



# Leading the Way on What Is Possible

## 2024 Annual Passive House Symposium

**Katherine Antos**

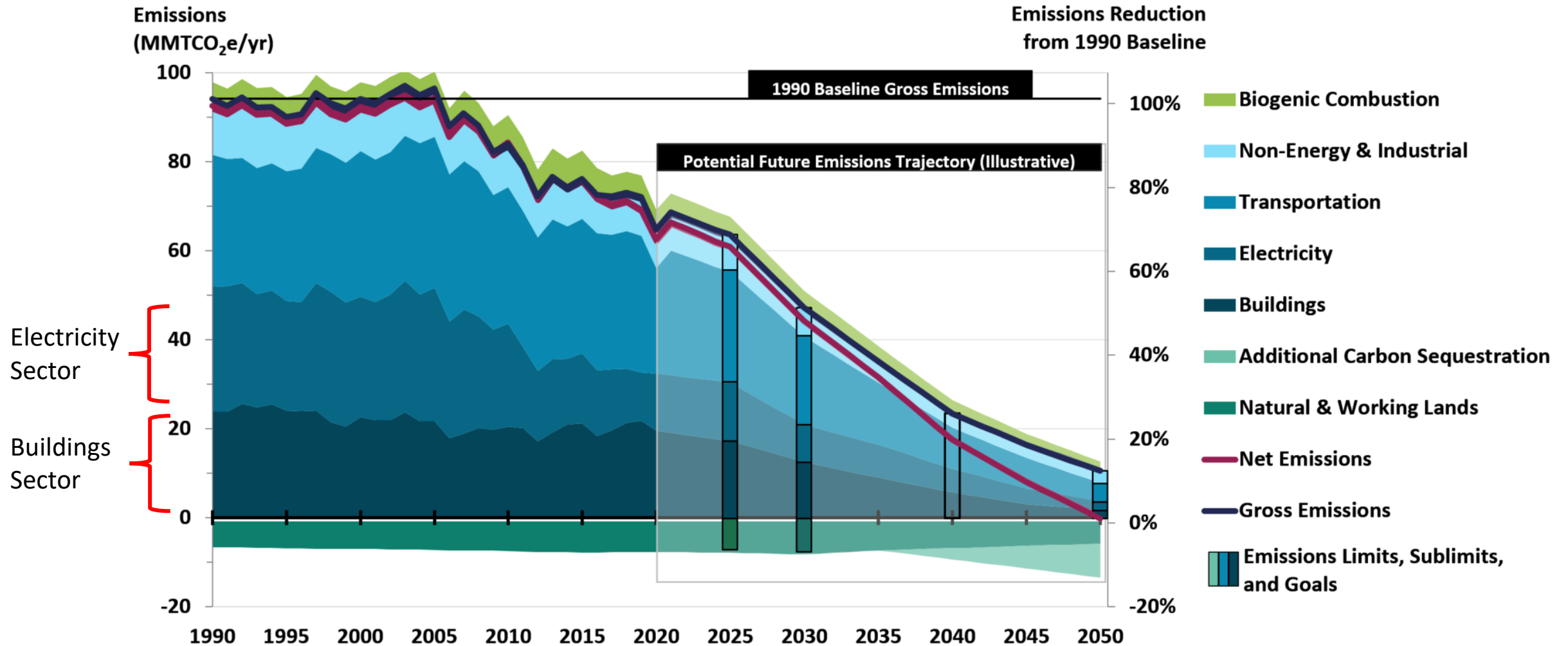
Undersecretary of Decarbonization and Adaptation  
MA Executive Office of Energy and Environmental Affairs



