Building Energy Policies and Municipal Opportunities in Illinois

Presentation to the Metropolitan Mayors Caucus

March 16, 2021

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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slipstream

Accelerating climate solutions. For everyone.

We deliver research, technical assistance, financing, education and training, and programs for utilities and their customers.

California Lottery Santa Fe Springs | Santa Fe Springs, CA *Credit: LPAS Architecture + Design*

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Mission

To achieve better buildings that are zero energy, zero carbon, and beyond – through research, policy, guidance and market transformation – to protect people and the planet.

Agenda

- Introductions
- Value of Building Energy Policies
- Policy Principles
  - Energy codes
  - Beyond energy codes
- Municipal Initiatives
- Local Updates
- Next Steps and Discussion

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Value of Building Policies

Why are energy policies so important?

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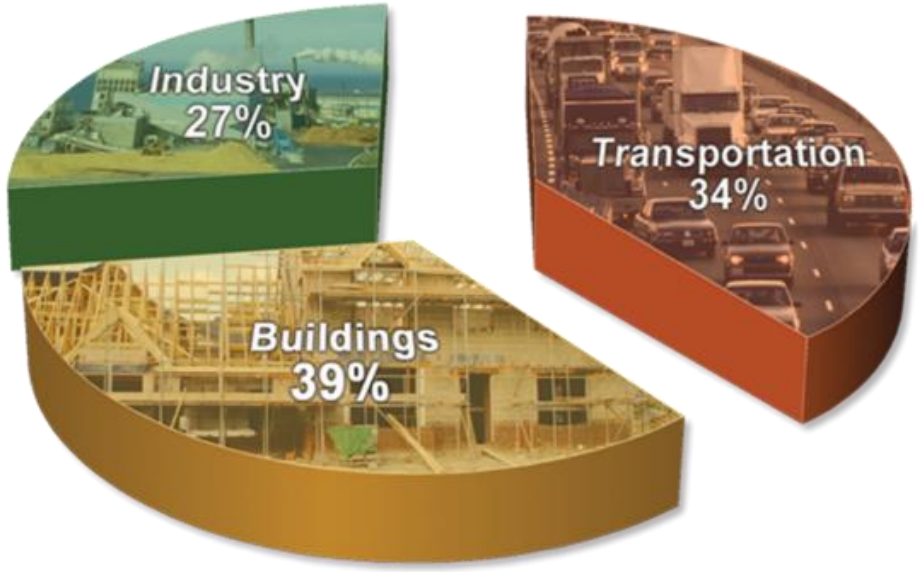
Value of Energy Policies

Why Energy Codes are Important

- Reduce energy use
- Impacts energy use for the life of a building
  - Most cost-effective to implement during initial design and construction
- Benefits building owners and operators by guaranteeing a minimum of efficiency
- Health and resilience benefits to building owners and occupants



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Value of Energy Policies

Why Energy Codes are Important

Cities

Energy codes and compliance are necessary to meeting climate goals

Energy efficient new construction improves building stock

Utilities

Energy efficiency goals can be met by creating technical assistance programs

Utilities can help advance policies

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Value of Energy Policies

Why Above Code Policies are Important

Cities

- Above code policies can help meet climate goals
- Improve community and building stock

Utilities

- Energy efficiency goals can be met by creating technical assistance programs

Residents and Renters

- Can reduce future energy bills
- Health benefits

Building Owners

- Identify opportunities in existing buildings
- Improves value of building stock

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Policy Principles

Baseline Energy Codes

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Baseline Energy Codes

What are Energy Codes?

- Energy Codes are a set of rules that govern the energy use of a building through mandated building practices & components
  - Prescriptive, Total UA, Performance
- 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)
- States/Municipalities Adopt and Enforce the Code

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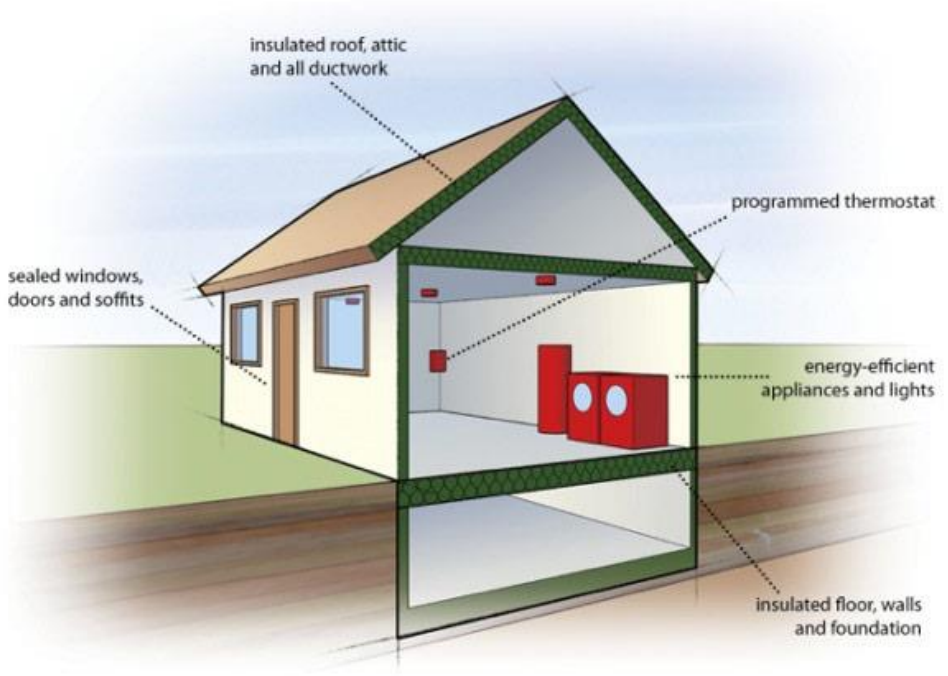
ENERGY CODE BASICS



Air Seal, Insulate, Condition, Ventilate

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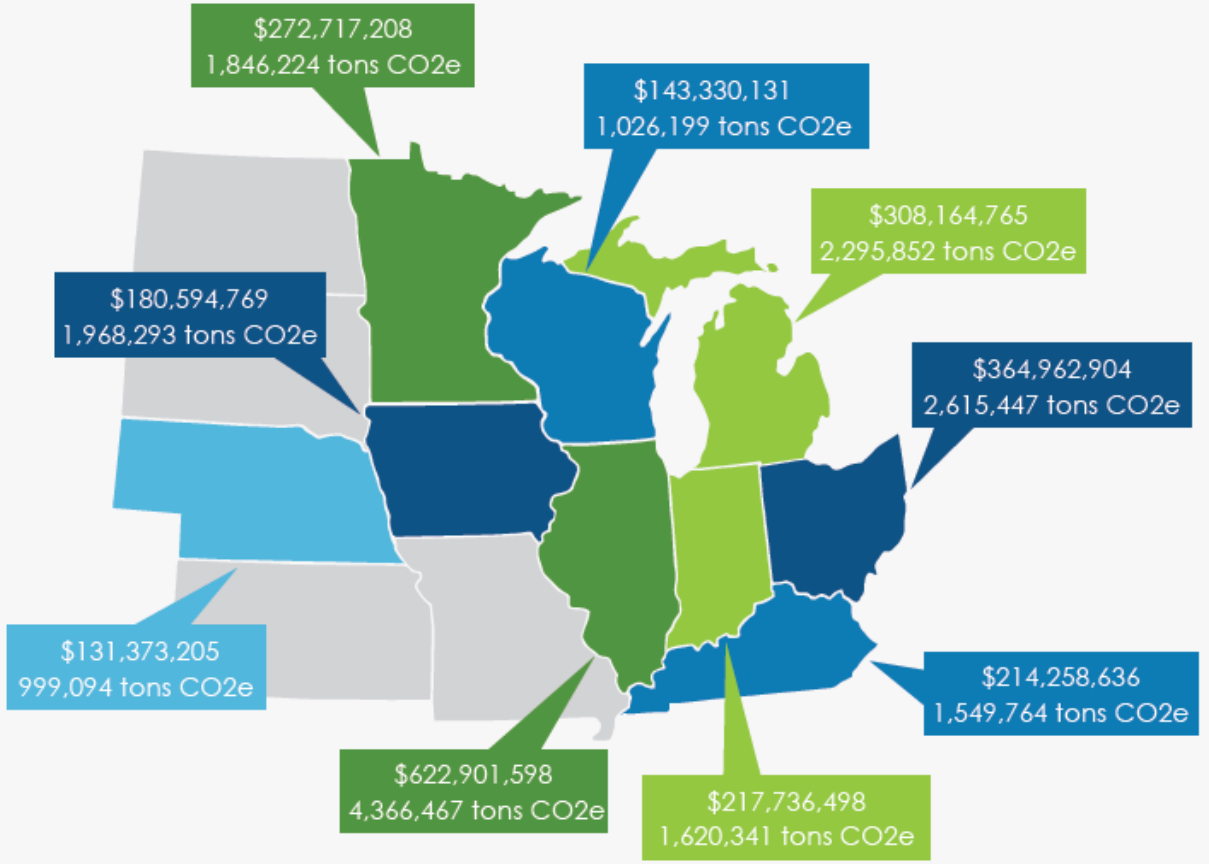
Building Energy Code Impacts in the Midwest

Cumulative Savings 2009-2018



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Impacts of Energy Codes

Thanks to building energy codes, Midwest states saved:

Consumer Energy Savings
$2,456,039,714

Total Energy Savings (MMBTU)
156,963,199

Total CO2e Savings (Tons)
18,287,683

That's enough savings to:

Pay for **63,628** students to attend 4 years of college

Build **18,893** miles of new bike lanes

Buy **35,086** Tesla Model S electric cars

In CO_2 equivalent, that's like:

Powering **1,792,732** homes

Installing **4,202** new wind turbines

Removing **3,552,529** cars from the road

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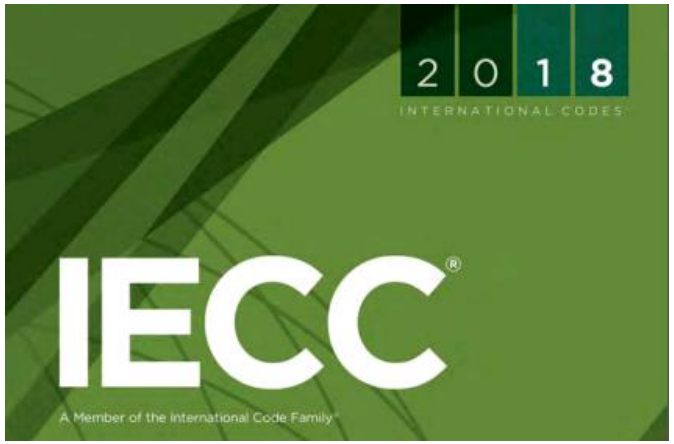
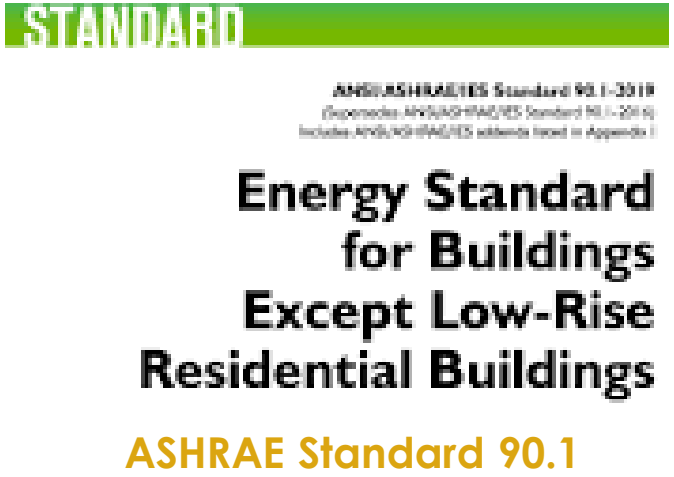
Building Energy Codes

