



Providing effective energy strategies for buildings and communities

Energy Code Basics & 2018 IECC Updates

2.25.2019



Who we are

We assist buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable.

We are an applied research program at University of Illinois, working in collaboration with 360 Energy Group.

Our goal: Reduce the energy footprint of Illinois.



SEDAC is the Illinois Energy Conservation Code Training Provider

This training program
is sponsored by
Illinois EPA
Office of Energy



Energy Code Assistance

- Technical support
 - 800.214.7954
 - energycode@sedac.org
- Online resources at sedac.org/energy-code
- Workshops
- Webinars
- Online on-demand training modules





Energy Code Training

[Illinois Energy Conservation Code](#)[Workshops](#)[Webinars](#)[Online training](#)[Resources](#)[Frequently Asked Questions](#)[Contact us](#)

Energy Code Training

SEDAC is the Illinois Energy Conservation Code training provider

The Smart Energy Design Assistance Center (SEDAC), in partnership with the Illinois EPA Office of Energy, provides training to increase awareness of the Illinois Energy Conservation Code and to improve the energy efficiency of new construction and renovation in Illinois. Community code officials, construction professionals and trades, and design professionals such as architects and engineers are invited to participate. SEDAC offers [workshops](#), [webinars](#), [online training](#), [resources](#), and [technical support](#).

Funding provided in whole or in part by the Illinois EPA Office of Energy.



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 Department of
LANDSCAPE ARCHITECTURE

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Energy Code 101

- Building codes are state laws – states or local governments can choose to adopt one of the national model energy codes, a modified version of the model code, or their own state-specific code
- Energy codes are one of many building codes, such as fire, electrical, structural, or plumbing
- Energy codes are different than appliance and equipment standards. Energy codes cover the building itself. However, there is some overlap, particularly in lighting



Energy Code Process: Key Components

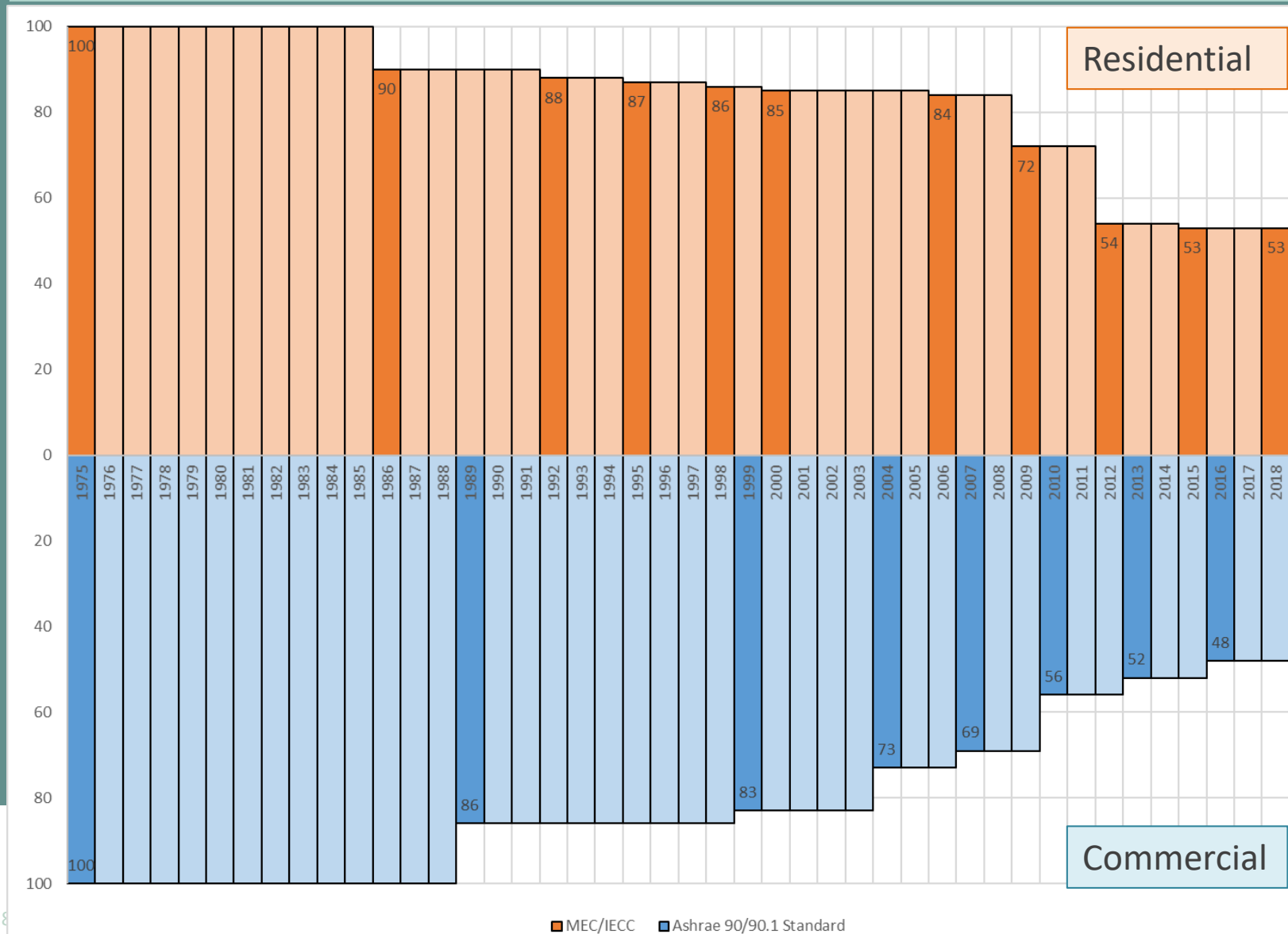
Development:

- National model energy codes are developed by two organizations – ICC & ASHRAE.

Any interested party can participate in the development processes. The codes cycle is continuous, with new codes being developed every three years. Final versions of each new edition are determined by a vote of the 90.1 committee members for ASHRAE and by the ICC membership for the IECC



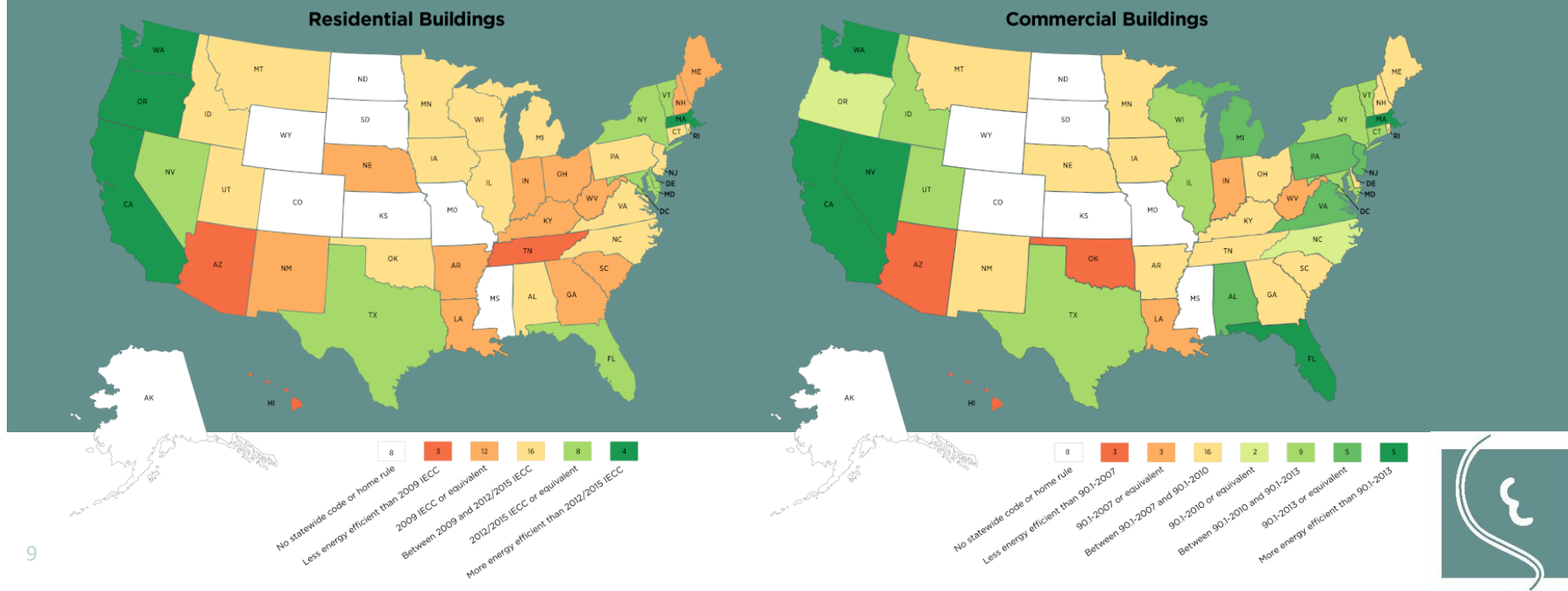
History of Model Codes Improvement



Energy Code Process: Key Components

Adoption:

- Most codes are adopted at the state level, though, in about 10 states they are adopted by cities. Once adopted, the code becomes law within the particular state or local jurisdiction



Energy Code Process: Key Components

Adoption Process in Illinois:

- In accordance with the Energy Efficient Building Act, the Illinois Capital Development Board (CDB) is required to review and adopt the most current version of the IECC within one year following its publication date (September 2017).
- The Code will then become effective within 6 months following its adoption by the CDB, unless voted down by JCAR (March 2019?)
- **Effective date for new code:**
- ~~March 1, 2019~~ → **April 1, 2019?**



Illinois Energy Conservation Code



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Illinois Energy Conservation Code

The Illinois Energy Conservation Code requires design and construction professionals to follow the latest published edition of the International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1 "Energy Standard for Buildings except Low-Rise Residential Buildings" including amendments adopted by the Capital Development Board.

State Funded Facilities must comply with ASHRAE 90.1 per 20 ILCS 3105/10.09-5. See Subpart B of the [Illinois Energy Conservation Code](#) for more information. The 2013 edition of ASHRAE 90.1 went into effect on 1/1/16.

Privately Funded Commercial Facilities must comply with IECC per 20 ILCS 3125. See Subpart C of the [Illinois Energy Conservation Code](#) for more information. The 2015 edition of the IECC went into effect on 1/1/16.

Residential Buildings must comply with IECC per 20 ILCS 3125. See Subpart D of the [Illinois Energy Conservation Code](#) for more information. The 2015 edition of the IECC went into effect on 1/1/16.

ILLINOIS CODES

[Building Codes & Regulations](#)

[Illinois Accessibility Code](#)

[Illinois Administrative Code](#)

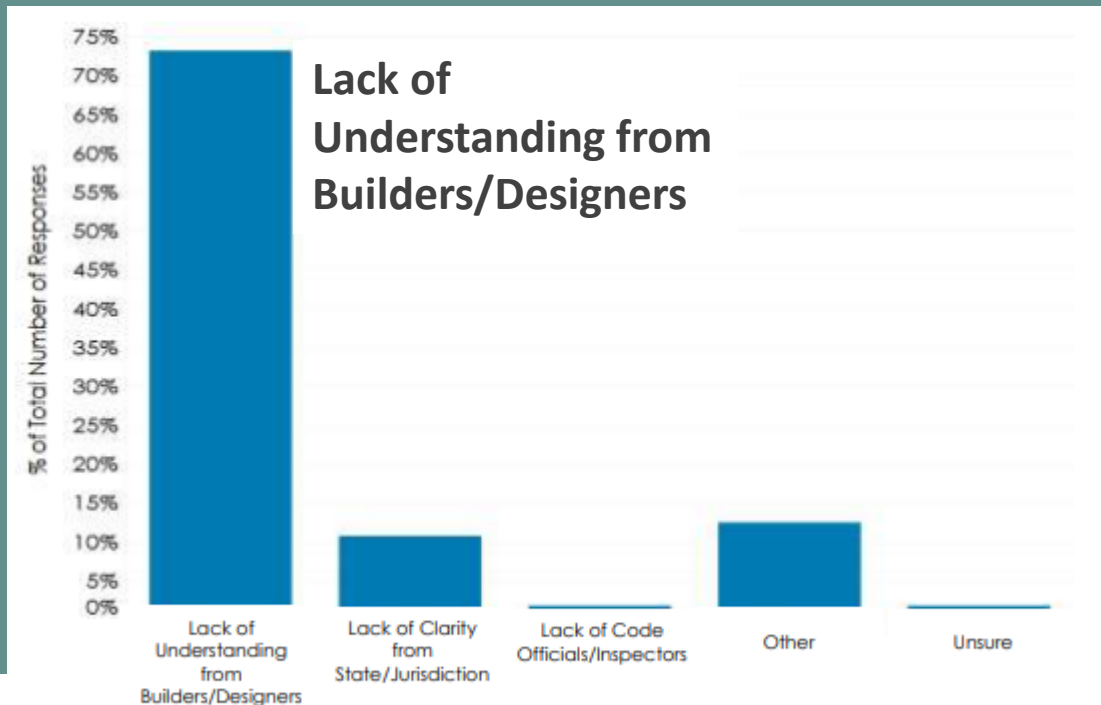
[Illinois Energy Conservation Code](#)

Anticipated to
Change to IECC

Energy Code Process: Key Components

Compliance:

- The key to realizing the full savings potential of building energy codes is compliance by **design & construction professionals**.



* 2018 MEEA
Illinois Enforcement
Survey on Existing
Commercial Buildings

Sample: 69 Illinois
Code Officials

Q. Biggest issue in enforcing the energy code?



Energy Code Process: Key Components

Enforcement:

- Code enforcement is the duty of the local jurisdiction, which must meet minimum compliance documentation requirements
- Issues:

Lack of knowledge base
for code officials to
interpret energy codes

Contractor resistance

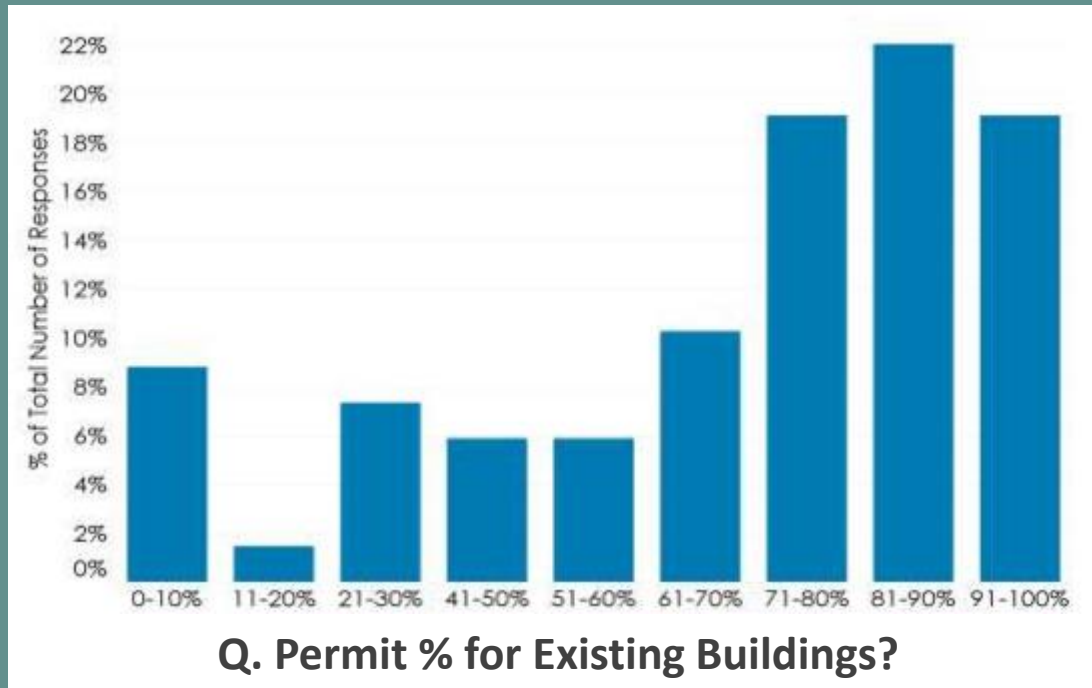
Energy Code is not a
priority for code officials

Lack of consistent
enforcement from town
to town



Importance of Existing Bldgs in Energy Code

Dominance of existing building addition / renovation



* 2018 MEEA
Illinois Enforcement
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Residential Energy Code

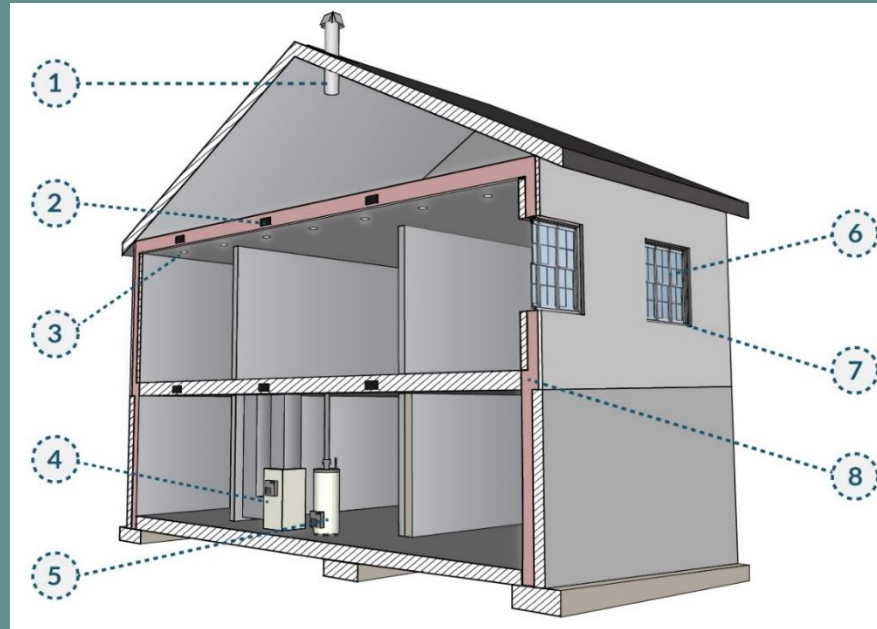
1. Ventilation

2. Ducts

3. Lighting

4. HVAC

6. Water Heating



6. Fenestration

7. Air Sealing

8. Insulation

IECC Residential Provisions

R402 Building
Thermal
Envelope

R403 Systems

R404 Electrical
Power &
Lighting Systems



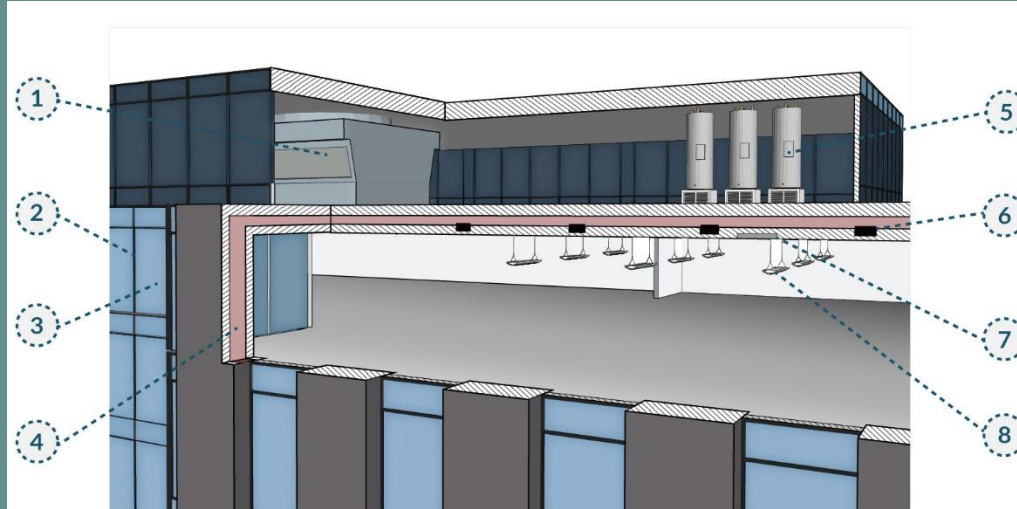
Commercial Energy Code

1. HVAC

2. Air Sealing

3. Fenestration

4. Insulation



5. Water Heating

6. Ducts

7. Ventilation

8. Lighting

IECC Commercial Provisions

C402 Building
Envelope
Requirements

C403 Building
Mechanical
Systems


C404 Service
Water Heating



C405 Electrical
Power &
Lighting Systems



Access to 2018 IECC

<https://codes.iccsafe.org/public/document/iecc2018>

 Experience the ICC premiumACCESS™ Demo ICC Home cdpACCESS Store premiumACCESS™ publicACCESS™

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2018 International Energy Conservation Code

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Commercial or Residential?

Residential:

- A detached one-family or two family dwelling
- Any building 3 stories or less above grade that contains multiple dwelling units, where occupants reside on a primarily permanent basis (4 stories or less in Chicago)
- Examples:
 - Townhouse
 - Row house
 - Apartment house
 - Convent
 - Monastery
 - Rectory
 - Fraternity or sorority house
 - Dormitory
 - Rooming house



Commercial or Residential?

- 5 story mixed use building with 2 stories of retail stores and 3 stories of apartments in Chicago
- 3 story mixed use building with 1 story of retail stores and 2 stories of apartments in Bloomington
- 5 story single family home
- 3 story hotel



2018 IECC **Commercial** Changes: Highlights

- No significant energy efficiency improvement (initial estimate of 2-5% improvement)
- Mechanical Section (C 403): Reorganized, so all provisions for a type of equipment or system are in one place
- Additional efficiency package options: Enhanced envelope performance (C406.8) & Reduced air infiltration (C406.9)
- More detailed requirements for controls: Change from “be capable of” to “be configured”)



2018 IECC **Commercial** Changes: Highlights

- Appendix CA Solar-Ready Zone
- ASHRAE 90.1-2016
- New climate zone map (6 counties in Illinois – Calhoun, Clark, Coles, Cumberland, Greene, Jersey: from 5A to 4A)
- New performance-based compliance path (Appendix G)



2018 IECC **Residential** Changes: Highlights

- **Residential**

- No significant energy efficiency improvement (initial estimate of 0% improvement)
- Definition of “Approved”
- Inspection: Change from construction or work shall remain “accessible and exposed” to “visible and able to accessed” for inspection”



2018 IECC Updates

- **Commercial**
 - Envelope
 - Mechanical Systems
 - Service Water Heating
 - Lighting
 - Performance
 - Maintenance & Commissioning
- **Residential**
 - Envelope
 - Building Systems
 - Lighting
 - Performance



Commercial



Heated Slab Insulation

R-5 continuous insulation required under heated slabs for both commercial and residential

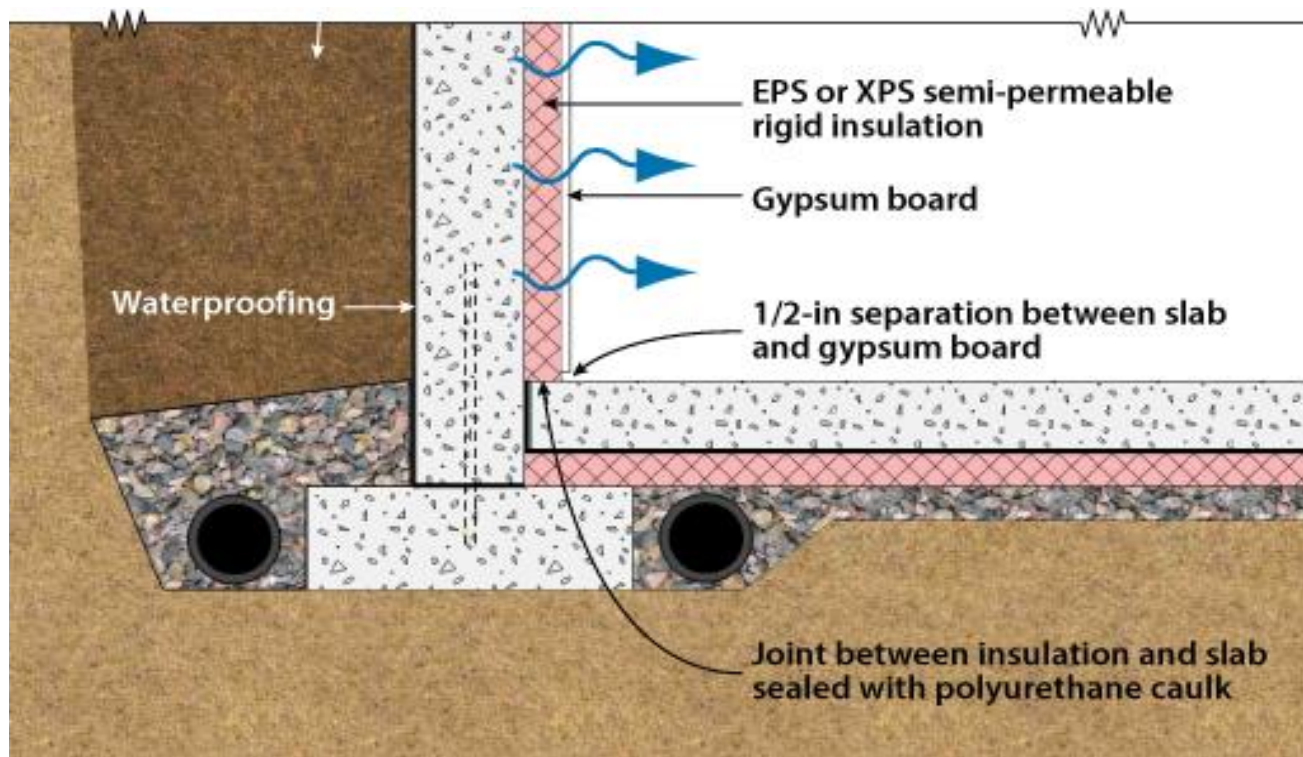


Image courtesy of DOE

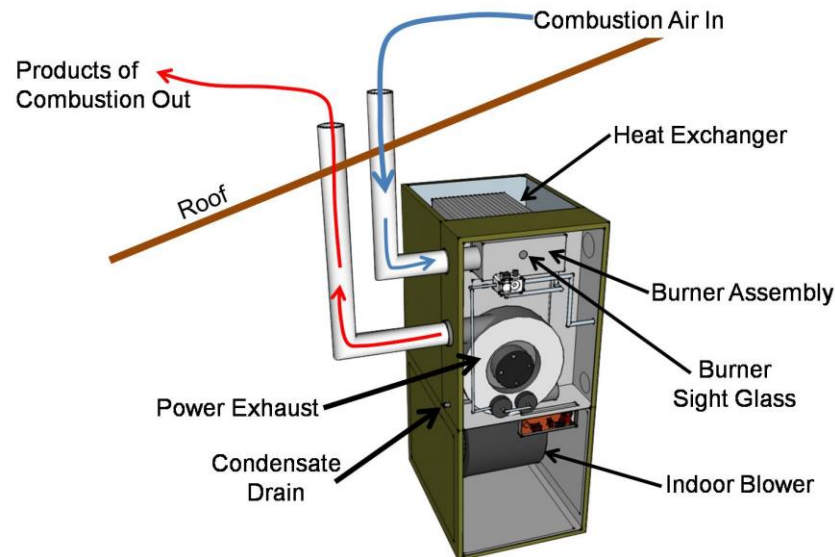


Isolating Combustion Appliances

- Specifies minimum construction methods for rooms containing open combustion appliances (Water heaters, furnaces, etc.)
- This was amended out in 2015 IL Energy Conservation Code due to increased cost of building these isolated rooms.
- Alternative is to install sealed combustion (higher efficiency) appliances



26 Images courtesy of DOE



Expanded VFDs

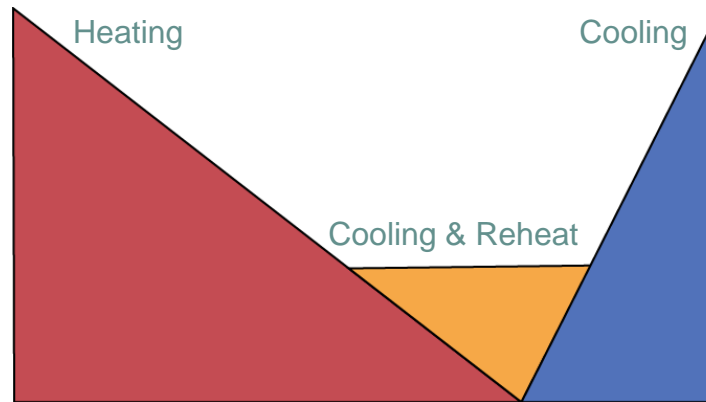