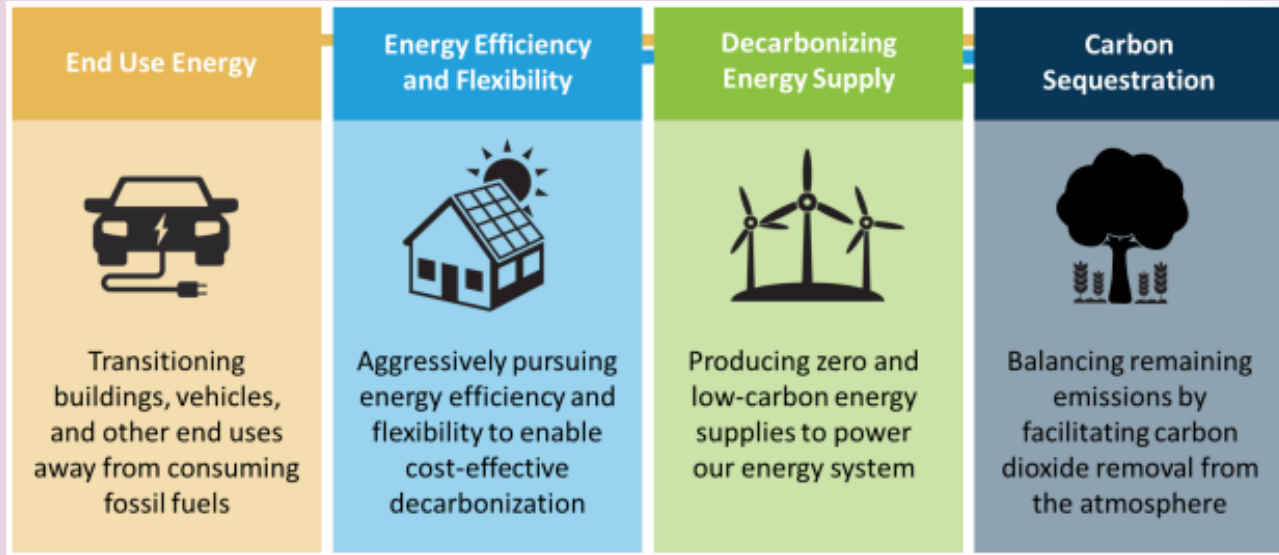


Massachusetts is  
taking a  
comprehensive  
approach to  
**CLIMATE CHANGE**

# Massachusetts' Path to Net Zero



# How We are Getting There



## 2050 CECP KEY BENCHMARKS

Achievement of the Commonwealth's greenhouse gas emissions limit of at least 85% below the 1990 baseline level and net-zero emissions in 2050

### TRANSPORTATION

**97%**

of light-duty vehicles (5 million) electrified

**93%**

of medium- and heavy-duty vehicles (over 350,000) electrified or non-emitting



### BUILDINGS

**80%**

of homes (over 2.8 million) heated and cooled by electric heat pumps (including those with on-site fuel backups)

