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Building Policies Workshop: Impacts Now and Going Forward

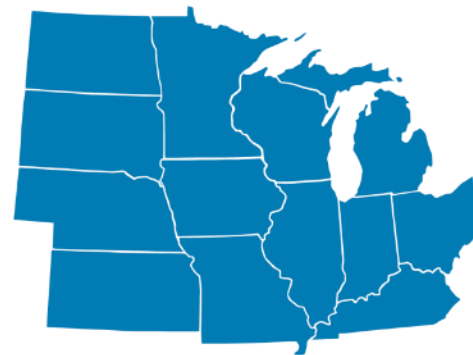
Midwest Energy Solutions Conference
February 26, 2020



About MEEA

The Trusted Source on Energy Efficiency

- Nonprofit membership organization with 160+ members
- Serve 13 Midwest states
- Resource and champion for energy efficiency
- Our mission: advancing energy efficiency in the Midwest for sustainable economic development and environmental stewardship



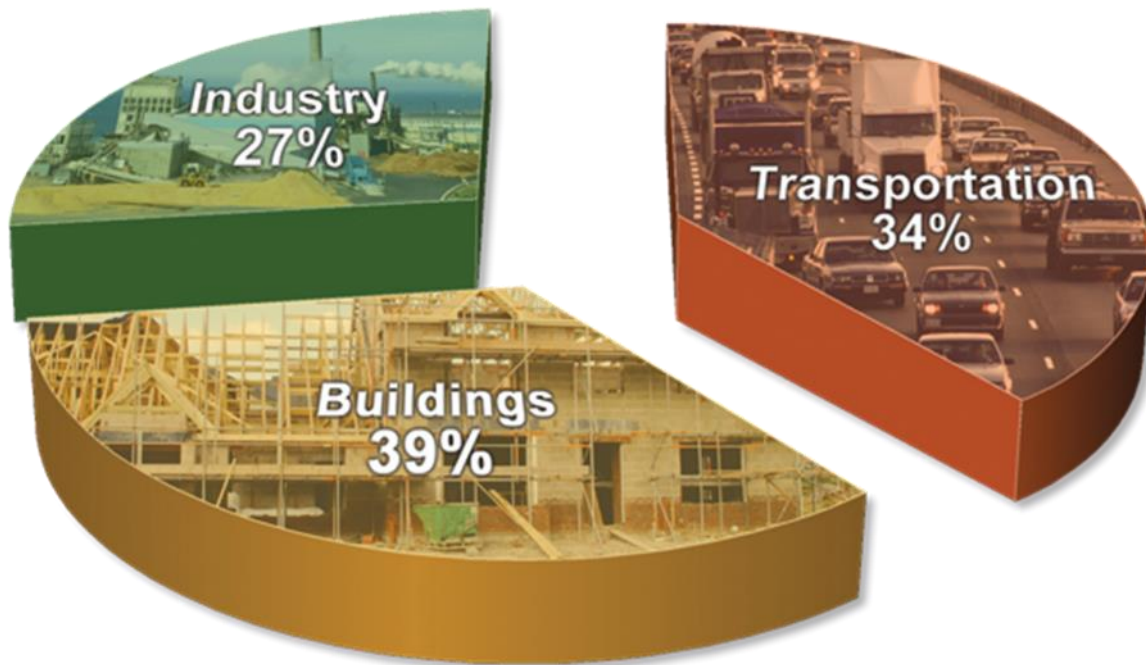
Today's Agenda

- **Building Policies Primer** | 8:30-9:25
- **Future of Building Policies** | 9:25-9:50
- **Break** | 9:50-10:00
- **Panel Discussion** | 10:00-10:45
- **Small Group Discussion** | 10:45-11:30

Energy Code Overview

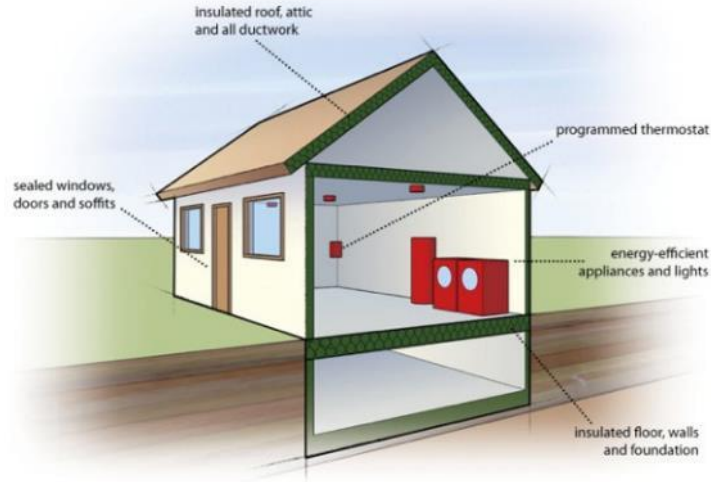
Building Energy Codes Matter!

US Energy Use by Sector



Buildings account for ~70% of electricity use

ENERGY CODE BASICS

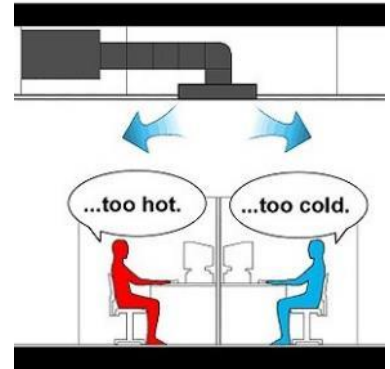


Air Seal, Insulate, Condition, Ventilate

What Is An Energy Code?

Much More Than a Book

- Codes are more than just a book of rules
- Energy code is a **health and safety code** just like any other building code
 - Interacts with virtually all building systems and components
- Energy codes govern the energy use of a building
 - **Mandated** building practices & components
- Focus is **indoor environment** – thermal comfort, natural and artificial light, and ventilation.



What Is An Energy Code?

Much More Than a Book

- Minimum Energy Efficiency Requirements
 - “**Worst building** that can legally be built”
- National model codes developed by International Code Council and ASHRAE
 - **Updated every 3 years** (level of improvement varies)
 - Current editions are 2018 International Energy Conservation Code and ASHRAE 90.1-2019
- States/Municipalities **adopt and enforce** the code



Where Does the Energy Code Apply?

