MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

20 N. Wacker Drive, Suite 1301
Chicago, Illinois 60606
312.587.8390 Main Line
312.587.8391 Fax
www.mwalliance.org

October 11, 2019

Mr. Robin Nicoson
Chairman, Indiana Fire Prevention and Building Safety Commission
Indiana Government Center South
302 West Washington Street
Indianapolis, IN 46204

Re: MEEA's comments on Chapter 11 of the proposed 2018 International Residential Code

Dear Chairman Nicoson:

Thank you for the opportunity to provide feedback on Indiana's code adoption process and the proposed energy chapter of the 2018 International Residential Code (IRC). The Midwest Energy Efficiency Alliance (MEEA) is a member-based non-profit organization that promotes cost-effective energy efficiency policies in order to reduce energy waste in the Midwest. We have worked with previous Administrations on Indiana's building energy codes.

MEEA has reviewed the proposed residential energy code and recommends the adoption of the unamended Chapter 11 (IECC) of the 2018 IRC, as the statewide minimum residential energy code. The 2018 IECC includes cost-effective measures to improve the efficiency, performance, health and safety of new and existing homes undergoing major renovations in Indiana.

1. **Building Performance, Consumer Protection and Resilience**
   The IECC provides critical, cross-referenced minimum requirements that ensure all components in a home (such as heating, cooling, ventilation, lighting and the building shell) operate effectively and efficiently as a single interactive system, without creating unintended consequences that might harm occupants or damage the structure. The adoption of key efficiency measures and tests will help ensure buildings operate as a fine-tuned system. A prime example of this is the requirements for residential buildings to undergo performance testing to determine the amount of building leakage in the home. An air leakage test depressurizes the home to determine the amount of airflow that filters through holes, cracks, and junctions in a home. A well-sealed home results in better system efficiency and performance, as well as a more comfortable and healthier indoor environment. If a home is not properly sealed, harmful pollutants, dust and moisture can be dragged uncontrollably through the indoor living environment. However, through proper sealing and the introduction of mechanical ventilation, indoor pollutants can be minimized, and fresh air from a known source can be introduced through a controlled and clean system.

   Although, the proposed code provides guidance on how to properly seal the building shell of a home, the proposed 5 ACH50 leakage rate cannot be fully verified without the use of an air leakage test. Studies have shown that a significant majority of visually inspected new homes have unintentionally low air leakage rates (below 5 ACH 50). This situation is a potential health hazard to occupants and a significant liability exposure for builders. The verification process and determination of the leakage rate of a building is especially critical when considering the need for mechanical ventilation or continuous makeup air. By understanding the level of airflow in a home, a builder can ensure adequate makeup air is

MEA
MIDWEST ENERGY EFFICIENCY ALLIANCE
20 N. Wacker Drive, Suite 1301
Chicago, Illinois 60606
312.587.8390 Main Line
312.587.8391 Fax
www.mwalliance.org

introduced through mechanical ventilation, providing the first critical step to a healthy home.

Additionally, improvements to the building envelope through increased insulation and air sealing will result in the construction of more resilient buildings. These updates allow buildings to maintain temperatures for longer periods of time, a feature particularly important during severe weather events. In a study conducted after Superstorm Sandy, researchers found that homes built to newer energy codes enabled residents to safely stay in their homes longer after a power outage than those occupying similar buildings constructed under an older code. Because the building was able to maintain a habitable temperature for a much longer period, residents were able to shelter in place, giving critical flexibility for deploying first responder resources.

2. Cost-Effectiveness of the 2018 IECC

The adoption of the unamended 2018 IECC provides a significant opportunity to advance minimum building performance in the state and reduce operating costs for residents. On a per home basis, updating to the full 2018 IECC is cost-effective and would save residents approximately $500 annually and reduce energy use by over 25%.[1] In the first year alone, this would result in a collective statewide cost savings of $6,600,000 and enough energy savings to power over 6,200 homes in Indiana.[2]

However, first year savings only tell a fraction of the positive impact from an updated energy code because energy and cost savings from efficiency measures are cumulative in nature. MEEA estimates that the cumulative savings from the adoption of the 2018 IECC would put more than $250,000,000 back into the pockets of Indiana residents over the next decade.[3] Simply put, an investment in cost-effective updated building energy codes will put more money into Hoosiers' pockets, improving local economies for decades to come.

