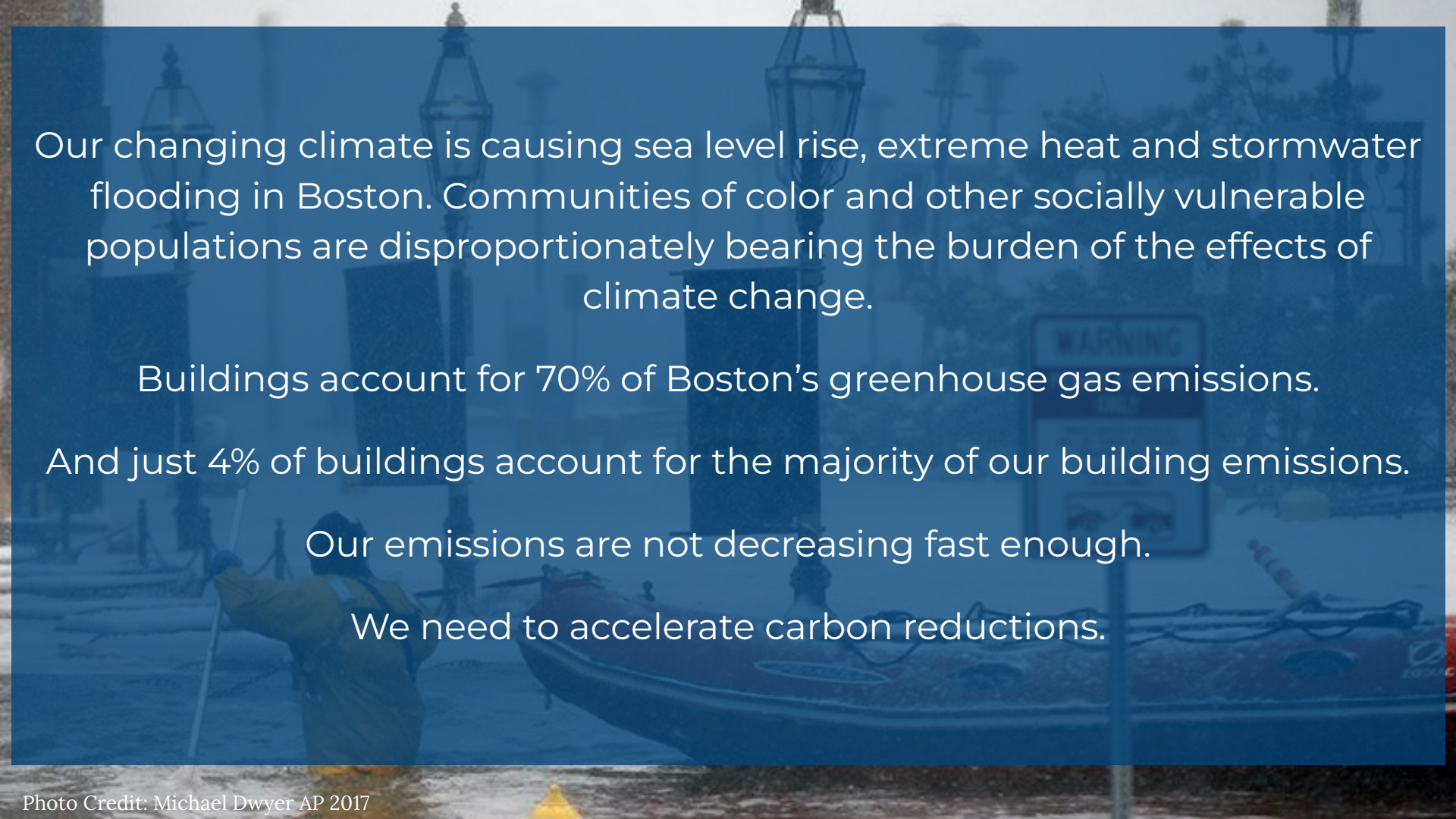


# Decarbonizing Boston's Existing Affordable Housing

*June 21, 2022*

**B**



Our changing climate is causing sea level rise, extreme heat and stormwater flooding in Boston. Communities of color and other socially vulnerable populations are disproportionately bearing the burden of the effects of climate change.