Residential and Commercial Buildings

- Residential Code:
 - 3 stories or less
 - Residential use
- Commercial Code:
 - All non-residential buildings
 - Multifamily buildings over 3 stories
- Both Codes apply to:
 - New Construction
 - Existing Buildings - additions and major alterations
 - Several exceptions, including historic buildings and minor repairs



Energy Code Enforcement

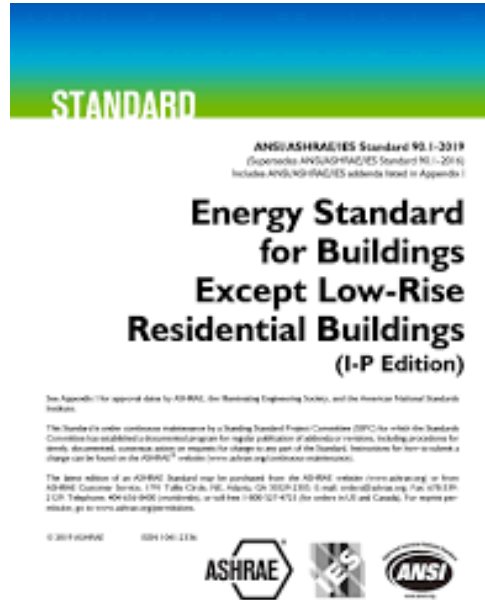
Who is responsible?

- Building Code Officials **perform:**
 - Plan Reviews
 - Field Inspections
- Reviews and inspections generally done at the **local level**
 - Third party inspections
- Design professionals develop plans that **meet or exceed** code
- Builders are responsible for building to the code
 - Even in absence of plans



National Code Development

Model Building Energy Codes



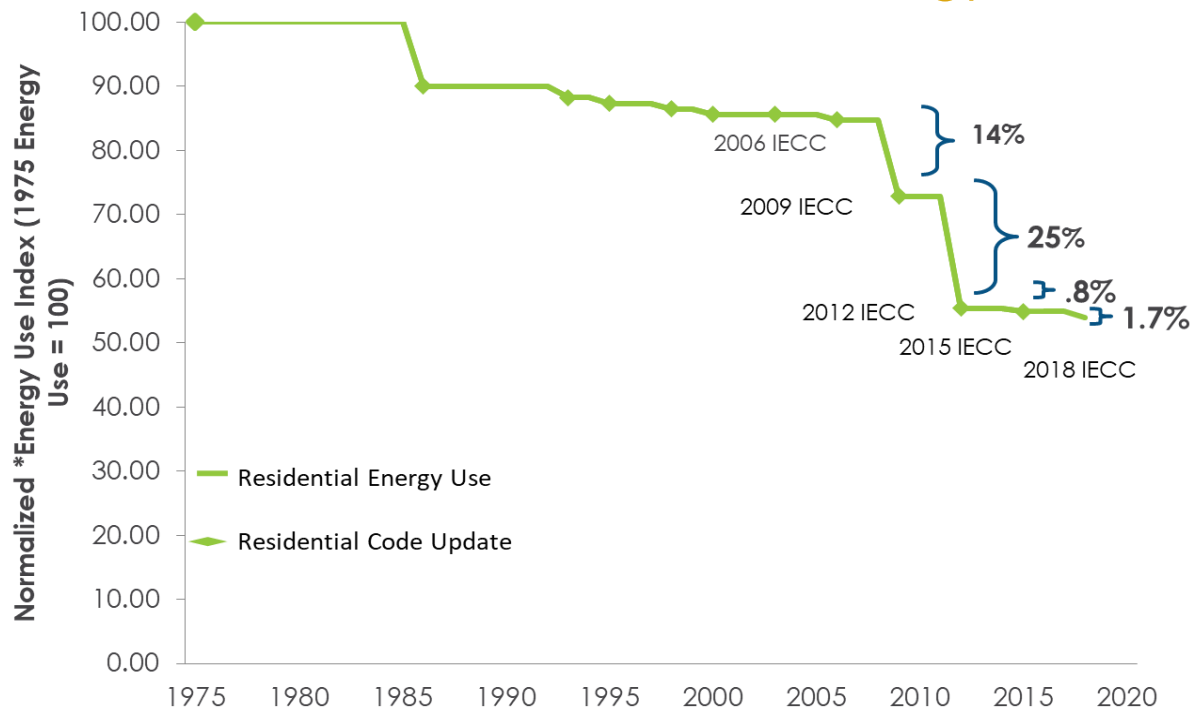
ASHRAE Standard 90.1



International Energy Conservation Code

Model Building Energy Codes

Residential Energy Code Efficiency



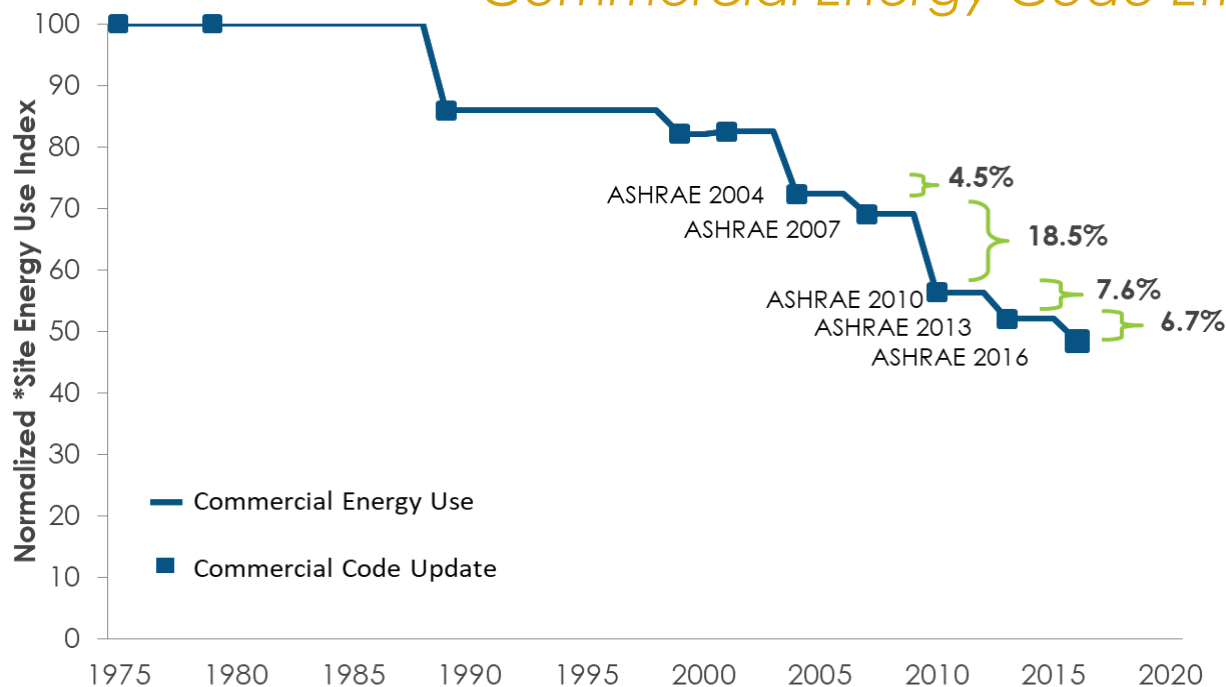
* Energy Use Index: National average energy use by building type and size.

