Energy Codes 101: Benefits for the Residential Real Estate Industry

NAR Green Designation
Chicago, IL  April 18, 2017
Presentation Overview

1. Introduction
2. Energy Code Development
3. Adoption Process
4. Elements of the Code
5. Recommendations
We are a nonprofit membership organization with 160+ members, including:

- Utilities
- Research institutions
- State and local governments
- Energy efficiency-related businesses

As the key resource and champion for energy efficiency in the Midwest, MEEA helps a diverse range of stakeholders understand and implement cost-effective energy efficiency strategies that provide economic and environmental benefits.
What Is The Energy Code?

- Energy Codes are a set of rules that govern the energy use of a building through mandated building practices & components

- Minimum Energy Efficiency Requirements
  - “Worst home that can be built”

- National Model Codes developed by International Code Council and ASHRAE
  - Updated every 3 years (level of improvement varies)
  - Current edition released in 2015

- States/Municipalities Adopt and Enforce the Code
History of Energy Codes

- First codes established in 1975

- Code has gotten more stringent over time, with new codes being more than 50% more efficient than the first codes
History of Energy Codes
Graphically

Normalized Energy Use Index (1975 Energy Use = 100)

- Residential Energy Use
- Commercial Energy Use
- Residential Code Update
- Commercial Code Update

Source: MEEA based on PNNL Analysis

* Energy Use Index: National average energy use by building type and size.
Residential Energy Use

Residential Site Energy Consumption by End Use

- Small Appliances, Wet Cleaning, Microwave & Others: 10%
- Refrigeration: 4%
- Electronics: 5%
- Cooking: 4%
- Lighting: 6%
- Space Heating: 45%
- Water Heating: 18%
- Space Cooling: 9%

Why are Codes Important?

• Reduce energy use

• Impacts energy use for the life of a building
  – Most cost-effective to implement energy measures during initial design and construction

• Benefits building owners and operators by guaranteeing a minimum of efficiency
What are the benefits?

- Reduce energy costs
  - Homeownership more affordable;
  - Lower operating costs
- Savings accrue over life of building
- Improves occupant comfort and Indoor Air Quality (IAQ)
Adoption Process

- Model Codes
- Statewide Adoption
- Local Adoption
- Midwest Status
Adoption Process

• Some States Adopt Statewide Codes through an Administrative Process
  – Approval by regulatory agency and legislative committee

• Model codes may be amended
Residential Building Energy Codes

Adoption Timeline

Code Level / Equivalence

- No mandatory statewide code
- Pre-2000 Code
- 2000 IECC
- 2003 IECC
- 2006 IECC
- 2009 IECC
- 2012 IECC
- 2015 IECC
Residential Building Energy Codes
Current Status of Midwest States

[Map showing the current status of residential building energy codes in the Midwest states as of December 2016. The map indicates the code levels and equivalences used by each state, with different colors representing varying code levels: No mandatory code, 2009 IECC, Enhanced 2009 IECC, 2012 IECC, 2015 IECC. Stripes indicate code updates in progress.]

As of December 2016

MEEA
Midwest Energy Efficiency Alliance
Energy Code Elements

- Applicability
- Code Measures
- Definitions
Purview of Code

Residential and Commercial Buildings

• Residential Code:
  – 3 stories or less
  – Residential use

• Commercial Code:
  – All non-residential buildings

• Both Codes apply to:
  – New Construction
  – Existing Buildings - additions and major alterations
    • Several exceptions, including historic buildings and minor repairs
Key Measures

Residential Energy Code

- Wall/Ceiling Insulation (R-values)
- Air Infiltration/Blower Door Testing
- Duct Tightness/Duct Insulation
- Window U-Factor and Solar Heat Gain Coefficient
- Efficient Lighting
- Piping Insulation
- HVAC Equipment Sizing
- Whole House Mechanical Ventilation
Key Measures

Insulation Definitions

• **R – Value**
  - The capacity of a building material to resist heat flow
    • Higher R value = Higher Insulating Value

• **U – Factor**
  - Measure of heat flow through building material
    • Lower U Factor = Higher Insulating Value