3. Meeting key requirements of the 2018 IECC is well within the capabilities of residential builders in Indiana

A recent statewide analysis of HERS rated homes (2014-2016), and a 2018 report from RESNET shows that over 50% of newly constructed single-family homes built in Indiana received a HERS rating. This robust dataset not only reveals that builders are building efficient homes - average HERS score of 66 - but also demonstrates that a high percentage of builders are regularly meeting or exceeding key code requirements in the 2018 IECC.[4]

In terms of performance testing, over 50% of builders in the state are already meeting the 2018 IECC mandatory code requirement to test the level of air leakage in their homes. As the chart below shows, those tests reveal that all builders in the dataset meet the state's current energy code requirement of 7 ACH50, with half already meeting or exceeding the 2018 IECC home tightness levels (3 ACH50) with over 75% meeting 4 ACH50.

---

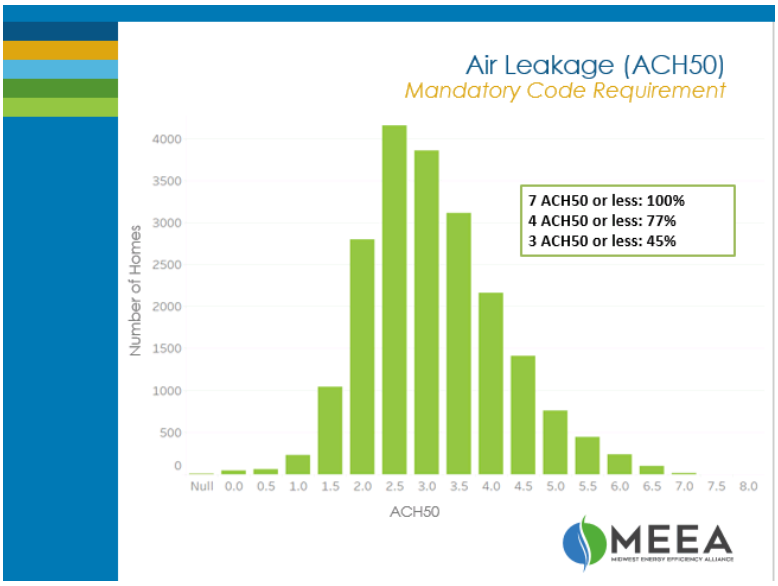
[1] See MEEA attached factsheet. *Residential Energy Use Comparison: IN (CZ 4 + 5) IN 2009 IECC, 2018 IECC*

[2] See US Energy Information Administration. Residential Energy Consumption Survey Data (Washington DC: 2015) https://www.eia.gov/consumption/residential/data/2015/index.php?view=consumption#summary

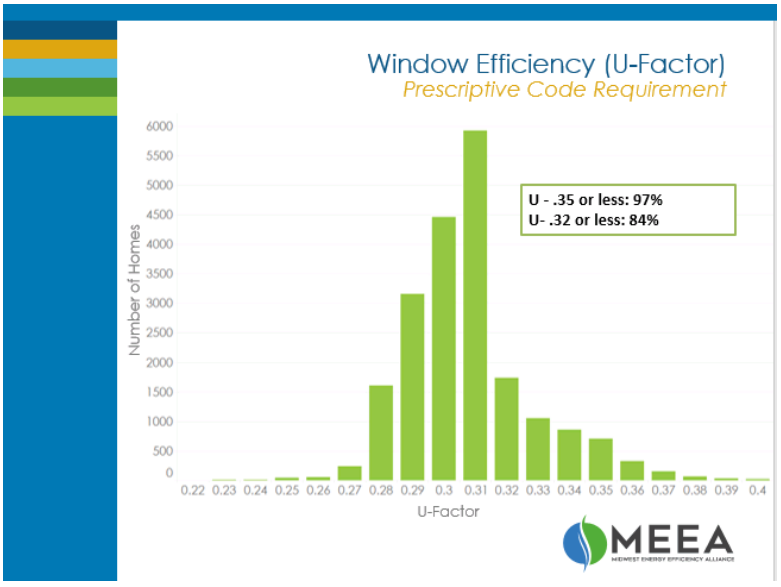
[3] See MEEA attached factsheet. *Building Energy Codes: Saving Energy & Money for Indiana*

[4] See Midwest Energy Efficiency Alliance. *Indiana HERS Ratings: Comparison to the State Energy Code.* (Chicago, IL: 2017). http://www.mwalliance.org/sites/default/files/meea-research/indiana-hers-study_0.pdf

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE
20 N. Wacker Drive, Suite 1301
Chicago, Illinois 60606
312.587.8390 Main Line
312.587.8391 Fax
www.mwalliance.org



Additionally, the vast majority of rated homes already meet or exceed the 2018 IECC requirement for window efficiency. As shown in the graph below, 84% of homes in the dataset have windows that meet or exceed a U-factor of .32 and half exceed a .30, the prescriptive requirement for Indiana in the 2018 IECC.