Source: MEEA based on PNNL Analysis



Model Building Energy Codes

Commercial Energy Code Efficiency



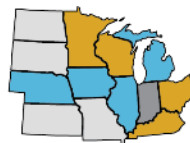
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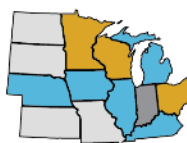
Midwest Code Adoption

Residential Building Energy Codes

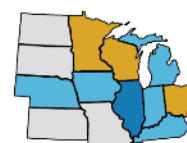
Adoption Timeline



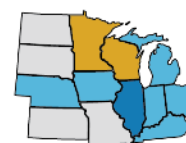
2010



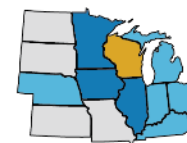
2011



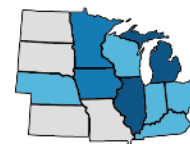
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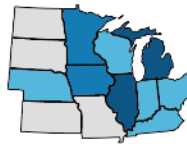
2013



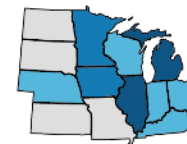
2014



2015



2016



2017



2018



2019

Code Level / Equivalence

□ No mandatory
statewide code

■ Pre-2000
Code

■ 2003
IECC

■ 2006
IECC

■ 2009
IECC

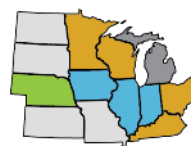
■ 2012
IECC

■ 2015
IECC

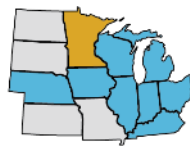
■ 2018
IECC

Commercial Building Energy Codes

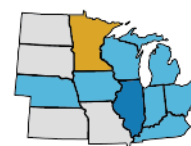
Adoption Timeline



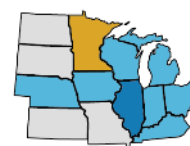
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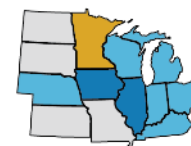
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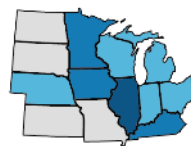
2012



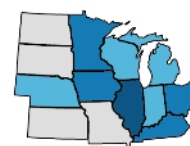
2013



2014



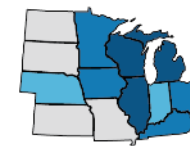
2015



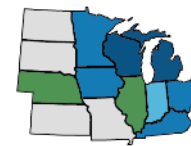
2016



2017



2018



2019

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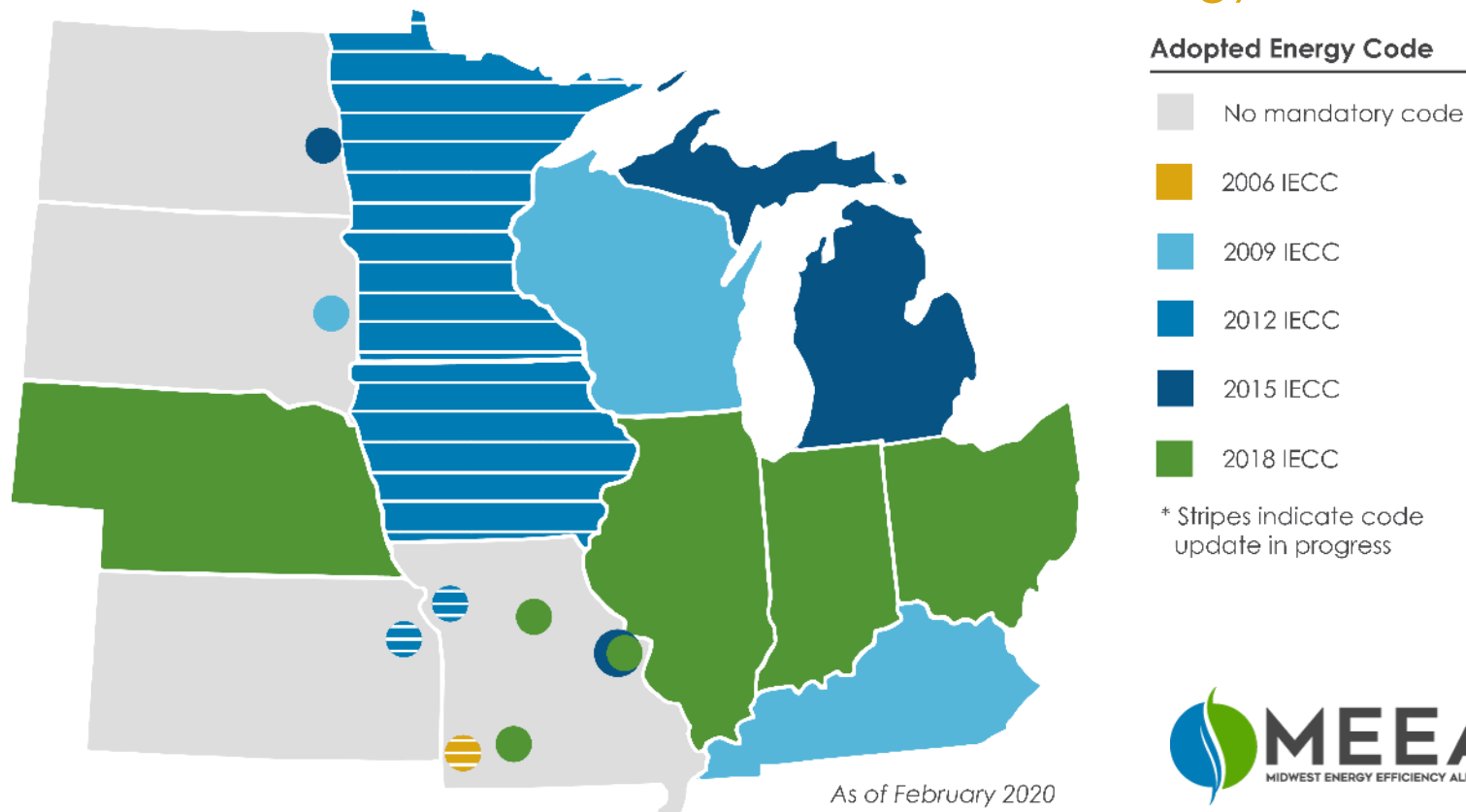
■ 2012
IECC