**87%**

of commercial space is heated by either electricity or alternative fuels

### ELECTRIC POWER

**2.5-fold**

increase in electric load compared to 2020

**97%**

of electricity consumed is from clean and renewable sources



### NON-ENERGY AND INDUSTRIAL

**52%**

of industrial energy use electrified

**90%**

reduction in solid waste disposal

### NATURAL AND WORKING LANDS

**40%**

of lands and waters in MA permanently conserved

**64,400 acres**

of new riparian and urban tree cover



### JOB AND HEALTH BENEFITS

**65,000**

additional full-time jobs created from the clean energy transition

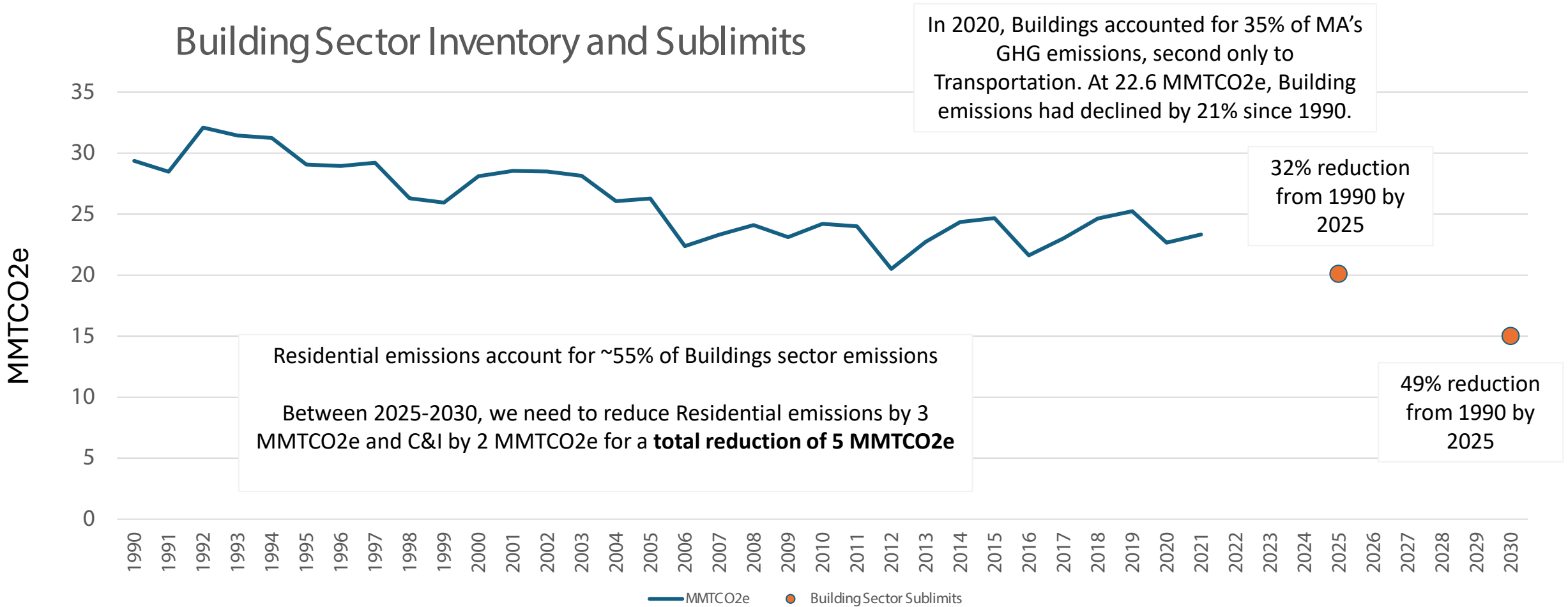
Up to **\$4.7 billion** in health benefits

Visit

<https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2050>

# Massachusetts Buildings Emissions Over Time

## Building Sector Inventory and Sublimits



# Building Blocks of **Success**

## Piloting Approaches

- MassCEC Passive House Design Challenge
- DOER Affordable Housing Decarbonization Grants

## Bringing to Scale

- Mass Save Passive House Incentive Program
- MassCEC, PHMA, Mass Save Workforce Development & Training

## Institutionalizing Change

- Incorporation into building codes – new construction
- Building Performance Standards – existing buildings



# Passive House Design Challenge



- Launched in 2017
- \$1.7 million demonstration program
- Up to \$4,000 per unit incentive
- 8 Affordable Projects: 540 Units



## Demonstration Results:

Passive House multifamily new construction can be built today in MA with very low incremental cost and significant comfort and energy benefits.

# Affordable Housing Decarbonization Grants

- \$90 million in total funding
  - \$50 million awarded to date
  - 14 projects, 5 seeking Passive House Certification
  - Over 1,300 affordable housing units to be decarbonized
- Awards of \$40,000 per unit to affordable housing projects that perform;
  - Deep energy retrofit
  - Electrification
  - On-site renewable
- Third round open now, applications due January 31st
- Technical Assistance Program
  - No-cost support for affordable housing decarbonization
  - Affordable housing will receive decarbonization scoping and design assessments
  - Will enable application for grant opportunities
  - To be launched in January 2025



Hano Homes, Passive House Retrofit Project

# Mass Save **Passive House** Incentive Program



Leyland Community  
Dorchester MA  
Davis Square Architects



Glen Brook Way  
Medway MA  
Meander Studio Collaborative



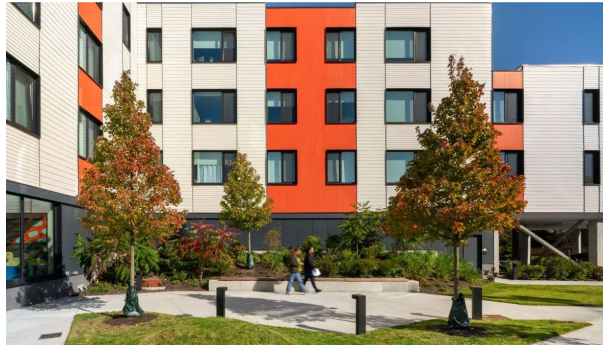
McElwain Apartments  
Bridgewater MA  
Prellwitz Chilinski Associates



