2006 Changes to the RESNET Technical Standards

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Standards Development Process

Two year drafting process
- Proposal period open to all
- All proposals considered by Drafting Committee

- Pre-vetting offered to national groups
  - NAHB Energy Committee
  - U.S. DOE and EPA
  - Building America Team
  - National Association of State Energy Officials
- 75 Day Public Comment Process (2004)
- Additional amendments adopted 11/2005

Comprehensive Enhancements

- Program Administration (Do not affect rating score)
  - QA, software, testing, renewals, others
  - Went into effect on April 1, 2005
- Technical – Chapter 3
  - Will impact how rating scores are calculated
  - Goes into effect on July 1, 2006
  - Governs software *and* ratings

To Download Enhancements

www.resnet.us/standards

2006- Next Generation of HERS

- Three *different* changes that have *different* effects on the results!
- New Reference Home = 2004 IECC
- Expanded Rating Score
- “Score” to “Index”

Technical Enhancements

- Enhance technical basis of energy ratings
- Update standards to align with current national standards
  - IECC, zero energy homes, tax credits
- Change in NAECA efficiency minimums
  - Water heating EF (1/2004)
  - SEER 13 Air Conditioning

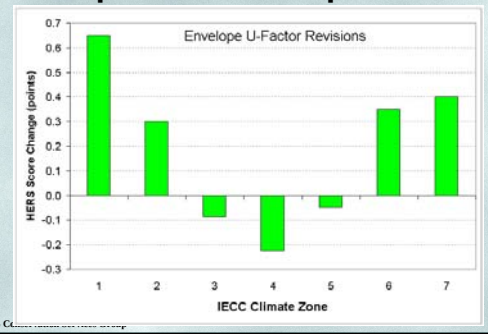
HERS Reference Home

- Establishes the HERS Reference Home as equivalent to the 2004 IECC
  - 2004 *performance path* values = 2006 IECC prescriptive tables
  - Relatively minor change in performance-based efficiency from other MEC/IECC
  - Aligns with IECC SHGC requirements for warm climates

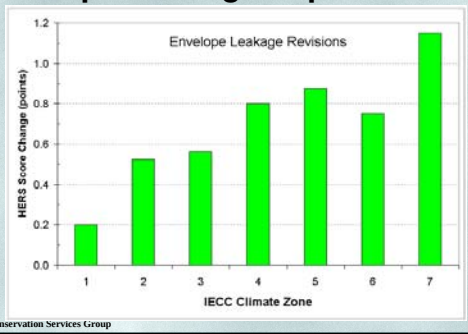
Changes from MEC-based Reference

- Envelope U-Factors (slightly more stringent)
- Window SHGC
- Envelope Leakage reduced ~16%
  - nL = 0.57 >> SLA = 0.00048
- Interior Shading Factor (IECC & HERS)
  - Heating ISF = 0.90 >> ISF =0.85
- Internal Gains (HERS)
  - 72,000 Btu/day >> based on floor area and Nbr

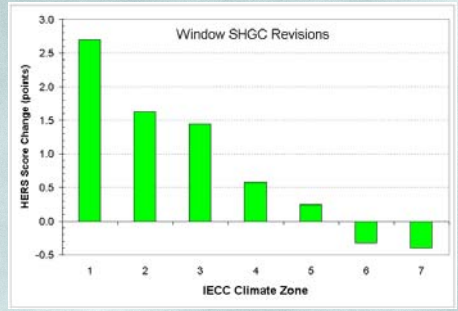
Envelope U-Factor Impacts



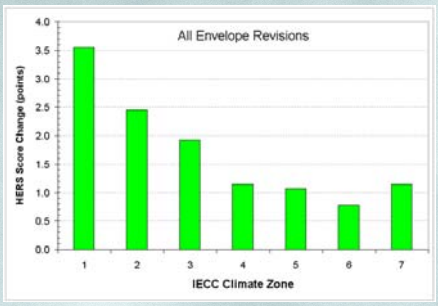
Envelope Leakage Impacts



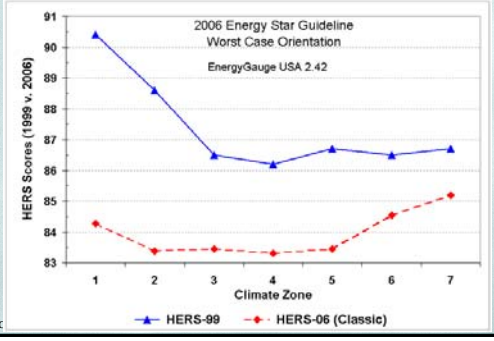
Window SHGC Impacts



Net Reference Home Impacts



Bottom Line – Including SEER



Reference Home Changes

"Small home penalty" reduced by revised glazing area calculation

- Equipment efficiencies based on "prevailing federal minimum"
  - Will be updated when NACEA changes
- In load calculation, credit is given for tested air tightness below 0.35 ACH
  - When ventilation system is present
  - Down to ASHRAE 62.2 ventilation air flow requirements (+ measured infiltration)

Technical Amendments (rater)

- **Mechanical Ventilation System definition**

"A fan designed to exchange the air in the house with outside air, sized to provide whole-house service per ASHRAE 62.2, and controlled automatically (i.e. not requiring human intervention to turn on and off). The presence of a remote-mounted on-off switch or dedicated circuit breaker labeled "whole house ventilation" (or equivalent) shall not disqualify a system from meeting the requirement of automatic control."