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IECC

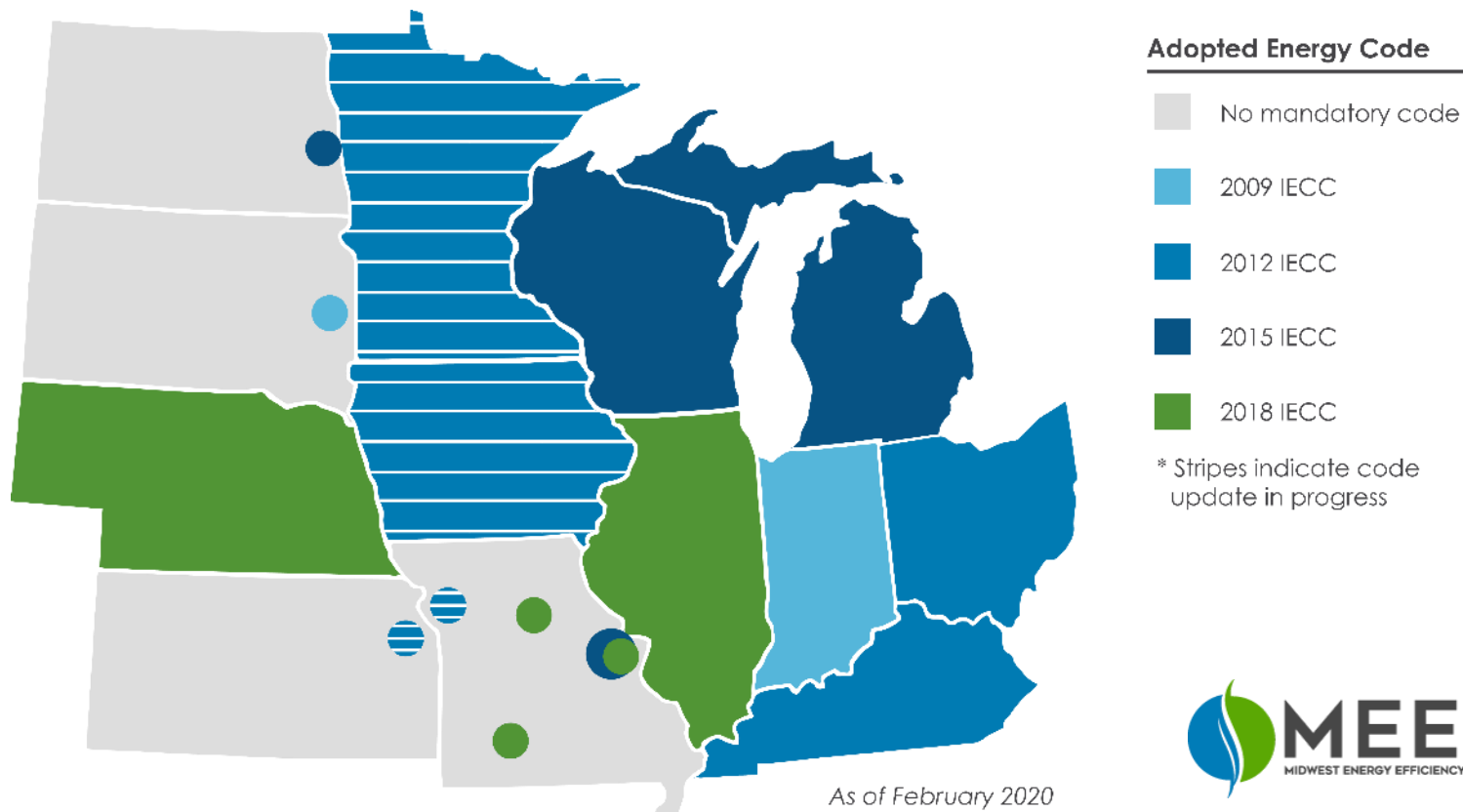
Adopted Codes in the Midwest

Residential Energy Code



Adopted Codes in the Midwest

Commercial Energy Code



Recently Adopted Energy Codes

- Chicago, IL: 2015 – 2018 IECC*
- Illinois: 2015 – 2018 IECC*
- Indiana: 2009 – 2018 IECC*
- Minnesota: 2012 – 2018 IECC* (Commercial)
- Nebraska: 2009 – 2018 IECC
- Ohio: 2009 – 2018 IECC* (Residential)
- St. Louis, MO: 2009 – 2018 IECC*
- St. Louis County, MO: 2009 – 2015 IECC*
- Columbia, MO: 2015 – 2018 IECC with Solar Ready Provisions

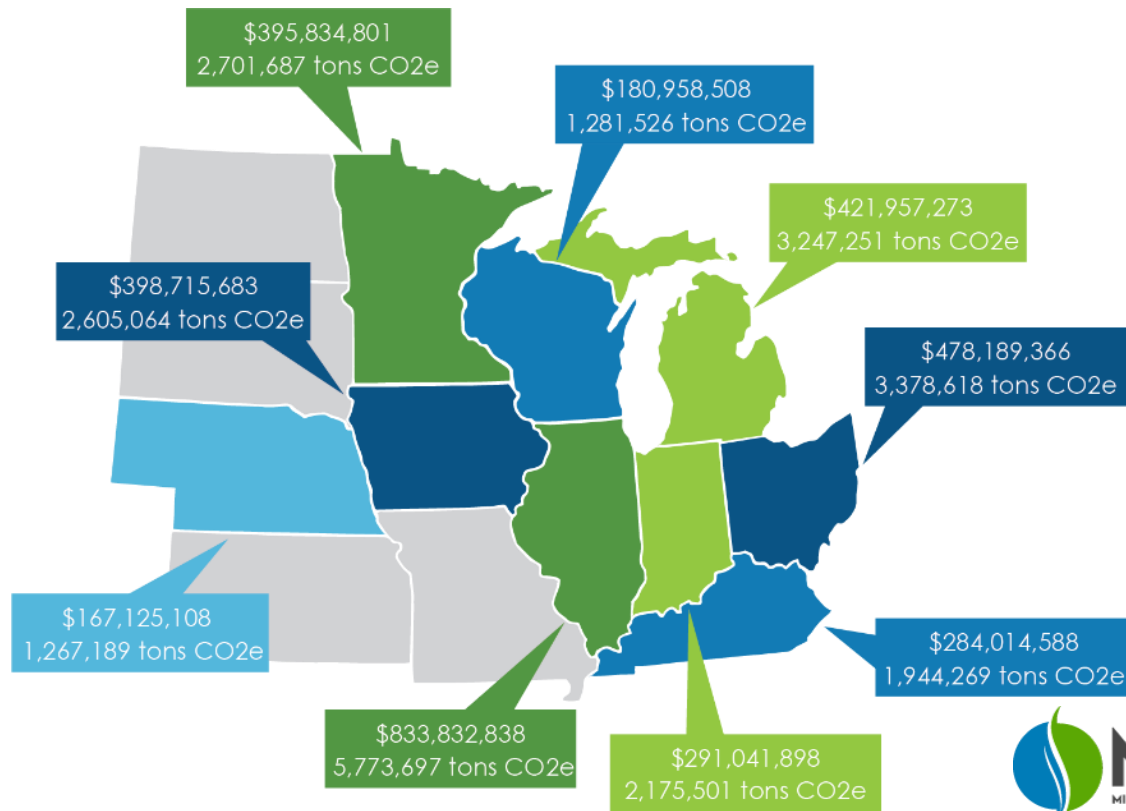
* Includes Amendments



Ongoing Code Adoptions

- Iowa: 2012 – 2018 IECC
- Minnesota: 2012 – 2018 IECC (Residential)
- Kansas City, MO: 2012 – 2018 IECC