- Pumps and fans with 2hp and larger now required
- Increased allowance for DDC controlled systems



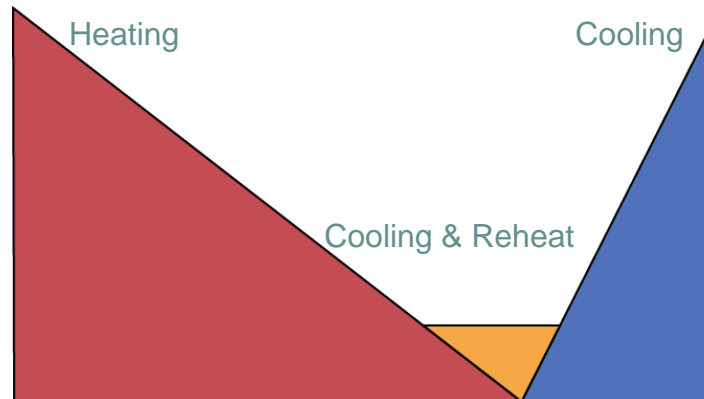
Improved HVAC Turndown

Reduced minimum airflow from 30% to 20% of maximum

2015 IECC



2018 IECC



Guestroom Automatic Controls

Automatic HVAC control now required for buildings with over 50 guestrooms



Image courtesy of Wattstopper



Vestibules



Maximum heating temp: 60 °F
Enabled only when OAT <45 °F

Minimum cooling temp: 85 °F



Luminaire Level Lighting Controls

- Allows for luminaire lighting controls to take the place of centralized controls
- Must include occupancy sensor and ambient light sensor
- Wireless reprogrammability



Image courtesy of Cree



Office Area Occupancy Sensors

Open office areas now must have occupancy sensors



Image from <https://www.focalpointlights.com>



Occupancy Sensors

1. Classrooms/lecture/training rooms
2. Conference/meeting/multipurpose rooms
3. Copy/print rooms
4. Lounges/breakrooms
5. Enclosed offices
6. Open plan office areas
7. Restrooms
8. Storage rooms
9. Locker rooms
10. Other spaces 300 sf or less that are enclosed by floor-to-ceiling height partitions
11. Warehouse storage areas



Daylight Responsive Exception

- Does not require daylight-responsive controls if 40% lower than wattage allowance (weighted average)
- Office Allowance – 0.79 w/sf
- Threshold for Daylight-responsive controls – 0.47 w/sf



Daylight Responsive Exception

- Does not require daylight-responsive controls if 40% lower than wattage allowance (weighted average)
- Office Allowance – 0.79 w/sf
- 200,000 SF total area
- 100,000 SF daylit zones (50% daylit)
- Ending total w/sf allowance – 0.63 w/sf
- $0.79 \text{ w/sf} - (40\% \times 50\%) = 0.63 \text{ w/sf}$



- Daylight shutoff
- Time switch control functionality
- Decorative lighting shut off during non-business hours
- Lighting setback – 30% watts minimum



Track Lighting Demand Reduction

Reduces demand from 30W/ft to 8W/ft



Reduced Lighting Power Allowances

- Office 0.82 to 0.79 – 4% reduction
- Library 1.19 to 0.78 – 34% reduction



Increased Efficiencies

Dry-type transformers & Motors



Images courtesy of Schneider Electric



Image courtesy of Baldor



Renewable Energy Credit Limits

- Limits on-site renewable credits to 5%
- Allows Code Official to request documentation on renewables used for credit



Image courtesy of: solartrader.ca



Operations and Maintenance

Building O&M must be provided to building owner



Image courtesy of Berkeley



Residential



Window U-Factors

Modest improvement in window U-factors

Climate Zone	2015 U-Factor	2018 U-Factor
4	U-0.35	U-0.32
5	U-0.32	U-0.30

ENERGY STAR® Qualified in Highlighted Regions



World's Best Window Co.
Millennium 2000+
Vinyl-Clad Wood Frame
Double Glazing - Argon Fill - Low E
Product Type: Vertical Slider
(per NFRC 100-97)

ENERGY PERFORMANCE RATINGS

U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.30	0.30

ADDITIONAL PERFORMANCE RATINGS

Visible Transmittance	Air Leakage (U.S./I-P)
0.51	0.2

Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. Consult manufacturer's literature for other product performance information.
www.nfrc.org



Ducts in Conditioned Space

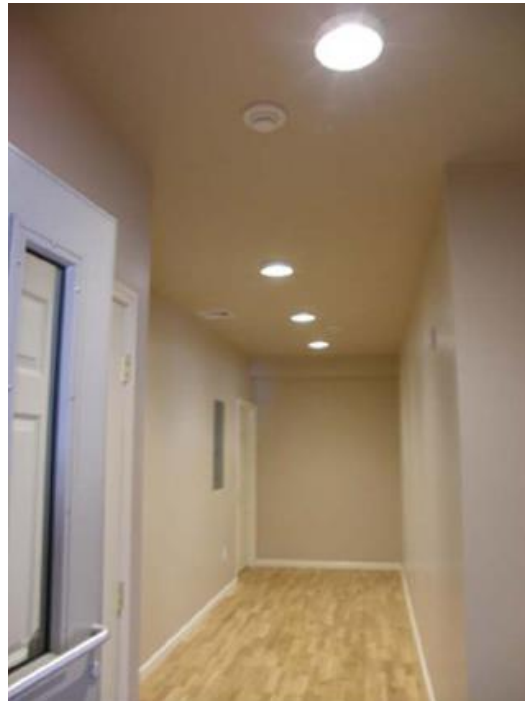
Provides criteria to determine if ducts are inside conditioned space or not.

- Completely inside air barrier OR
- Buried in the ceiling insulation AND
 - Air handler within air & thermal barrier
 - Duct leakage < 1.5 cfm per 100 sf
 - Full depth insulation above duct



High Efficiency Lighting

- Increases high efficiency lighting to 90% from 75%
- Eliminates the low-voltage exception



Multifamily Unit Modeling

Batch sampling is allowed for stacked multifamily units



Energy Rating Index

- Increase of Max. ERI score

Climate Zone	2015 ERI Score	2018 ERI Score
4	54	62
5	55	61



Image courtesy of Energy IQ



Existing Buildings

- Additions and alterations shall conform to new construction requirements
 - Does not required unaltered portions to comply
- Existing excess fenestration area may remain, but U-values and SHGC apply to replacement fenestration
- Existing cavities exposed during constructed, provided filled with insulation (Chicago allows air gap behind masonry to allow proper drying)



Questions?

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800-214-7954