Purview of the Code



International Energy Conservation Code



ASHRAE Standard 90.1

- 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

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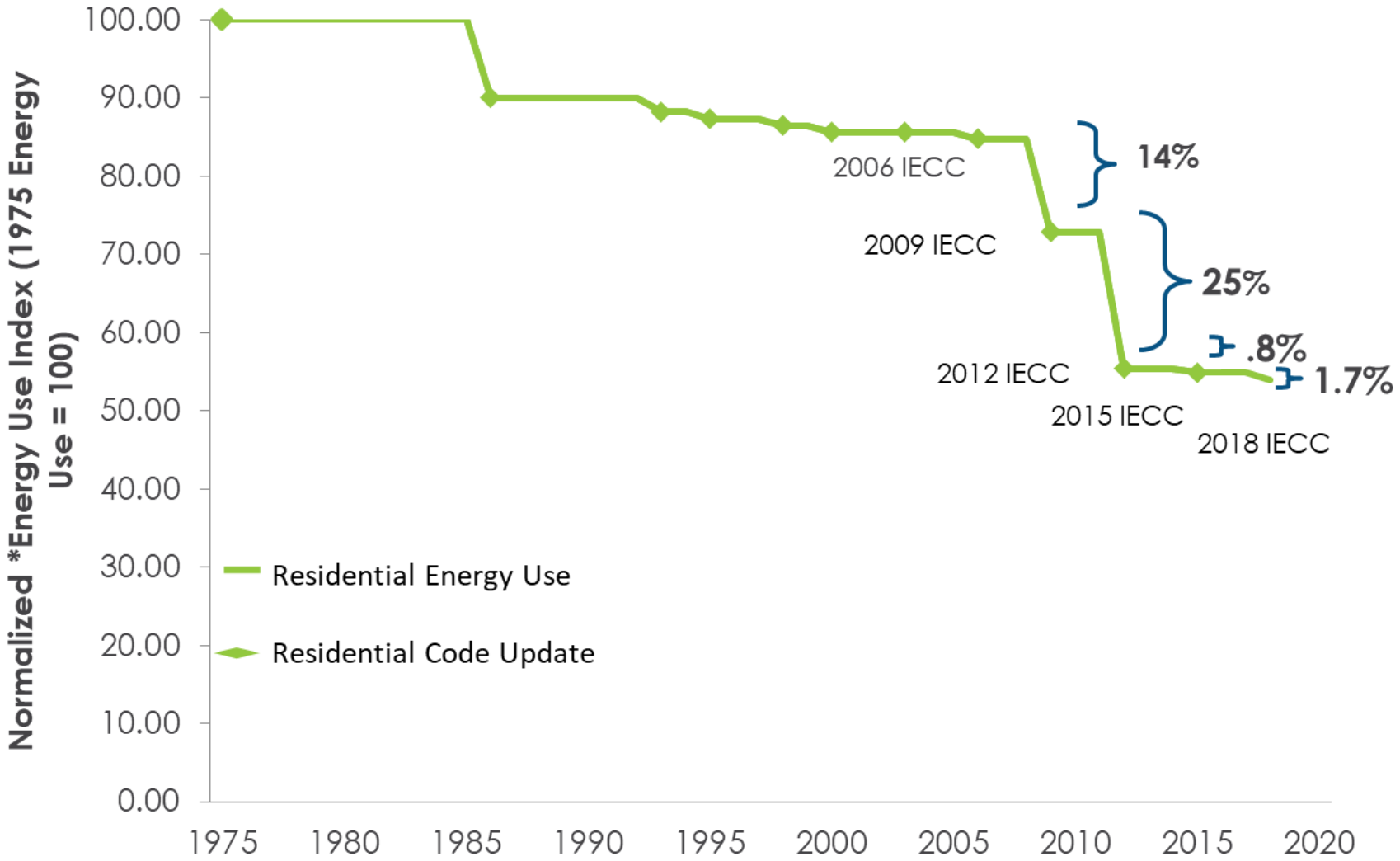
Baseline Energy Codes

Residential Building Energy Code Efficiency

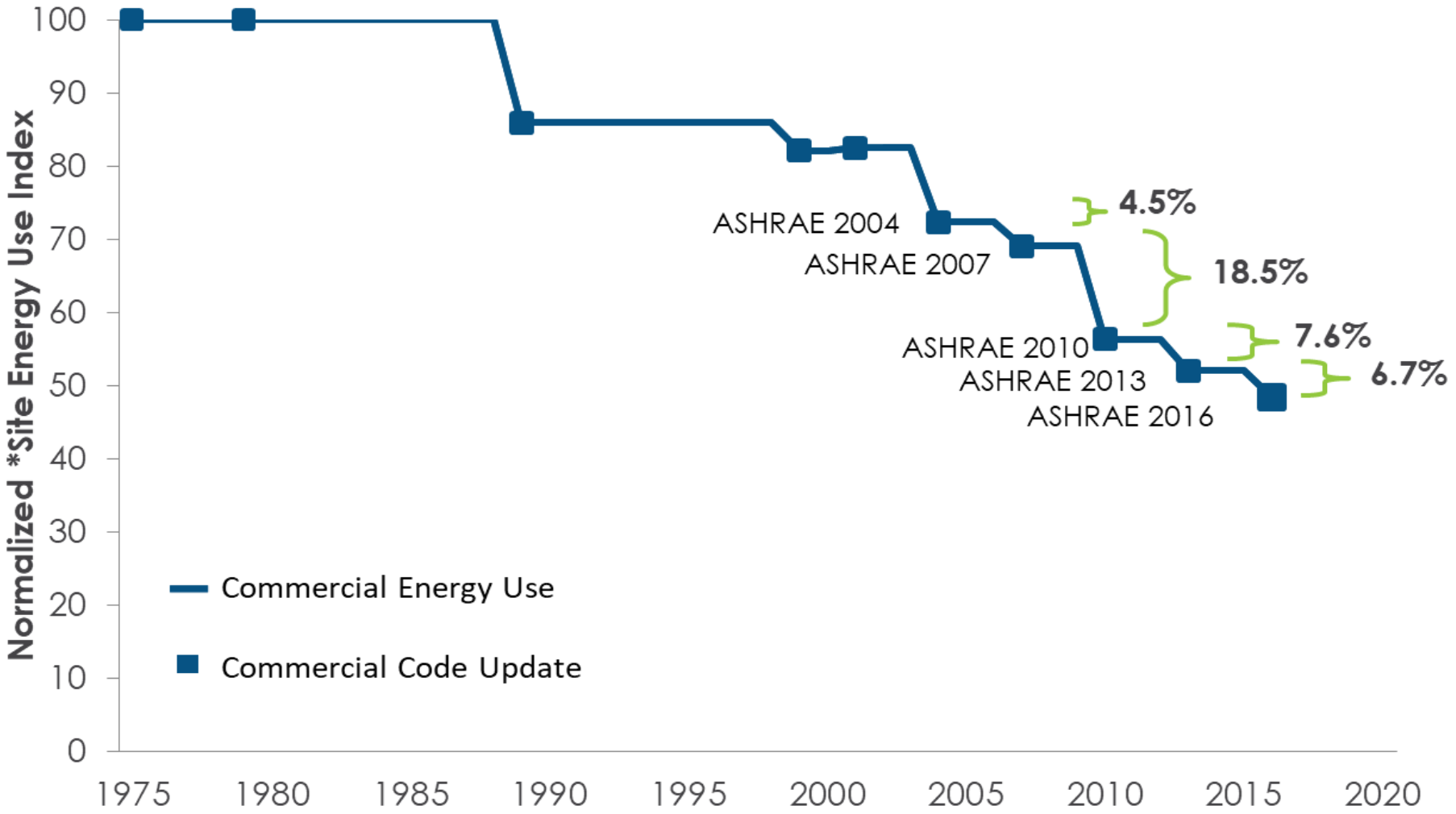


* Energy Use Index: National average energy use by building type and size.

Source: MEEA based on PNNL Analysis

Baseline Energy Codes

Commercial Building Energy Code Efficiency



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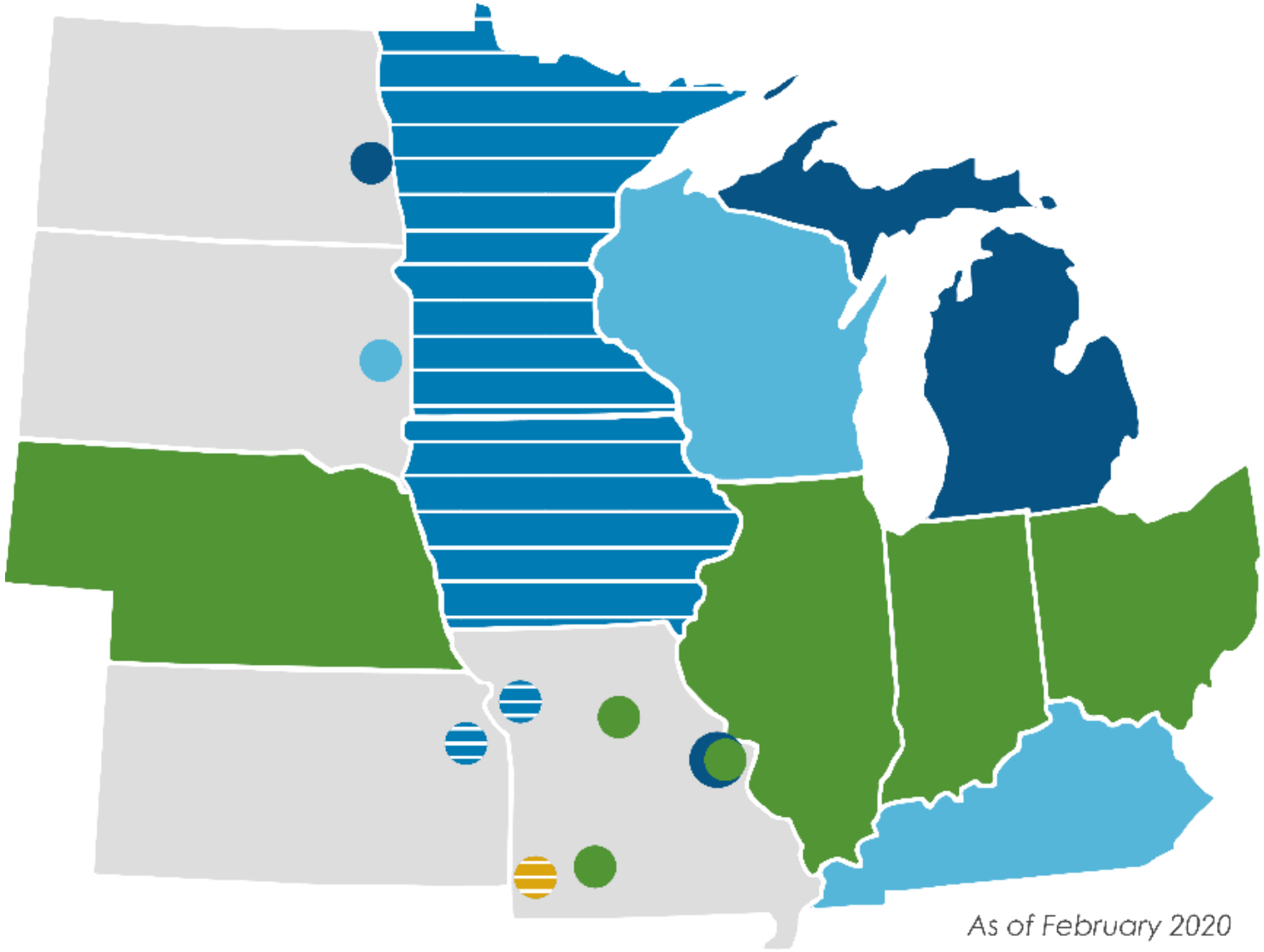
Adopted Codes in the Midwest

Residential Energy Code



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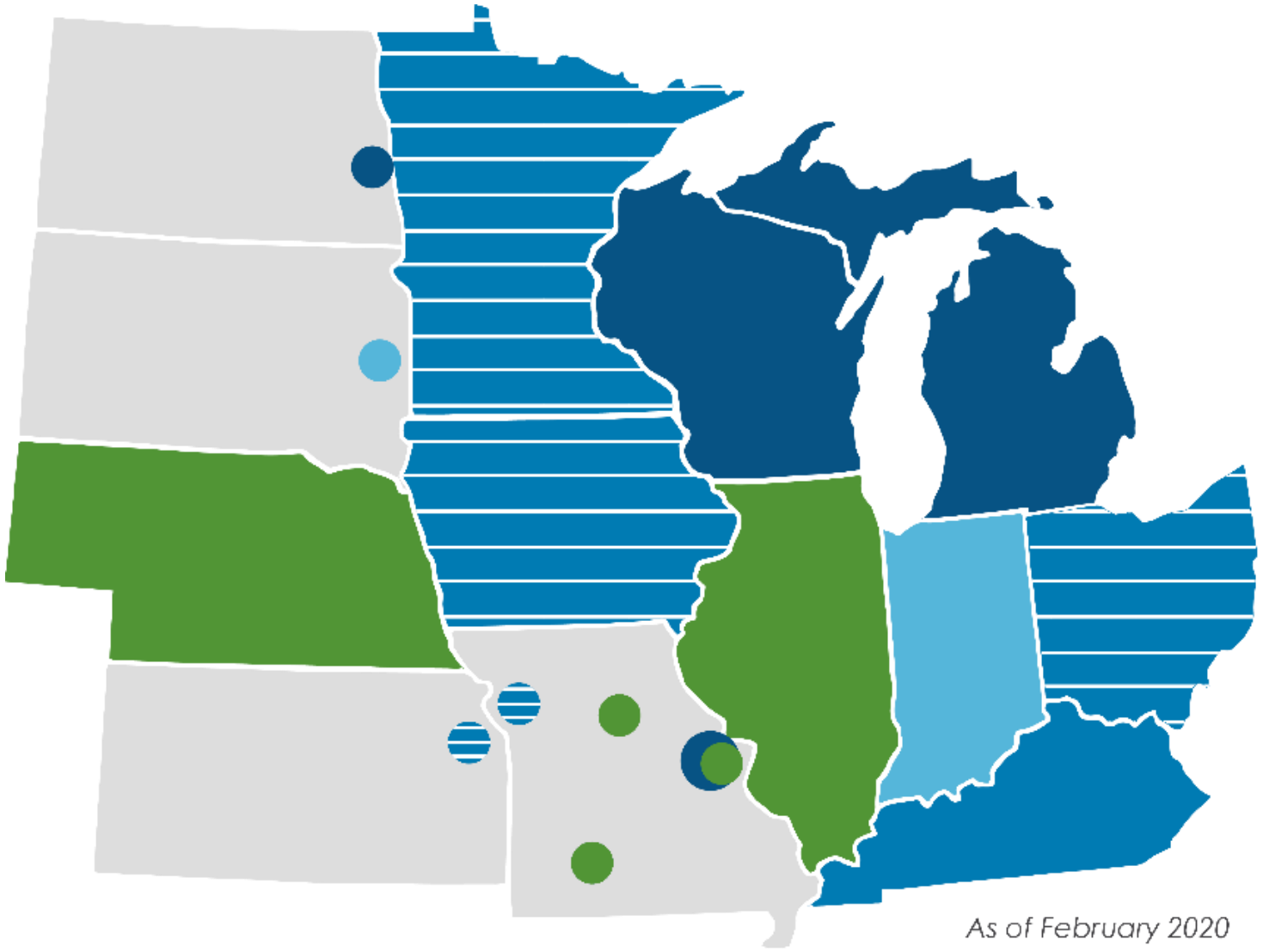
Adopted Codes in the Midwest