The level of construction for the two energy code measures discussed above is consistent with the findings from the single-family residential energy code field studies in other states funded by

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

20 N. Wacker Drive, Suite 1301
Chicago, Illinois 60606
312.587.8390 Main Line
312.587.8391 Fax
www.mwalliance.org

the U.S. Department of Energy. Results from these studies in various climate zones indicate that a significant percentage of builders are already meeting the requirements of the 2018 IECC.[5]

The adoption of the unamended 2018 IECC is a cost-effective way for Indiana to advance building performance, efficiency and resilience while improving indoor air quality and comfort. As noted throughout this testimony, performance testing, improved building envelope, and other advancements in the 2018 IECC are critical components in fine-tuning the building so the home operates as a healthier and more efficient system.

If you have any questions about this testimony, noted reports and references, attached fact sheets, or the general impact and analysis of building energy codes, please don't hesitate to contact me.

Sincerely,

Ian Blanding,
Building Policy Manager, MEEA
iblanding@mwalliance.org; 312-784-7269

These comments reflect the views of the Midwest Energy Efficiency Alliance – a Regional Energy Efficiency Organization as designated by the U.S. Department of Energy – and not necessarily the organization's members.

[5] See US Department of Energy. *DOE Single-Family Residential Energy Code Field Studies Findings*. (Washington D.C: 2017). https://www.energycodes.gov/compliance/energy-code-field-studies

BUILDING ENERGY CODES

Saving Energy & Money for Indiana

Q How do building energy codes benefit Indiana residents?

A

- Lower energy bills
- Healthier indoor air
- A stronger economy

If Indiana adopts the 2018 IECC, **over the next 10 years residents will save:**

Energy Savings (dollars)

$250,163,000

Energy Savings (MMBTU)

16,847,000

That's enough savings to:

Pay for **6,481** students to attend 4 years of college

Build **1,924** miles of new bike lanes

Buy **357,376** new laptop computers

In energy, that's like:

Powering **177,314** homes for a year

Installing **416** new wind turbines

Powering **7,168,936** refrigerators for a year

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

About MEEA: The Midwest Energy Efficiency Alliance (MEEA) is a collaborative network focused on advancing energy efficiency in the Midwest for sustainable economic development and environmental stewardship.

Contact: Ian Blanding, Building Policy Manager
iblanding@mwalliance.org, (312)784-7269

Residential Energy Use Comparison: IN (CZ 4 + 5)

IN 2009 IECC, 2018 IECC

The adoption of the unamended 2018 International Energy Conservation Code (IECC) will greatly benefit Indiana residents by improving the comfort, air quality, efficiency and performance of newly constructed residential buildings. In addition to improving building performance, the 2018 IECC will ensure critical efficiency components are installed - for all income levels - when its most cost-effective to do so, during the initial construction of the building. Below are findings which highlight the potential for energy and energy cost savings when building to the unamended 2018 IECC in climate zone 4 and 5.[1] On the back of this sheet MEEA provides a description of specific code improvements that largely influence building improvements.

Comparison of Current Indiana Code against the 2018 IECC as Written

- If the unamended 2018 IECC were adopted, **a future homeowner could expect to reduce energy use by 25% and save ~$500** per year on energy bills.
- If the 2018 IECC were passed as written, **residents in the state could save $6.6 million in the first year**.