Ventilation system examples:

- Exhaust or supply fan *with timer or control*
  - *NOT* bath fan with wall switch or humidistat
- Outdoor air intake to air distribution system
  - *MUST* have controller to ensure operation during mild weather (fan cycler)
  - Or *continuous* operation (big electrical penalty)
- Balanced system (HRV or ERV)
- *Generally* need average of required flow every hour
  - *BIG penalty if less than every three hours*

Formal interpretation

- Measured air leakage is *added* to ventilation system flow
  - Using quadrature equations from ASHRAE
- Ventilation system flow *shall not be less than*
  - 7.5 x (Nbr+1) + 0.01 x CFA *for the purpose of calculating the score*
  - Input actual flow rate and hourly program to software
  - Adjustments are made for very tight or leaky homes

RATED HOME Changes

- Ducted/hydronic distribution efficiency calculated by ASHRAE 152-2004
  - Duct leakage testing required
- RESNET interpretation of 152 for rating purposes
  - Defaults may be used for many of the 152 required inputs
- Default (untested) duct efficiencies have changed
  - Generally higher
  - No distinction between "observable" leakage or none

Old duct defaults:

Distribution System Configuration and Condition:	Forced Air Systems	
	Heating	Cooling
Observable leakage pathways[3] with distribution system components located in *unconditioned* space	0.70	0.70
Observable leakage pathways with entire distribution system located in *conditioned* space[4]	0.75	0.75
Distribution system components located in *unconditioned* space	0.80	0.80
Entire distribution system located in *conditioned* space	0.85	0.85
Proposed[5] "leak free" with entire air distribution system located in the *conditioned* space	1.00	1.00
Proposed "leak free"air distribution system with components located in the *unconditioned* space	0.95	0.95
"Ductless"[6] systems	1.00	1.00

NEW Defaults:

Distribution System Configuration and Condition	Forced Air Systems	Hydronic Systems [b]
Distribution system components located in unconditioned space	0.80	0.95
Distribution systems entirely located in conditioned space [c]	0.88	1.00
Proposed "reduced leakage" with entire air distribution system located in the conditioned space [d]	0.96	
Proposed "reduced leakage" air distribution system with components located in the unconditioned space	0.88	
"Ductless" systems [e]	1.00	

Expanded HERS Score

Establishes technical guidelines and procedures for expanding the rated features of the rated home

Expanded HERS Score

- Old HERS score was based on
  - Heating, cooling, water heating only
- HERS "Expanded" score based on
  - Heating, cooling, water heating
  - Lighting and appliances
  - On-site power generation

Expanded Rating Score

- Adds allowance for standard consumption to reference home
  - Efficient lighting (10% of qualifying locations)
  - Refrigerator (775 kWh/year)
  - Dishwasher (0.46 EF)
  - Ventilation fan energy (If rated home has ventilation system) at 0.45 W/CFM
    - Assuming (7.5 x (Nbr+1)+0.01xCFA) CFM
  - Ceiling fan (if in rated home) at 23.5 CFM/W

Expanded Rating Score:

- *IF you want to do better than the reference home by x%,*
- *THEN you must do x% better than the defaults on lighting and appliances*
- *Adds allowance for "all" typical non-heating, cooling or water heating energy uses to both rated and reference home*

On site power production

- On-site Power Production (OPP): Net electric power produced at the Rated Home
- OPP = gross electrical power production minus purchased fossil fuel energy used to produce the on-site power
  - Converted to "Equivalent Electric" at 40% effi'cy
- Examples: PV, fuel cell, propane generator
  - If conversion efficiency exceeds 40%, will increase score (less will decrease)

Insulation inspection procedures

- Assess insulation quality
  - Three installation Grades: I, II, and III
  - "Grade I" based on industry published standards
- Provide specific modeling guidance
  - Based on results of field assessment
  - Primarily for software developers, not raters
- Other details
  - Installation practices, framing, compression

Inspection *Requirement* ?