11 E. Lenox Street  
Boston MA  
Haycon Construction



Walnut Street Building 2  
Foxborough MA



1005 Broadway  
Chelsea MA  
Utile, Inc



The Loop at Mattapan Station  
Boston MA  
The Architectural Team



Hillside Center for Sustainability  
Newburyport MA  
Hall & Moskow



JJ Carroll Redevelopment  
Boston MA  
MASS Design Group

to date (November 2024)

**20,661 units** have enrolled in the program



# Mass Save® incentives for Passive House Multi-Family



July 1, 2024 Program Changes:

- **New electrification requirements to qualify for incentives**
- Must utilize all-electric equipment for space conditioning, ventilation, oven/cooktop, and clothes drying
- Can use fossil-fuel hot water heating, though no incentives for this equipment.
- **Incentives increase to \$3,750/unit**

Incentive	How to Participate	Eligibility	Training
<b>Passive House Incentive Structure for Multi-Family (5 units or more)</b>			
Incentive Timing	Activity	Incentive Amount	Max. Incentive
Pre-Construction	Feasibility Study	Up to 100% Feasibility costs	\$5,000
	Energy Modeling	75% of Energy Modeling costs	\$500/unit, max. \$20,000
	Pre-Certification	\$750/unit	N/A
Post-Construction	Certification	\$3,000/unit	

# Incentivizing **Passive House** in Massachusetts

Building Type	Fuel Type	Stretch Code	Specialized Code
<b>New Multi-Family</b>  4+ stories & >12,000 sf	<b>All Electric</b>	HERS 45 or TEDI or <b>Passive House</b>	<b>Passive House</b>
	<b>Mixed Fuel</b>	HERS 42 or TEDI or <b>Passive House</b>	<b>Passive House</b> + wiring for electrification

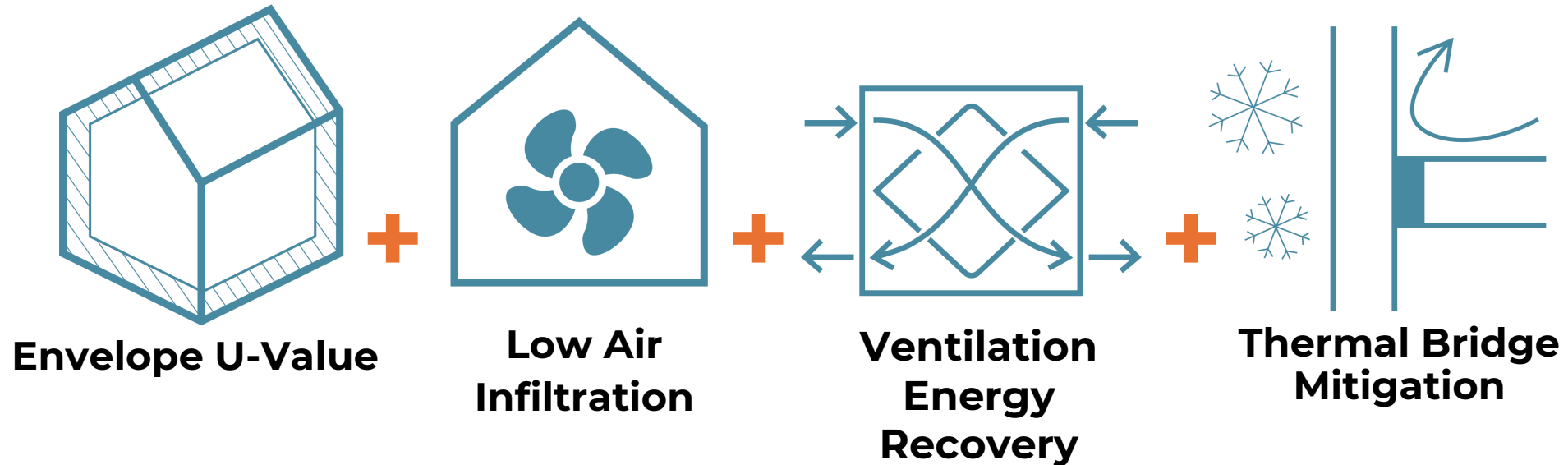


Incentive structure for  
Multi-Family (5 units or more)

- \$5,000 : Feasibility study
- \$500/unit : Energy modeling
- \$750/unit : Pre-Certification
- \$3,000/unit : Certification