	Reduced Energy Use Per Home	Annual Energy Cost Savings Per Unit	Simple Payback Period[2]	Net Positive Cash Flow[2]	Life-cycle Cost Savings[2]
Climate Zone 4	24%	$427	5.2 years	10 months	$5,670
Climate Zone 5	25%	$491	4.4 years	8 months	$6,825
	Annual Statewide Cost Savings:[3] $ 6,600,000/yr Annual Statewide Energy Savings: 607,000 MMBTU				

Importance for Low-Income Households

Low-income households - which include an increasingly larger share of elderly adults - operate on fixed incomes and tight budgets.[4] Both the energy savings and building health benefits associated with adopting the 2018 IECC are especially critical to improving the lives of this at-risk community for the following reasons:

- This population **spends double the amount of their income on energy bills** compared to the national average.[5]
- **These residents do not have the opportunity to retrofit after the home is built**; improving comfort, efficiency, and occupant health needs to be done during construction.
- Considering buildings are around for 50 -100 years, **all newly built homes could eventually be occupied by low-income residents.**

* Sources listed on the back of this page

Significant Improvements from Adopting the 2018 IECC:

Building Thermal Envelope

- **Air Infiltration:** Tighter building envelopes and envelope testing
  - A tighter building envelope and a reduced air leakage rate will improve air quality, comfort and building efficiency.
  - This is verified by diagnostic blower door test; it is difficult to meet the requirement and realize energy benefits without testing.
- **Insulation:** Increased wall, ceiling and basement insulation (Climate zone dependent)
  - Increasing insulation is most cost-effective during initial construction and is not often addressed after the home is constructed.
- **Windows:** More efficient windows
  - More efficient windows and increased insulation improve the building thermal envelope resulting in improved efficiency and comfort.
- **Mechanical Ventilation:** Whole house mechanical ventilation that meets the 2015 IRC/IMC is required
  - Controlled ventilation guarantees the exchange of fresh and filtered air in the home, resulting in better indoor air quality.

HVAC System

- **Duct Tightness:** More effective duct systems through reduced leakage
  - A tighter duct system and a reduced leakage rate improve air quality and duct system efficiency.
  - This requirement is verified with a diagnostic duct leakage test when the ducts are not entirely within conditioned space.

Lighting

- **Lighting:** 40% increase in efficient lighting
  - This change will result in cost-effective electricity savings for the homeowner.

Sources:

1. Based on MEEA REM/Design analysis using DOE model home specifications - IN 2009 IECC to 2018 IECC home. Determined energy savings and multiplied that by EIA Indiana 2016 residential energy costs.
2. Based on the US DOE methodology for residential cost-effectiveness in energy codes. https://www.energycodes.gov/development/residential/methodology
   Incremental Costs of $2,260 (cz4) and $2,197 (cz 5) were derived from the following sources: PNNL, RS Means, Home Depot, and local energy raters.
3. Based on 14,640 new construction building permits in 2016. Source: U.S. Census data, 2016 1+2 Unit residential homes in Indiana: https://www.census.gov/construction/bps/txt/tb2u2016.txt
4. Now over 25 million American's 60+ live at or below 250% of the federal poverty level. https://www.ncoa.org/news/resources-for-reporters/get-the-facts/economic-security-facts/
5. See ACEEE and EE for All. Lifting the High Energy Burden in America's Largest Cities http://energyefficiencyforall.org/sites/default/files/Lifting%20the%20High%20Energy%20Burden_0.pdf

Energy Codes are Life-Safety Codes

Robust Energy Codes Result in Healthier Buildings and Healthier Residents

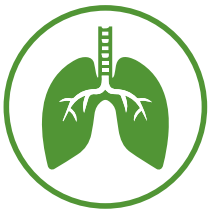
Outdated or unenforced energy codes can lead to buildings with poor indoor air quality, dangerous mold growth and rotting structural members, which not only cost the owner more money in higher operating costs, but also impact their health.

Just like all building codes, energy codes are truly life-safety codes. They exist to protect building occupants and communities.

Buildings are Systems – Energy Codes Make Them Work

Buildings are complex, interconnected systems, much in the same way that a car is a system. If an auto manufacturer installs just one faulty component, it is not just a daily annoyance, it can send a ripple effect across the car. A poorly installed suspension negatively impacts ride comfort, tire wear, gas mileage and, most importantly, it effects safety by degrading steering control.

Energy codes are critical to ensuring that buildings operate as intended. They integrate electrical, heating, cooling, ventilation and building envelope components to provide a safe, healthy and comfortable place to live and work.