Buildings account for 70% of Boston's greenhouse gas emissions.

And just 4% of buildings account for the majority of our building emissions.

Our emissions are not decreasing fast enough.

We need to accelerate carbon reductions.



# What will it take to decarbonize existing affordable housing?

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**85%**

*of floorspace that will exist in 2050 has already been built.*

**80%**

*of buildings will need to undergo deep energy retrofits and electrification by 2050.*



# BUILDING RETROFITS CAN CREATE...



## BETTER BUILDINGS FOR RESIDENTS

Building rehabs can improve comfort levels and indoor air quality, help lower energy use and bills, and support resilience.



## QUALITY JOBS FOR WORKERS

Retrofitting Boston's buildings will create high-quality construction, energy efficiency and clean energy job opportunities for workers.



## HEALTHIER CLIMATE FOR EVERYONE

By making Boston's buildings carbon neutral, we will reduce our largest contribution to global climate change and make our city more resilient.

# Our strategic approach to retrofits is likely to follow two paths...

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## Not BERDO

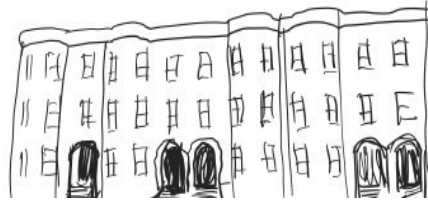
## BERDO



Two family



Triple Decker



12 packs



Row houses

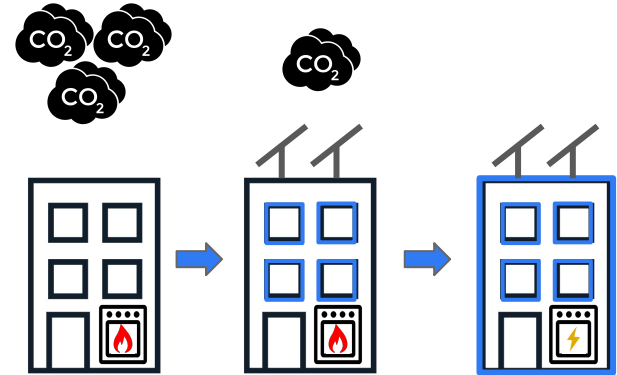


Larger apartment buildings

# Building Emissions Reduction and Disclosure Ordinance

A building performance standard that sets carbon targets for existing large buildings, which decrease over time. A performance standard:

- Directly targets our largest source of emissions;
- Sets long planning horizons;
- Provides flexibility in how buildings meet targets and when they make investments.



# BERDO 2.0 Policy Elements

- 20,000+ sq ft or 15+ units
- Many pathways to achieve targets:
  - *Energy efficiency*
  - *Electrification and fuel switching*
  - *Renewable energy*
  - *Alternative compliance payments*
- Additional flexibility:
  - *Portfolio*
  - *Individual compliance schedule*
  - *Hardship compliance plan*
- Review Board
- Equitable Emissions Investment Fund

Default targets by building type

Building type	Emissions threshold (kgCO <sub>2</sub> e/SF)					
	2025	2030	2035	2040	2045	2050
Assembly	7.8	4.6	3.3	2.1	1.1	0.0
College/University	10.2	5.3	3.8	2.5	1.2	0.0
Education	3.9	2.4	1.8	1.2	0.6	0.0
Food Sales & Service	17.4	10.9	8.0	5.4	2.7	0.0
Healthcare	15.4	10.0	7.4	4.9	2.4	0.0
Lodging	5.8	3.7	2.7	1.8	0.9	0.0
Manufacturing/Industrial	23.9	15.3	10.9	6.7	3.2	0.0
Multifamily housing	4.1	2.4	1.8	1.1	0.6	0.0
Office	5.3	3.2	2.4	1.6	0.8	0.0
Retail	7.1	3.4	2.4	1.5	0.7	0.0
Services	7.5	4.5	3.3	2.2	1.1	0.0
Storage	5.4	2.8	1.8	1.0	0.4	0.0
Technology/Science	19.2	11.1	7.8	5.1	2.5	0.0

## Flexibility measures under BERDO for larger buildings

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- **Portfolios:** owners with more than one covered building may apply to comply across their portfolio.
- **Individual compliance schedules:** buildings or portfolios may submit their own individual compliance plan for approval, which must be aligned with citywide emissions goals.
- **Hardship compliance plans:** buildings or portfolios with unique building characteristics or circumstances that present a hardship in complying with the standard (e.g., affordable housing refinancing timelines, historic designation, financial hardship, existing long-term energy contracts without reopeners) would be eligible to apply for a hardship compliance plan.



