

What It All Means: Quantifying The Impacts of the 2006 Changes

Presented at the RESNET Conference March 2005

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Agenda



- Changes? What changes?
 2006 industry changes
- Quantifying the Impacts
 Analytical process
- So What's Next for ENERGY STAR? EPA's DRAFT proposed threshold



Changes? What Changes?

ICC and NAECA \implies RESNET \implies ENERGY STAR

2006 Industry Changes



- Increasing Adoption of International Energy Conservation Codes
 - 30 states have now adopted 2000 IECC or newer model code
- NAECA Air Conditioner Requirement
 - Minimum available efficiency will become 13 SEER
- HERS Reference Home
 - 2004 IECC replaces the 1993 MEC
 - Redefined climate zones
 - Stricter window requirements
 - Redefined infiltration rates & change in units
 - Enhanced internal gain definition

Increased window area for basement homes
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Simple Question – What Do These Changes Mean?

- May 2004 EPA Asked to Quantify Impacts
- Initial Modeling Showed Unexpected Trends
- July 2004 Began Collaboration with FSEC
- October Consensus on Relative Impacts

6 Months Later...

November – In Depth Analysis on Impacts



- Modeled ENERGY STAR Homes in 2006 HERS Methodology
- Assessed Multiple Home Configurations
 - 3 foundation types; single and double story
 - Multiple SHGC values, and U-values
 - Multiple envelope Uo and UA values
 - 4 orientations
 - 237 TMY2 cities / all climates
 - Gas furnace, heat pump
 - Multiple equipment efficiency levels
 - ~ 20,000 DOE-2 Runs



Impact of Proposed HERS Methodology on Existing ENERGY STAR Scores





So What's Next for ENERGY STAR?



- Identify a New HERS Threshold 83, 84...?
- HERS Score is Based on Upgrades in Homes
- Analyzed Various Upgrades that EPA Felt the Market Place Could Support in a MT Program



National Average Scores for Possible Upgrades







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Climate Zones



• Key Question:

How Do You Select A Single HERS Score for a Performance Approach?

• One Proposed Solution:

A Performance Path, Based on Dynamic HERS Score

The HERS score achieved by market-appropriate upgrades, applied to a specific house configuration

Proposed ENERGY STAR Prescriptive Path



Envelope	ANTE HVAC		
 < 0.35 ac/h air infiltration 	North: ES heating (90 AFUE, 8.0 HSPF)		
 2004 IECC-compliant insulation 	 South: ES cooling (14 SEER, 12 EER) 		
 Thermal Bypass Checklist 	Right-sized		
	ES thermostat		
<u>Ducts</u>	Windows		
• <u><</u> 4 cfm/ 100 sq. ft.	ES (climate-specific)		
 2004 IECC-compliant insulation 			
Water Heater	Lights, Appliances, & Fans:		
 Gas: 0.60 EF; or Electric: 0.92 EF; or Oil: Indirect storage off of boiler 	 Min. of 5 ES qualified light fixtures, ceiling fans, and/or appliances 		

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DRAFT Proposed Threshold



Thermal Bypass Checklist

- 1. Shower/tub at exterior wall
- 2. Insulated floor above garage
- 3. Attic knee walls
- 4. Attic hatch/drop-down stair
- 5. Cantilevered floor
- 6. Duct shafts

- 7. Flue shaft
- 8. Piping shaft/penetrations
- 9. Dropped ceiling/soffit
- 10. Fireplace wall
- 11. Staircase framing at exterior wall/attic
- 12. Whole-house fan attic penetration

Proposed ENERGY STAR Performance Path



... Or Equivalent HERS Score

- As determined by modeling the new HERS Reference Home, but with the incorporation of the requirements for the ENERGY STAR prescriptive home
- Plus the Thermal Bypass Checklist

For Example:



Home Component	HERS Reference Home	ENERGY STAR Model Home	Rated Home
A/C SEER	13	14	≥ Code
Furnace AFUE	78	80	≥ Code
Duct Leakage	0.80 DSE	4 CFM/100 SF	≤ Code
Duct Insulation	R-8	R-8	≥ Code
Water Heater EF	0.544	0.60	≥ Code
Total Envelope UA	HERS Reference Home UA		≤ Code
Thermal Inspection	N/A	Required	Required
Window U-Value	0.75	0.65	≤ Code
Window SHGC	0.40	0.40	≤ Code
Infiltration	0.00048 SLA	0.35 ACH	≤ Code
Lighting & Appliances	Standard	5 ENERGY STAR	Any
All Other	HERS Reference Home Values		Any
HERS Score	80	83.5	≥ 83.5

Summary



- Significant Changes are Occurring
- Significant Modeling Effort and Collaboration Result in Fairly Consistent Understanding of the Impacts
- Market Appropriate Upgrades Result in Varying HERS Scores
- EPA PROPOSES that the HERS score be defined by market-appropriate upgrades, applied to a specific house configuration
- This is a Proposal and EPA wants your Comments!



Questions / Comments?