Indoor Air Quality

Adequate ventilation is necessary to remove indoor pollutants and provide a healthy indoor environment. But not all ventilation is good ventilation. A leaky home allows for air to move uncontrolled through cracks in walls, attics, crawlspaces and other areas where harmful contaminants often freely collect. Just like plumbing codes assure safe drinking water, energy codes help assure the quality of the indoor air. The energy code requires that homes be well sealed to keep pollutants out and properly ventilated to control the source of incoming fresh air, making the home healthier and safer for occupants. As the saying goes: "*Build tight and ventilate right.*"

Moisture Management

Moisture infiltration can lead to rotting construction materials and harmful mold growth. A well-sealed envelope is the first defense, but no moisture barrier is perfect. Understanding this, the energy code also provides options for building materials to dry out. Additionally, by requiring a well-insulated building envelope, the energy code helps keep old outside air from the warm interior, reducing condensation and ice damming.

Resilient Buildings

Homes built to newer energy codes are more resilient. A study conducted after Superstorm Sandy found that homes built to newer energy codes enabled residents to safely stay in their homes longer after a power outage**.** The ability to shelter in place longer saves lives and provides critical flexibility for deploying first responder resources. This benefit is a direct result of the improvements newer energy codes make to the building envelope.

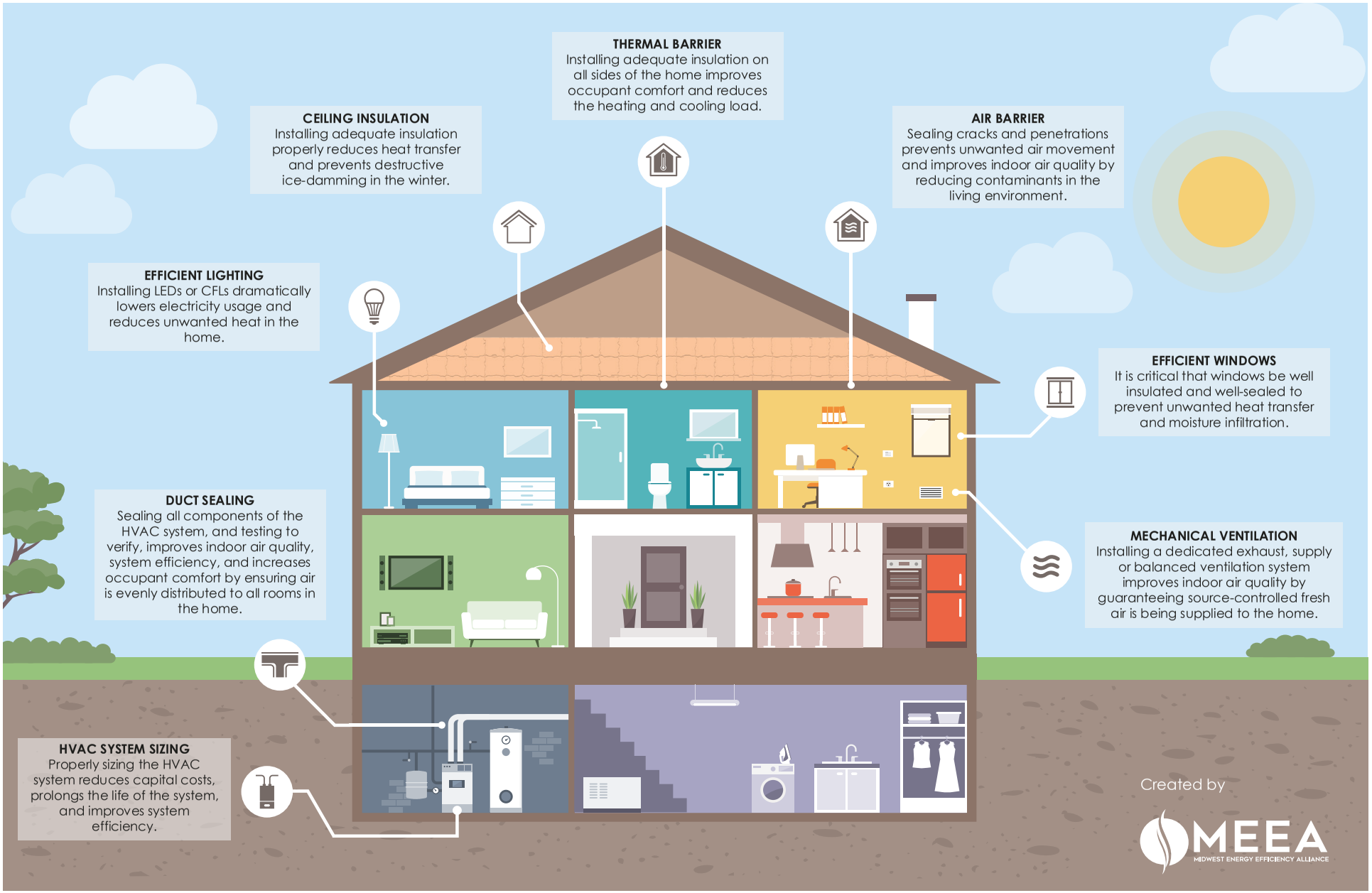
MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