# Massachusetts **Thermal** Code

**Four Pillars** based on Passive House



**=** **energy efficiency**, comfort, **resilience** & grid-friendly electrification

# Massachusetts Thermal Code

**Base Code**  
IECC 2021 w/  
modest  
amendments

**50** municipalities

New construction,  
Major Alterations  
+ Additions

**Stretch Code**  
IECC 2021 w/  
**key** amendments

New construction

**Specialized Code**  
IECC 2021 w/  
**key** amendments  
+  
Passive House  
(multifamily > 12,000 sf)  
+  
All-electric or  
Net-Zero or  
Electric-ready + Solar

**253** municipalities

**48** municipalities

## Where can you find the codes?

**MA Building Code** = CMR 780 10th Edition

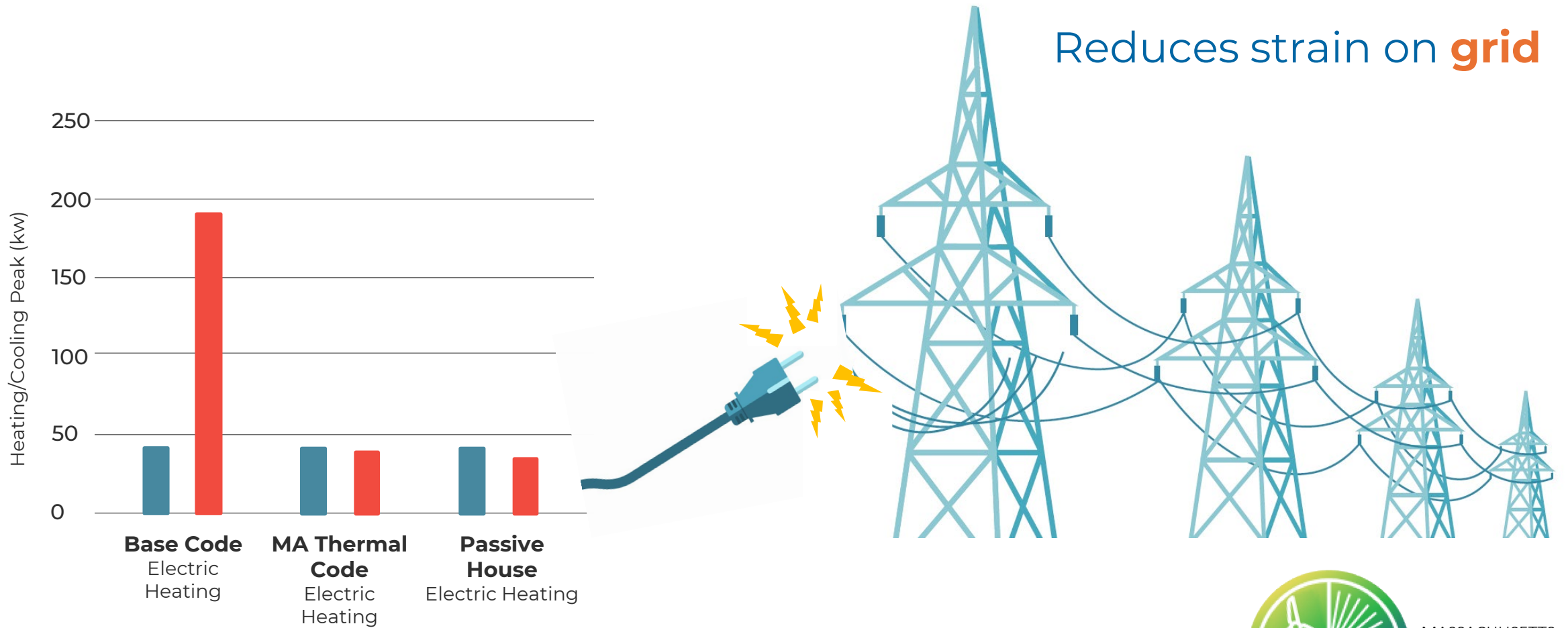
**Base Code** = IECC 2021 w/ MA amendments  
*Find these amendments in:*  
780 CMR Chapter 11R (residential)  
780 CMR Chapter 13 (commercial)

**Stretch Code** = IECC 2021 w/ MA amendments  
*Find these amendments in:*  
225 CMR Chapter 22 (residential)  
225 CMR Chapter 23 (commercial)

**Specialized Code** = IECC 2021 w/ MA amendments  
*Find these amendments in:*  
225 CMR Chapter 22 + Appendix RC (residential)  
225 CMR Chapter 23 + Appendix CC (commercial)

While national model energy codes focus on reduction of total energy.....