Commercial Energy Code



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Building Energy Codes

Code 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; and/or
  - Lack of consistent training and funding for compliance improvement.

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Building Energy Code Impacts in the Midwest

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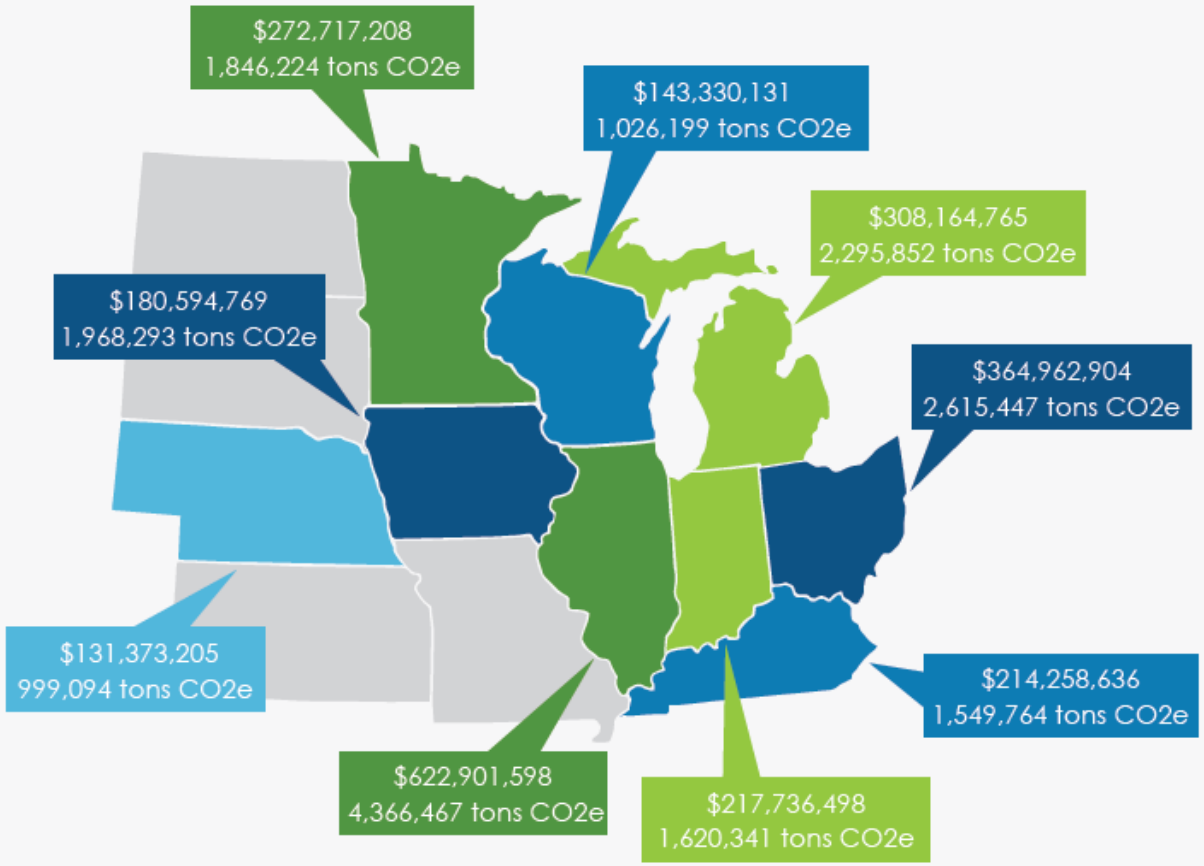

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Policy Principles

Beyond Baseline Energy Codes

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Stretch Codes

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What are Stretch Codes?

A stretch code, also known as a “reach code”, is a locally mandated code or alternative compliance path that defines a higher level of energy efficiency or sustainability than the adopted base code. Another way to envision a stretch code is as the future base code.

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Why Stretch Codes?

- Gives municipalities who want the ability to take meaningful action on energy use and climate change 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, and
- Help gain market acceptance of the adoption of more energy efficient codes in the future.

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Benchmarking Ordinances

Policy Principles

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Policy Principles

Building Energy Use Benchmarking

"If you can't measure it, you can't improve it."

US DOE Definition:

Benchmarking is the practice of comparing the measured performance… with the goal of informing and motivating performance improvement. When applied to building energy use, benchmarking serves as a mechanism to measure energy performance of a single building over time, relative to other similar buildings, or to modeled simulations of a reference building built to a specific standard.

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Benchmarking Policies

Uses two general pieces of information

- General building characteristics (Location, size, population, use and age)
- Utility energy consumption information (electricity, natural gas/propane and steam use)

Establishes baseline energy use of an existing building

Allows a building to be compared to itself, other buildings, or an applicable standard over time

Buildings that regularly benchmark their energy use reduce their energy consumption by an average of 2.4% per year (energystar.gov)

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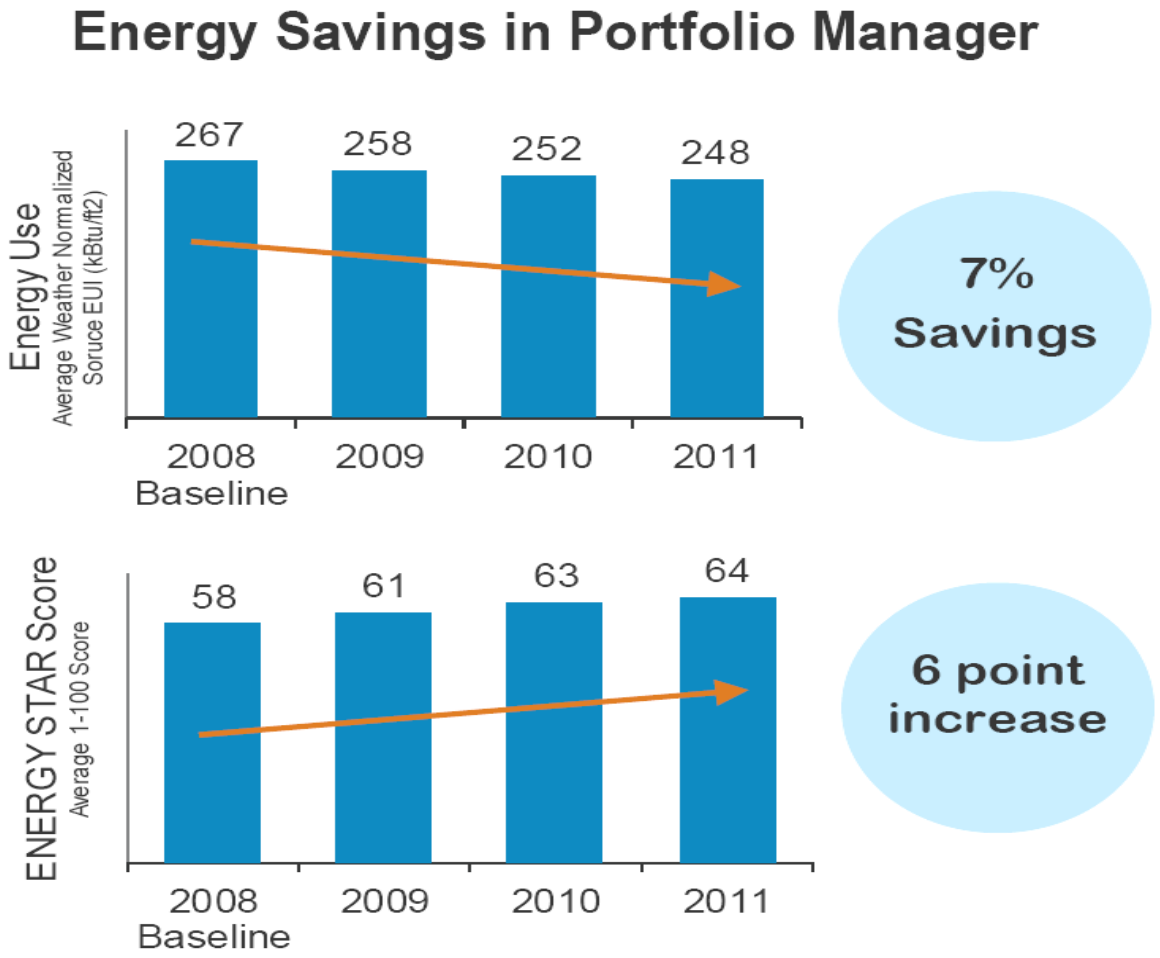
Building Energy Use Benchmarking



Source:
http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf?8d81-8322

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Building Benchmarking

Consistent benchmarking in buildings results in energy savings and improved performance

Provides information needed to make smart, cost-saving investments

Helps property and financial markets accurately value energy efficient buildings

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Policy Principles

Adopted Midwest Benchmarking Ordinances

Mandatory Programs

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

Voluntary Programs

- Grand Rapids, MI
- Madison, WI

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Policy Principles

Benchmarking vs. Performance Standards

Benchmarking Policies

- Focus on tracking efficiency of existing building stock
- Set requirements for large commercial, multifamily, institutional and municipal buildings
- Do not require improvements but can help identify opportunities

Performance Standards

- Focus on improving efficiency of existing building stock
- Set energy targets for large commercial, multifamily, institutional and municipal buildings
- Require efficiency improvements via energy management or building upgrades

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Building Performance Standards

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What is a BPS?

Building Performance Standard ordinances are a municipal tool to equitably reduce energy costs in existing buildings while creating jobs in the efficient and clean energy economy.

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Building Performance Standards

- Set energy use or carbon emissions thresholds for commercial buildings within a jurisdiction.
- Property owners report actual energy consumption of their buildings on a set cadence (e.g. biennial) or upon certain triggers (e.g. sale or lease of property).

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Building Performance Standard

- Buildings found to exceed their energy or carbon threshold are required to make operational and/or capital improvements to reduce energy consumption and bring the property into compliance.
- Participation requirements and thresholds are typically differentiated by size (e.g. buildings over 50,000 square feet) and sector (e.g. multi-family rental, office, etc.).

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Building Performance Standard

- Performance thresholds typically target the worst-performing buildings first. The BPS policy may chart stepped reductions over time, coinciding with broader city equity, jobs or carbon goals.

