Energy Codes 101: Benefits for the Residential Real Estate Industry

NAR Green Designation

Chicago, IL April 18, 2017

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Presentation Overview

1. Introduction
2. Energy Code Development
3. Adoption Process
4. Elements of the Code
5. Recommendations

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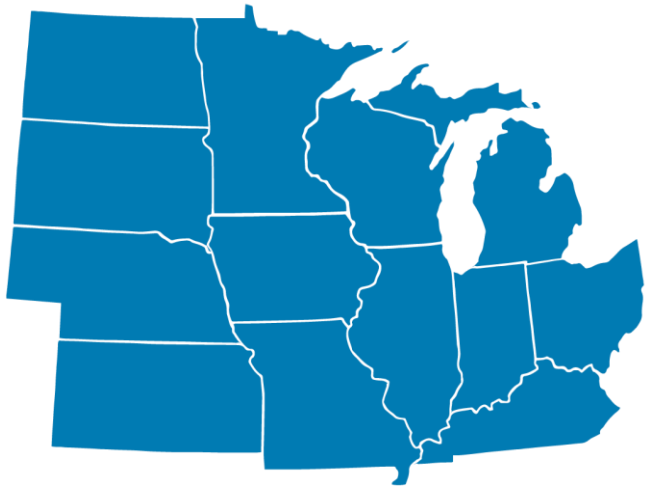
About MEEA

The Trusted Source on Energy Efficiency

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.



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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

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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

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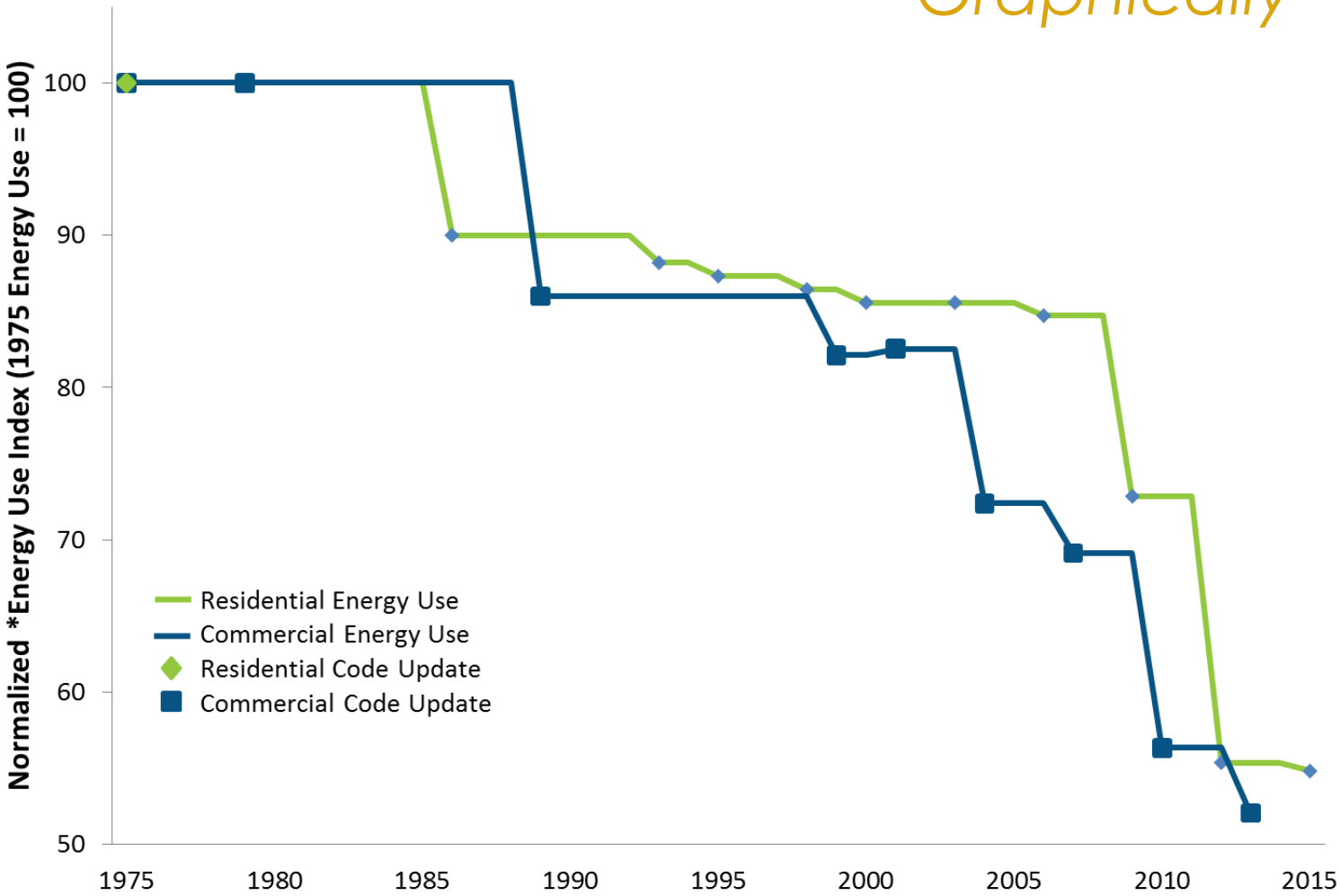
History of Energy Codes