About MEEA: The Midwest Energy Efficiency Alliance (MEEA) is a collaborative network focused on advancing energy efficiency in the Midwest for sustainable economic development and environmental stewardship.

Contact: Ian Blanding, Building Policy Manager | iblanding@mwalliance.org, (312)784-7269

Based on the article *Energy Codes are Life and Safety Codes* by Christine Brinker, Southwest Energy Efficiency Partnership

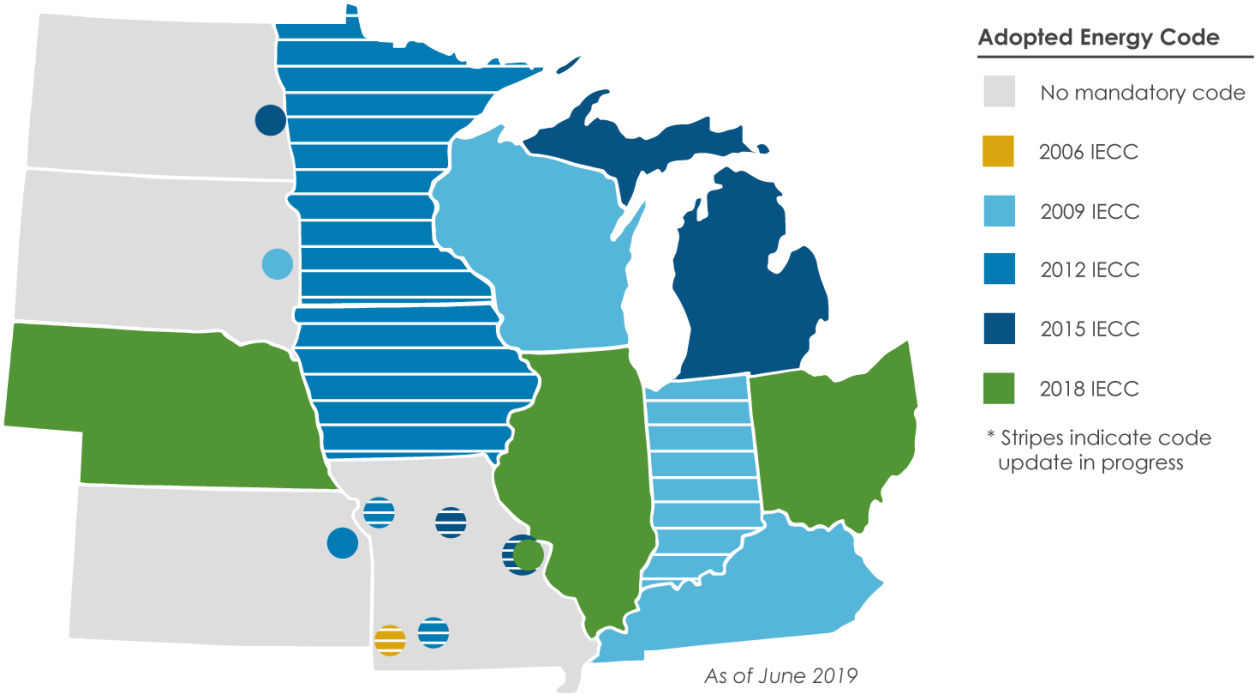
How the Energy Code Improves a Home



Midwest Building Energy Codes

States adopting 2018 IECC - Residential

The following is a list of states and key municipalities in the Midwest that have adopted or are in the process of adopting the 2018 International Energy Conservation Code for residential buildings.