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National Building Performance Standards

Source: IMT

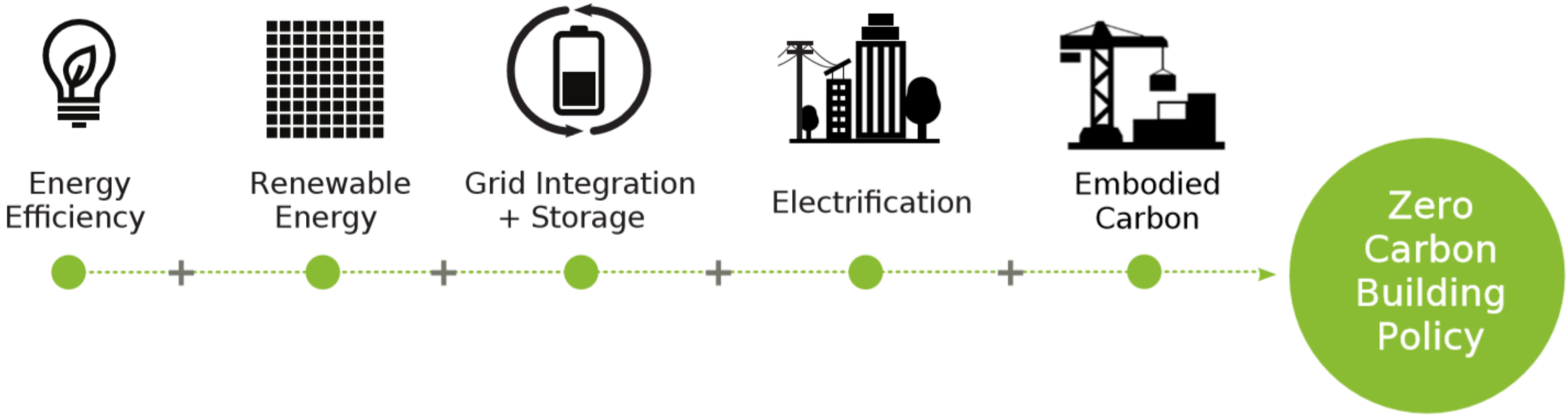
Building Performance Standard Flavors

Where	Intro.	Enf.	Scope	Metric	Standard
Washington, DC	2018	2026	Commercial >50k sf (down to >10K overtime)	ENERGY STAR score	Median Energy Star Score by building type
New York, New York	2019	2024	Commercial >25k sf	Carbon Intensity (CO2/sf)	40% reduction by 2030, 80% by 2050
Washington State	2019	2026	Commercial >50k	Energy Use Intensity (kBtu/sf)	Median EUI by building type
St. Louis, MO	2020	2025	Commercial >50k	Energy Use Intensity (kBtu/sf)	Estimated at 65th percentile of local buildings by type

Zero Carbon

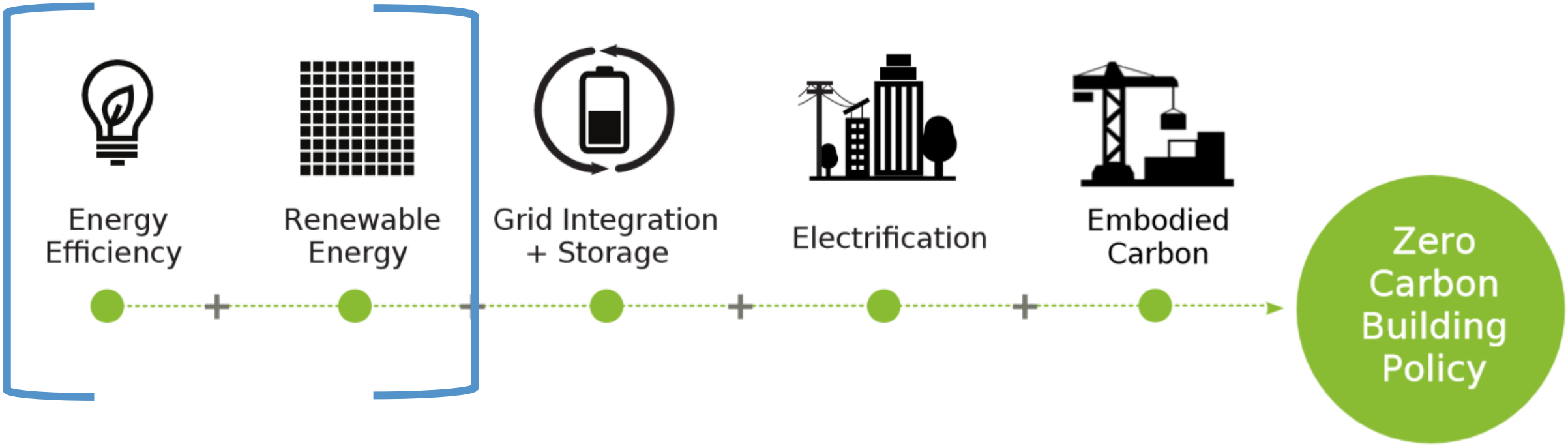
Policy Principles

Five Foundations of Zero Carbon Building Policies



Definitions/Lexicon

Five Foundations of Zero Carbon Building Policies



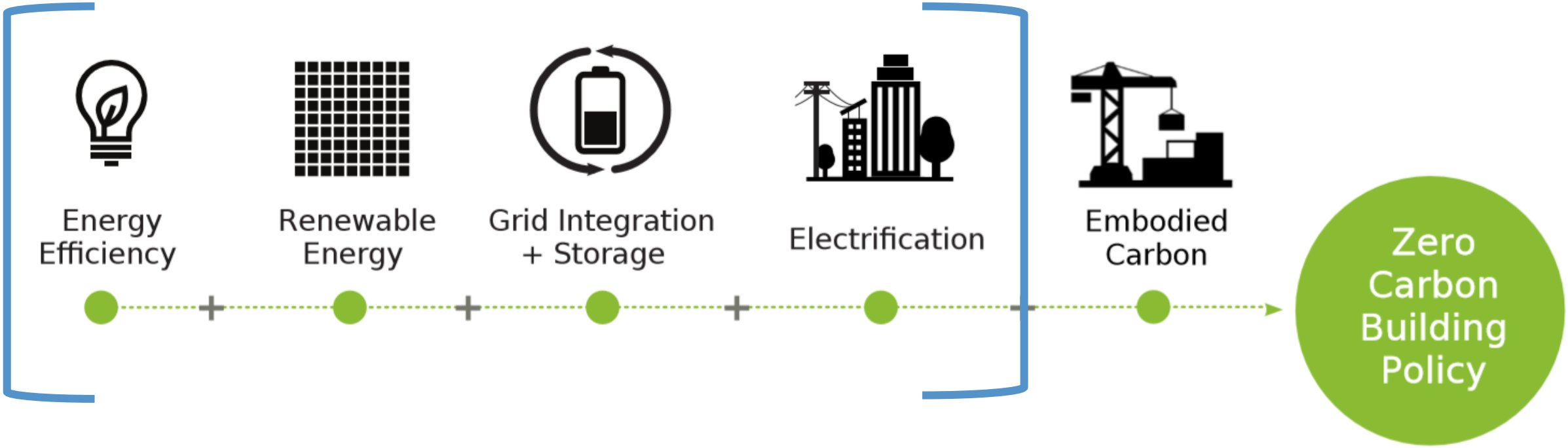
Zero Energy

Zero Energy

(aka Net Zero Energy, Zero Net Energy)

A zero energy building combines energy efficiency and renewable energy generation to consume only as much energy as can be produced onsite through renewable resources over a specified time period. (Source: U.S. Department of Energy)

Five Foundations of Zero Carbon Building Policies

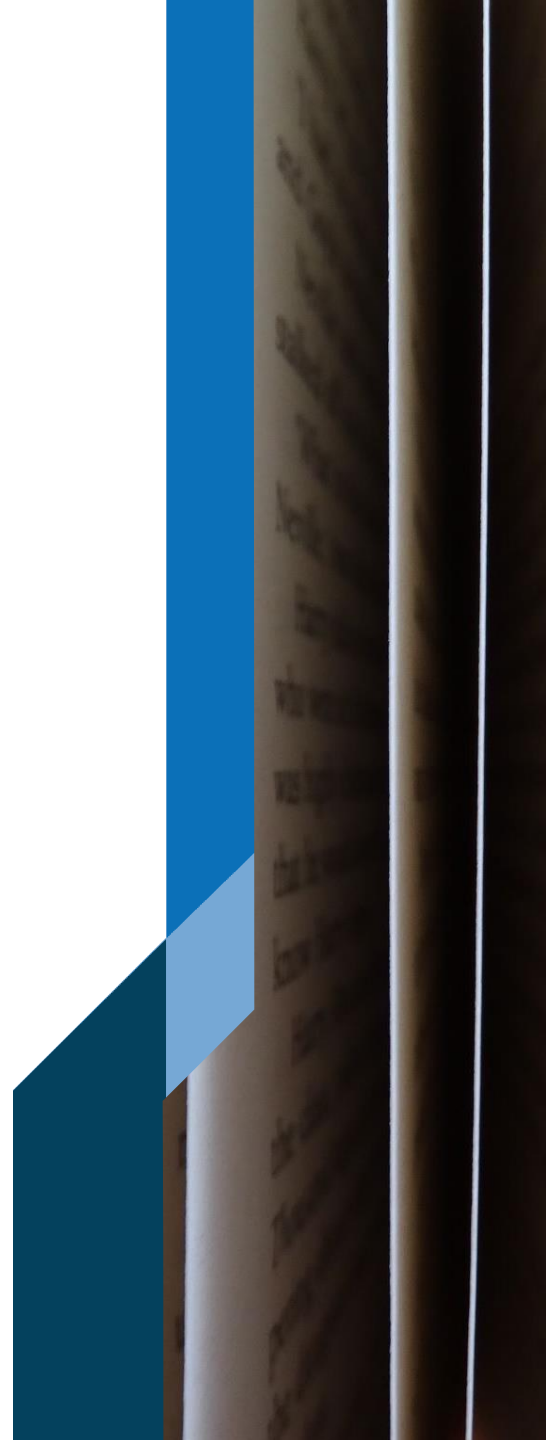


Zero Operational Carbon

Zero Carbon

(aka Net Zero Carbon, Zero Net Carbon)

A zero carbon building is defined as one that is highly energy-efficient and produces onsite, or procures, carbon-free renewable energy in an amount sufficient to offset the annual carbon emissions associated with operations. (Source: Zero Carbon Building Standard Canada Green Building Council)



Electrification

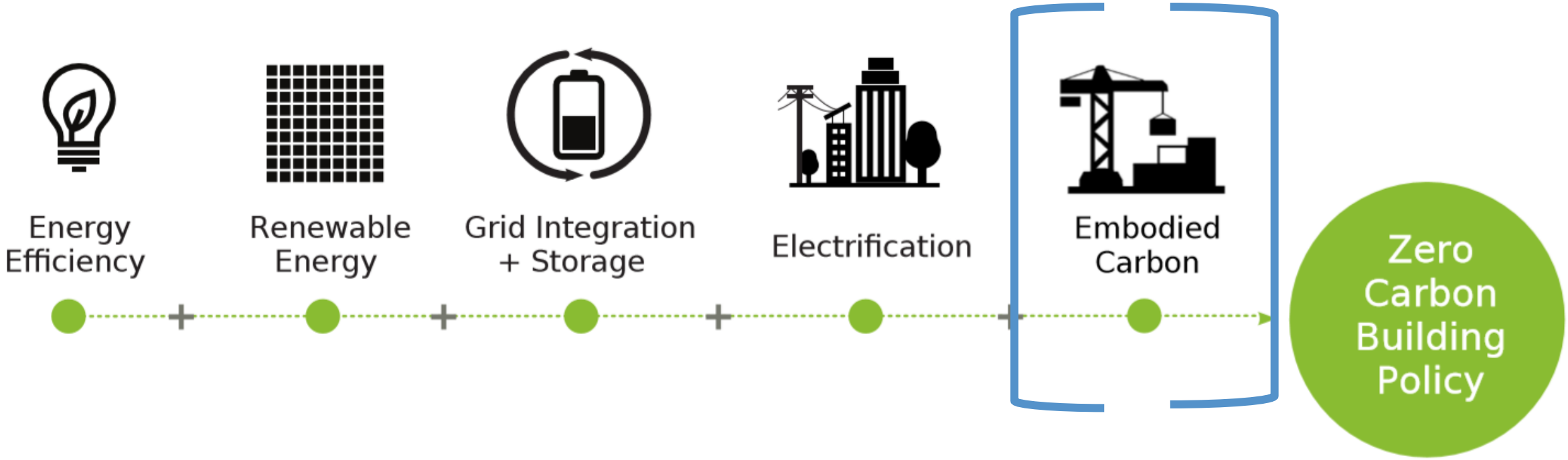
Electrification refers to replacing direct fossil fuel use (e.g., propane, heating oil, gasoline) with electricity [use] in a way that reduces overall emissions and potentially energy costs while lowering other air pollutants.
(Source: Environmental and Energy Study Institute)

Building-Grid Integration

(aka Grid-Enabled Buildings, Grid Harmonization)

Building-grid integration refers to the integration and optimization of homes and commercial buildings with the nation's energy grid. (Source: Department of Energy)

