓ Windows & Skylights
- ✓ Systems

[View Summary](#)
[Back to Dashboard](#)

Roof

Roof construction ⓘ
Select the type of construction for the roof (not the attic floor)

Construction:

Exterior Finish:

Insulation Level:

Absorptance of exterior surface of the roof ⓘ:

Attic

Attic or ceiling type ⓘ:

Attic floor insulation ⓘ:
Select only if the house has an attic.

Foundation

Foundation type ⓘ:

Floor insulation ⓘ:
Select only if the house has a basement or crawlspace.

Foundation insulation level ⓘ:

[Back](#) [Save & Exit](#) [Next](#)



Lawrence Berkeley
National Laboratory



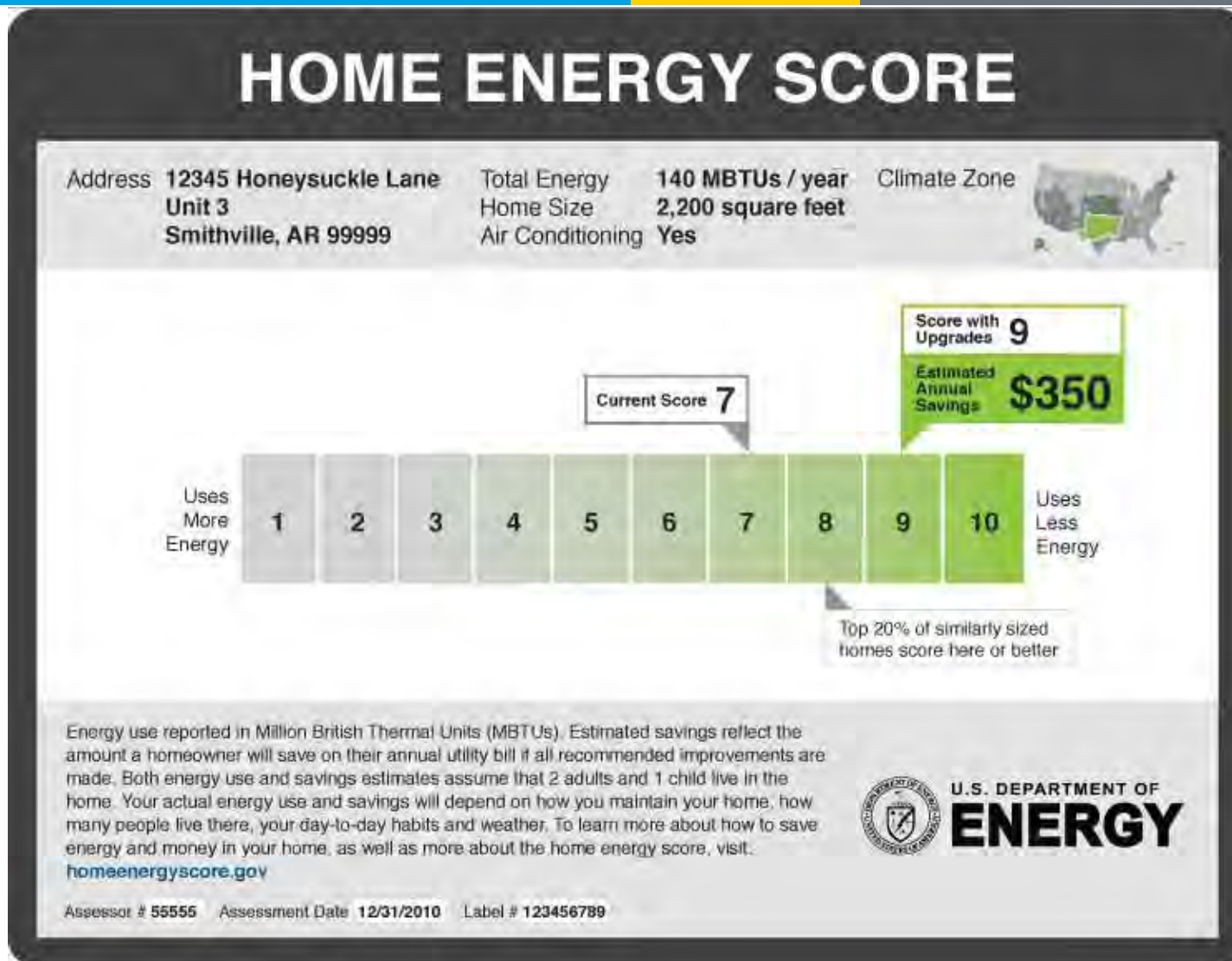
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ENERGY

The Home Energy Scoring Tool was developed by Lawrence Berkeley National Laboratory in collaboration with the U.S. Department of Energy. The modeling engine can be accessed as a web service API.
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Home Energy Score: What does the consumer get?