Impacts of Codes in the Midwest (2009 – 2019)



Energy Code Compliance

Energy Codes

Non-compliance

Non-compliance is often due to:

- Lack of awareness and understanding of energy codes
- Lack of understanding about how to meet the compliance requirements
- Lack of resources and technical capacity of local building departments
- Lack of consistent training and funding for compliance improvement

What and Why

Energy Codes Compliance Collaboratives

- **What:** A group of stakeholders that come together on a regular basis to explore common interests and address obstacles related to **energy code compliance**
- **Why:** To establish a forum for identifying and tackling obstacles to **improving** energy code compliance (eventual goal 100%)



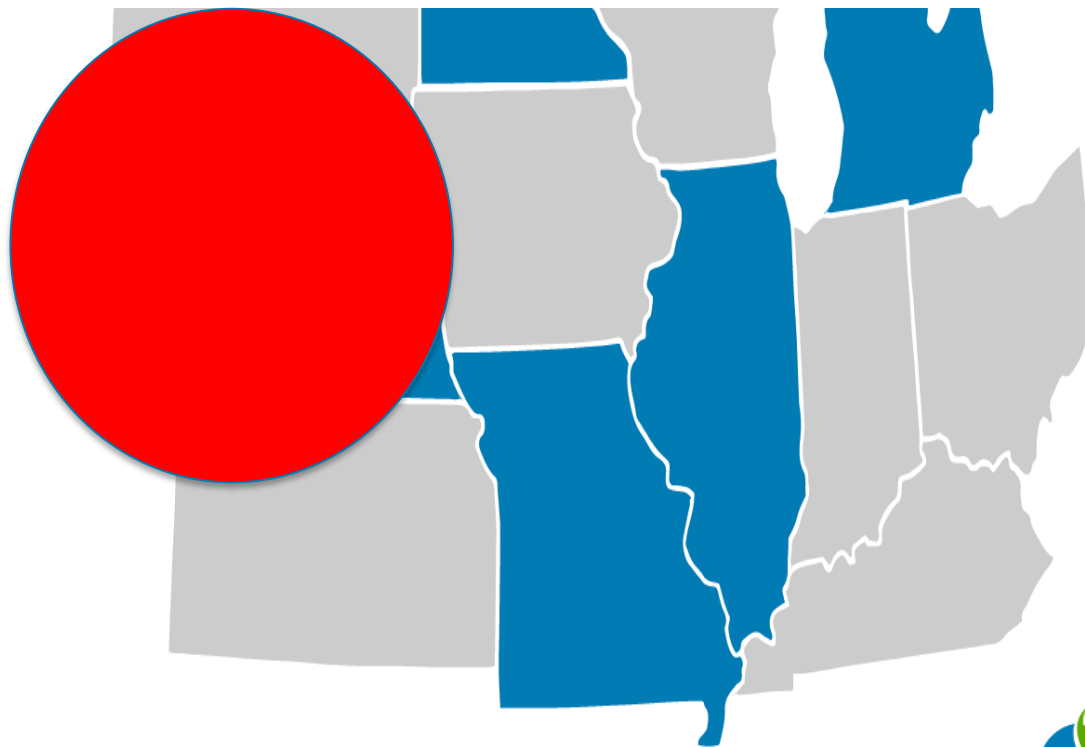
Benefits

Energy Codes Compliance Collaboratives

- Increasing Compliance
- Funding
- Education/Training
- Studying Compliance Rates
- Interpreting/Facilitating Understanding
- Adoption
 - Not typically the focus but some collaboratives decide to work on adoption

Energy Code Compliance

Midwest States with Code Compliance Collaboratives



KY Residential Study – Results

Phase I

Phase III

Measure	Total Energy Savings (MMBtu)	Total Energy Cost Savings (\$)	Total State Emissions Reduction (MT CO2e)	Total Energy Savings (MMBtu)	Total Energy Cost Savings (\$)	Total State Emissions Reduction (MT CO2e)
Envelope Air Leakage	27,182	484,314	3,092	581	\$10,321	65
Ceiling Insulation	11,372	215,656	1,080	4,835	\$91,786	595
Exterior Wall Insulation	9,277	171,044	1,102	8243	\$151,974	976
Foundation Insulation	6,800	108,156	668	11,676	\$178,905	1,075
Lighting	5,742	197,544	1,427	4,454	\$153,383	1,130
Duct Leakage	2,135	43,142	284	17,151	\$342,217	2,251
TOTAL	62,508	\$1,219,856	7,653	46,941	\$928,585	6,093
SAVINGS				25%	24%	20%

*Based on 7,345 annual new homes

KY Residential Study

Cumulative Potential Savings

Total Energy Savings (MMBtu)		
5yr	10yr	30yr
937,620	3,437,939	29,066,211

Total Cost Savings (\$)		
5yr	10yr	30yr
\$18,297,844	\$67,092,095	\$567,233,170

*Based on 7,345 annual new homes



Energy Code Compliance

Opportunities for Claimed Savings



Source: *Attributing Building Energy Code Savings to Energy Efficiency Programs (2013)*, Institute for Market Transformation, Institute for Electric Innovation, Northeast Energy Efficiency Partnerships

Energy Code Compliance

Utility Programs Underway

Missouri

- Funded by Ameren MO; Missouri Energy Efficiency Investment Act (MEEIA)
- Ameren MO territory
- Residential baseline study completed
- Residential Compliance Program 2019
- Collaborative
- Home rule state; no statewide code



Energy Codes Utility Programs

Other States and Utilities

Rhode Island and Massachusetts

- National Grid

Arizona

- Salt River Project

Iowa

- Cedar Falls Utility

California

- Pacific Gas and Electric Company
- San Diego Gas and Electric
- Southern California Edison
- Southern California Gas

Above Code Policies

Non-Code Standards

These are only a small percentage!