Five Foundations of Zero Carbon Building Policies

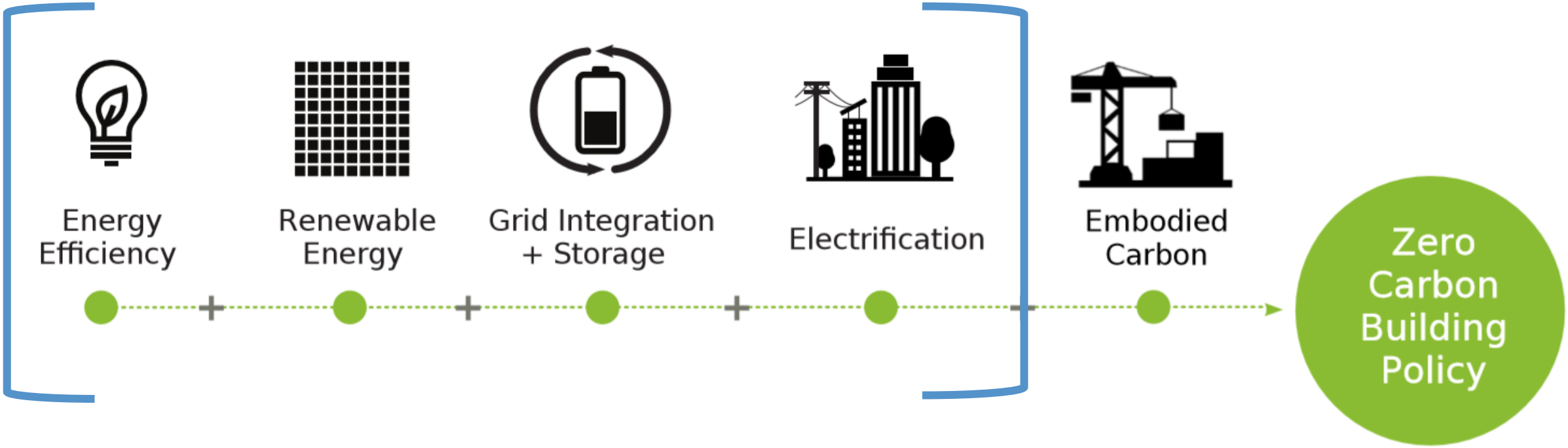


Embodied Carbon

The sum of all the greenhouse gas emissions resulting from the mining, harvesting, processing, manufacturing, transportation, and installation of building materials. (Source: American Institute of Architects)

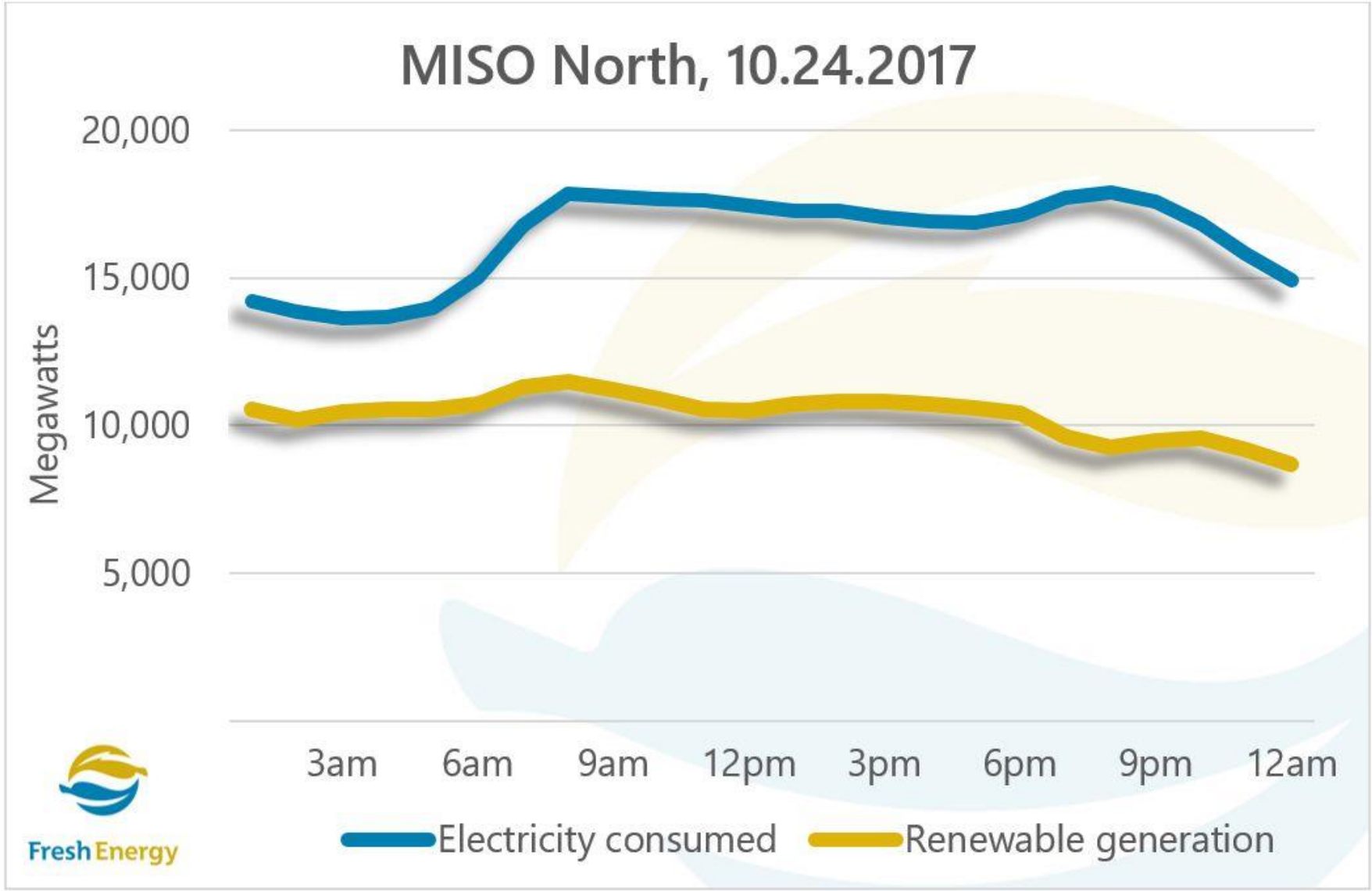
Grid Integration and Storage

Five Foundations of Zero Carbon Building Policies



Zero Operational Carbon

Time of Use



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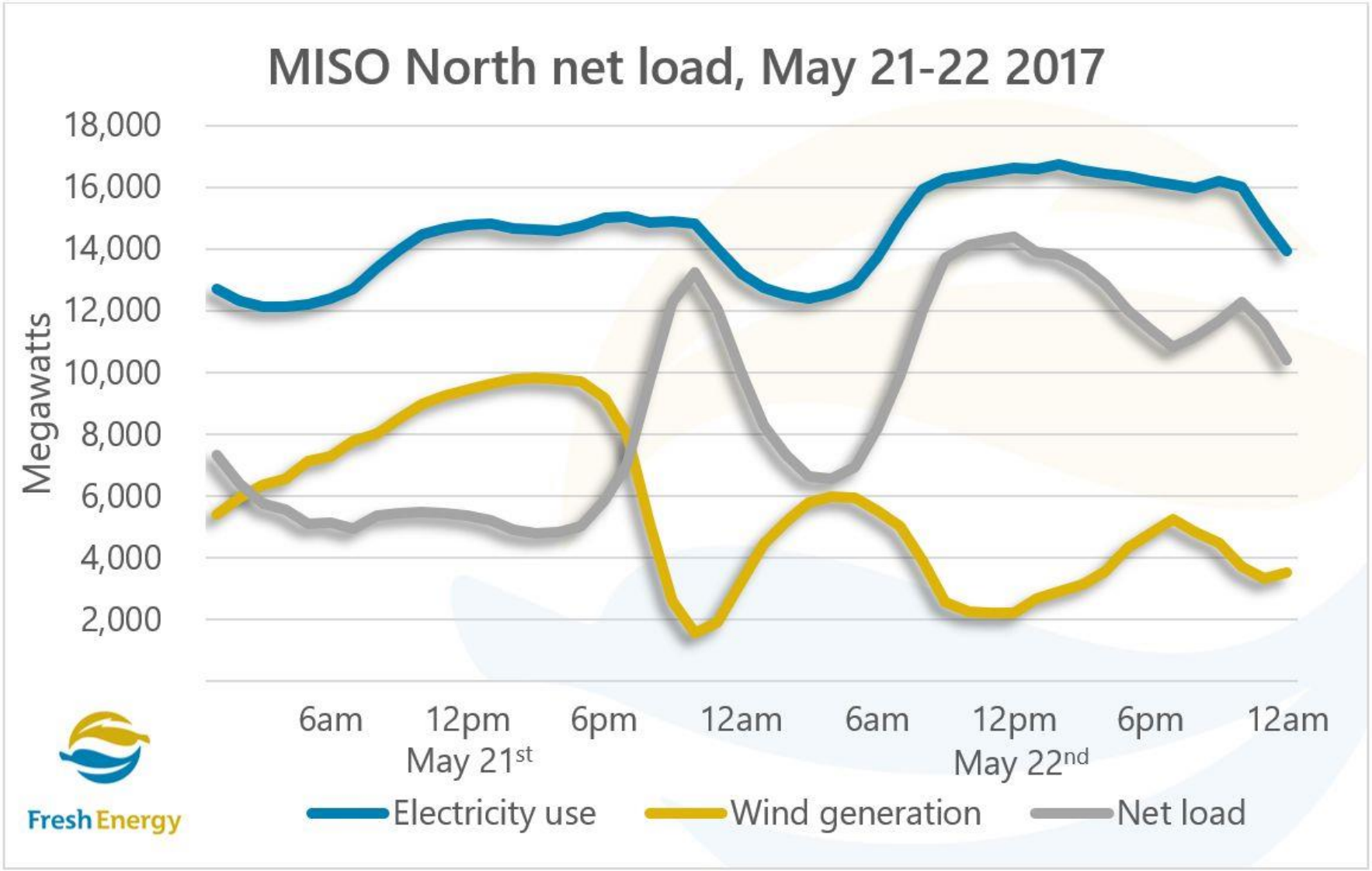
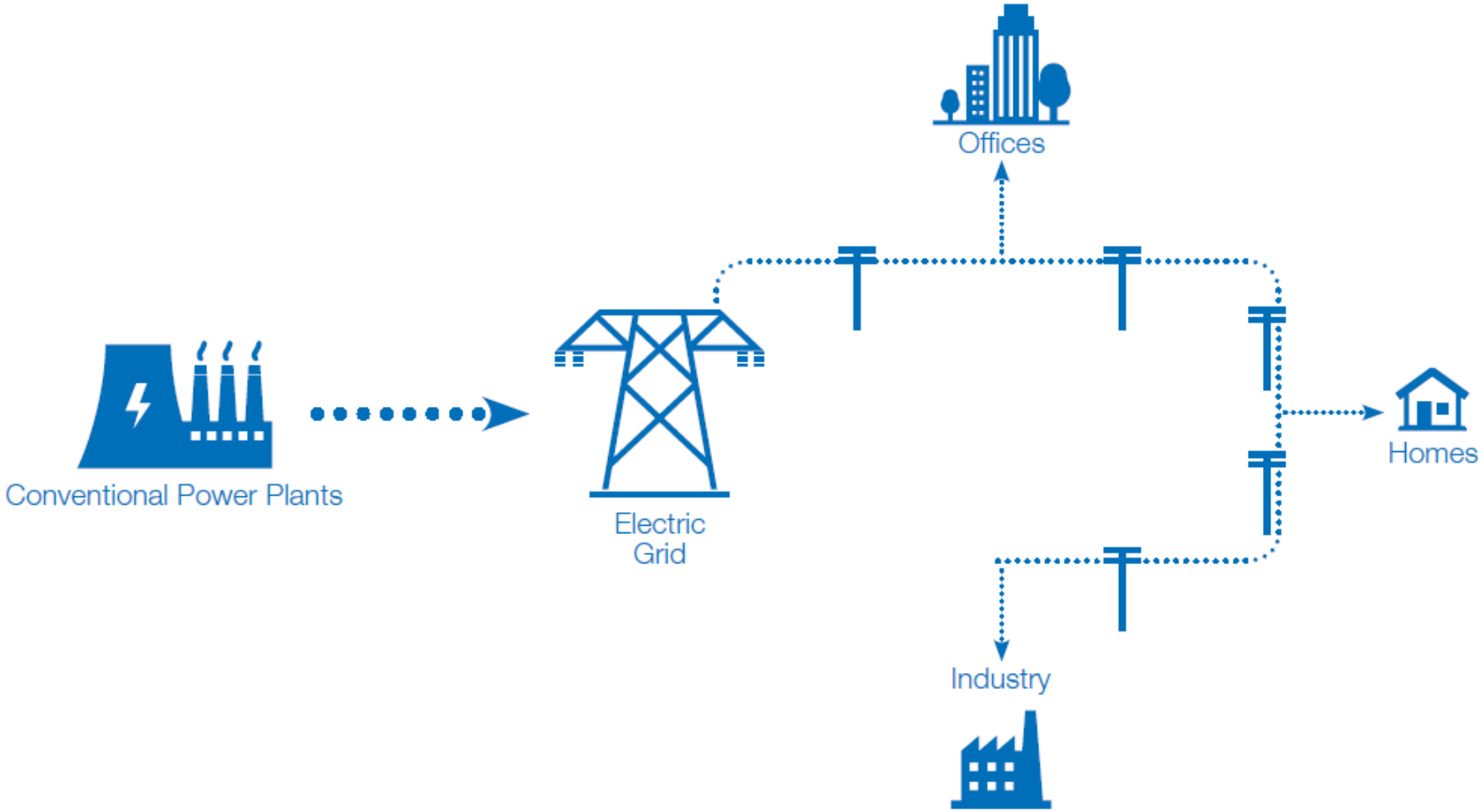


One-Way Grid



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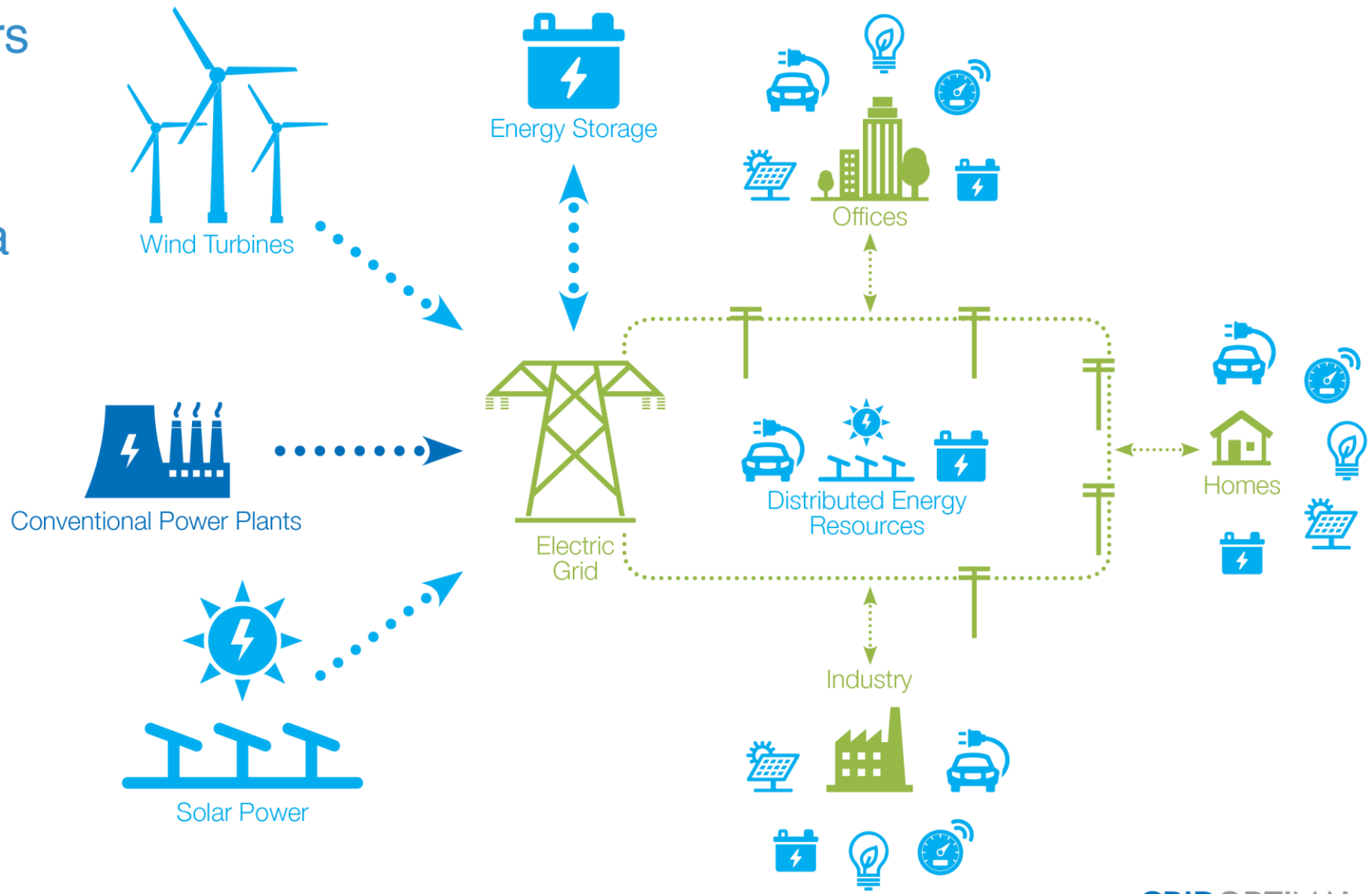
GridOptimal empowers players on both sides of the meter to actively support the transition to a carbon free grid



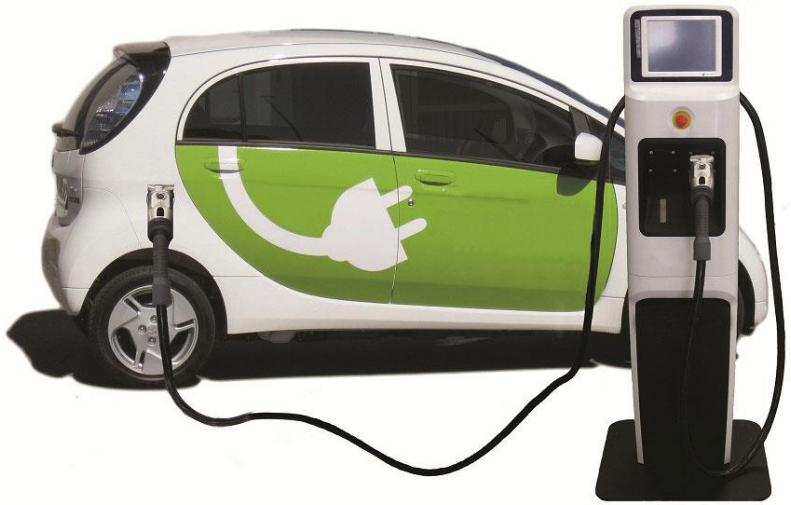
GridOptimal Technologies and Strategies:

- renewable energy
- energy efficiency
- electric vehicle
- energy storage
- smart connected controls

GRIDOPTIMAL™ BUILDINGS INITIATIVE

Opportunities for Building Integration with Grid

- **Permanent Efficiency**
  - Reduce building energy loads…
- **Peak Shifting**
  - Design to modify time of peak building energy use to adapt to grid…
- **Dynamic Response**
  - Actively reduce building energy use in response to short-term grid constraints…
- **Dispatchable Energy Storage**
  - Actively manage energy use patterns based on grid signals…



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Electrification

Making Headlines

Electrification of buildings: A cornerstone of Canada's low-carbon future

The Electrifying Path to Decarbonization — Part 3

OPED - Jan. 10, 2018 - By Dylan Heerema

PEMBINA institute

Goodbye, gas furnaces? Why electrification is the future of home heating

CBC

Emily Chung · CBC News · Posted: Jan 20, 2020 4:00 AM ET | Last Updated: February 4

No more fire in the kitchen: Cities are banning natural gas in homes to save the planet

Elizabeth Weise USA TODAY

Published 10:33 a.m. ET Nov. 10, 2019 | Updated 7:47 p.m. ET Nov. 21, 2019

USA TODAY

Cost, comfort emphasized as building electrification takes off in Colorado

In a first for Massachusetts, Brookline votes to ban oil and gas pipes in new buildings

The Boston Globe

Cities Look to Natural Gas Bans to Curb Carbon Emissions

SCIENTIFIC AMERICAN

Forward-Looking Cities Lead the Way to a Gas-Free Future

By Matt Gough February 11, 2020

Cities are banning natural gas in new homes, citing climate change

CBS NEWS

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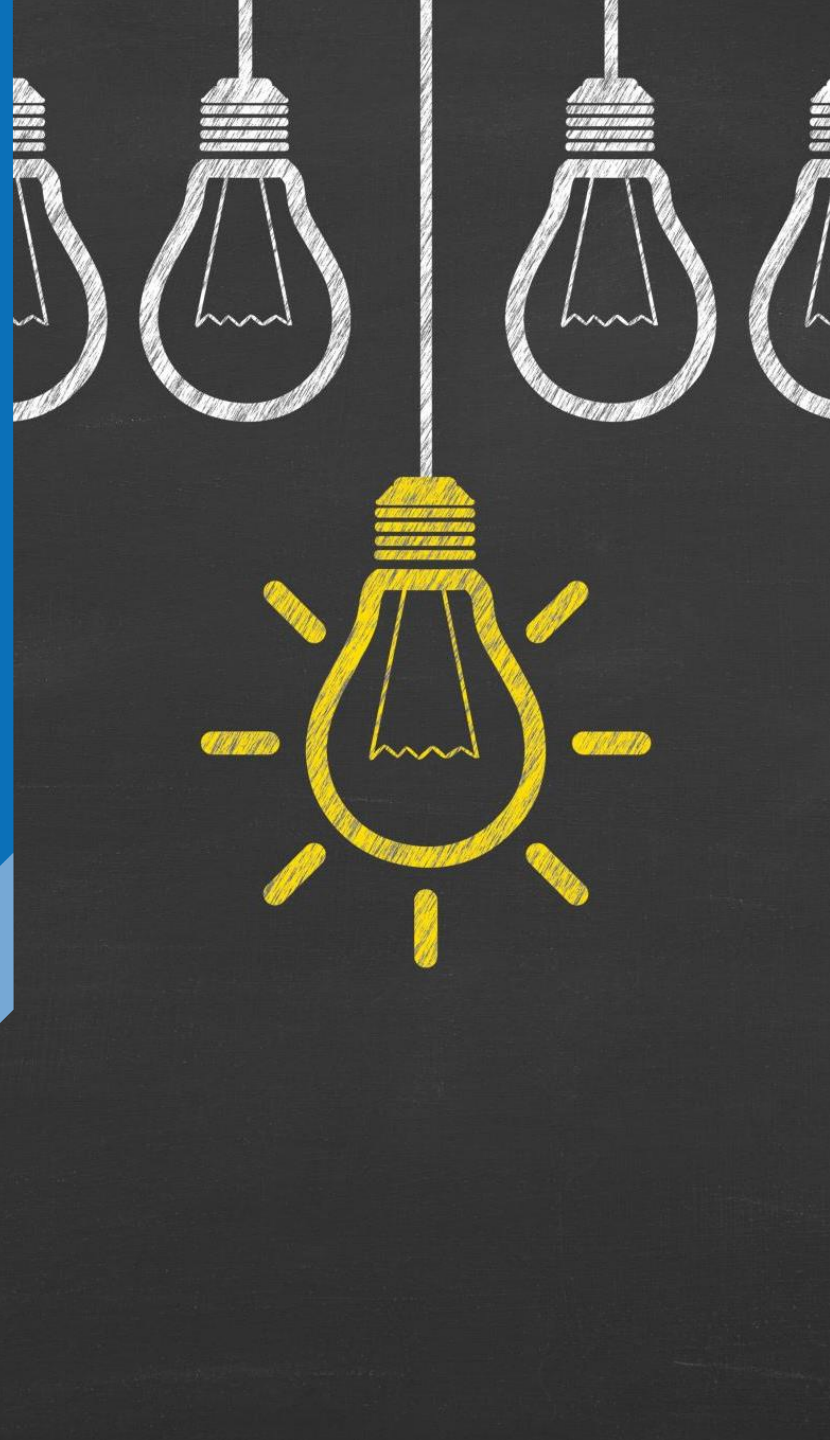
Beneficial Electrification

- Saves consumers money over the long run;
- Enables better grid management; and
- Reduces negative environmental impacts
- Indoor air quality and safety



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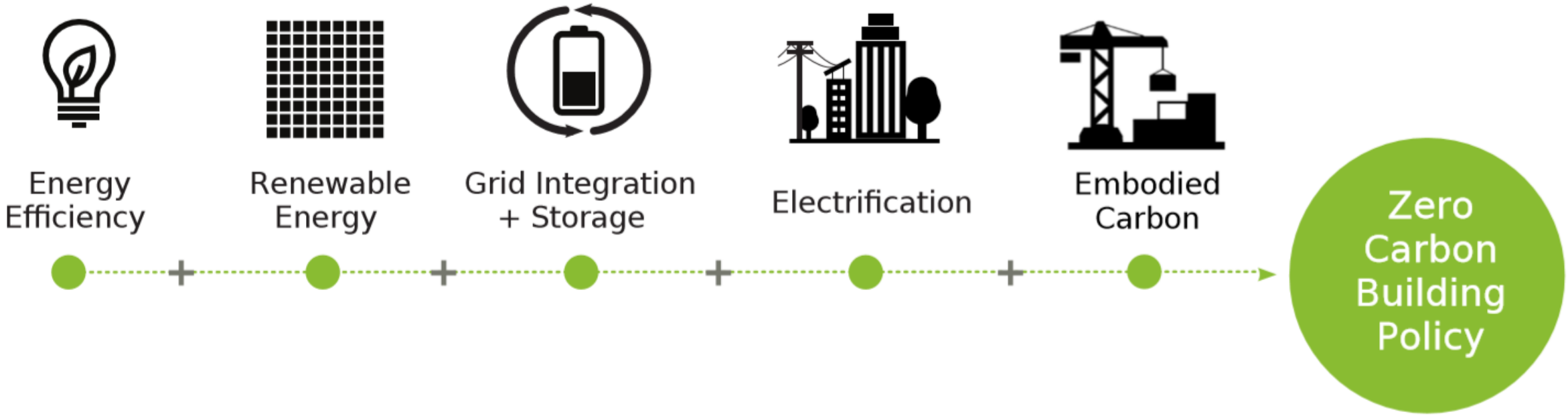

Municipal Initiatives

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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 2018/ASHRAE 90.1-2016
- Residential: sliding scale of ERI/HERS 50 or better; > 3,000 sq. ft. houses are required to be Net Zero Energy (NZE)
- Commercial: At least 5% of building energy use must be supplied by on-site renewables
- EV-ready and PV-ready are required by code for res & com
- Pilot: outcome-based code

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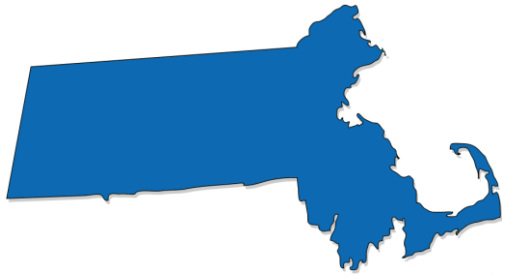
Massachusetts

Addition of a Stretch Code Component to the State Code



- 2009 - First state to adopt an above-code policy using an informative appendix to its state code
- New residential construction must achieve a HERS rating of 55
- The 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.

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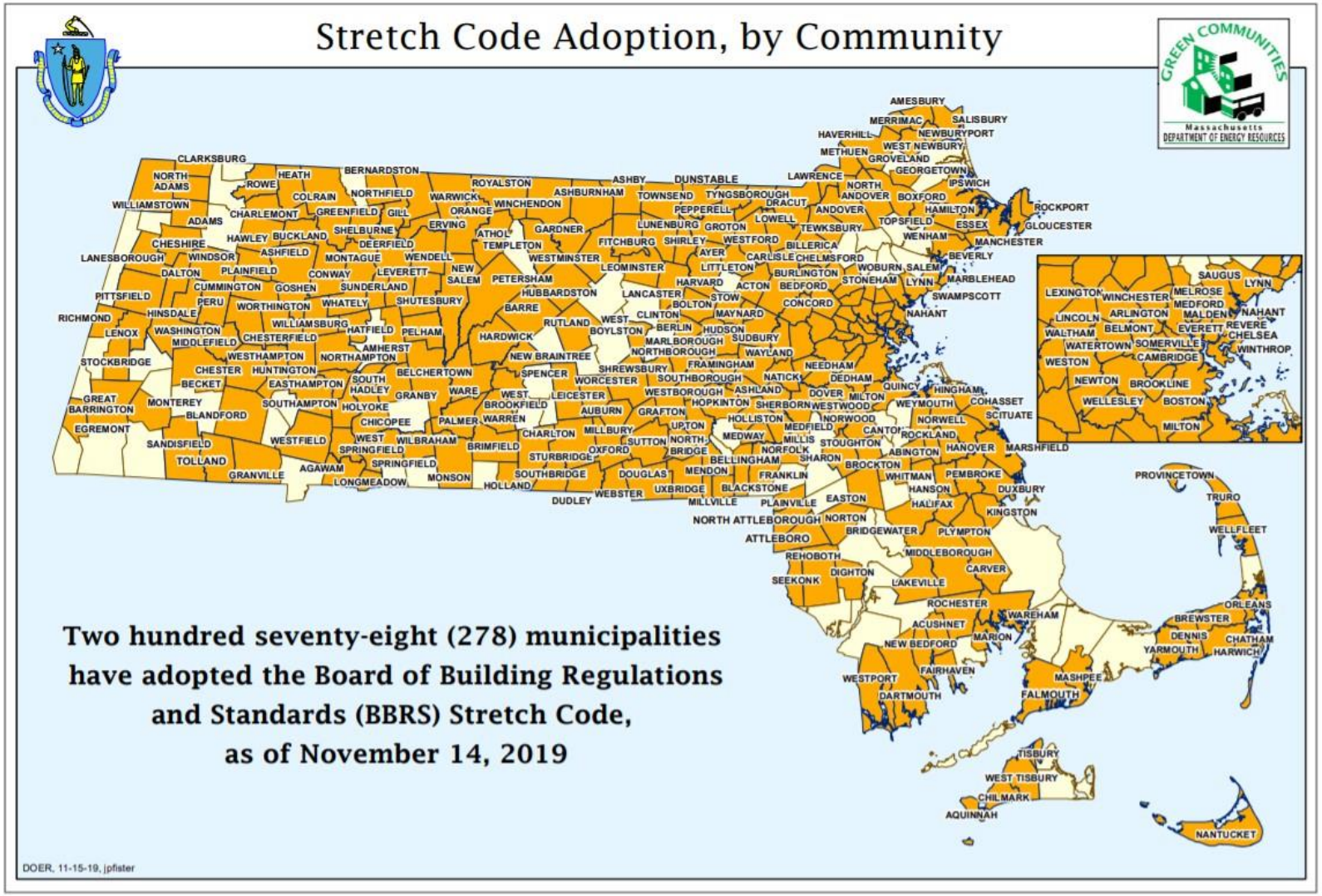

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St. Louis, MO

Midwest Municipal Initiatives

- First BPS in Midwest – passed May 2020, go into effect May 4th, 2021
- Covers municipal, commercial, institutional and residential properties ≥ 50,000 sq. ft.
- BPS Measures - Building EUI
- Aligned with City's climate goals
  - 100% emission reduction by 2050

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Minnesota City and County Policies

Midwest Municipal Initiatives

- St. Paul, MN: All projects that receive city assistance (monetary over $200,000) must achieve energy certification & benchmark energy consumption annually.
- St. Louis Park, MN: Planned unit developments are required to meet SB2030, which includes annual energy benchmarking.
- Hennepin County – Technical Assistance with Benchmarking
- Minneapolis – "Truth in Housing" Point-of-Sale Policy

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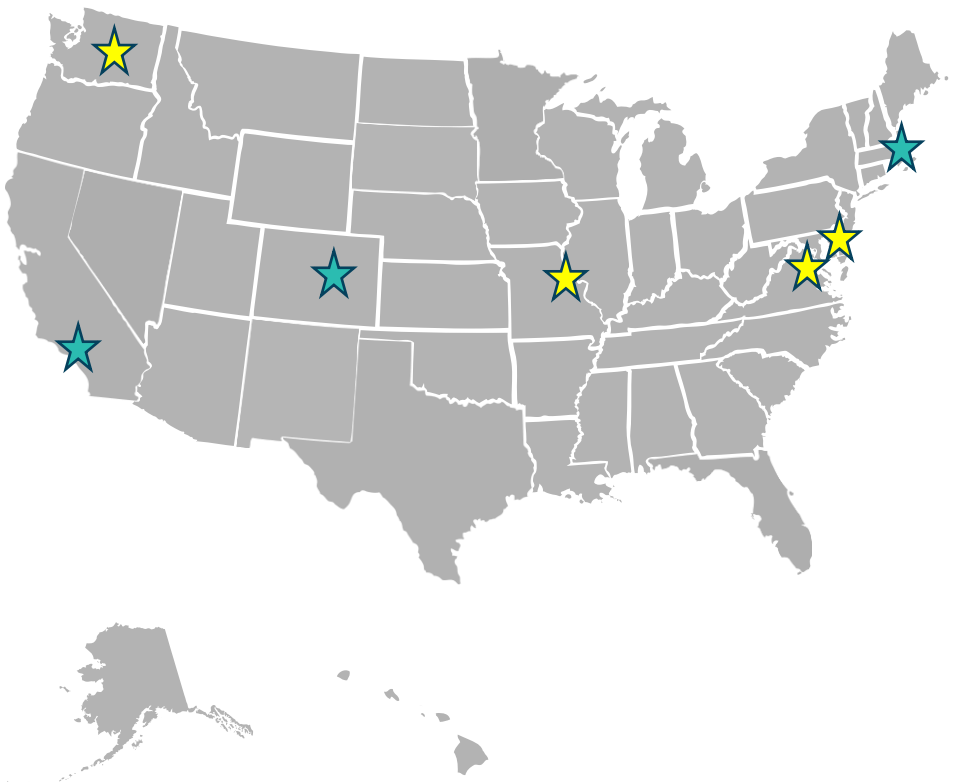
Building Performance Standards in US



Cities with an adopted BPS (DC, NYC, St. Louis, Washington State)

Cities in process of creating a BPS (LA, Denver, Boston, and Cambridge)

American Cities Climate Challenge

nbi new buildings institute

BPS Framework Overview

Step 1: Preparation

Establish **policy goals** with understanding of the city's context and **key considerations**

Perform a **market segmentation** to understand building segments and how building owners interact with the City

Establish the **stakeholder engagement** process to be used throughout BPS policy development and implementation

Step 2: Policy Making

Answer policy questions in 6 key areas to establish the **nuts and bolts of policy design**

Address **additional considerations** related to funding, staffing, data, tenants, interaction with other policy

Develop a **communications and political strategy** to pass legislation

Step 3: Implementation

Re-engage stakeholders to support **rulemaking and policy implementation**, including outreach, staffing, data collection, and reporting out

Establish **tools and resources**, such financial incentives and resource hubs, to support building owners and workers most in need

Integrate Equity, Stakeholder Engagement, and Cost Considerations at every stage

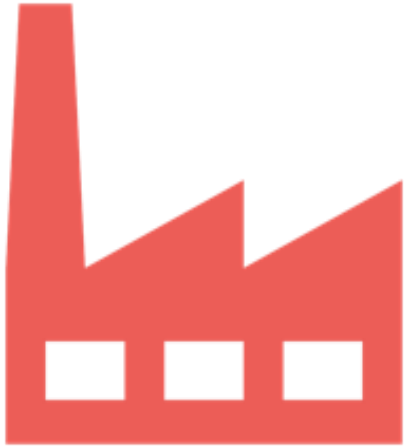
Step 1: Preparation

- Establish Policy Goals: Equity and Climate
- Market Segmentation Analysis
- Establish Stakeholder & Community Engagement Process
  - Gain critical perspectives
  - Fosters transparency
  - Builds support
  - Policy more likely be designed well- addressing equity and climate
  - Create partnerships

Step 2: Policy Making: Nuts and Bolts of BPS

1. What buildings are covered
2. Choosing a building performance metric
3. Setting targets for covered buildings
4. Establishing a compliance timeline
5. Defining compliance pathways
6. Determining compliance penalties
7. Identifying support programs

Measure Energy or Carbon?



Carbon Metric:

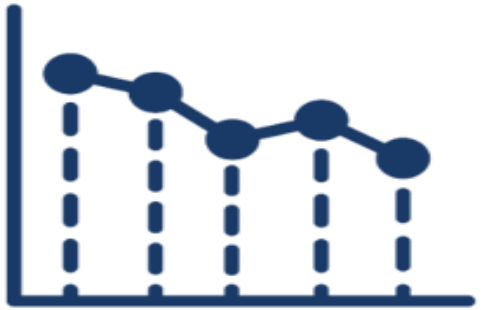
Greenhouse Gas Intensity (kgCO2e/sf)

Energy Metrics:

- ENERGY STAR Score
- Site EUI (kBtu/sf)
- Source EUI (kBtu/sf)

Compliance Pathways

- Absolute
- Buildings must meet the standard to be in compliance



- Relative Improvement
- Buildings below the standard can improve performance by a set percentage

- Prescriptive
- Buildings below standard can complete list of upgrades (e.g., mechanical or lighting replacements)

Step 3: Implementation

- Stakeholder processes for implementation
- City staffing and support for Ordinance Roll-out
- Supportive Tools and Resources
- Documenting and Reporting Out

Updates

Local policies and programs

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National Code Development

International Energy Conservation Code

The ICC recently decided to move IECC to a "Standards" process

Municipalities will now no longer have an official vote on code changes in IECC

Municipalities can still be involved in process; exactly how is still TBD

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State Code Adoption

Illinois Code Process and Development

The State of Illinois will begin adoption of 2021 IECC in a few months. The Illinois code process takes ~18 months before the code is final.

Illinois statute requires that all local jurisdictions must follow the most current versions of the Illinois Energy Conservation Code. The Illinois state residential energy code is Min/Max except for municipalities with a population 1,000,000 or greater

Local Code Officials enforce the code

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State Code Adoption

Illinois Code Process and Development

Energy Code Advisory Council (ECAC) - reviews the code and approves any provisions and amendments

Capital Development Board - holds public meetings to hear comments on the proposed code and formally codifies the code (written into official code language)

When approved and codified, the code is sent to the Joint Committee on Administrative Review (JCAR), who reviews it for legality.