# the Massachusetts **Thermal Code crushes heating loads**



Example Load on Electric Grid due to Heating/Cooling in a school

# Massachusetts Thermal Code

91% of MA by population

Stretch Code

Specialized Code

Base Code

<9% MA population

61% MA population

30% MA population

## Who benefits from a thermal code?

### **Residents/Tenants:**

**Equity** – affordable comfort for multi-family tenants – typically renters

**Health** – mitigates extreme heat and cold, noise and high indoor air quality

### **Owners:**

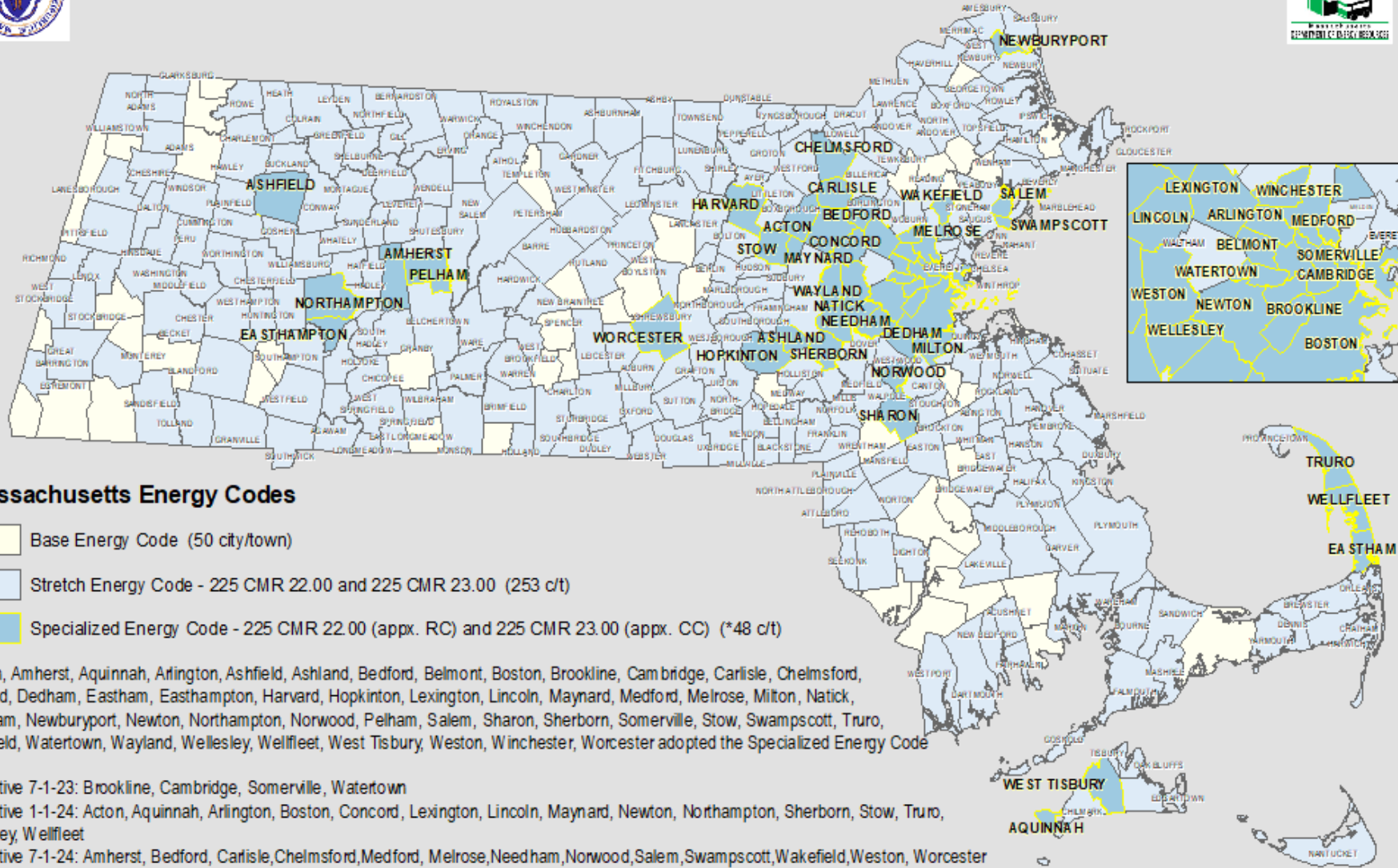
**Economics** – high tenant retention, low utility costs, low maintenance