LIVING
BUILDING
CHALLENGE™



There are many, many non-code standards

- Minimum code standards still have to be met (code is the *law*)
- Specific requirements for meeting standards above, beyond, or in addition to code minimum



Beyond-Code City Policies

Energy efficiency in buildings

- Sustainable/energy criteria for projects
 - receiving financing
 - receiving technical assistance
 - government-owned/operated
 - Planned Unit Developments
 - receiving expedited/reduced-fee permits
 - receiving tax abatements
 - Qualified Action Plan (QAP) points

Midwest City Policies

Energy efficiency in buildings

- Chicago: Sustainability Criteria. All projects that receive city assistance (monetary or technical) must achieve 100 points. Certification can include LEED, Passive House, Living Building Challenge, and/or separate elements.
- The Illinois Housing Development Authority Qualified Allocation Plan for Low Income Housing Tax Credits awards 3 points for NGBS, Enterprise, LEED, or Passive House certifications.

Midwest City Policies

Energy efficiency in buildings

- St. Paul, MN: Sustainability Criteria. All projects that receive city assistance (monetary over \$200,000) must achieve certification (LEED, Passive House, Living Building Challenge, SB2030 and/or separate elements). All projects must benchmark energy consumption annually.
- St. Louis Park, MN: Planned unit developments are required to meet SB2030, which includes annual energy benchmarking.

Midwest City Policies

Energy efficiency in buildings

- Cleveland, OH. In cooperation with the Cuyahoga County Auditor's Office, provides a 10 to 15 year 100% tax abatement for increases in assessed real estate value for eligible residential projects. New construction of single-family homes or multifamily investor-owned properties: 15 years. (Enterprise Green Communities Criteria, National Green Building Standard, or LEED (Silver) Certification.)

Midwest City Policies

Energy efficiency in buildings

- Minneapolis, MN. Truth-in-Housing Ordinance. An Energy Disclosure Report is created to provide homeowners and prospective buyers with the general energy performance of a home. The report gives recommendations to improve the energy efficiency of a home, and generates a score of 0-100.

Existing Buildings Policies

Benchmarking Policies

Benchmarking

Benchmarking 101

- Baseline energy use of a commercial building
- Allows a building to be compared to itself, similar buildings, or an applicable standard over time
- Uses two basic pieces of information
 - General building characteristics (Location, size, population, use and age)
 - Utility energy consumption information (electricity, natural gas/propane and steam use)
- Buildings that regularly benchmark reduce energy consumption by an average of 2.4% per year (energystar.gov)



Benchmarking

Adopted Midwest Ordinances



Mandatory Program

- Chicago, IL
- Evanston, IL
- Kansas City, MO
- St. Louis, MO
- Minneapolis, MN
- Edina, MN
- Des Moines, IA
- St. Paul, MN



Voluntary Program

- Columbus, OH
- Grand Rapids, MI
- Madison, WI

Recent Benchmarking Adoption

Des Moines, IA

- 25,000 sq. ft.

Edina, MN

- 25,000 sq. ft.

St. Paul, MN

- 50,000 sq. ft.

Impacts of Building Policies

Impact of Codes in the Midwest

Thanks to building energy codes, Midwest states saved:

Consumer Energy Savings

\$3,451,670,063



Total Energy Savings (MMBTU)

211,675,994



Total CO2e Savings (Tons)

24,374,801

That's enough savings to:

Pay for **89,422** students
to attend 4 years of college



Build **26,551** miles
of new bike lanes



Buy **49,310** Tesla
Model S electric cars



In annual CO₂e equivalent, that's like:



Powering
2,551,632 homes



Operating **4,774**
wind turbines



Removing **4,694,787**
cars from the road

Benefits of Energy Efficiency

- Energy efficiency is the most cost-effective method for reducing energy consumption and greenhouse gas emissions
- Efficient homes and commercial buildings have a lasting payback; new construction has a lifespan of more than 50 years
- Lower energy expenditures mean residents have more money to invest in the local economy
- Efficient buildings result in higher quality, safer and more comfortable homes and buildings

Why utilities are interested

Benefits

- **Short term**
 - Portfolio savings
 - Less low-hanging fruit
- **Long term**
 - Ever-accruing demand savings
 - Less stress on the grid
 - Better buildings = fewer customer complaints
 - Opportunity to engage customers in a new way



Why cities/states are interested

Benefits

- Energy savings for their own buildings
- Resiliency
 - ANCR – Collaboration with ICC
- Climate goals
 - Bloomberg Cities Challenge
- Less stress on the grid
- Better buildings

Future Building Policies

Future Building Policies

Midwest

- Energy Code Compliance Utility Programs
 - may include adoption
 - may include stretch codes
- EV and Solar ready provisions
- Net-zero Targets and Stretch Codes
- Building Energy Performance Standards
- Grid-interactive Efficient Buildings

Energy Code Compliance

Potential Midwest Utility Programs

Illinois - exploratory

- Funded by IL IOUs
- Residential baseline study completed - 2019
- Commercial baseline study completed - 2019
- Collaborative
- Statewide code – Amended 2018 IECC
- Market Transformation

Minnesota - exploratory

- Minnesota Department of Commerce CARD Grant funding Codes and Standards Roadmap
- Minnesota Department of Commerce and Department of Labor and Industry stakeholder meetings

National Model Energy Code

2021 IECC - Big Efficiency Gain

~ 10% improvement for R & C Buildings*

- Increased insulation
- More efficient windows
- More efficient lighting
- More efficient ventilation in multifamily buildings
- EV Ready required for new buildings
- Lighting efficiency in horticulture buildings
- Zero Energy Residential Appendix option for progressive states and jurisdictions

* Final version not yet published



Building Policy Adoption

Midwest

EV-ready

- Bill in Illinois
- 2021 IECC

Solar-ready

- Can help meet NZE goals
- Policies could help with resiliency and grid resiliency

Energy Codes

- Expect amendments on state/municipal adoptions
- Stretch code exploration
 - Illinois
 - Minnesota

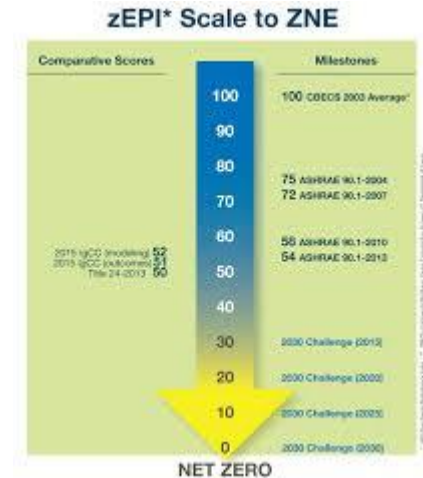
Stretch Codes

Why Stretch Codes?