- Asset Score (on 10 point scale)
- Tailored recommendations for improvements
- Standard operational tips
- List of data inputs used by the assessor

Home Energy Score



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HOME UPGRADE RECOMMENDATIONS

Home Energy Score | Session # 000062465 | Page 3

Address 555 Park Lane | Pittsburgh, PA 99999

Improvements recommended now

These upgrades can help you save energy right away.

	Estimated Utility Bill Savings (\$/year)	Simple Payback Period (years)	Greenhouse Gas Reductions (lbs CO ₂ /year)
Basement: Add insulation to walls to R-11.	\$230	2	1,680
Air tightness: Have a professional seal the gaps and cracks that leak air into your home.	\$130	5	970
Attic: Increase attic floor insulation to R-38.	\$120	6	890

Recommendations for when you need to replace equipment

These recommendations will help you save energy when it's time to replace or upgrade:

Furnace: Pick one with an ENERGY STAR label.	\$160	1	1,150
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It is important to consult a certified energy professional to ensure improvements are made properly and take into account health, comfort, and safety. Proper installation, including details such as complete coverage of rigid insulation and taping the seams, is critical to achieving energy savings. As with any major purchase, you should seek more than one cost estimate before making a buying decision.

How are savings calculated?

These estimates are based on standard energy use patterns of 2 adults and 1 child. Actual energy bills and projected savings will vary according to the number and type of appliances, the number of occupants and their behavior, and weather.

What do lbs of CO₂ mean in my everyday life?

On average, a car generates about 11,000 lbs of CO₂ each year.

What does payback period mean?

For improvements recommended now, simple payback reflects the number of years it will take to cover your upfront costs. For recommendations concerning future equipment replacement, payback time is the number of years it will take for your savings to add up to your upfront cost if you buy an Energy Star, or high-efficiency unit, instead of a lower-efficiency one. Payback periods will vary depending upon local energy costs and the costs of improvements in your area. Only measures with paybacks of 10 years or less are included. If you take into account the opportunity cost of money, the payback time is longer.

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TIPS TO SAVE ENERGY AT HOME

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Most home owners can reduce their energy bills and increase the comfort and safety of their home by changing some basic habits and doing more routine maintenance. Here are some easy ways to save energy and money. Savings from these measures are not included in the Home Energy Score.

Refrigerator/Freezer

- If your extra refrigerator is only used once in a while, unplug it and prop the door open when it's empty.
- If your extra refrigerator doesn't have much in it, consider replacing it with a smaller Energy Star model.

Laundry

- Use cold water to wash your clothes. Most detergents clean just as effectively and clothes don't fade as fast.
- Hang your clothes on a line to dry, when appropriate.
- If you use a clothes dryer, set the timer to Autodry so the dryer stops when your clothes are dry. This saves energy and is better for your clothes.
- Clean the dryer lint trap before each use. Clean the dryer vent hose every 6 months, more if you dry a lot of clothes. Be sure your vent hose is free of kinks.

Buying and Replacing Appliances, Windows and Other Equipment

When you buy or replace appliances, windows or other equipment, be sure to pick ones that have an ENERGY STAR label. If there are no ENERGY STAR choices, compare the products' energy use specifications and pick one that is more energy efficient.

Heating and Cooling

- Install a programmable thermostat.
- During the winter, lower the thermostat setting at night and when the house is empty.
- During the summer, raise the thermostat setting at night and when the house is empty.
- Avoid the desire to turn the thermostat temperature way up or way down to make the house warmer or colder. It doesn't heat or cool the house any faster but it uses more energy.
- Use ceiling fans alone or with air conditioning. Remember to turn them off when you leave.
- Change your furnace filter every two months (during summer too, if you have central air conditioning). Do it more frequently if you have pets or see that the filters are more than a little dirty.
- Bleed the air out of the radiators within a month of turning the boiler on each winter. Don't block vents and radiators with furniture.
- Install reflectors behind the radiators on outside walls.
- Keep about 2 feet of space cleared around your outside air conditioner/heat pump compressor.