Graphically



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

Source: MEEA based on PNNL Analysis

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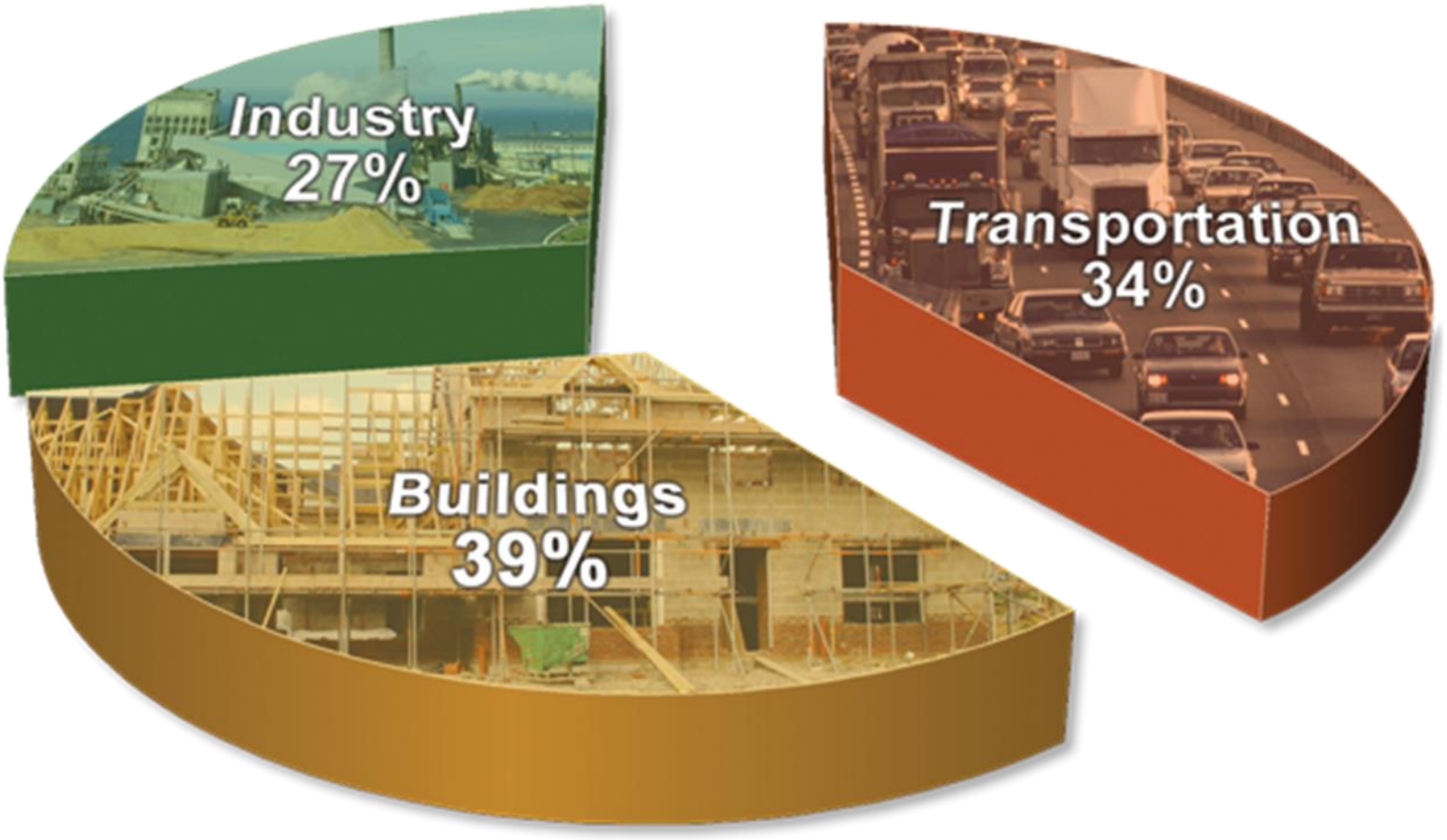
Energy Use by sector