- Gives municipalities the ability to take **meaningful action** on energy use and climate change
- Provides an **alternative** mandatory compliance path that promotes energy efficiency beyond the available code options
- Provides **significant** cost savings for residents and businesses
- Implement **cutting-edge** technologies and processes
- Help gain **market acceptance** of the adoption of more energy efficient codes in the future

Stretch Code Components

- Simple improvement of prescriptive or mandatory requirements found in model energy codes
- Simple improvement of code efficiency from a performance perspective
- Improvement of the energy code through the use of energy use indices such as the Energy Use Index (EUI), Zero Energy Performance Index (zEPI) number, and Home Energy Rating System (HERS) Index



Stretch Code Components

- Improvement of the energy efficiency through adoption of codes or standards that are above the baseline code
- Might include non-energy-efficiency measures, like the International Green Construction Code (IgCC) or Leadership in Energy and Environmental Design (LEED)
- Conversion of language in design guides into code-enforceable language

Stretch Code Adoption

- Could be mandated legislatively or through normal adoption process
- Developed as part of the larger state energy code,
 - Could be added as an Appendix
- Developed through a stakeholder process

City of Boulder, CO

Individual Cities/Counties with No Statewide Code

The City of Boulder has set a goal of reaching net zero energy (NZE) construction through building and energy codes by 2031

- Baseline: IECC 2012/ASHRAE 90.1-2010
- Residential: sliding scale of ERI/HERS 60 or better
- Additional "green points" of EV-ready and PV-ready are now required by code for res & com.
- > 5,000 sq. ft. houses are required to be Net Zero Energy (NZE)

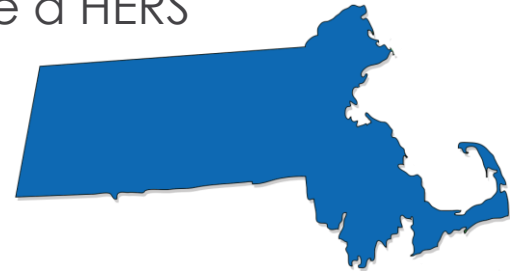


Photo credit: Matt Nager

Massachusetts

Addition of a Stretch Code Component to the State Code

- 2009 - First state to adopt an above-code policy
 - Appendix to state energy code
- New residential construction must achieve a HERS rating of 55
- Commercial was approximately 20 percent more efficient than code
- The updated stretch code also applies to new commercial buildings over 100,000 square feet
- As of Nov. 2019, 278 jurisdictions have adopted the stretch code – more than half of the state by population



Key Characteristics of GEB



EFFICIENT

Persistent low energy use minimizes demand on grid resources and infrastructure



CONNECTED

Two-way communication with flexible technologies, the grid, and occupants



SMART

Analytics supported by sensors and controls co-optimize efficiency, flexibility, and occupant preferences



FLEXIBLE

Flexible loads and distributed generation/storage can be used to reduce, shift, or modulate energy use

Image Source:

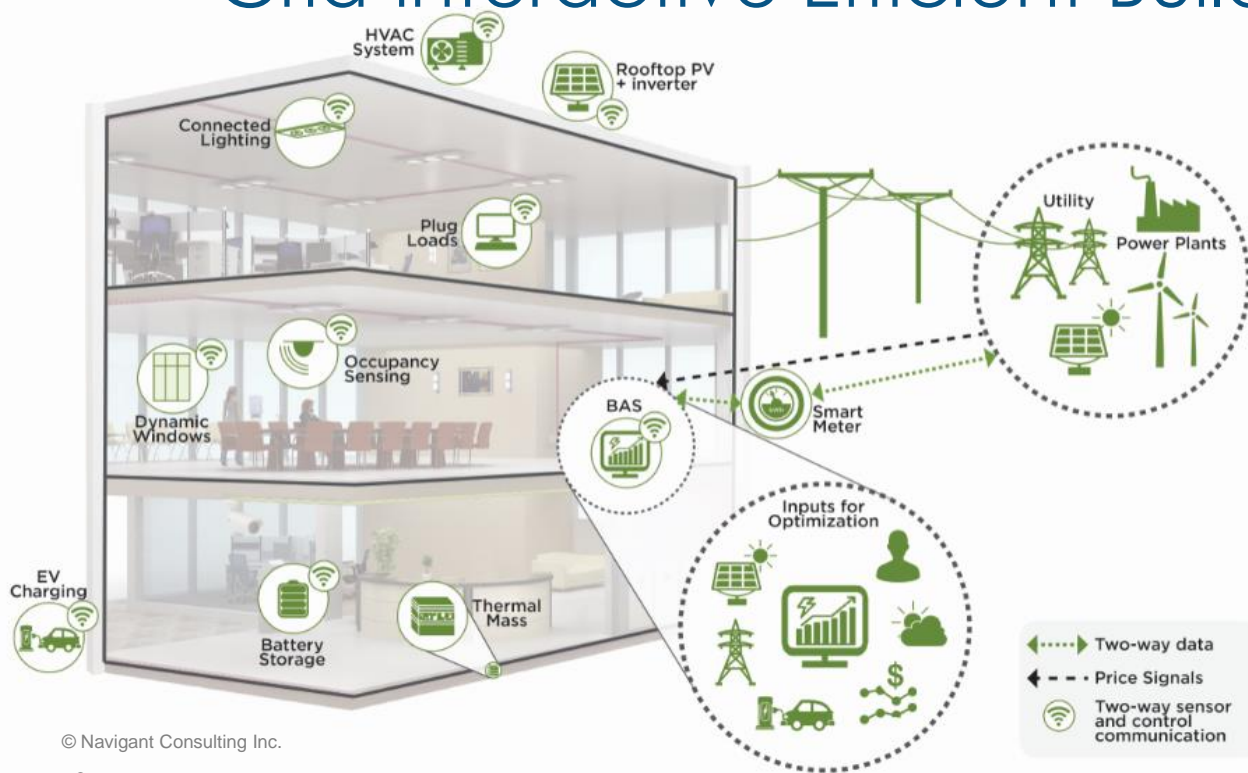


U.S. DEPARTMENT OF
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Energy Efficiency &
Renewable Energy