Curtains and Blinds

- On summer days, close window shades and curtains on the south and west side of the house. On winter days, open them.
- On winter nights, close all window shades and curtains.

Lights

- When you leave a room, turn lights off.
- Replace incandescent bulbs with compact fluorescent lights (CFLs).

Computers and Other Electronics

- Use the energy saver settings on computers and other electronics so they go to sleep when you are not using them.
- Plug groups of electronics together into one power strip. Turn off the whole powerstrip off when they are not in use.

Water

- Fix leaky faucets and running toilets right away.
- Install low-flow showerheads and faucet aerators.

Whole House upgrades save energy and money and can make your home more healthy, comfortable and safe to live in.

For even bigger savings, ask a certified energy professional about "whole house" energy upgrades. Qualified professionals can help you pick the right kind and size of equipment and make sure it is installed correctly. They also help you understand the health, comfort and safety considerations of your decisions when planning improvements.

A few important points about the score & report...

- Shows MBTU (allows linkages to other tools, etc.), but convert the metric to easily understood scale
- Accounts for climate
- Shows square footage, but doesn't normalize for size
- Uses average state energy costs and average national costs for energy improvements
 - Does not show cost of improvement; only payback
- Allows partners to provide their own recommendations based on more accurate information where available

Home Energy Score Pilots in 11 States

- Virginia
- Massachusetts
- Minnesota
- Indiana
- South Carolina
- Colorado
- Nebraska
- Texas
- Oregon
- Pennsylvania
- Illinois



As a complement to the pilots, DOE is conducting additional research with NYSERDA, national labs, others

Pilot Characteristics (draft, subject to change)

Pilot	# Homes	Audit	Audit Tool	Better Buildings Participant	Participant Selection	Data Collection	Diagnostics?
NE	150	HERS, BPI	Prop.	Yes	As part of BB program	As per BB program	Yes
IN	100	BPI	REM/Rate, NEAT	No	Weatherization program	Through contractors	Blower door & CAZ
MA	200	BPI	NEAT	No	Database of interested homeowners	Through contractors	Blower door
VA	200	BPI	Earth Advantage	Yes	Self-selected from HPwES program and Cent. VA Coop. customers	Through contractors and staff delivered surveys	Blower door option, maybe CAZ
SC	200	HERS, BPI	TBD	No	Database of interested homeowners	Through contractors and subcontracted firm	Blower door