• (R is roughly the Inverse of U: \( R = 1/U \) and \( U = 1/R \))
• Building Air Tightness
  – Measured in Air Changes Per Hour at 50 Pascals (ACH50)
  – ACH50: How frequently the air in a building is exchanged with outside air when exposed to a pressure differential of 50 Pascals between the inside and outside (roughly equivalent to 20 mph winds)
  – **Lower ACH50 Value = Tighter Building Enclosure**
Key Measures

ACH50 - Air Changes per Hour = “housefuls of air moving through walls in 1 hour” is measured by a blower door test

Sources: The Energy Conservatory & US EPA
• The Illinois Joint Committee on Administrative Rules (JCAR) formally adopted the 2015 IECC by reference on 12/11/15, effective 1/1/2016.

• The City of Chicago formally adopted the 2015 IECC by reference on 9/14/2016.
Illinois Residential Energy Code

Learn how your homes compare

• Climate zones 4 and 5
• 5 ACH(50)
• Windows: U-factor – 0.32/.35
• Insulation:
  – Above-grade wall – R-20, 13 + 5
  – Ceiling – R-49
  – Basement/foundation – R13/10
• Lighting - 75% high-efficacy
• Ducts 4cfm/100
• ERI (HERS) – 54, 55
Compliance

- Paths to Compliance
- Energy Rating Index
Paths to Compliance
2015 IECC Residential Prescriptive

• Follow specific requirements for insulation levels, windows, air leakage

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<th>Climate Zone</th>
<th>Fenestration U-Factor</th>
<th>Skylight U-Factor</th>
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 Paths to Compliance  
Total UA Alternative

• RESCheck/ComCheck (free software released by DOE)
  – Allows tradeoffs within building envelope measures

• RESCheck: Insulation and Windows

• COMCheck: Insulation and windows; separate tradeoffs for lighting
Paths to Compliance

Residential: Energy Rating Index

• May show compliance by obtaining an energy rating and achieving a certain “score”

• Score is based on simulated energy usage, which takes into account: Home size; Climate zone; Energy measures (insulation, windows, air tightness, HVAC equipment, etc.)

• HERS Rating originally developed to provide guidance to the mortgage industry to more effectively value energy efficiency at time of sale
Paths to Compliance

Residential: Energy Rating Index for IECC 2015

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- Similar to HERS score
  - Baseline of 2006 IECC = 100
  - Net Zero = 0

- Need to comply with mandatory code sections (limits tradeoffs)
Codes and me

- Why should I care about energy codes?
- Recommendations
Why should I care about energy codes?

• Improved efficiency in new building stock, more ERIs/HERS in the market – a way to talk about energy with buyers. Some existing homes can be tested and will be comparable; others can have low-cost upgrades.

• These now-new buildings will be resold in a few years – learn the product

• Homes built to current energy codes have improved occupant comfort and Indoor Air Quality

• It is most cost-effective to improve the efficiency of a home during the initial construction phase, rather than update later

• Reduced operational costs for buyer/homeowner – More money for mortgage payments
Recommendations: Improving to match energy code

• Perform an energy audit or HERS score – ask your local utility if they offer discounts

• Air leakage improvement: Sealing around penetrations, bathtubs adjacent to exterior walls, and fireplaces
  – limit wasted energy, outdoor pollutants, noise, etc.
  – minimal materials and moderate amount of labor
  – greater comfort and better indoor air quality

• Duct Leakage improvement: Requires sealing around penetrations in duct work to reduce energy use; achieves a better performing HVAC unit and more comfortable indoor environment, (can be expensive but is very important to families with respiratory concerns).
Recommendations: *Improving to match energy code*

- **Lighting** – Most cost-effective to update to 75% or even 100% efficient lighting (CFLs and LEDs)
- **Windows** – Highest up-front cost, but they will improve the efficiency of the shell of the building and are a key home component buyers will ask about.
- **Furnace** – Utilities often offer rebates for furnaces, and a new furnace is a plus for homebuyers.
- **Programmable thermostats** - cheap and fun technology!
- *****Utility rebates can usually assist for energy upgrades.***
Thank you!

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