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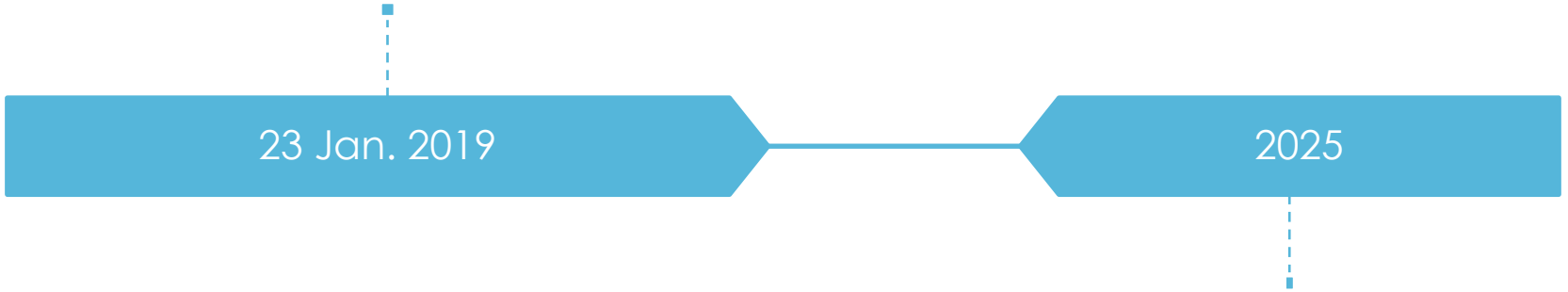
Illinois Updates

GHG Emission Executive Order

Governor Pritzker signed Executive Order 2019-06 entering Illinois in the U.S. Climate Alliance



Implements policies aimed at getting GHG emissions to 26-28 percent below 2005 levels by 2025

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Clean Energy Jobs Act

Illinois Policy Process and Development

Clean Jobs Coalition

Governor's Energy Plan

Requires state to develop (in addition to lots more):

- Commercial and residential stretch code (with path to Net Zero)
- Building Performance Standard (TBD)
- Both will be available for voluntary adoption by municipalities (they become mandatory once adopted by that municipality)

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Illinois Investor-Owned Utility Initiatives

MEEA and Slipstream

Stretch Codes and BPS

Phase I – research and savings estimation - completed

Phase II – municipal policy adoption and program development - in progress

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ComEd Initiative

MEEA and Slipstream

Municipal Energy Planning

Research phase in progress

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Next Steps

How can the Mayors get involved?

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Suggestions for Municipalities

New Buildings

Participate in IL State Baseline Energy Code Adoption Process

- Attend meetings and show support for adoption of full code and/or strengthening amendments of base state code
- Sign up for MEEA Codes Newsletter for updates

Make energy code compliance a priority

- Adopt and enforce the 2021 IECC
- Send code officials to trainings
- Participate in IL Energy Code Compliance Collaborative

Commit to Stretch Energy Codes

- Adopt CEJA statewide stretch code
- If stretch code does not happen via CEJA, add amendments to local commercial energy code
- Consider NBI's Building Decarbonization Code

Participate in stretch code utility research programs

- Reach out to MEEA/Slipstream for a follow up meeting

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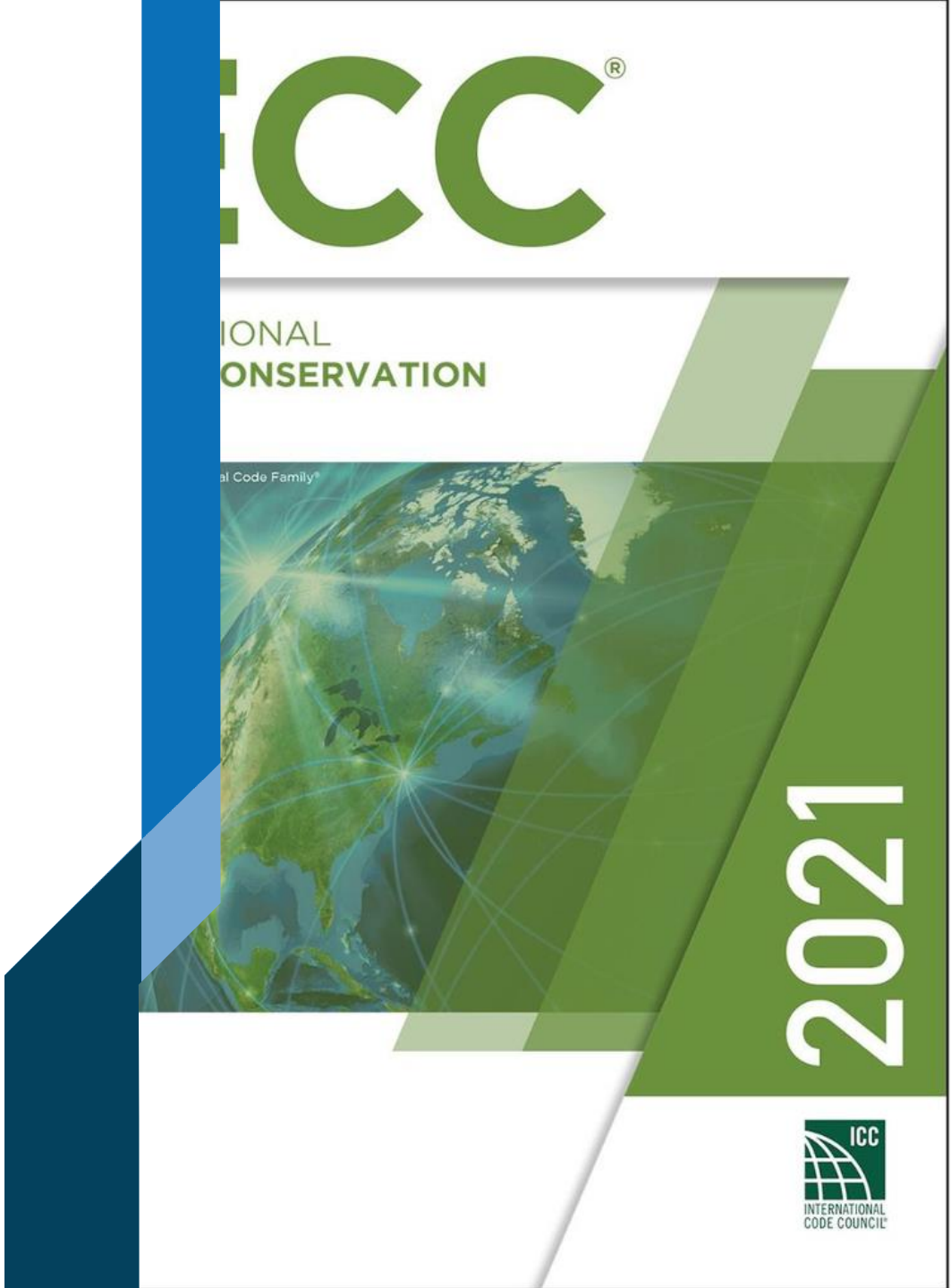
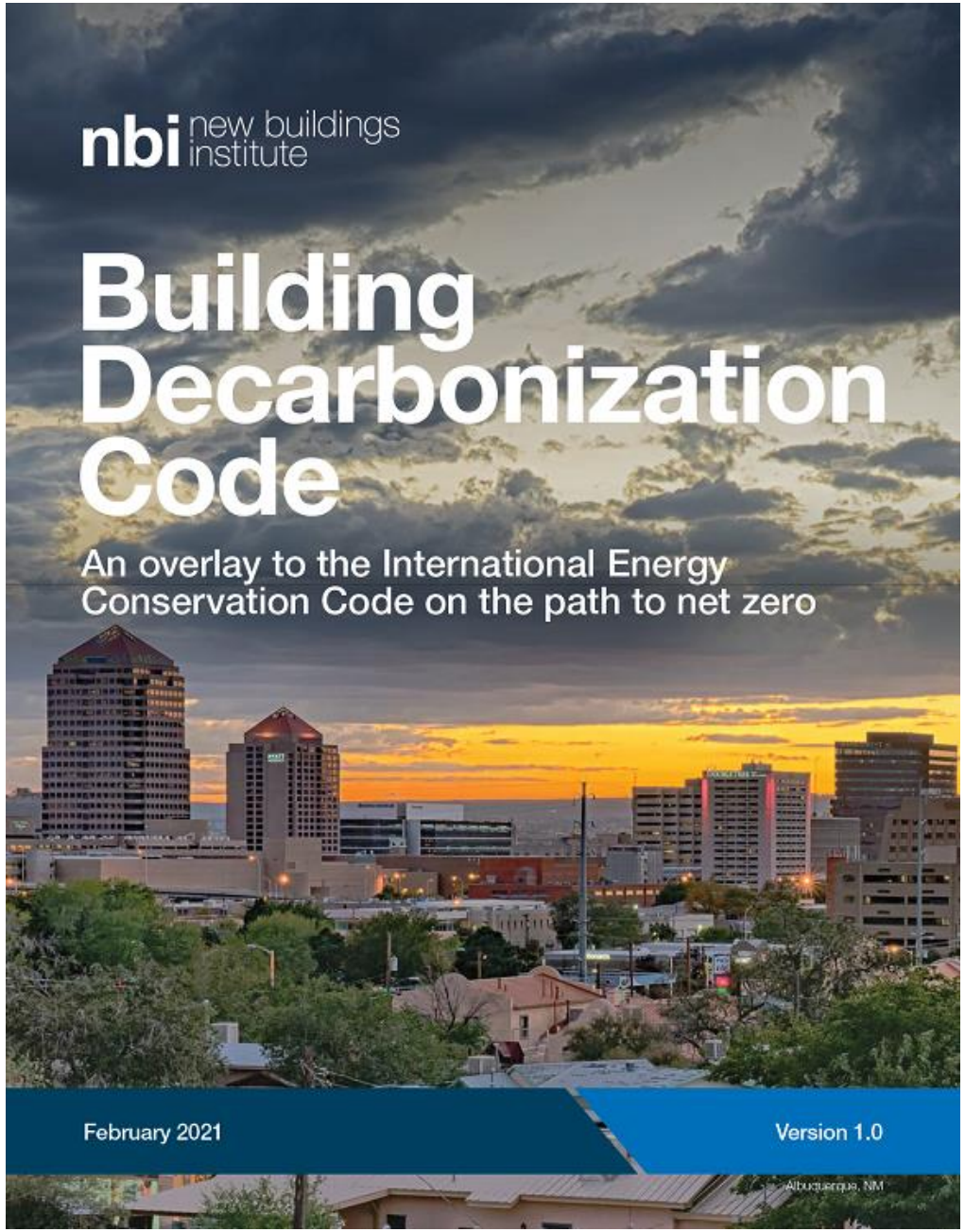
Building Decarbonization Code

What can we do?

- Influence Base Code
  - Advocate for amendments when Capitol Development Board reviews the 2021 IECC.
- Adopt a Commercial Stretch Code with decarbonization amendments





Overlay Structure

- Key areas for electrification: heating, water heating, cooking, lighting
- Addresses regulated loads only and creates exceptions for institutional uses that are critical to service (i.e., hot water in hospitals)
- Adds language for onsite renewable energy, storage ready, EVs, and demand response

Electric-Readiness

- Electric infrastructure required for:
  - Water heating
  - Space heating
  - Clothes drying
  - Cooking
  - “Other”
- Requirements for:
  - Branch circuits and labeling
  - Physical space and other associated needs (i.e. condensate drains)

Electric-Ready Water Heating

C405.16.2 Combustion water heating equipment. Gas-fired water heaters with a capacity less than 300,000 Btu/h (88 kW) shall be installed in accordance with the following:

1. A dedicated 208/240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 3 feet (914 mm) …
2. A condensate drain that is no more than 2 inches (51 mm) higher than the base of the installed water heater …
3. The water heater shall be installed in a space with minimum dimensions of 3 feet (914 mm) by 3 feet (914 mm) by 7 feet (2134 mm) high, and
4. The water heater shall be installed in a space with a minimum volume of 700 cubic feet (20,000 L)

Suggestions for Municipalities

Existing Buildings

Set

Set energy goals for existing buildings

- Participate in BPS utility outreach program
- Participate in city energy planning research program
- Reach out to MEEA/Slipstream for a follow-up meeting

Track

Track Building Energy Use

- Track Municipal Buildings Data
- Adopt Benchmarking Ordinance for commercial buildings
- Encourage "Point of sale" for homes

Improve

Improve Building Performance

- Adopt CEJA BPS; OR
- Create stakeholder engagement process to develop and adopt own BPS

Assist

Assist with policy compliance

- Participate in utility program development
- Encourage utility program participation

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Thank you!

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