Grid-interactive Efficient Buildings



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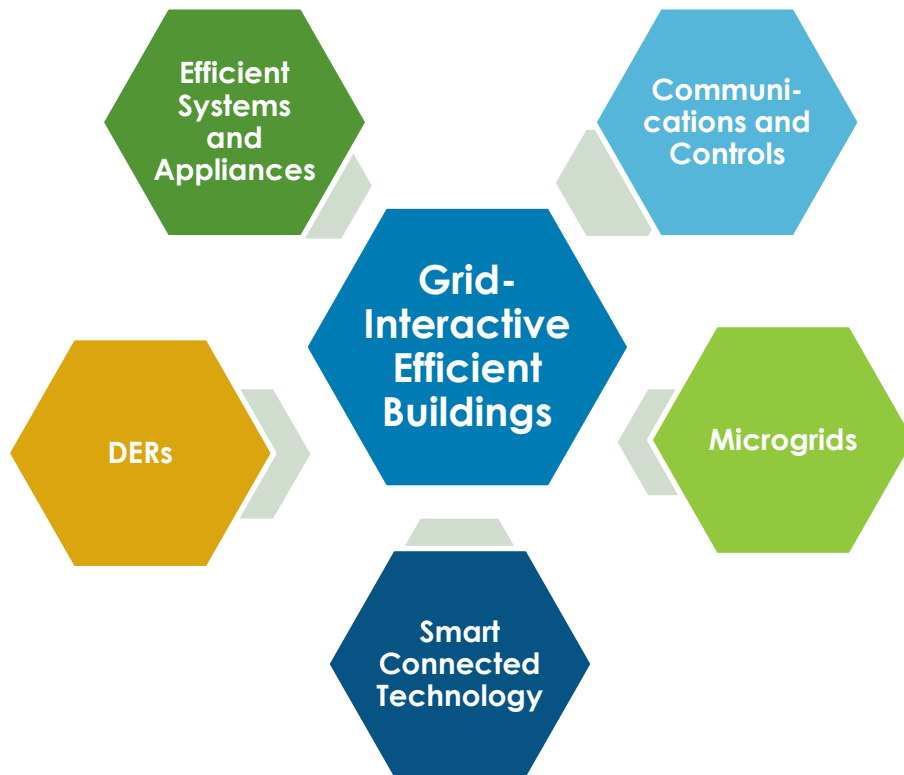


Focus of MEEA's Research

Grid-interactive Efficient Buildings

- Current utility research and development related to GEB?
 - *Technology development, performance testing, product demonstrations, pilots and cost analyses*
 - *Analysis by state*
- What are the leading GEB initiatives, who is involved and what is driving them in the Midwest?
- Identify technology, product and market information gaps
- Additional research and development needed to advance GEB

Deployed Technology



Major Grid Modernization Initiatives in the Midwest

Minnesota PUC	Exploring policy to promote distribution system investment and time of use rate offerings; 2025 Energy Action Plan to develop indicators and actions to advance clean and efficient technologies from E21 stakeholder-led initiative
Michigan	MI Power Grid Program, which focuses on customer engagement, integrating emerging technology, and optimizing grid performance and investments
Ohio PUC	PowerForward initiative, which is addressing the future of electricity in the state
Illinois	Mandated Smart Grid Advisory Council stakeholder group

GEB-related Initiatives in the Midwest

Illinois Power Agency Adjustable Block Program	Distributed generation program
ComEd Community Energy Storage Pilot Program	Energy storage pilot
Xcel Energy Time-of-Use (TOU) Rate Program	Flexible rate program
Consumer Energy Peak Power Savers Club Program	Flexible rate program
Consumer Energy Savers Club Program	Flexible rate program
Indiana Michigan Power Home Energy Management	Load flexibility program
DTE Energy Cool Currents Program	Load flexibility program
ComEd Internet of Things (IoT) Program	Load flexibility program
ComEd Bronzeville Microgrid Demonstration Project	Microgrid
Ameren Illinois Champaign Microgrid	Microgrid

Path Forward

Stakeholder engagement and information sharing

- Break down the silos between the different program departments
- Create training and educational opportunities
- Easily available information for pilots, policies and demonstrative programs
- Support industry to advance interoperability and controllability
- Collaboration with ESCOs
- Incorporation of gas utilities
- Local governmental involvement



Building Energy Performance Standards

Existing Buildings Policies

New York City –

- Carbon reduction goals
- 25,000 sq. ft.

Washington, DC–

- Energy reduction goals
- 50,000 sq. ft.

St. Louis, MO – (in progress)

- Energy reduction goals
- 50,000 sq. ft.

2020 Pending Legislative and Regulatory Activity

Illinois

- HB 3624: “Clean Energy Jobs Act” (CEJA) comprehensive clean energy & environmental bill:
 - 100% carbon-free by 2030; 100% renewable by 2050
 - Expands gas utility energy efficiency requirements
 - Repeals the 10MW industrial exemption
 - State-run capacity market in PJM (ComEd) territory
 - Increases spending in income-qualified program
- HB 2966: “Path to 100 Act” increase the RPS to 40% by 2030 (increase from 25% by 2025 under FEJA) and increase funding for utility-scale solar and wind energy.

Minnesota

- Clean Energy First Act (HF 1956) would prioritize clean energy, energy efficiency and renewable energy prior to building new fossil fuel generation.
 - Senate Republicans have released their version of the bill (SF 1456). Minor amendments were made to the bill in committee.
- Discussions continue on the Energy Conservation and Optimization Act, the second portion of the three-part Clean Energy First legislative package.
- The third act would transition Minnesota to exclusively carbon-free by 2050.

Wisconsin

- Governor Evers issued two executive orders:
 - Created a new Office of Sustainability and Clean Energy with goal of converting WI power sector to 100% renewable energy by 2050.
 - Created a Task Force on Climate Change, chaired by Lt. Governor Barnes. Charged with issuing recommendations by August 31, 2020. Task Force is conducting meetings throughout the state.

Indiana

- House Bill 1278 (Public Law 250 signed 5/5/19)
 - Establishes 21st Century Energy Policy Development Task Force
 - Requires IURC to conduct a study on transitions in generation resources how new/emerging technologies will contribute to reliability, resilience and cost

Michigan

- MI Power Grid (2019-2021)
 - A focused, multi-year stakeholder initiative supported by Governor Whitmer and the MPSC to maximize the benefits of the transition to clean, distributed energy resources for Michigan residents and businesses.
 - Customer Engagement
 - Integrating Emerging Technologies
 - Optimizing Grid Investments and Performance

10-Minute Break

Panel Discussion

Panel Discussion

- Anthony Fryer, Minnesota Department of Commerce
- Katrin Klingenberg, Passive House U.S.
- Vinoth Kumar Sekar, Wildan

Small Group Discussion

TRUTH OR UNTRUTH?

It will be too costly for builders to
build to the new code

TRUTH OR UNTRUTH?

Building prices will go up because of additional costs to builders, pricing out moderate to low-income homebuyers and drive away businesses from owning/leasing newer buildings.

TRUTH OR UNTRUTH?

Builders will take their business to areas with a less efficient energy codes.

Commercial: Data shows upward trend in the number of commercial building projects initiated

Residential: increased since 2014

- Move towards multifamily in urban areas

Small Group Discussion

What one change to energy codes or other building policies is needed?

Small Group Discussion

What are some ways that you would like to increase your involvement with building policies?

Small Group Discussion

Please name:

- One resource that you have found valuable
- One resource that you wish existed

Next Steps

- Sign up for Energy Codes Newsletter
- Attend MEEA Energy Codes Conference – October 2020
- Get involved
- Tell us: How can MEEA help you?

Thank you!

Chris Burgess

cburgess@mwalliance.org

Alison Lindburg

alindburg@mwalliance.org

Nicole Westfall

nwestfall@mwalliance.org