States and municipalities that have <u>adopted</u> the 2018 IECC for residential buildings include:
Nebraska (2009 IECC to 2018 IECC)
Illinois (2015 IECC to 2018 IECC)**
Ohio (2009 IECC to 2018 IECC)**
City of St. Louis, MO (2009 IECC to 2018 IECC)**
Columbia, MO (2015 IECC to 2018 IECC with solar ready provisions)

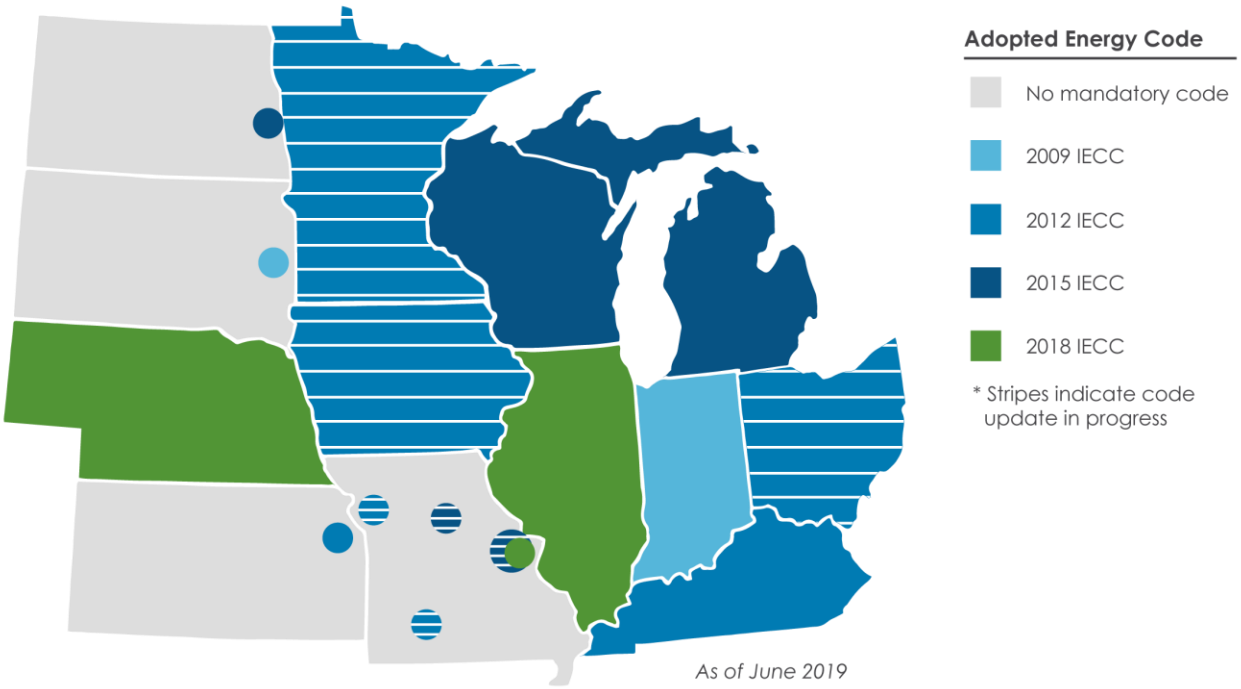
States and municipalities that are <u>in the process</u> of adopting the 2018 IECC for residential buildings include:
Indiana (2009 IECC to 2018 IECC)**
Iowa (2012 IECC to 2018 IECC)
Minnesota (2012 IECC to 2018 IECC)**
Springfield, MO (2006 IECC to 2018 IECC)**

*** Proposed or adopted code is less efficient than the Model 2018 IECC*

Midwest Building Energy Codes

States adopting 2018 IECC – Commercial

The following is a list of states and key municipalities in the Midwest that have adopted or are in the process of adopting the 2018 International Energy Conservation Code (IECC) for commercial buildings.



States and municipalities that have <u>adopted</u> the 2018 IECC for commercial buildings include:
Nebraska (2009 IECC to 2018 IECC)
Illinois (2015 IECC to 2018 IECC)**
City of St. Louis, MO (2009 IECC to 2018 IECC)
Columbia, MO (2015 IECC to 2018 IECC)

States and municipalities that are <u>in the process</u> of adopting the 2018 IECC for commercial buildings include:
Iowa (2012 IECC to 2018 IECC)
Minnesota (2012 IECC to 2018 IECC)**

*** Proposed or adopted code is less efficient than the Model 2018 IEC*

Contact: Nicole Westfall, Building Policy Associate
nwestfall@mwalliance.org, 312.374.0918
20 N. Wacker Dr. Ste 1301, Chicago IL 60606 | *www.mwalliance.org*

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE