



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



Building Energy Codes

Development of Energy Efficiency Standards for Manufactured Housing

Game Plan and Progress Report

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ENERGY INDEPENDENCE AND SECURITY ACT OF 2007 (EISA)

SEC. 413. ENERGY CODE IMPROVEMENTS APPLICABLE TO MANUFACTURED HOUSING

DOE is required to establish energy efficiency standards by December 2011

- Provide notice and a formal opportunity for comment by manufacturers of manufactured housing and other interested parties including the public
- Consult with the Secretary of Housing and Urban Development
 - HUD may seek further counsel from the Manufactured Housing Consensus Committee

EISA – Continued

- The energy conservation standards shall be based on the International Energy Conservation Code

- Consideration to changing the IECC must be given
 - if DOE finds that the IECC is not cost effective
 - a more stringent standard would be more cost effective

- Base consideration on
 - IECC impact on home purchase price
 - total life-cycle construction and operating costs

EISA – Continued

- The energy conservation standards established may
 - consider the design and factory construction techniques of manufactured homes
 - be based on the climate zones established by current HUD code (24CFR Part 3280) rather than the climate zones under the IECC
 - provide for alternative practices that result in net estimated energy consumption equal to or less than the specified standards

Rulemaking Steps

- Prepare Notice of Proposed Rulemaking (NPR) July to December 2009
- Publish NPR in the Federal Register January 2010
- Public comment period including public hearing February/March 2010
- Consider and address public comment 2010
- Issue Final Rule by 2011

NOPR Elements

- Administrative Details
- Introduction and legislative background
- Discussion of proposed action with respect to all relevant technical and administrative issues
- Procedural requirements and assessment of the proposal rule under various federal directives
- Proposed rule

Objective of Technical Analysis

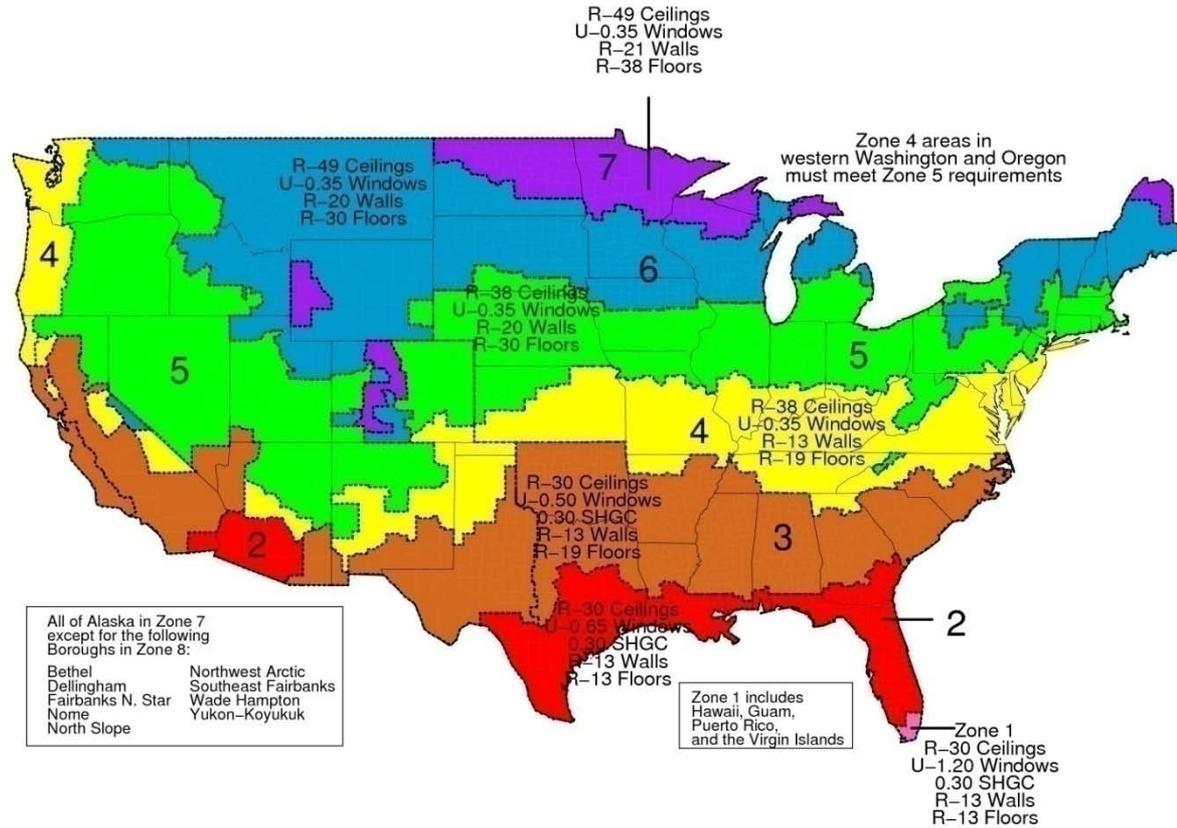
Analyze various options for energy efficiency in manufactured housing

- 2009 IECC is the “basis” or starting point per EISA
- Account for differences in construction between manufactured homes and site-built homes
 - IECC developed specifically for site-built
 - Ensure that energy standard does not compromise provisions and properly integrates with the HUD code

Technical Issues

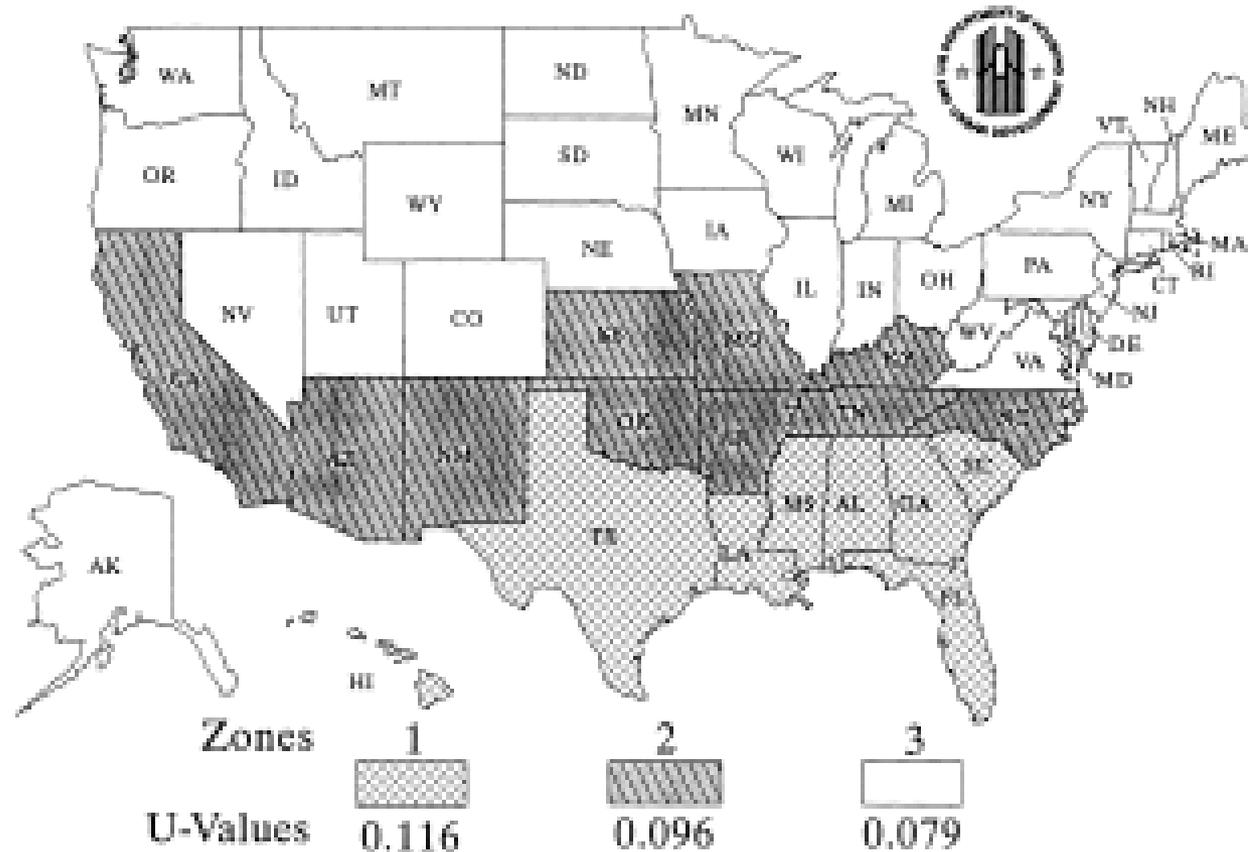
- Climate zones in IECC versus HUD code
- Differences in manufactured housing and site-built housing that impact IECC requirements and energy efficiency
- Economic (purchase price and life cycle cost) considerations
- Format and presentation of the standards