### **Ratepayers:**

**Electric Grid** - Avoided peak summer & winter demand even while fully electrified



# Massachusetts Building Energy Code Adoption by Municipality

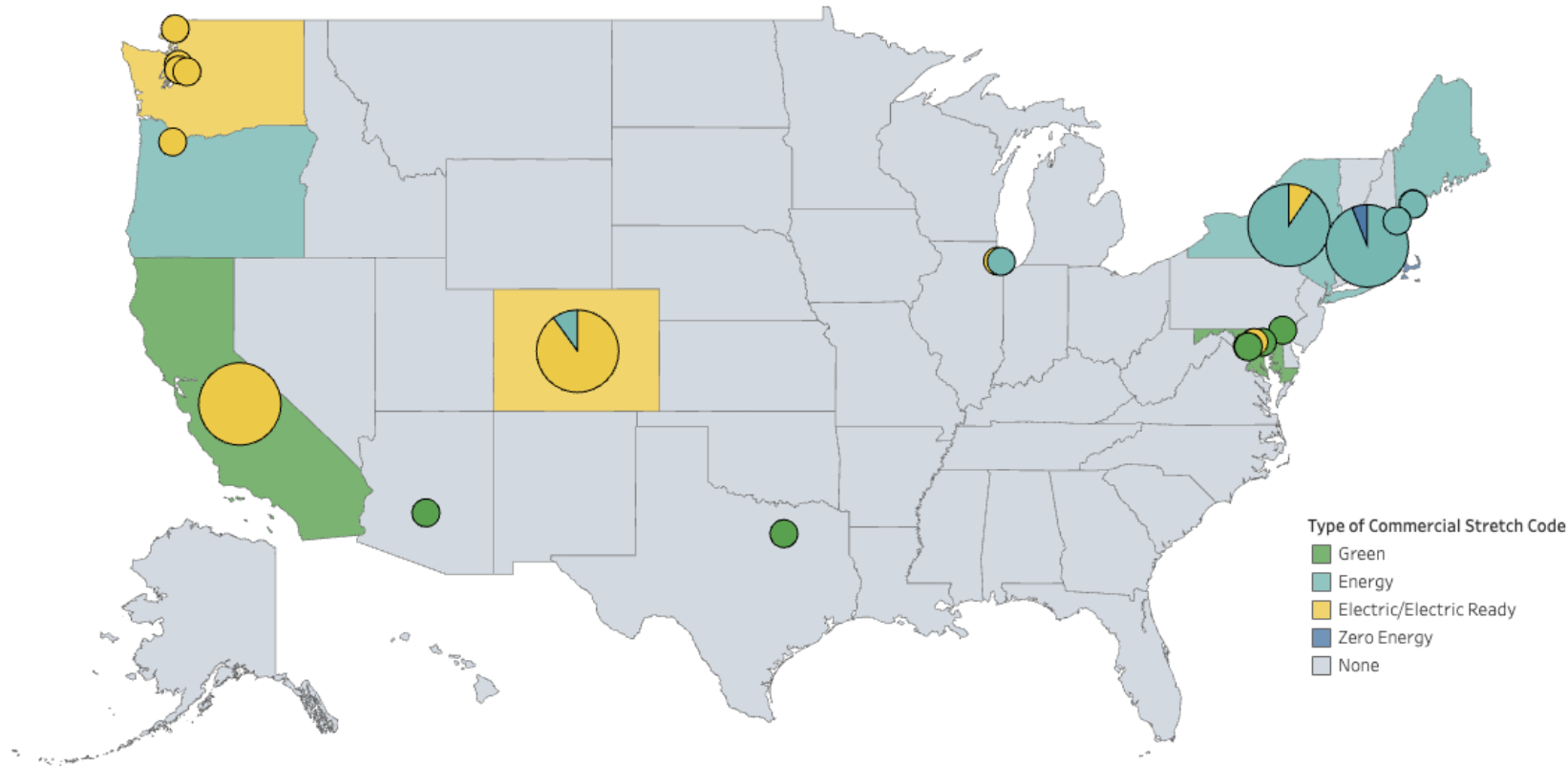


The Climate Act 2021 commits Massachusetts to achieving **Net Zero emissions by 2050**