United States



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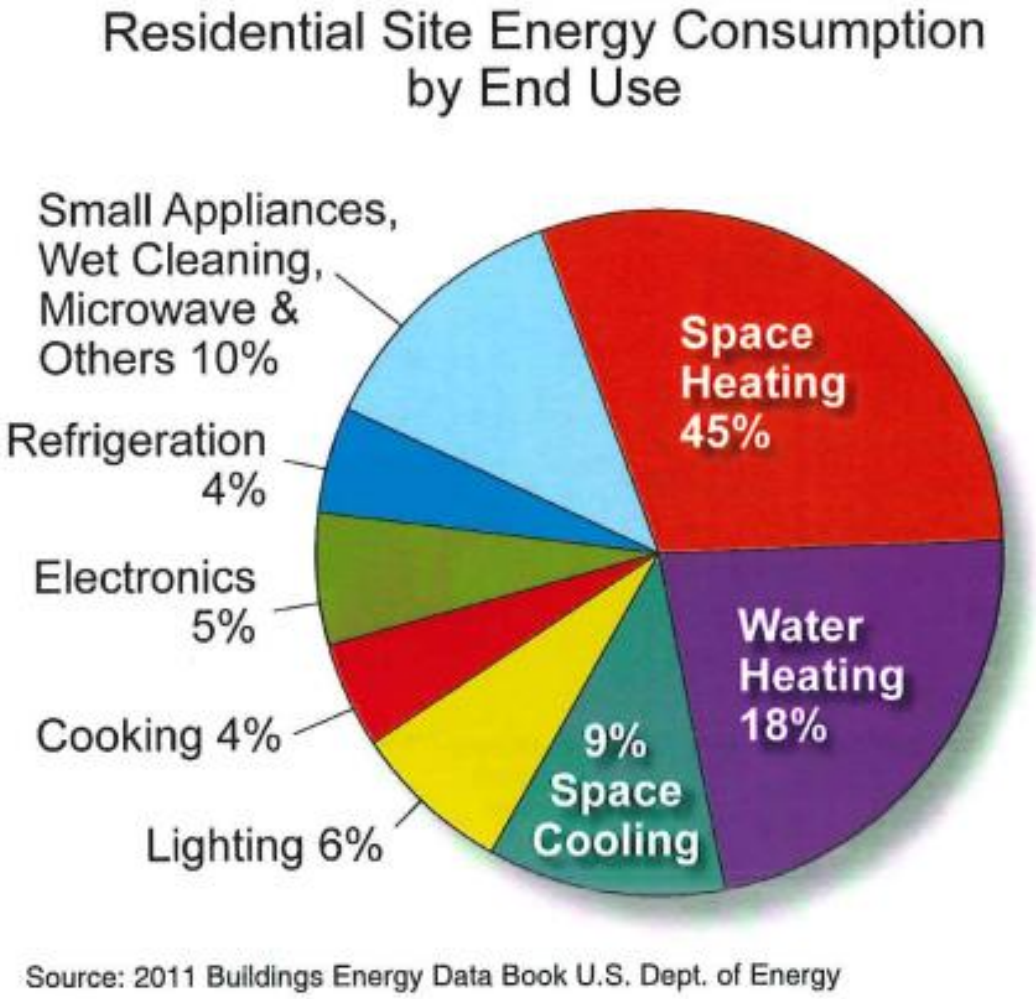
Residential Energy Use