2009 IECC Climate Zones and Envelope Requirements



Current MHCSS (HUD-Code) Climate Zones and Envelope Requirements

U/O Value Zone Map for Manufactured Housing



(a) Configuration of heat transmission. The overall coefficient of heat transmission (U) of the manufactured home for the respective zones and all interior

design temperatures of 70 F, including internal and external doors, and excluding infiltration, ventilation and condensation control, shall not exceed

2009 IECC Requirements New to Manufactured Housing

- 0.30 maximum SHGC (solar heat gain) glazing in zones 1-3
- R-6 ducts (R-8 for supply ducts in attic), R-3 pipes (for boilers)
- Tested tight ducts (or ducts completely inside the building envelope)
- 50% of light bulbs are efficient (CFLs qualify)
- NFRC window ratings (NFRC currently does not rate storm windows)
- No trade-off credit for high efficiency equipment
- Certificate on building listing insulation R-values, window U-factor/SHGC, etc.

Proposed Analytical Approach

- 56 foot long doublewide, 1568 ft² floor area
 - Analyze space constraints with single-wides

- Analysis conducted with DOE-2 or EnergyPlus simulation tool

- Wide range of climates

- Equipment types
 - Account for market share heating equipment types – Electric resistance, heat pump, natural gas, propane
 - Assume central air conditioning everywhere
 - Electric water heating (IECC has minimal requirements for water heating)

Proposed Economic Parameters for Life-cycle Cost Analysis

Lifetime/Analysis period – 30 years

Mortgage/loan parameters

- Interest rate: Personal property loans
- Discount rate – same as interest rate
- 15 year loan rate

Fuel prices and escalation rates

Recent average prices:

- Electricity: 12 cents/kWh
- Natural gas: \$1.20/therm

Energy Efficiency Measure – Cost Data

Cost data to be collected for measures required by IECC and potential alternatives

- Total installed cost including overhead and profit
- Account for systemic differences between manufactured housing and site-built that impact construction cost

IECC has limited requirements

- Ceiling, wall, floor insulation
- Window/door/skylight U-factor and SHGC
- Duct sealing (including testing) and insulation
- Seal building envelop (testing not required)
- 50% efficient lighting (cfl, etc.)

Progress to Date (7-15-09)

- www.energycodes.gov site updated
- NOPR rough draft prepared
- Strategy and plan forward to complete NOPR
- Started technical and analytical work
- Meetings being established with HUD staff, MHCC and DOE legal and policy offices
- Identified federal directives that must be reviewed in preparing the NOPR

Next Steps to NOPR

- Establish economic parameters
- Perform energy/economic analysis
- Seek input from stakeholders
- Initiate work on review of current HUD Code and industry construction practice