Our **Cities and Towns** are responding to the opportunity

- \* Acton, Amherst, Aquinnah, Arlington, Ashfield, Ashland, Bedford, Belmont, Boston, Brookline, Cambridge, Carlisle, Chelmsford, Concord, Dedham, Eastham, Easthampton, Harvard, Hopkinton, Lexington, Lincoln, Maynard, Medford, Melrose, Milton, Natick, Needham, Newburyport, Newton, Northampton, Norwood, Pelham, Salem, Sharon, Sherborn, Somerville, Stow, Swampscott, Truro, Wakefield, Watertown, Wayland, Wellesley, Wellfleet, West Tisbury, Weston, Winchester, Worcester adopted the Specialized Energy Code
- Effective 7-1-23: Brookline, Cambridge, Somerville, Watertown
- Effective 1-1-24: Acton, Aquinnah, Arlington, Boston, Concord, Lexington, Lincoln, Maynard, Newton, Northampton, Sherborn, Stow, Truro, Wellesley, Wellfleet
- Effective 7-1-24: Amherst, Bedford, Carlisle, Chelmsford, Medford, Melrose, Needham, Norwood, Salem, Swampscott, Wakefield, Weston, Worcester
- Effective 1-1-25: Ashfield, Ashland, Belmont, Dedham, Eastham, Easthampton, Harvard, Hopkinton, Milton, Sharon, Wayland, West Tisbury
- Effective 7-1-25: Natick, Newburyport, Pelham (9-1-25), Winchester

# Commercial Stretch Code **Adoption**



The **Specialized Code** leads the nation as the **first Zero Energy Stretch code**

Less apparent:

The **Stretch Code** also leads the nation as the **first 'thermal' code**

# Passive House Education Grant

## The Challenge

Hundreds of building professionals will be trying to achieve Passive House for the first time. Therefore, it is essential to share lessons learned and educational content from early Passive House projects with building professionals.

## MassCEC Goal

Educate general contractors, architects, and engineers on Passive House approaches and certification.

## MassCEC Approach

Provide a \$1 million grant to Passive House Massachusetts to test mentoring and education models and support teams trying to achieve Passive House certification.

Lessons from early successful projects like Maple on Franklin in Holbrook can help passive house novices achieve certification at lower cost.



## ANTICIPATED RESULTS ACROSS THE PROGRAM

Deliver \$1 million in educational support and staffing



1,740 new participants



35 virtual and in-person training and events



150 firms connected to Passive House trainings



# MassCEC's funding will **educate building professionals** by:

- Identifying best practices and methods of avoiding common pitfalls to reduce the cost of achieving Passive House certification
- Improving and developing new educational resources
- Delivering events, resources, and programs that engage architects, engineers and contractors
- Driving equitable building performance improvements with special focus on affordable and public housing

## Potential co-benefits



Cost savings for project owners



Increases in likelihood of code compliance



Creation of a community of learning



Sets example for other states to follow

# Building Performance Exchange



## The Challenge

Stakeholders working to decarbonize larger buildings do not have centralized information and shared lessons for how commercial buildings might approach getting to zero emissions over time.

## MassCEC Goal

Educate and upskill general contractors, architects, energy consultants and engineers using the model of building energy exchange hubs in NYC, Washington DC, St. Louis, Kansas City and more

## MassCEC Approach

Provide a \$4 million grant over four-year period to Built Environment Plus (BE+) to expand programming and training related to retrofits of existing commercial and multifamily buildings. **The Exchange will launch in early 2025.**



# Funding will educate building professionals by:

- Delivering educational resources that support stakeholder compliance with building emission standards
- Creating events, resources, and programs that engage and upskill architectural, engineering, and contractor audience on retrofit knowledge
- Directing teams to relevant MassSave, State, Municipal, and federal financial resources and programs
- Driving equitable building performance improvements with special focus on the affordable housing sector and building owners with small real estate holdings



Preservation of Affordable Housing's Salem Heights Apartments recently completed a deep energy retrofit. (Photo Credit: LISCS).

# Thank You!



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