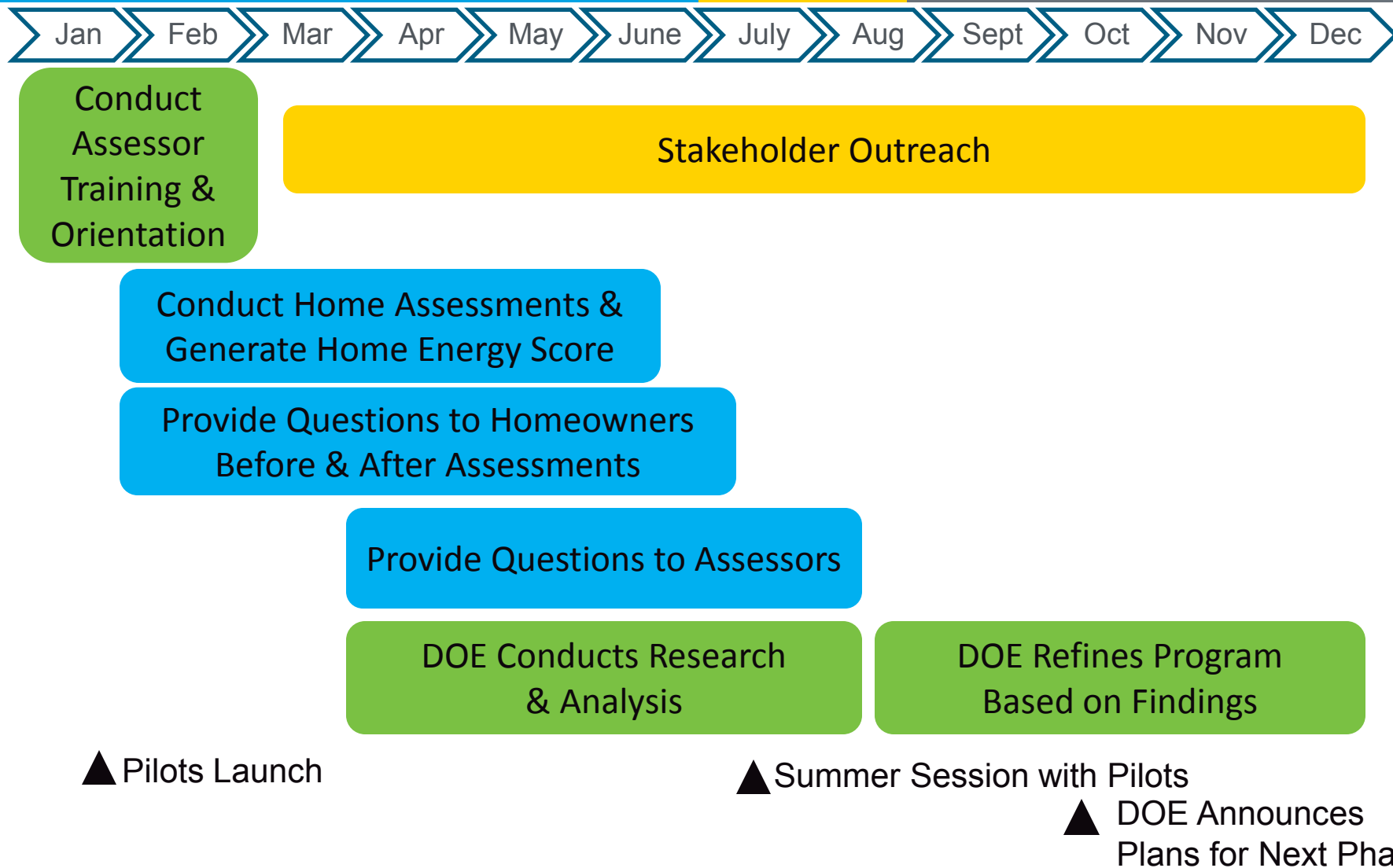
Pilot Characteristics (draft, subject to change)

Pilot	# Homes	Audit	Audit Tool	Better Buildings Participant	Participant Selection	Data Collection	Diagnostics?
PA	12	HERS, BPI	TREAT	No	Component of Green Innovation Festival	Through contractors	No
OR	400	BPI	RealHome Analyzer, SIMPLE	No	Random selection from database of interested homeowners	Through contractors and surveys	No
CO	300	HERS, BPI		Yes	Energy Resource Centers, outreach efforts	Through contractors and subcontracted firm	Blower door & CAZ
MN	200	BPI	SIMPLE	No	Selected from Community Energy Services Program	Through staff	Blower door
TX	250	HERS	U. of OK proprietary tool	No	Database of interested homeowners	Through staff	Blower door upon request
IL	200	HERS, BPI	MyHomeEQ	Yes	Chicago Air Sealing Pilot participants	Through staff	Blower door

What are we testing?

- Scoring tool
 - Inputs: are there additional data points we should collect?
 - Diagnostic information: to what degree does it affect calculations?
 - Comparison to other tools (energy calculations, recommendations)
- Scoring methodology
 - Bins: do BTU values accurately reflect homes in each climate zone?
- Assessor understanding and reaction
 - Does level of certification or training make a difference?
 - How long does it take to collect and input the data?
- Homeowner understanding and reaction
 - Do they understand the information and find it useful
 - Other issues (e.g., should we break out energy types (electricity, natural gas, other))

Home Energy Score Timeline



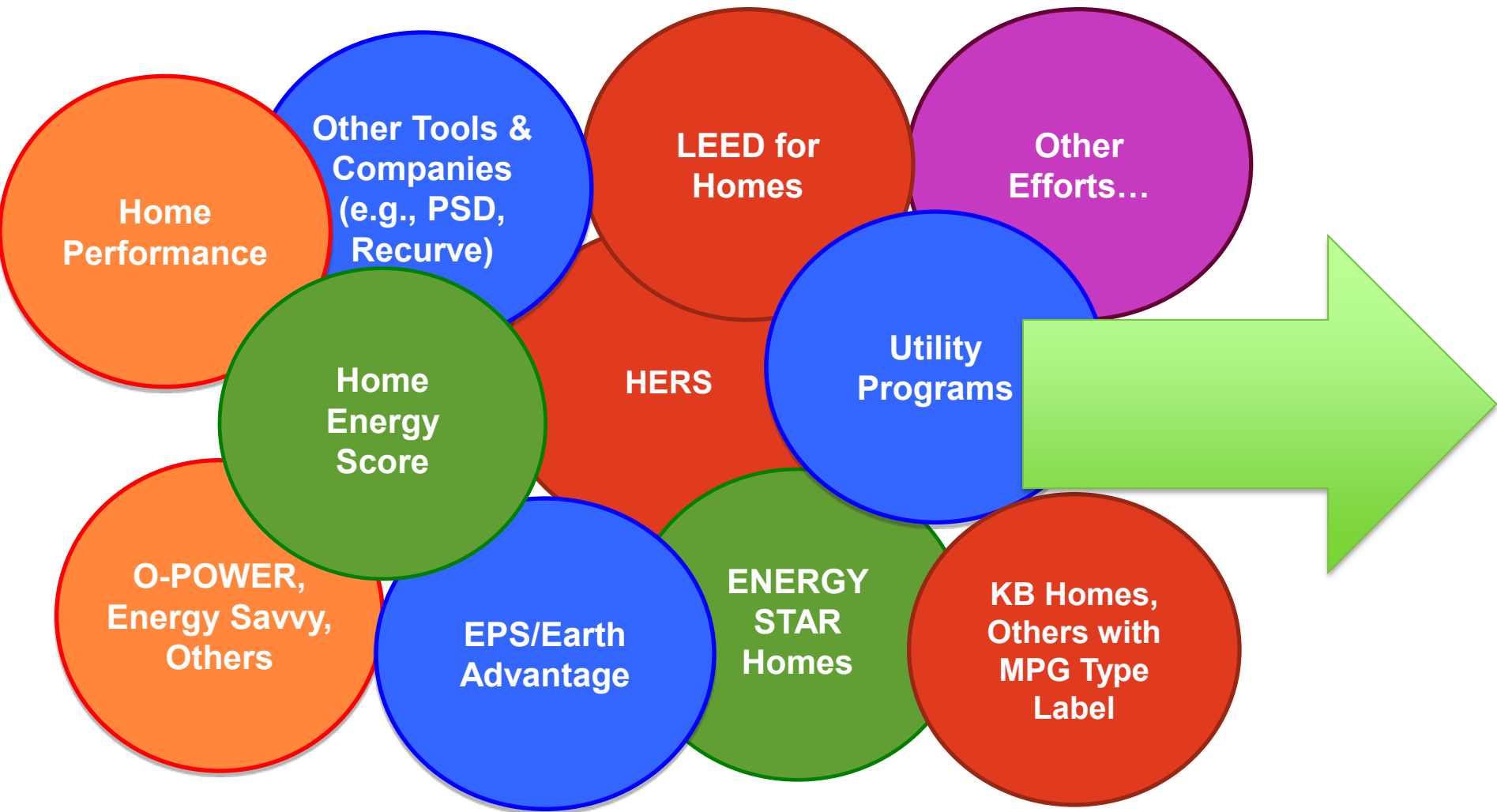
Next Steps

- Conduct pilot studies and collect information
 - Homeowner feedback from surveys
 - Assessor feedback
 - Home characteristics
 - A few pilots may also be able to provide utility bills and operational information (all anonymous)
- Analyze data
- Make continued improvements to Scoring Tool
- Determine quality assurance requirements
- Develop plan for moving forward with National Home Energy Registry
- Refine Home Energy Score per findings before national roll--out

Benefits to Raters, Energy Analysts, Contractors

- Potential additional revenue source and offering
 - Can augment, complement current efforts
 - Qualified assessor pool must be a certified rater or analyst
 - Provides a low-cost entry point for homeowners that may segue into more comprehensive examinations
- National program offers additional benefits to market
 - Increases public understanding of benefits of performing home energy evaluations
 - Generates additional data about home energy characteristics and needed upgrades by region and nation
 - Provides DOE recognition to assist energy professionals in selling their services

How Does It All Fit Together???



No Simple Answer...But, Partnering Can Help Expand the Market

- **Certain components will benefit from enhanced coordination**
 - **National Home Energy Registry**
 - **Analysis, calculation methods**
 - **Improved diagnostics and methods**
 - **Work specifications and worker standards**
 - **Quality assurance**


Questions and Comments Welcome

More information available at
www.homeenergyscore.gov

Send comments and questions to
homeenergyscore@ee.doe.gov



So, how does it all fit together???

- **Home Energy Score**
 - **Home Performance Contractors**
 - **HERS**
 - **Utility Programs**
 - **ENERGY STAR Homes**
 - **EPS/Earth Advantage**
 - **O-POWER, Energy Savvy, other on-line tools**
 - **LEED for Homes**
 - **KB Homes, Other Home Builders with MPG Type Label**
 - **Many, many more energy improvement efforts (PSD, Recurve, Masco, Big Box Stores...)**
- 

1) National Source Conversion Factors

Pros

- We shouldn't reward or penalize consumers for where they live in the country
 - Two exact homes with different source energy make-up shouldn't be rated differently since consumers have little control over the source of their energy
- It is impossible to isolate precisely which electrons are going where
 - The rating system cannot easily take into account purchase of green power
 - Marginal source is likely more accurate than regional source, but extremely difficult if not impossible to calculate...

Cons

- Regional conversion factors are more likely to reflect actual make-up of an individual home's energy use

Recommendation: Use national source conversion factors.

2) Consumption Metric

Pros

- **Consumption (BTUs) reflects the amount of energy the home is likely to use.**
- **BTUs/sf unfairly advantages larger homes, since size and energy use are not directly proportional.**
- **By showing total BTUs as well as square footage information on the label, consumers can see how much energy a home will likely use, but consider that information within the context of home size.**

Cons

- **Large homes will generally rate poorly and smaller homes will generally rate well. This may create a disincentive for smaller homes to reduce their energy use and improve efficiency.**

Recommendation: Show square footage of the home on the label, but do not factor it into the rating.

3) *Account for climate, but don't normalize*

Pros

- **Most consumers are interested in seeing how their home compares to others in their area.**
- **Normalizing for climate can lead to biases, particularly against homes in temperate climates.**
- **Consumers do not understand what energy per heating degree day means.**
- **The only way to normalize for climate without creating biases is to use a relative scale (e.g., HERS scale).**

Cons

- **It will be difficult to compare homes in different climate zones.**

Recommendation: Do not normalize for climate. Include a reference point on the scale to show how a home rates in comparison to others in the same climate.

4) *Local Reference Points Based on Building Stock*

Pros

- **Consumers want to see how they compare to their neighbors.**
- **A top 20th percentile point is likely to motivate consumers more than other points.**
 - **If a homeowner sees that their home performs better than average, they may not be as likely to improve their home.**
 - **Using a new home as a benchmark may create a disincentive to improve, since consumers may perceive this as too hard to achieve**
 - **A 20th percentile reference point will improve over time and can be regularly updated electronically, thereby showing a homeowner how they compare to the existing stock of homes.**

Cons

- **Consumers may find it frustrating to have reference points that continually improve relative to their home over time.**

Recommendation: Provide a top 20th percentile reference point that reflects local conditions to the greatest extent possible.

5) State Energy Costs & National Costs of Improvements

Pros

- This is the best information we currently have available.
- State averages more accurately reflect local energy costs than a national average cost of energy.
- Local tariff information is too difficult to keep up to date; furthermore, tariffs can vary even for customers using the same utility.

Cons

- Consumers prefer information that reflects their local costs.
- Contractors would prefer that DOE not provide any information regarding costs of improvements, since these can vary considerably based on location as well as the specifics of the home.

Recommendation: Use state average cost of energy and national average cost per measure from national database to compute cost savings.

Additional Issues

Pros

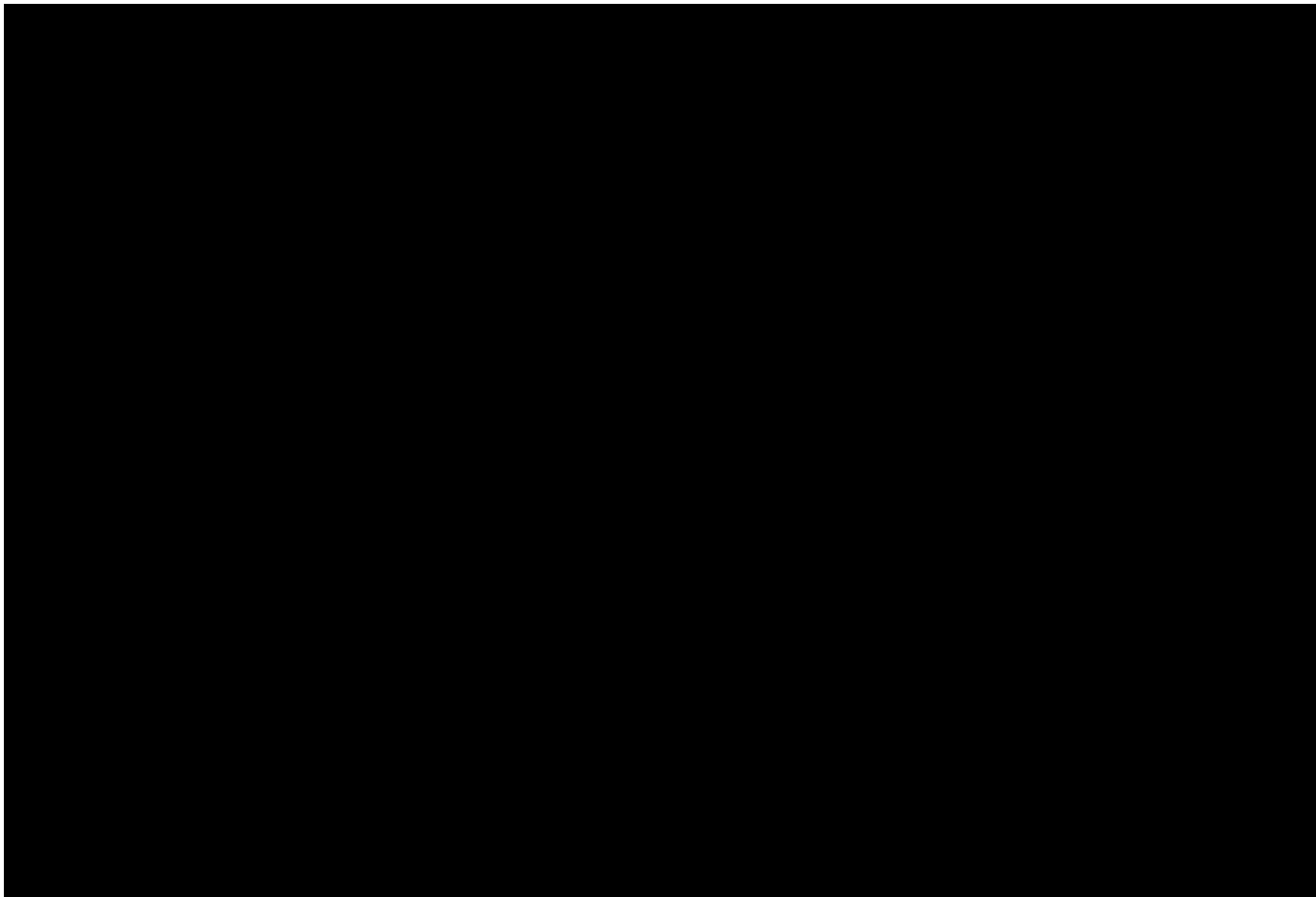
- Ratings should be as reliable as possible.
- As long as the information relates to the inputs used to compute the asset rating, it makes sense to use the best information available.
 - If the ICF analysis results in the development of a method for improving inputs with utility bill information, then this method should be allowed, but not required where utility bill information is not available.
 - DOE should provide guidance on how diagnostic testing can or cannot be used, as well as how to conduct such tests reliably.

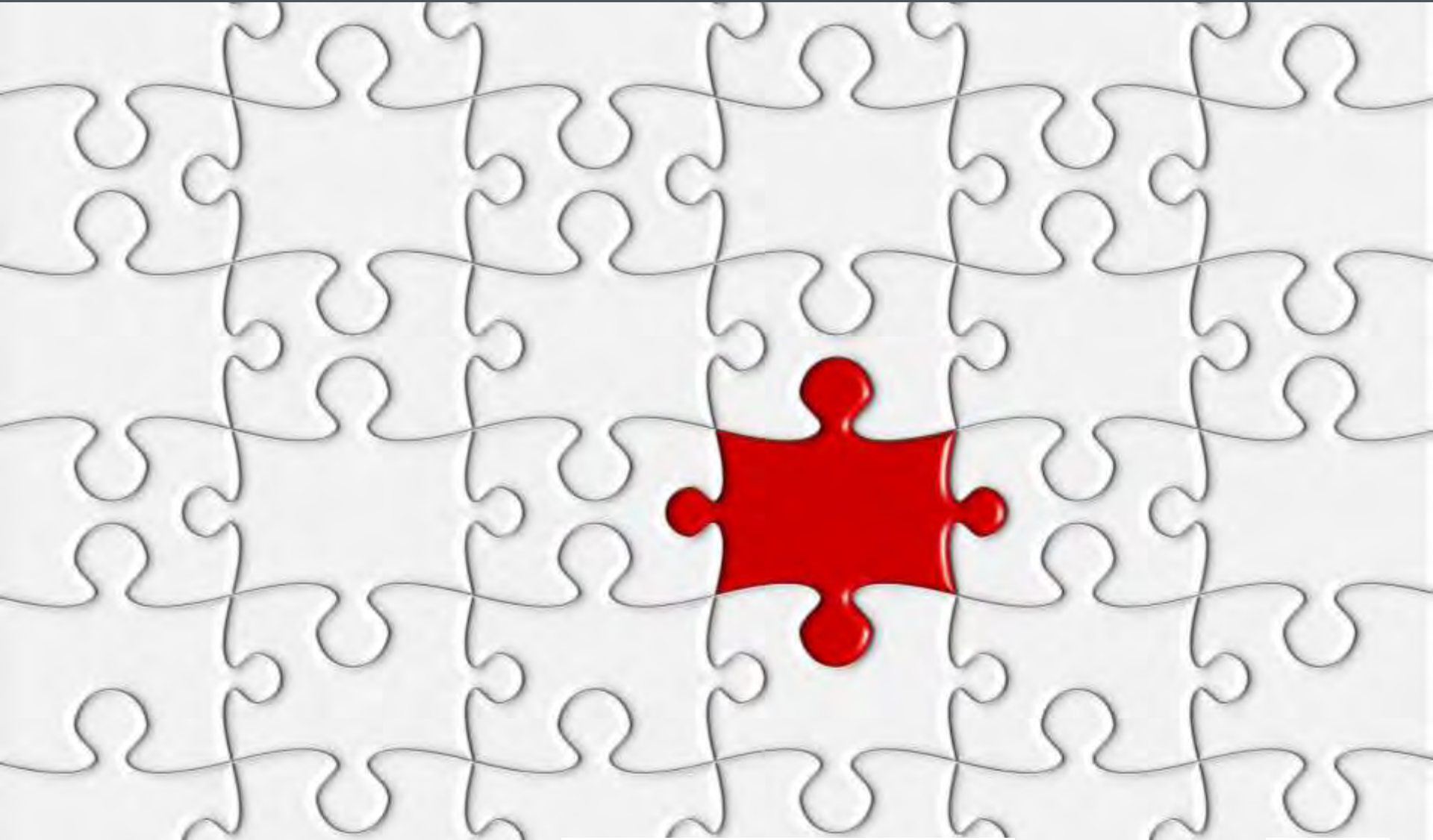
Cons

- Some ratings will be based on more accurate information than other ratings, thereby making some ratings more reliable than others.

Recommendation: Allow the use of best available information (e.g., diagnostic tests) in calculation of rating, where such information is directly relevant.

- The national average cost for a home energy rating is \$500-very little market penetration in existing homes
- Focus group findings:
 - Most homeowners want free energy audit for their home, but will pay up to \$150
 - But, when they purchase a home, participants say they will pay more to have a thorough energy analysis
- LBNL conducted a survey of home inspectors and real estate professionals who used the alpha version of HESPro. Estimated cost to use HESPro about \$100.





Company Name Here

Date