Midwest Energy Policy Series

Renewables & Efficiency

August 20-21, 2024 | Columbia, MO

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Advancing Building Performance & Moving Our Regional Markets Forward Session 9

Energy Efficiency at the Ground Level

be ex STL

building energy exchange
St. Louis

www.be-exstl.org

Get Energy Efficiency Done

Measure Performance

Identify Opportunities for Improvement

Plan, Budget, Get Buy-In

Implement Solutions. Rinse & Repeat

Integrate Efficiency into an Organizational Capital Strategy

Benchmark

Understand the opportunity for efficiency savings by tracking energy usage comparatively

Energy Audit

Utilize 3rd party professional to identify projects and returns

Capital Planning

Balance existing capital needs with ROI and organizational goals

Execution

If the plan works- follow it

Empower operations teams

Buildings are…
systems

To get the most out of a system think holistically and use an integrated approach

The State of Maintenance

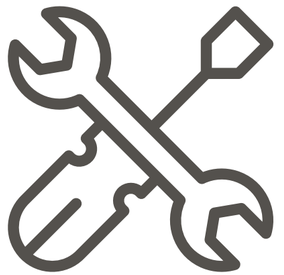
The Impact of O+M Teams

30%

of energy used in buildings is wasted through inefficiency according to the EPA

50%

of all energy savings are possible through low-cost or no-cost operational improvements



Follow the Plan
Do things Right

Communicate

Educate

Appreciate

Get Energy Efficiency Done

Measure Performance

Identify Opportunities for Improvement

Plan, Budget, Get Buy-In

Implement Solutions. Rinse & Repeat

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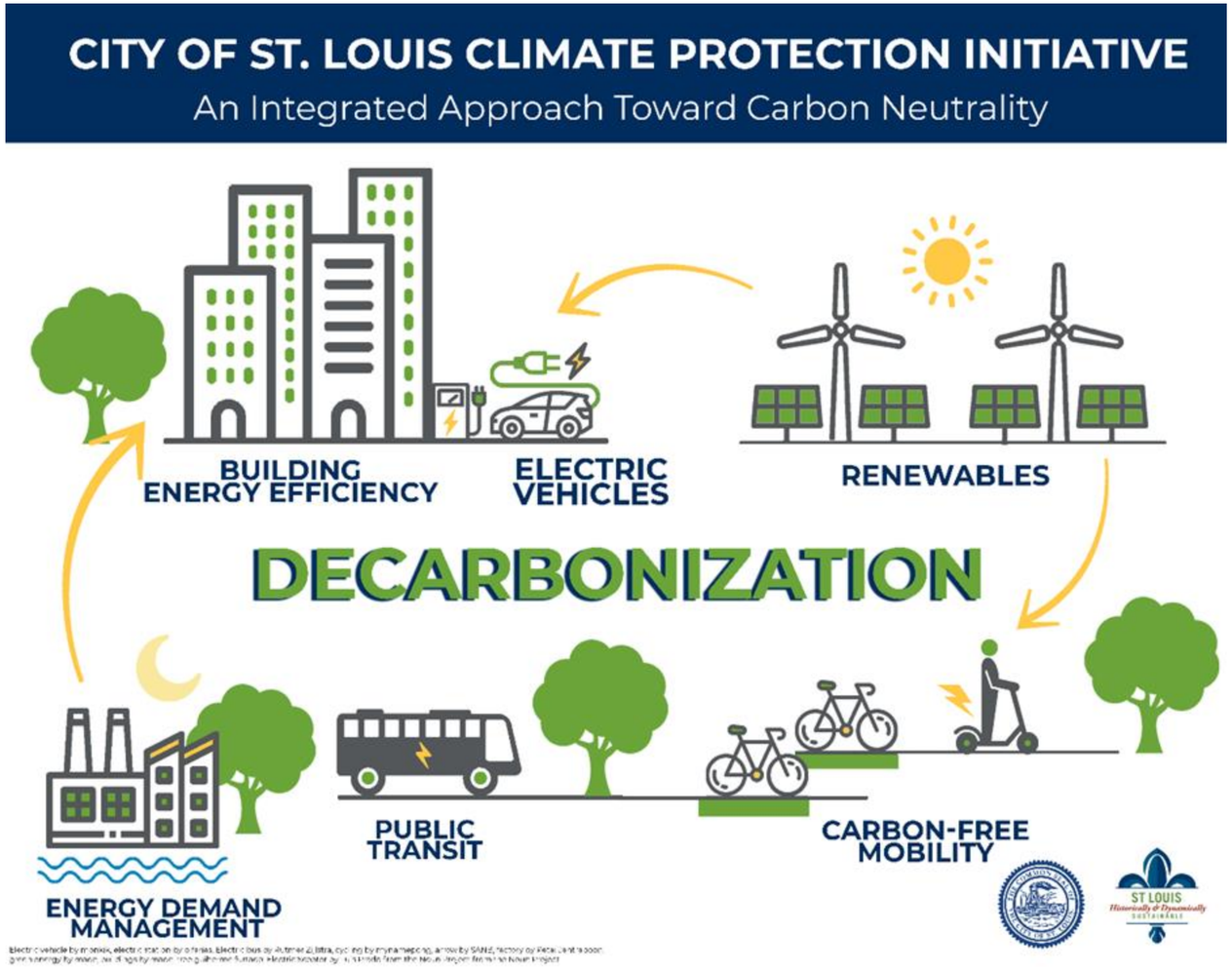
What is Benchmarking?

Everyone does some sort of energy accounting. Benchmarking is more-tracking your building’s energy use over time and leveraging data from comparable building types. This tells you what is on the table.

Existing Building Policy

- **Reduce buildings' impact on the environment**
- **Stay competitive with other cities!**
- **Supports Building Division goals to maintain and improve building stock**
- **Critical to help meet the City's climate goal to be carbon neutral by 2050**



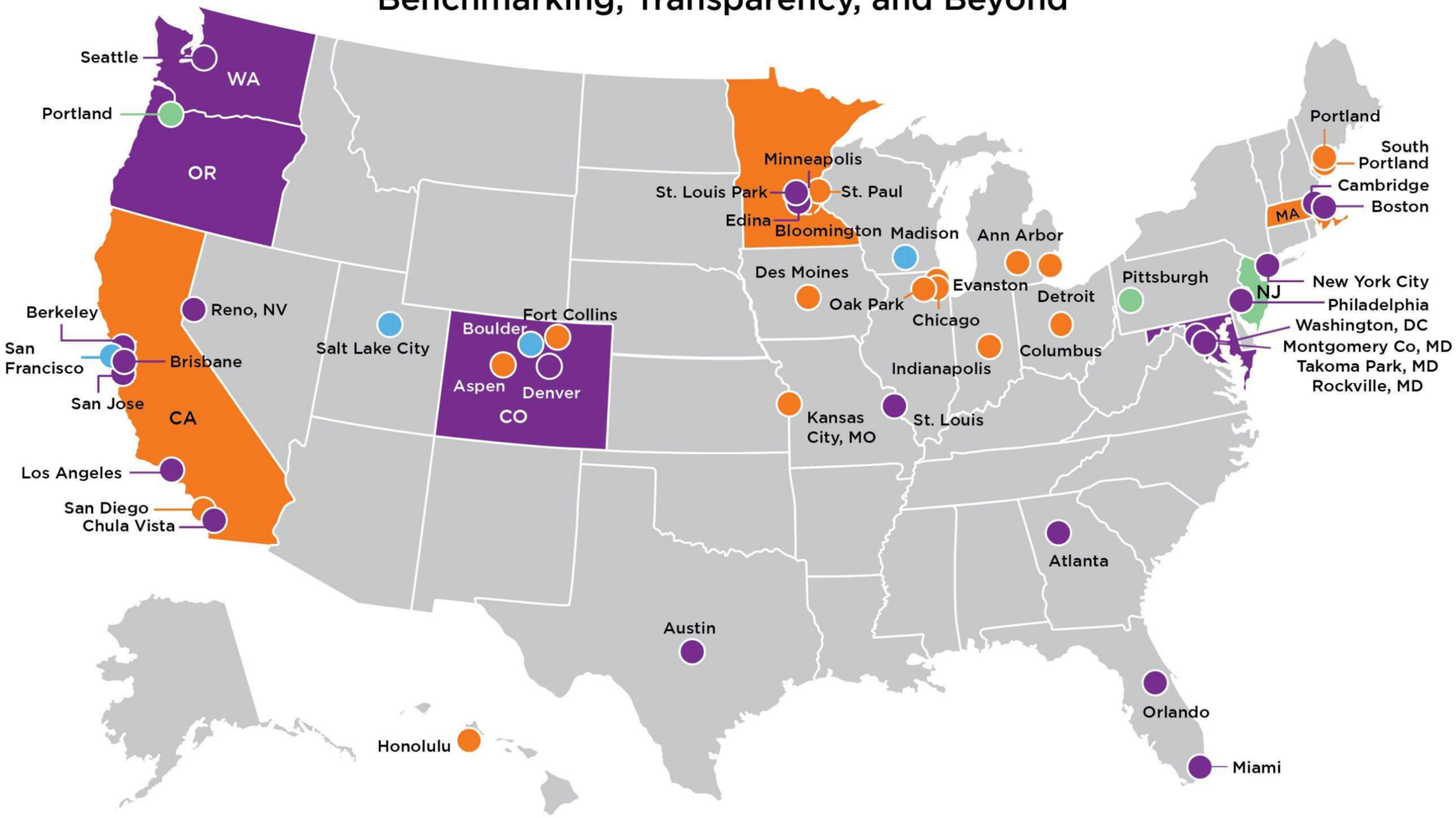
Building Energy Awareness Ordinance Passed & Signed in 2017

Requirements:

- Municipal and private buildings 50,000 square feet and larger must track and report energy and water use annually – including multi-family
- Some exemptions (low or no occupancy, manufacturing, financial duress, state & federal buildings)
- Buildings not in compliance with the ordinance will *not* be eligible for new residential or commercial occupancy permits
- Training and assistance is available!

Reporting Deadline is May 1 for previous calendar year's data

U.S. City, County, and State Policies for Existing Buildings: Benchmarking, Transparency, and Beyond



- Benchmarking required for public and commercial buildings
- Benchmarking required for public, commercial, and multifamily buildings
- Benchmarking and additional actions required for public and commercial buildings
- Benchmarking and additional actions required for public, commercial, and multifamily buildings

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Capital Planning? (CIP)

Facilities capital planning is a strategic and systematic process used by organizations to plan, prioritize and manage financial investments in their buildings, infrastructure and other physical assets, including the structures and equipment required to support the organization’s operations and objectives.

How does your budget cycle impact the ability to make long-term decisions?

How does Return on Investment (ROI) impact decision making within existing replacement timelines?

What is your biggest expense? HR or Operations?

Do productivity and retention have an ROI?

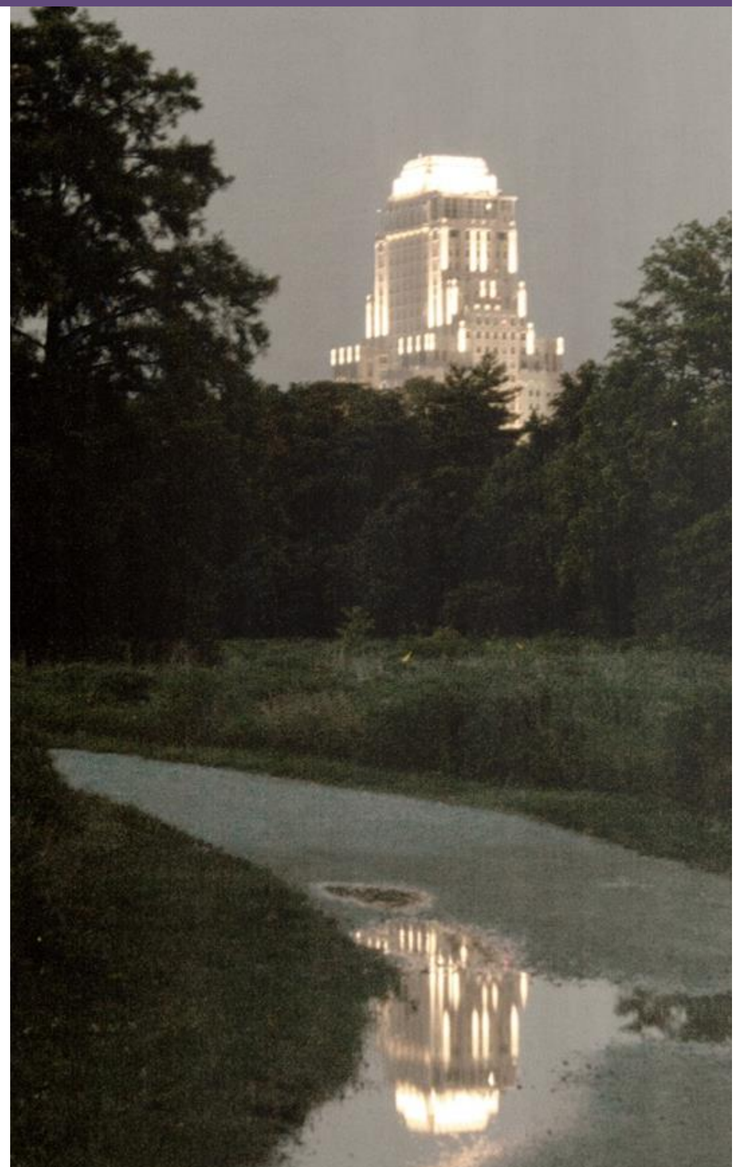
Deferred Maintenance

VS ROI

Building Energy Performance Standard Passed in 2020

What IS the standard?

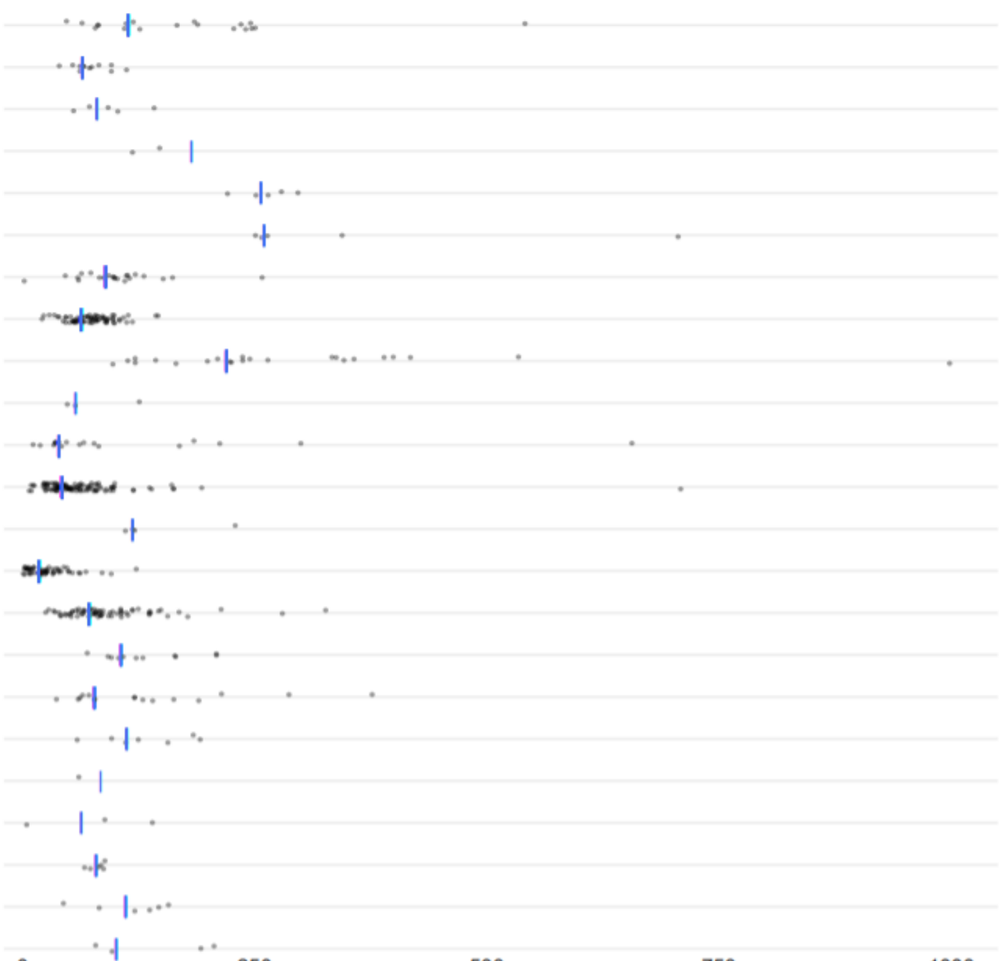
- Performance metric: Site Energy Use Intensity (EUI)
- Standards are calculated such that at least 65% of buildings have to improve their energy performance.
- Standards finalized in May 2021
- All commercial, institutional, multi-family and municipal buildings that are 50,000 square feet and above must comply.



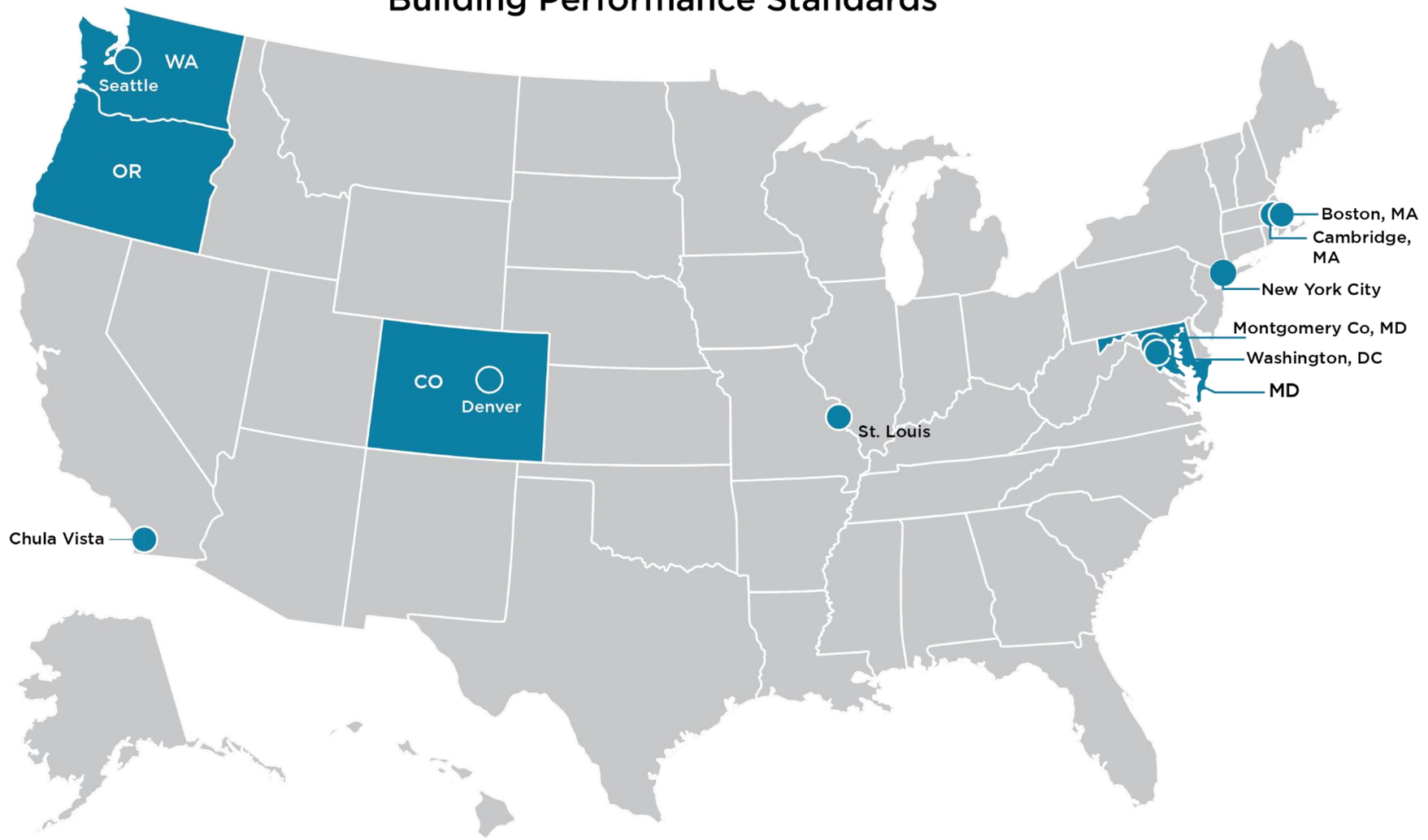
BEPS by Property Type

In this chart, each dot represents a building. Blue lines represent BEPS. Wastewater treatment and data centers are omitted due to data limitations.
To the left of the blue line, buildings are in compliance; to the right, they are not in compliance. Example:

Property Type Group	BEPS
College/university	113.8
Dormitory	64.5
Education	80.1
Food service	181.9
Grocery store	256.5
Hospital	259.9
Hotel	89.4
K−12 school	63.5
Laboratory	219.2
Library	57.0
Manufacturing/industrial	38.9
Multifamily housing	42.5
Museum	118.4
Nonrefrigerated warehouse	17.6
Office	71.7
Outpatient healthcare	105.9
Public assembly	77.3
Public order and safety	112.3
Refrigerated warehouse	84.1
Religious worship	63.4
Retail/service	79.3
Senior care/residential care	111.3
Strip shopping mall	101.1



U.S. City and State Policies for Existing Buildings: Building Performance Standards



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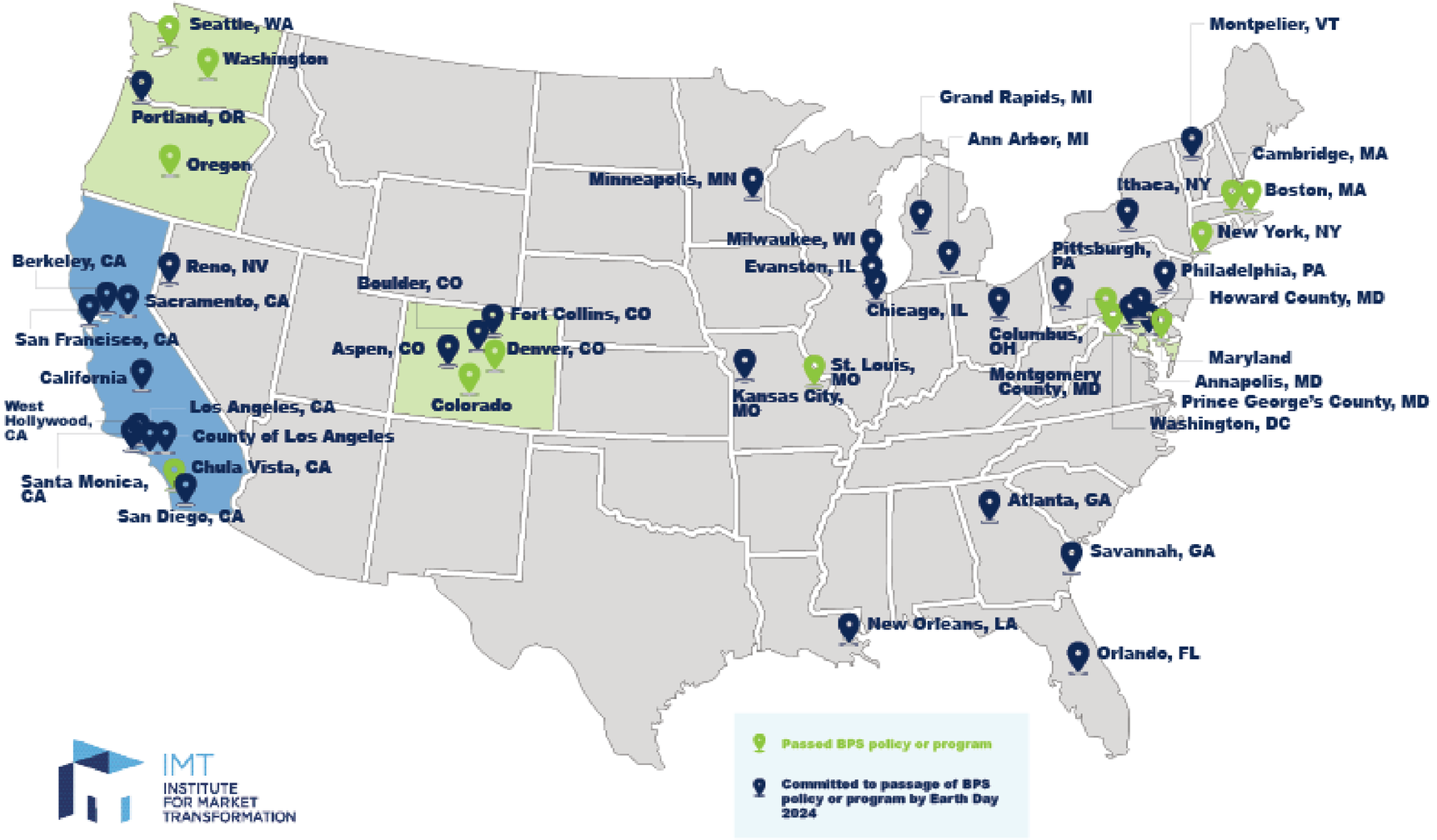
The State of Building Performance Standards (BPS) in the U.S.

Members of the National BPS Coalition as of December 2023



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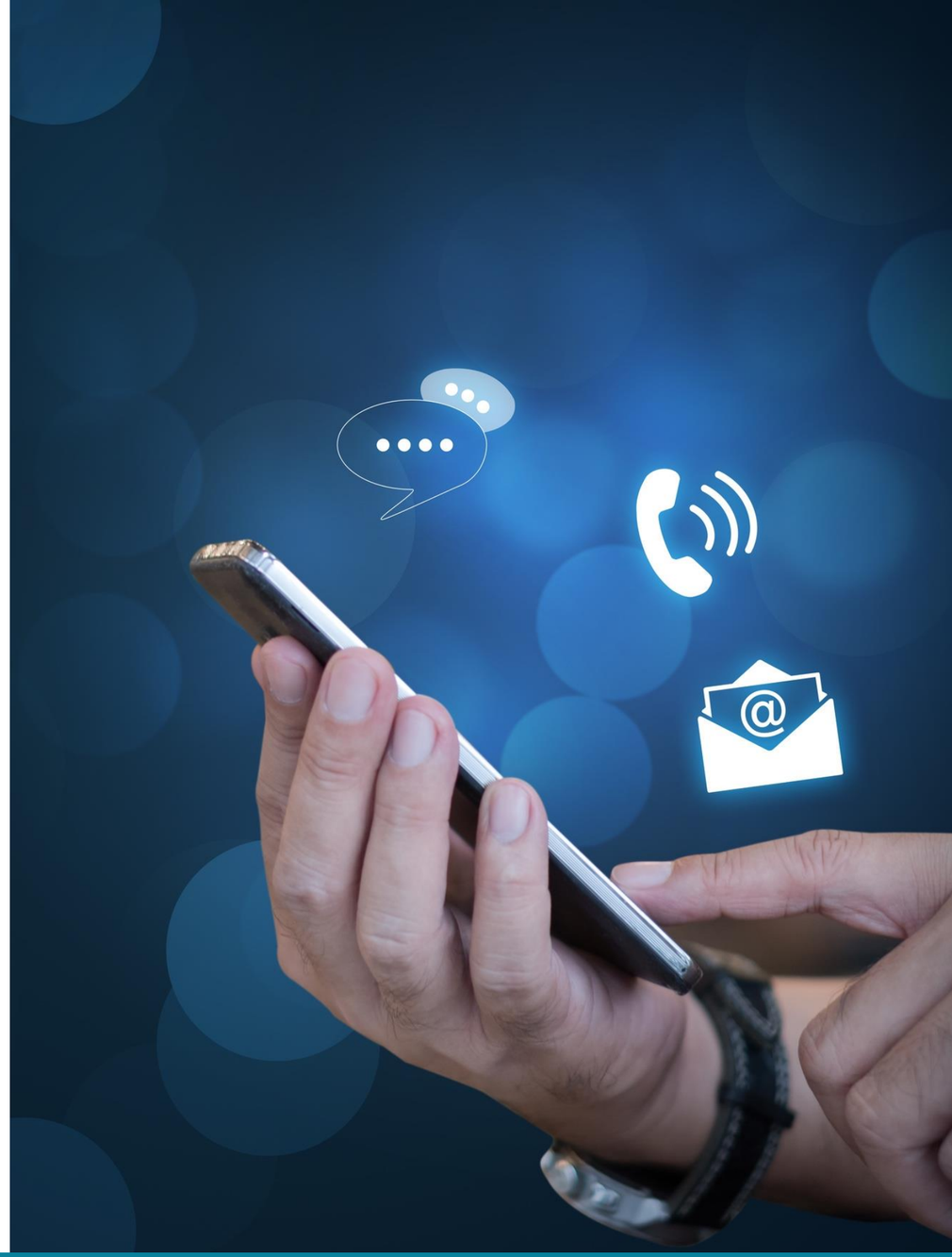


building energy exchange Kansas City

Building Blocks for Advancing your Energy Performance

The Midwest Energy Policy Series

August 21st, 2024

CLIMATE ACTIONKC

MARC Mid-America Regional Council

building energy exchange Kansas City

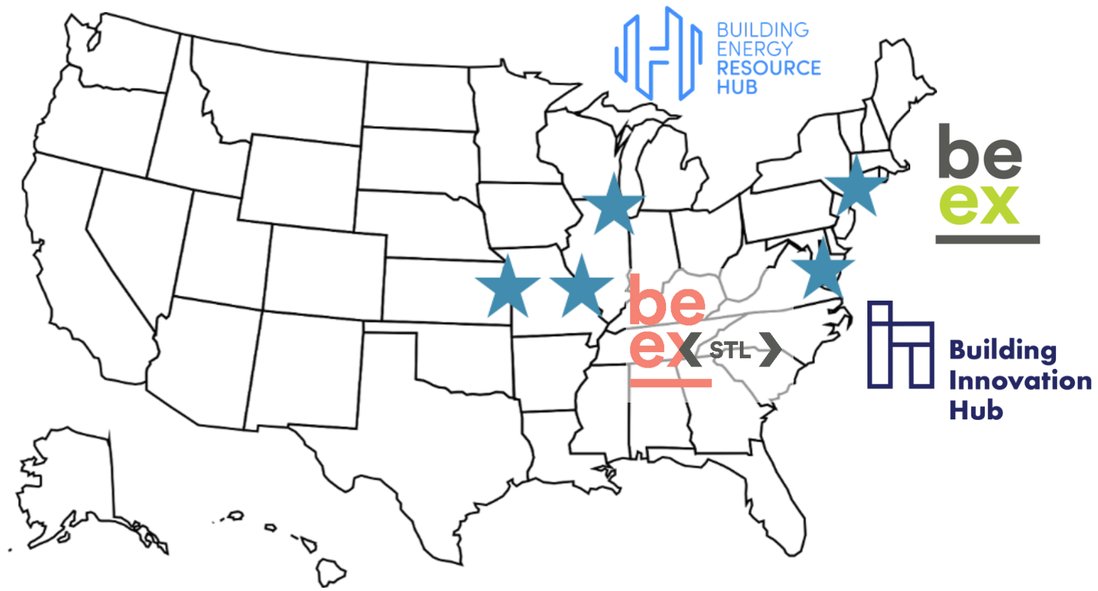
A nonprofit initiative between

MARC Mid-America Regional Council

CLIMATE ACTIONKC

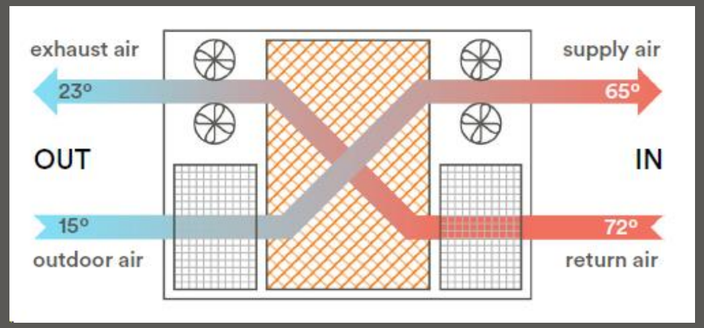
OUR SHARED VISION

Zero Barriers to Net Zero Energy



be ex KC

Defining **Net Zero Energy**



Use Less

Building Reuse
Right Size
Reduce Waste
Local, Durable Materials

Be Efficient

Passive Envelope
HVAC Systems
Transition to Electric

Offset

Renewable Energy
Carbon Sequestration

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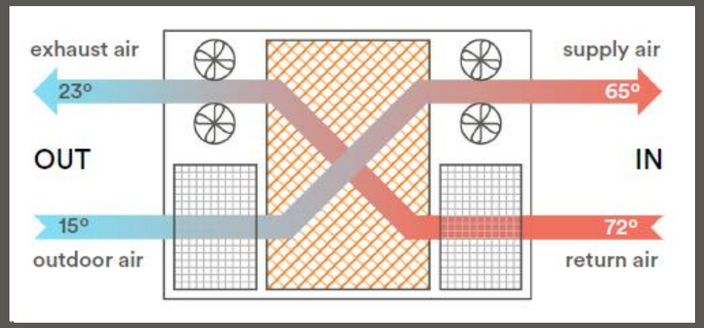
Defining **Net Zero Energy**



Use Less

Save on construction and operating costs

Preserve Historic Charm

Be Efficient

Lower Energy Bills

More Functional and Comfortable Spaces

Offset

Healthier Indoor Air Quality

Natural Beauty

Increase Productivity

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Path to Net Zero: **Existing Buildings**

Energy Audit is Step 1

Step 1 | **Energy Audit**

ASHRAE Level 1

- “Getting a Physical”
- Interviewing key personnel
- Reviewing utility bills
- Walk through on site and will identify glaring signs of inefficiency.
- Sets a baseline for current performance
- Good for prioritizing building improvements across a portfolio or pitching project to decision-makers

Step 1 | **Energy Audit**

ASHRAE Level 2

- Builds on Level 1 analysis with more detailed energy calculations.
- Building personnel are interviewed in more depth to give insights and help define project goals.
- Financial analysis: identifies projects that will provide greatest energy reduction and ROI
- RECOMMENDED LEVEL OF REVIEW
- ASHRAE Level 3: deeper analysis for large investments.

Step 1 | **Energy Audit**

Get your FREE ASHRAE Level 2 Audit!

- For industrial and commercial buildings
- See Midwest IAC website to see if your projects are eligible.
- DOE implementation grants available for manufacturers to subside construction costs.

SCAN ME

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Path to Net Zero: Existing Buildings

Building Blocks of a Retrofit Project

Low Hanging Fruit | Building Blocks

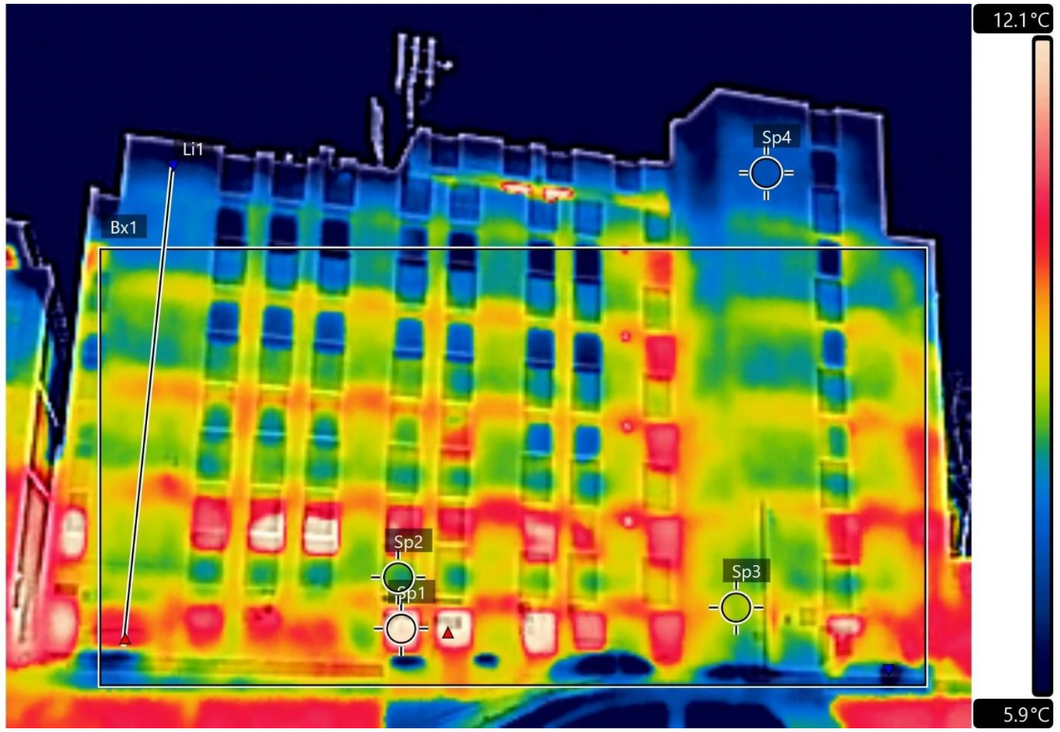
Lighting Retrofits

- Up to **75% savings** on lighting electricity
- Up to **50% savings** from controls like occupancy sensors, photosensors, and tuning.
- **Three options:** lamp & ballast replacement, fixture retrofit, fixture replacement.
- **Benefits:** GHG reduction, improved tenant experience, low cost, and low maintenance.

Low Hanging Fruit | Building Blocks

Weather Sealing

- Roof: look for holes, cracks, or seams with particular attention to roof penetrations for pipes, vents, etc.
- Look for gaps in insulation in the building envelope
- Insulate Pipes and Seal and Insulate Ductwork
- Seal air leaks in doors, windows, or other penetrations



Building Envelope | Building Blocks

High-Performance Roof Insulation

- Coinciding with repair/replacement of your roof, consider **upgrading roof insulation** along with improving other aspects of the building envelope.
- Add insulation above the roof deck and **adjust flashing** to accommodate additional thickness.
- Create a **cool roof** with a light coating and consider integration of **solar** or **green roof** features at this time.

Fig 3. Roof construction assembly with insulation above roof membrane.

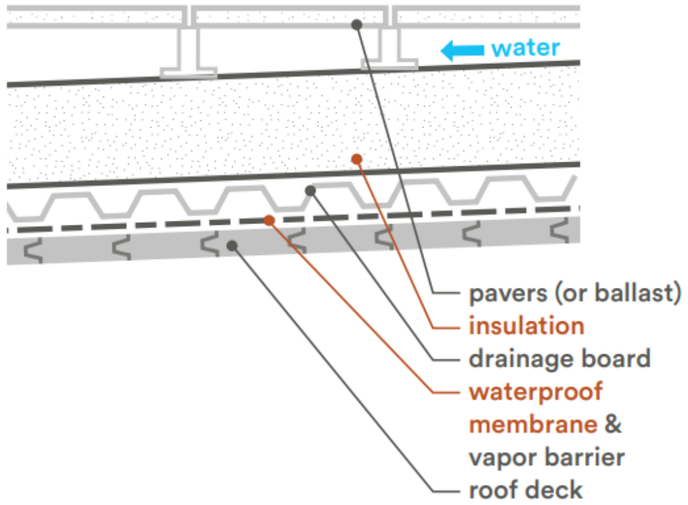
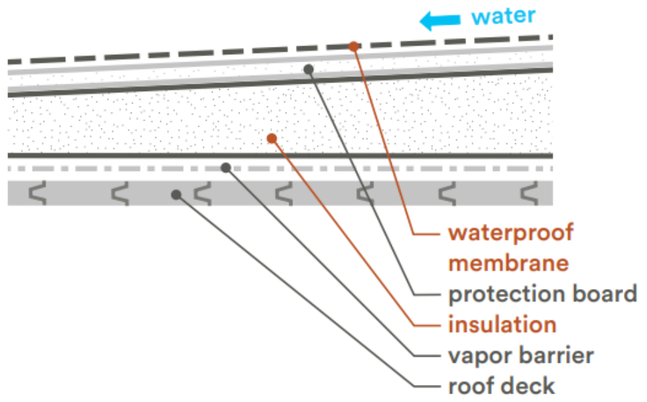


Fig 4. Roof construction assembly with insulation below roof membrane, commonly referred to as an inverted roof membrane assembly (IRMA).



Building Envelope | Building Blocks

Wall Insulation

- Coinciding with repair/replacement of exterior walls, additional wall insulation can be added on the exterior or interior surface
- Before insulating, confirm that the wall is not exposed to excess moisture and work with an architect to determine the need and/or location of a vapor barrier.
- Mitigate thermal bridges where walls meet floor where possible.

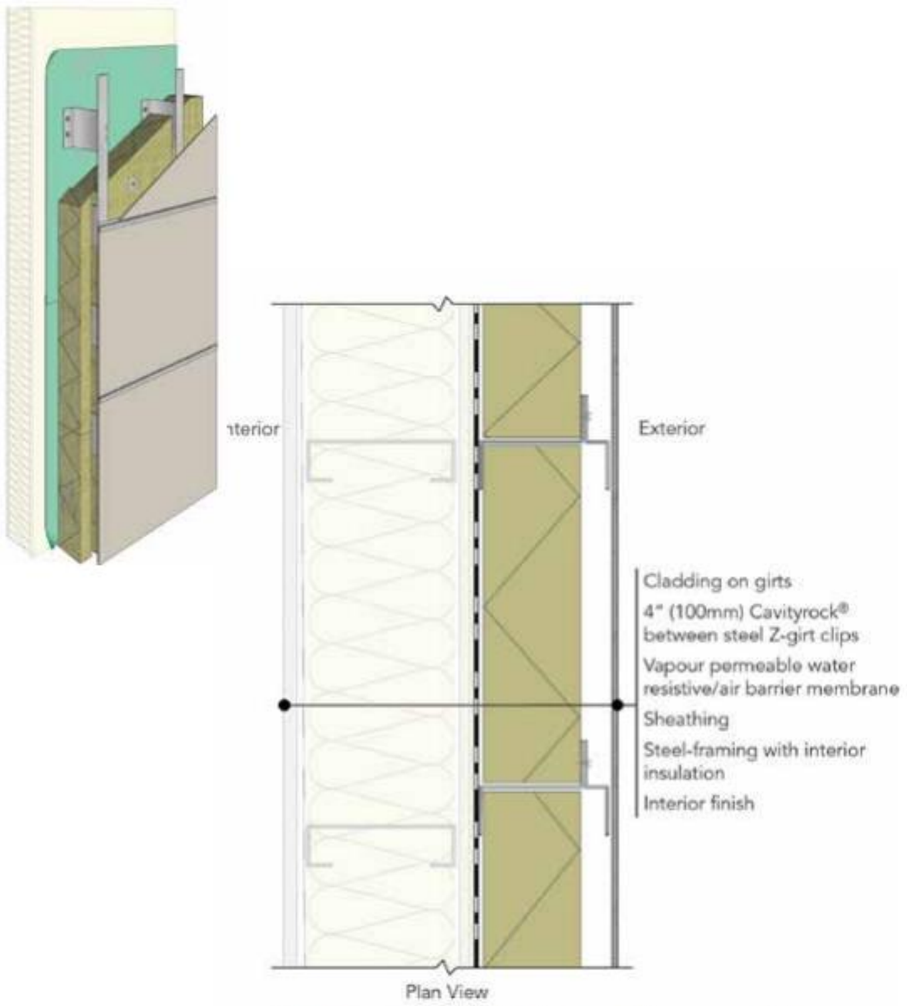


Figure 1: ROCKWOOL Cavityrock between a Z-girt clip system, installed over an existing steel stud wall

Building Envelope | Building Blocks

High-Performance Windows

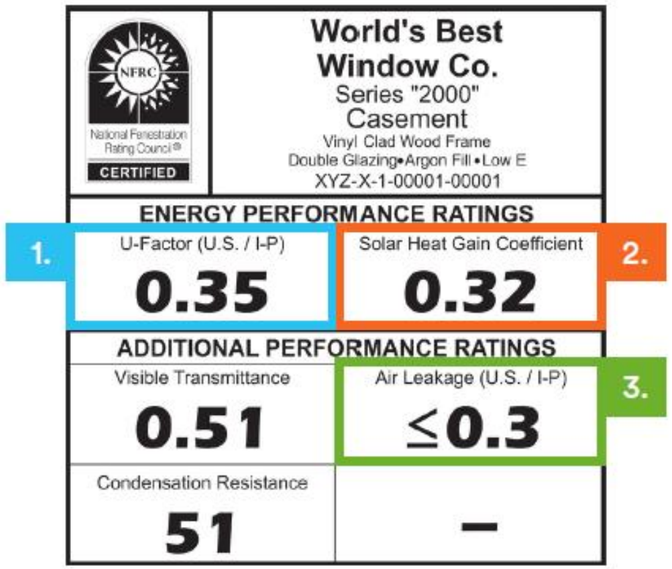
1. **U-Factor:** how quickly heat is conducted through the window, # = better ↓

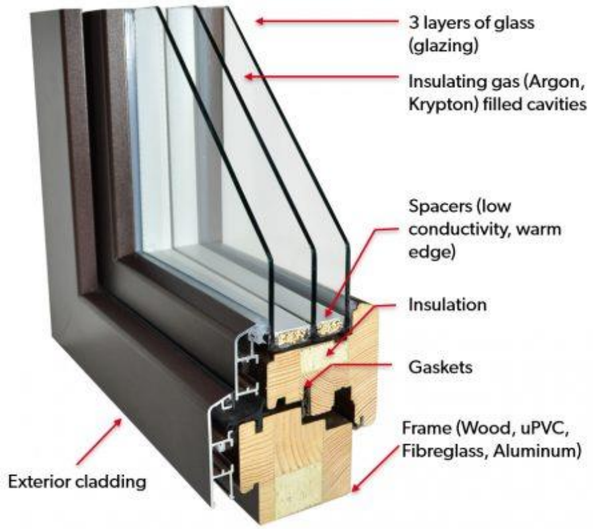
    1. Fiberglass recommended for low to mid-rise buildings and metal frames for higher rise with a rubber/plastic thermal break to interrupt the flow of heat.

2. **Solar Heat Gain Coefficient (SHGC):** window's capacity to allow or block solar radiation. Optimal value based on climate, orientation, and any external shading.

    1. i.e., south-facing windows want higher SHGC and increases passive survivability whereas west-facing want low SHGC and shading.

3. **Air Leakage:** # = better ↓





Technical Primers

www.be-exkc.org/resources

tech primer

LED lighting retrofits

Long lasting, highly efficient lighting upgrades that enhance building perform well-bei

tech overview

applicable building types
all buildings

when to implement
anytime

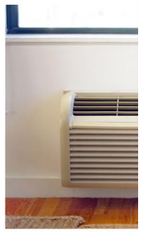
fast facts
- reduces GHG emissions
- improves light

Learn more at: be-exkc.org

tech primer

Packaged Terminal Heat Pumps (PTHPs)

Decentralized electric heating and cooling for multifamily buildings.



tech overview

applicable building types
multifamily; hotels

when to implement
equipment replacement; tenant turnover

fast facts
- reduces GHG emissions
- provides individual temperature control

Learn more at: be-exkc.org

tech primer

Mini-Split Systems

Highly efficient heat pumps for decentralized electric heating and cooling in multifamily buildings.

tech overview

applicable building types
all multifamily; hotels

when to implement
at equipment replacement

fast facts
- reduces GHG emissions
- improves comfort
- provides temperature and zoning control
- provides both heating and cooling
- offers design flexibility

costs & benefits*

GHG Savings

Tenant Experience Improvements

Utility Savings

Capital Costs

Maintenance Requirements

*ratings are based on system end use, see back cover for details.

Learn more at: be-exkc.org

APRIL 2022 1

tech primer

Air to Water Heat Pumps (AWHPs)

Highly efficient domestic hot water production that reduces emissions and ener

tech overview

applicable building types
hotels; hospitals; all multifamily

when to implement
anytime; at equipment replacement

fast facts
- reduces GHG emissions
- integrates with

tech primer

Point of Use (POU) Domestic Hot Water

Highly efficient on-demand domestic hot water that reduces emissions and mainte

tech overview

applicable building types
hotels; large commercial; institutional

when to implement
at equipment replacement; mid-cycle; refinancing

fast facts
- eliminates standby energy loss
- reduces GHG emissions

Learn more at: be-exkc.org

tech primer

Roof Insulation

High-performance roof insulation upgrades that improve the building envelope.

tech overview

applicable building types
all buildings

implementation
at time of roof replacement; mid-cycle; refinancing

fast facts
- improves acoustics
- improves building lifespan
- reduces heating and cooling loss
- enhances building performance

costs & benefits*

GHG Savings

Tenant Experience Improvements

Utility Savings

Capital Costs

Maintenance Requirements

*ratings are based on system end use, see back cover for details.

Learn more at: be-exkc.org

APRIL 2022 1

tech primer

High Perf... Windows

High perf windows comfort, costs, and

tech overview

Learn more at: be-exkc.org

tech primer

Enhanced Ventilation with Energy Recovery Ventilators (ERV)

Mechanical ventilation optimization for improved comfort and savings.

tech overview

applicable building types
all types

when to implement
refinancing

fast facts
- reduces GHG emissions
- improves air quality
- reduces heating and cooling loads
- reduces utility costs

costs & benefits*

Learn more at: be-exkc.org

SCAN ME

Next Steps

Reason 1! Builds out our case study library for us all to learn from each other.

Reason 2! Puts you on our mailing list and allows us to connect you to new sources of project capital including federal grants and lending products through the Greenhouse Gas Reduction Fund.

Wanna Chat? Reach out:
asadowski@be-exkc.org

be ex KC

SHARE YOUR PROJECTS!

WE WANT TO FEATURE

- Energy Retrofits
- High-Performance Design
- On-site Renewable Projects

Metropolitan
ENERGY CENTER

Advancing Building Performance

Metropolitan Energy Center

Metropolitan Energy Center

Dedicated to creating resource efficiency, environmental health, and economic vitality in the Kansas City region and beyond.

Kansas City area nonprofit since 1983

- 40+ years of energy efficiency

Building Performance

- Commercial and residential buildings: information & assistance
- Project Living Proof demo home in heart of KC

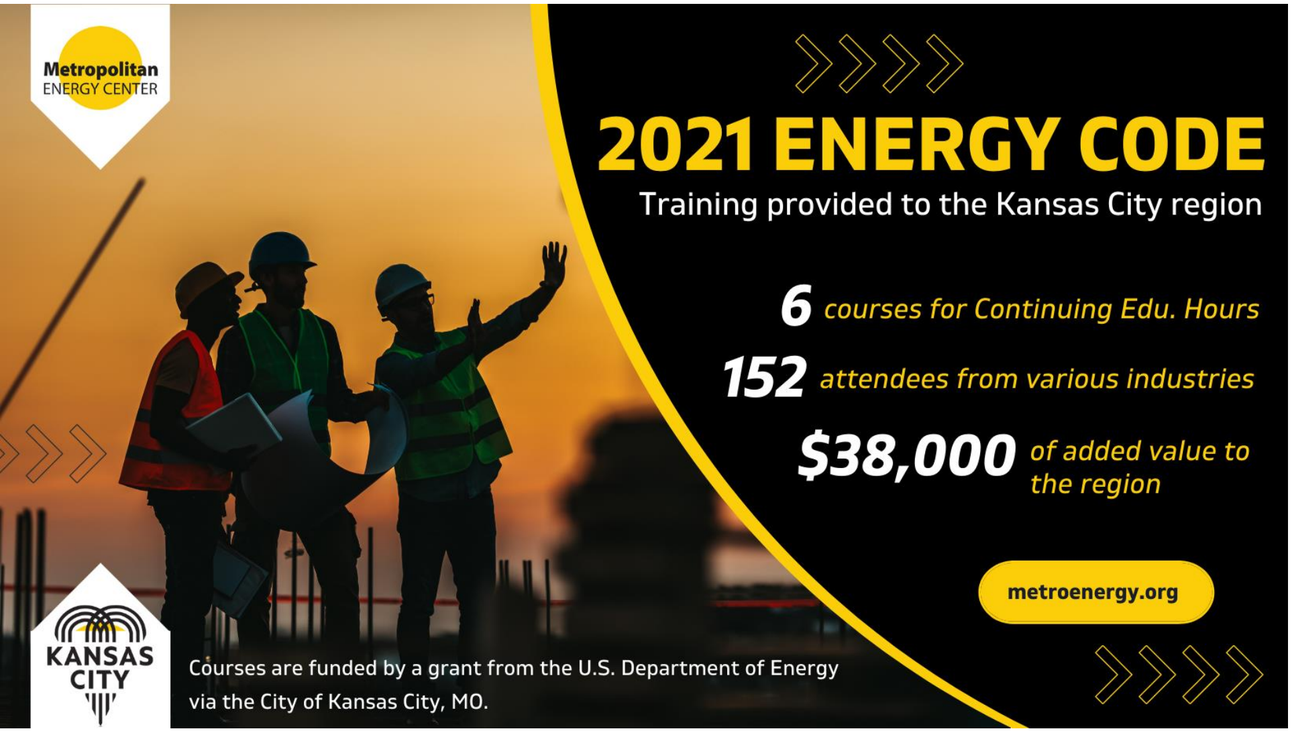
Sustainable Transportation

- Kansas City Regional Clean Cities - 1998
- Central Kansas Clean Cities - 2013

Energy Solutions Hub

- Provide information and support for healthy and sustainable buildings to all residents and businesses in the region.
- Represent new technology and best practices in the industry.
- Benchmarking and Energy Efficiency Best Practices Help Desk.
- New jobs training program launch with 30 partners over the next 3+ years.

*The Hub plays a critical role in **natural intersections** between energy efficiency, health, and equity.*



Energy Code Training to Building Officials and Contractors Since 2021

The Situation

OUR BUILT ENVIRONMENT NEEDS ENERGY UPGRADES

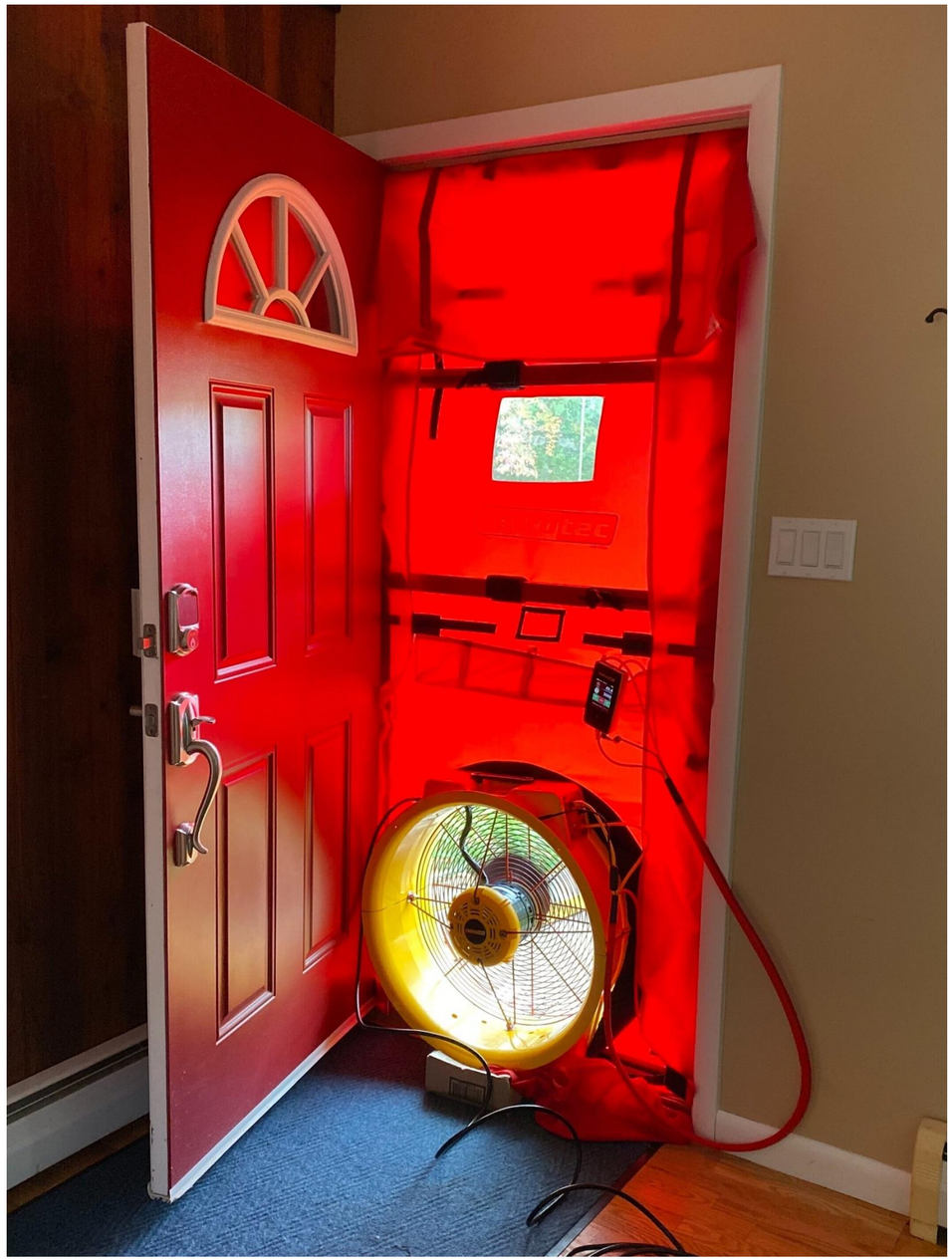
Building Science tells a story that people need to hear.

>> Gaps in the insulation in both walls and ceiling.

The health impact of lesser codes is being quantified by a growing number of studies in the field.

>> Black mold growth within walls can't be seen until it's very expensive to fix.

Supporting Best Building Practices through Labor Training



The Midwest Codes Collaborative Project 2024-2027:

- Industry needs energy efficiency professionals to support required testing and reporting.
- Justice40 Initiative focuses on recruiting from communities that have been left behind in past jobs training.

The Challenge

PROVIDING TRAINING ON POLICY RELATED SUBJECT MATTER…

…IN A REPUBLIC

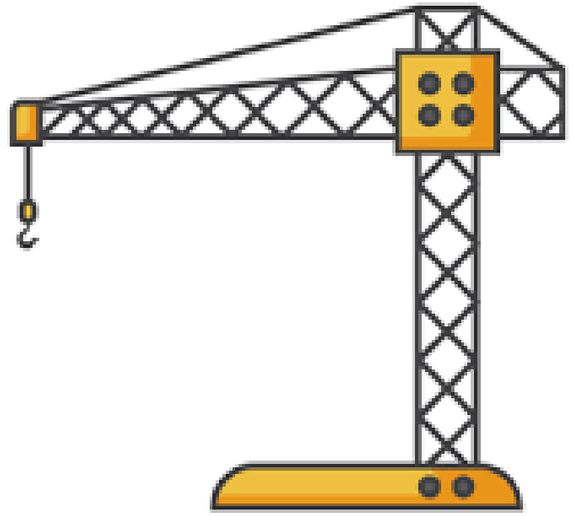
Systemic Challenges

New Construction:

- Incentivized to cut costs in design and build, not for lifetime of structure.
- New construction rules are governed by Home Rule (MO & KS).

Rental Properties:

- Majority of tenants pay the utility bills, i.e. landlords don't see – or feel – the problem.



Systemic Challenges

Passing Policy:

- One electoral body's treasure may be considered trash by the next.
- Policy review process can go at a snail's pace to ensure just law in enacted.
- Technology is ever changing.
- Federal spending to subsidize new technology implementation provides its own set of challenges.

In the Meantime…

- Extreme weather events are increasing.
- AI and other technology is impacting the jobs market.
- Affordable housing starts aren't keeping up with demand.

These are not problems we can ignore!

The What

- ❑ Program implementers need to be flexible.
- ❑ Community leaders need to be brought in early.
- ❑ Radical collaboration and transparency have to be standard operating procedure.
- ❑ One word: Education.

The How

- ❑ MEC staff specializes individually but each person has a back-up.
- ❑ Jobs training program has brought in new community-based organizations to help guide our work.
- ❑ Building Performance motto: "Collaborate, Don’t Duplicate."
    - ❑ 30 partners involved in the Jobs Training Program.
    - ❑ Educational programs include legislators and government staff.

Solutions:

What can we control?

Questions & Contact Info

Metropolitan ENERGY CENTER

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Become a Business Member

www.metroenergy.org

Support Cleaner Energy