Source: 2011 Buildings Energy Data Book U.S. Dept. of Energy

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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

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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)

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Adoption Process

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

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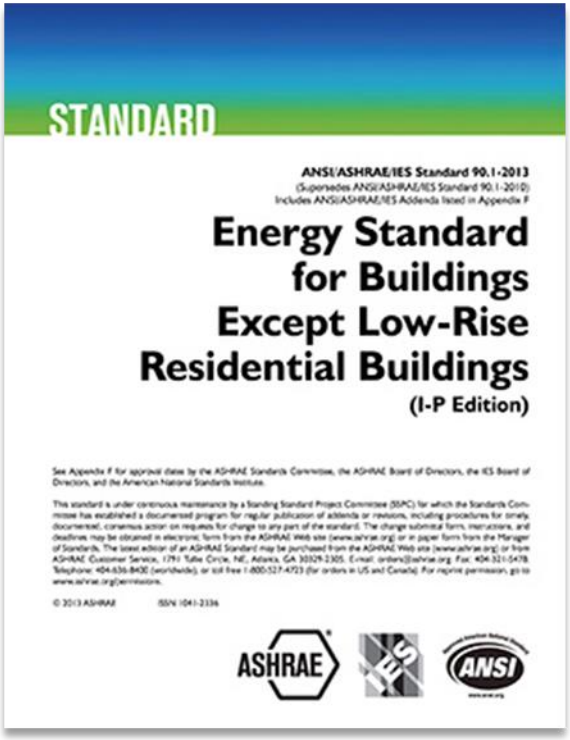
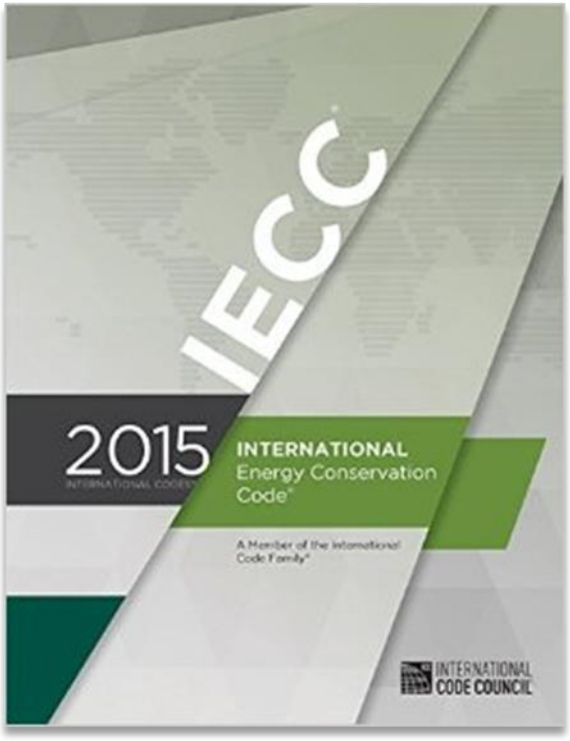
Model Building Energy Codes



ASHRAE Standard 90.1



International Energy Conservation Code

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Adoption Process

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

- Model codes may be amended

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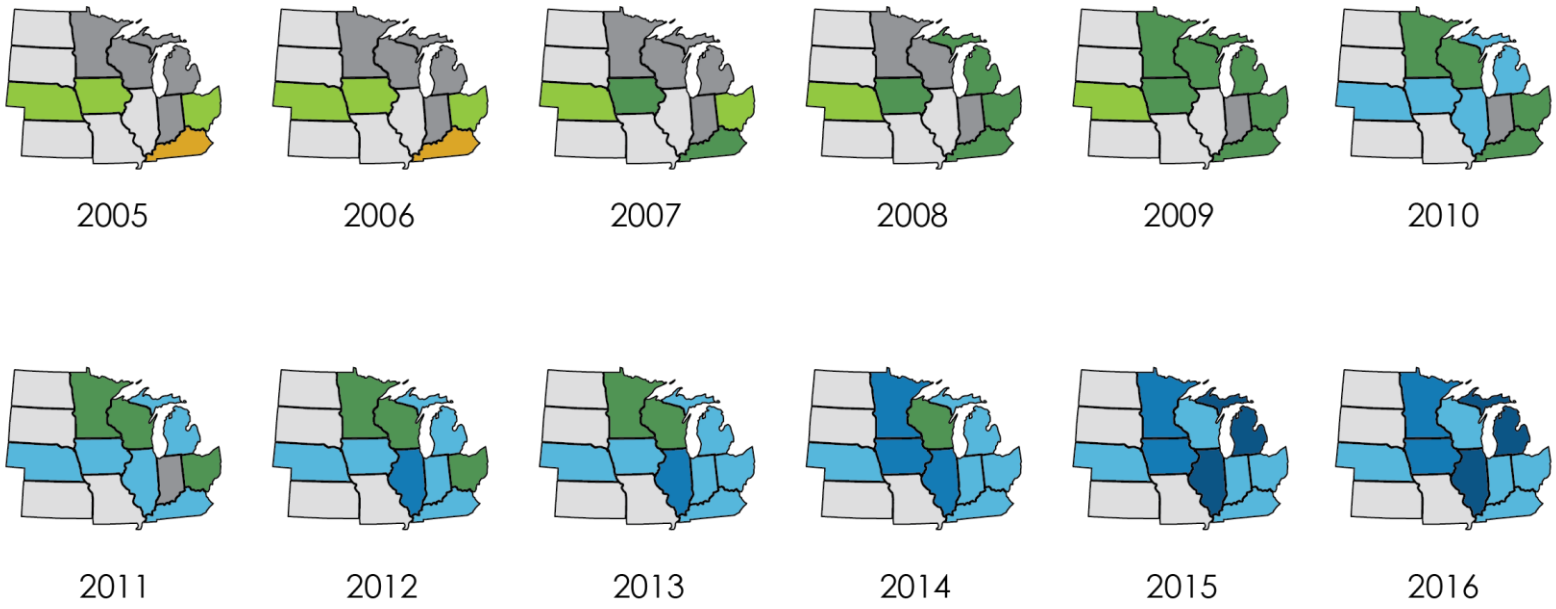
Residential Building Energy Codes

Adoption Timeline



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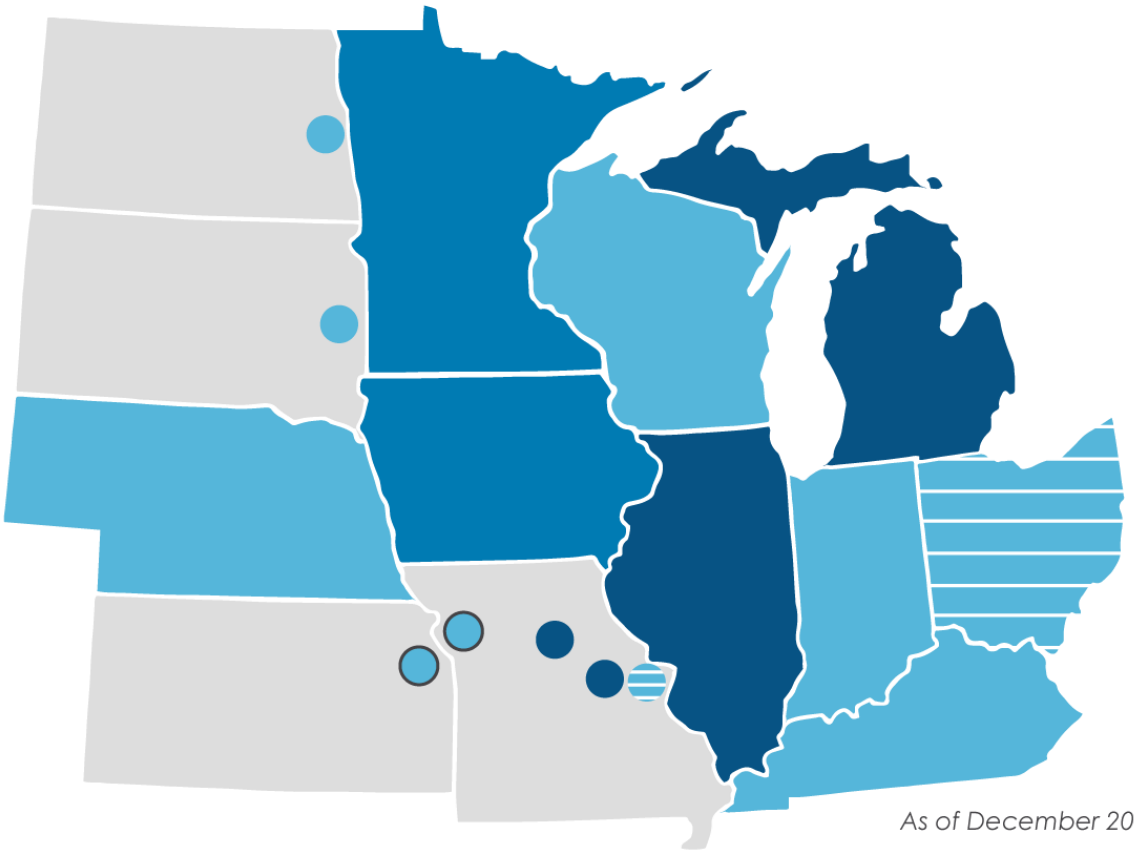
Residential Building Energy Codes

Current Status of Midwest States



Code Level / Equivalence

- No mandatory code
- 2009 IECC
- Enhanced 2009 IECC
- 2012 IECC
- 2015 IECC

*Stripes indicate code update in progress

As of December 2016

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Energy Code Elements

- Applicability
- Code Measures
- Definitions

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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

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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

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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)

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Key Measures
Definitions (cont.)

- 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**

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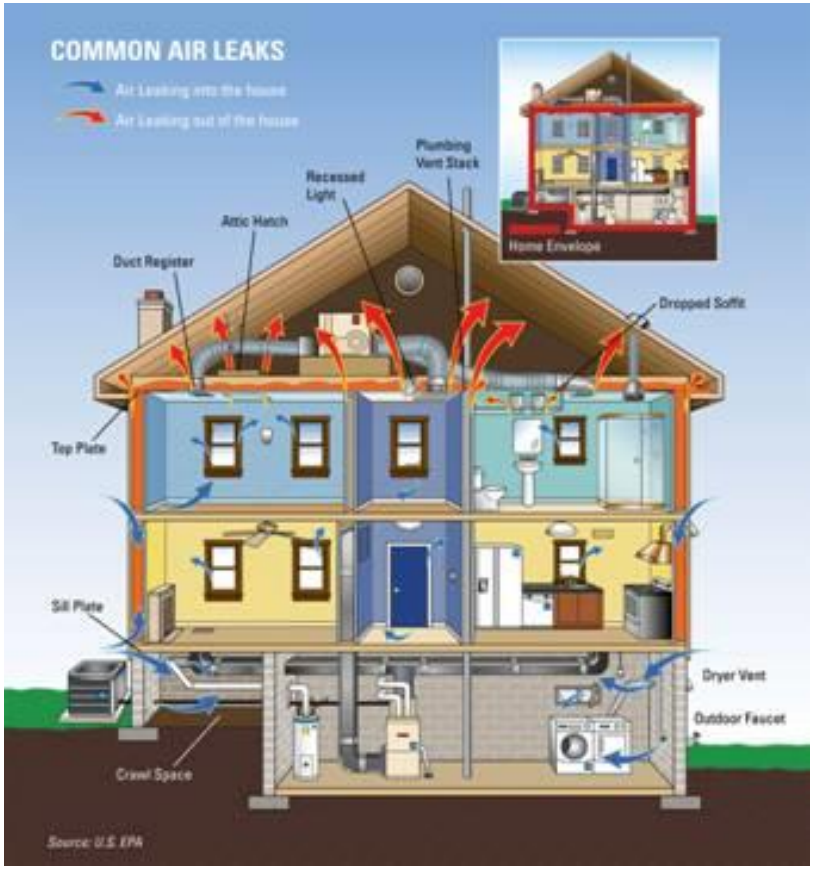
Key Measures

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

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Illinois Residential Energy Code

- 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

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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

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Compliance

- Paths to Compliance
- Energy Rating Index

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Paths to Compliance

2015 IECC Residential Prescriptive

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

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement Wall R-Value	Slab R-Value and Depth	Crawl Space Wall R-Value
4	0.35	0.55	0.40	49	20 or 13+5	8/13	19	10/13	10, 2 ft	10/13
5	0.32	0.55	NR	49	20 or 13+5	13/17	30	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10	15/20	30	15/19	10, 4 ft	15/19
7 & 8	0.32	0.55	NR	49	20+5 or 13+10	19/21	38	15/19	10, 4 ft	15/19

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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

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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

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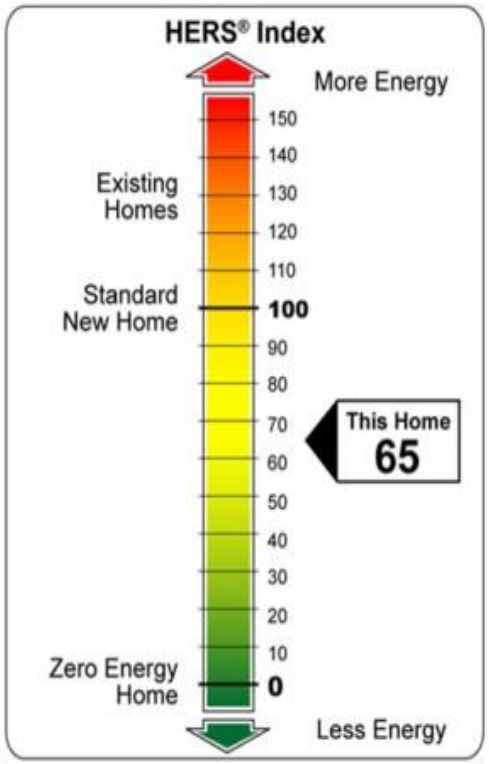
Paths to Compliance

Residential: Energy Rating Index for IECC 2015

Climate Zone	Energy Rating Index
4	54
5	55
6	54
7	53



- Similar to HERS score
  - Baseline of 2006 IECC = 100
  - Net Zero = 0
- Need to comply with mandatory code sections (limits tradeoffs)

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Codes and me

- Why should I care about energy codes?
- Recommendations

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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

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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).

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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.*****

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Thank you!

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