- Yes—to take full credit for thermal performance of properly installed product
- No—not required for a rating
  - Accept defaults if you don't inspect
    - Equivalent to Grade III
  - Parallel to other HERS requirements
    - Envelope, duct testing
- Applies to all types of insulation

Other Technical Amendments

Rater/Provider
Software
(Both)

Technical Amendments (rater)

- Standard blower door testing procedures
  - Specifies door, vent, damper positions during tests
- Requires that all pressure testing equipment be annually field tested for calibration, or re-calibrated
  - HERS provider must maintain a log of testing/calibration
- Establishes minimum content requirement for on-site inspection procedures manual
  - Providers must supply to raters

Technical Amendments (rater)

- Requires uniform method of calculating conditioned floor area of home – ANSI Standard Z765-2003
  - With exception to 5' ceiling height limit
- Includes furnace/boiler auxiliary energy consumption (i.e., combustion/blower fans) in HERS rating score
  - Allows credit for ECM motors
  - Will require accurate inputs of EaE ratings of mechanical equipment in ratings

Technical (software/rater)

- Establishes default framing factors for wall, floor, ceiling to be used in rated homes
- Changes in nMEUL a,b coefficients for heating oil to be same as natural gas
  - Eliminates differences in HERS score associated with different fossil fuels
  - Other a,b coefficients updated as needed
  - NAECA requirements for Hot water, A/C

Technical (software/rater)

- Establishes baseline data and rules needed to include wood burning appliances
- Establishes reference/default values
- Defines when they should be included in rating
  - Limited to the part of the building load that cannot be met by automatic system
  - Up to 100% (i.e. sole heating system)

Technical (software/rater)

- Refined definition of “home”
  - Includes individual units in small multi-family buildings

Technical (software/rater)

- Requires distribution system (ducts) modeled according to ASHRAE 152
  - Or computations that yield equivalent results
- Testing required
  - ASHRAE 152 procedures
  - With Exceptions: no need to separate supply/return
  - No requirement to test air flow
  - Conservative defaults
- Other as specified in RESNET interpretation
  - No requirement to test buffer zone pressures or plenum operating pressures

Technical Amendments (software)

- Specifically removes from the HERS Reference home any renewable energy systems present in the Rated home
- Establishes standard ventilation strategy for both reference and rated home
  - Ensures consistency for this occupant behavior (eliminates rater/software provider judgment)

Technical Amendments (software)

- Specifies source of data for Fannie Mae EEM Present Value
  - RESNET to be provided with discount rate annually
  - Established weighted life of energy efficiency measures at 23 years
- Establishes how EEM Present Value shall be calculated
  - Fannie Mae’s Energy Value and Annual Energy Savings
  - FHA and Freddie Mac’s Present Worth of Energy Savings

Technical Amendments (software)

- Establishes consistent method of converting HSPF and SEER to inputs appropriate for models that separately model compressor / evaporator / fan / defrost (e.g., DOE-2)
- Requires that software adjust HSPF and SEER to account for climate and mis-sizing of equipment Including electric auxiliary heat for heat pumps
- Establishes rule base for determining design loads for sizing purposes

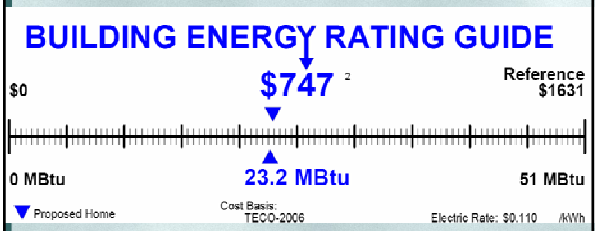
- ADMIN-2005-01 - Effective Date of Chapter Three, RESNET Standards
- TECH-2005-01 - Discontinue Use of the "Classic HERS Score"
- TECH-2005-02 - Modify the Expanded Score to Account for Total Home Energy Use
- TECH-2005-03 - Amend the List of Minimum Rated Features to Include the Expanded Score Items
- TECH-2005-04 - Update the "a" and "b" Coefficient Values
- TECH-2005-05 - Update the ANSI Standard Referred to in Measuring Floor Dimensions to ANSI Z765-2003
- TECH-2005-06 - Update mechanical ventilation specifications
- TECH-2005-07 - Ceiling Fan Ratings
- TECH-2005-08 - Specifications for Vented Crawlspaces in the Reference and Rated Homes
- TECH-2005-09 - Modify the HERS Score Calculation and Change its Nomenclature from "HERS Score" to "HERS Index"
- QA-2005-01 - Quality Assurance of Raters That Complete a Small Volume of Ratings

HERS Score becomes an Index

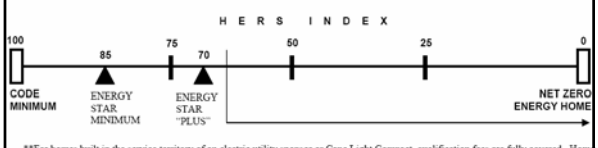
- Reference home now defined at 100 points
  - Used to be 80
- A net Zero Energy Home, Index = 0
  - Used to be 100, *but was H,C & DHW only*
- Energy Star limit:
  - Northern tier (ME, VT, NH, NY) - Index of 80
  - MA, RI, CT, Mid-Atlantic states - Index of 85

Index = 100 – [(Score - 80) x 5]
Score = 80 + [(100 - Index) / 5]

Energy Gauge Example ©



New England Program Example ©



**For homes built in the service territory of an electric utility sponsor or Cape Light Compact, qualification fees are fully covered. Home area served by a municipal electric company, half the qualification fee will be paid by the gas utility if the home is heated with gas.

Potential $2,000 Federal Tax Credit
Approximately 65 or less on Index