# A Boston Climate Bank is a timely response that can access new sources of funding, unlock private climate investment, and support economic recovery

Why?

## BOSTON CLIMATE BANK

How?



A Boston Climate Bank can **accelerate climate action** by **filling financing gaps**, while targeting other goals and **boosting economic recovery**

- ✓ Unlock **additional private investment** and **public co-financing**, esp. federal funding
- ✓ Support investment into **additional critical climate areas** in the future, such as resilience
- ✓ Align support for climate investments with **other city priorities**, esp. affordable housing
- ✓ Invest in the city's future and **create new, green jobs**
- ✓ Greater **flexibility** for financing tools and **more private leverage** compared to fund models



A Boston Climate Bank could be the **timely institutional response** dedicated to **mobilising investment** in identified markets

- ✓ Use financing tools that **enable and attract** greater levels of public & private investment
- ✓ Make **projects affordable and accessible** and **address market barriers**
- ✓ **Flexibly design** and implement interventions and **invest smartly**
- ✓ **Bridge the gap** between institutional capital and project investments
- ✓ Centralise expertise to produce **innovative transaction structures** and market expertise

## Questions we're asking about larger, deed-restricted buildings:

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- How much are different affordable housing owners already prioritizing decarbonization in long-term capital planning?
- Are there advantages to taking a portfolio approach?
- What are the realistic cost premiums compared to a typical rehab project? (How to define “typical” with so much variance?)
- How can new City resources for decarbonization be integrated into existing financing options for rehab projects?

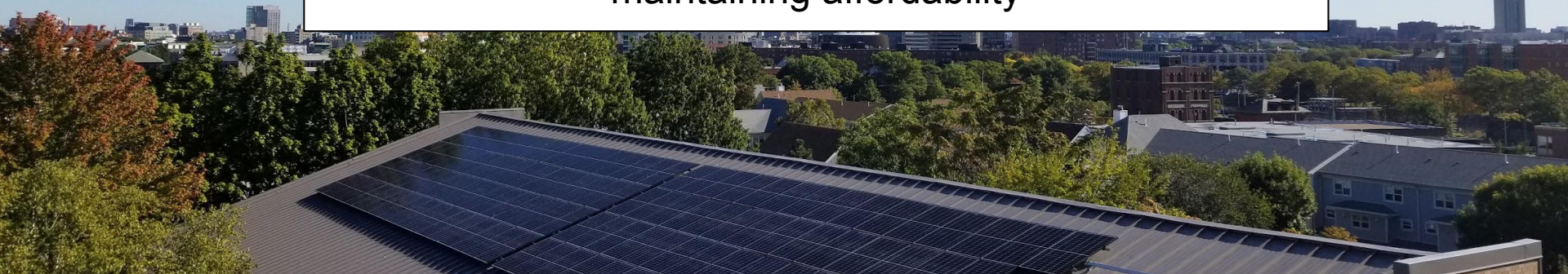
## BOSTON'S AMERICAN RESCUE PLAN

Federal stimulus funds from the American Rescue Plan Act (ARPA) represent a once-in-a-generation opportunity to transform our City's future, lay a foundation for Boston's Green New Deal and recover from the COVID-19 pandemic. These federal funds have been a vital resource for our city and will support an equitable recovery in the years to come.

## PROPOSED TRANSFORMATIVE INVESTMENTS

**\$206M** in unprecedented funding for  
affordable housing

**\$20M** for a nation-leading pilot for energy retrofits in  
triple deckers and other multi-family homes while  
maintaining affordability



## Different types of affordable housing require varied approaches.

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### Deed-restricted affordable housing

vs.

### Naturally occurring affordable housing

- Existing protections for long-term affordability
- Displacement risk is minimized
- Complex financing scenarios

- No guarantee of long-term affordability
- Wider range of building typologies
- More varied ownership arrangements

Since 2016, Boston's Acquisition Opportunity Program has focused on supporting developers to acquire "NOAH" properties and permanently deed restrict them. This program is an important building block for the deep green energy retrofit work.



## **Where we are now in our approach to “non-BERDO” housing:**

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We understand:      the scope of the challenge;  
(broadly)              the landscape in Boston;  
                                 the goal.

We have underwriters, technical experts,  
designers, and a strong mandate to act.

**How do we get projects started quickly?**

## **Questions we're asking about naturally-occurring affordable housing:**

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- How can the City bring owners to the table for decarbonization?
- Can we increase the inventory of deed-restricted housing?
- What is the best structure to administer ARPA dollars in compliance with the rules and timeline while reaching the maximum number of units?
- With such varied typologies, what can we generalize about the approach to decarbonization?
- How will we protect against displacement and rent increases as energy retrofits are performed?

**THANK YOU**





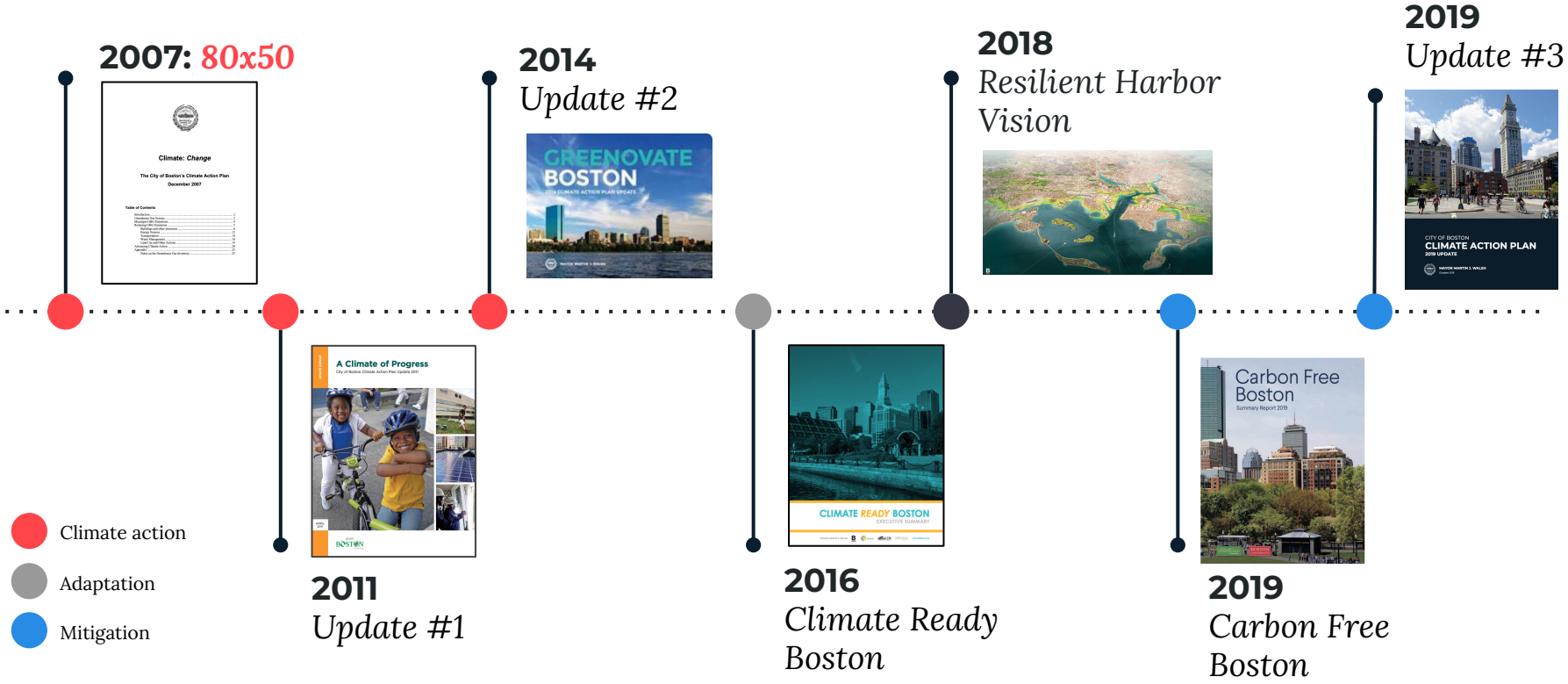
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# How Else are We Greening Boston?

A blue-tinted photograph of a park in Boston. In the center, a large, leafy tree stands next to a statue of a man in a long coat on a stone pedestal. The background shows classical buildings with arched windows and columns. The overall scene is lush and green, with a blue overlay.



# A HISTORY OF CLIMATE PLANNING AND ACTION



# A History of Partnership: Department of Neighborhood Development Green Building Programs



152-156 Highland  
Street



36-38 Colonial  
Avenue



Wensley  
Street/Fisher Avenue



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**Step 1: Achieving zero net carbon in new-construction affordable housing**

**Step 2: Achieving zero net carbon in existing affordable housing**

# What will it take to achieve zero net carbon for new construction?

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City of **Boston** - Department of  
Neighborhood  
Development

**2020**

guidebook for **Zero Emission Buildings (ZEBs)**



# What will it take to achieve zero net carbon for new construction?

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**Zero Emission Buildings** are possible now.

They are **not expensive** to build.

*Our case studies of zero emission buildings show that the total construction cost increase is 2.5% or less before rebates. After rebates, buildings are potentially less expensive than standard construction.*

They **reduce energy usage (EUI)** 30-100%.

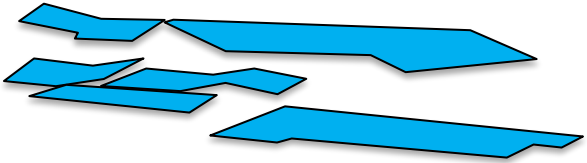
# Our modeling favored a “portfolio” approach to achieving ZNC

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# Our modeling favored a “portfolio” approach to achieving ZNC

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Energy Produced @  
75% of roof coverage:  
2,501,769 KWH



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Projected Number of  
Residents: 1,390



1,800 kWh  
Per Person  
OR  
0.717  
tons/CO<sub>2</sub>e  
Per Person



# 5 key attributes of ZNC buildings & 4 key recommendations

## Attributes



## Recommendations

1. *Electric fuel source/ Onsite PV*
2. *Air-sealing*
3. *Window: wall ratio*
4. *Window Performance*

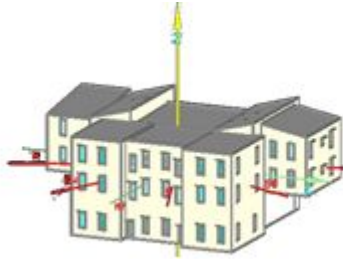


# 4 building typologies with specific recommendations

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*Small 3-story  
Multifamily*



*Large 3-story  
Multifamily*



*4 - 5-story  
Multifamily*



*6+story  
Multifamily*

# Cost-effective set of specs for achieving zero net carbon



## case study - results

Components	Stretch Code 2019	<b>Zero Emission Building</b>
Window U-value	0.3	<b>0.22 min.</b>
Window SHGC	no requirement	<b>0.3 min.</b>
Window/Wall ratio	no requirement	<b>11%</b>
Air-tightness (CFM <sub>50</sub> )	0.27 (3ACH)	<b>0.06 min.</b>
Heat Recovery %	no requirement	<b>57% min.</b>
DHW systems	gas hot water	<b>electric resistance</b>
Heating Systems	heat pump w/ boiler	<b>heat pump no fossil fuels</b>
Roof R-value	R-49	<b>R-60 min.</b>
Walls R-value	R-26	<b>R-36 min.</b>
Floor R-value	R-10	<b>R-21 min.</b>
PV 75% roof area	no requirement	<b>25 Kw</b>
Incremental Construction Cost	0%	<b>0.88% increase</b>
Incremental Operational Cost	0%	<b>20% decrease</b>

# Boston's low-carbon affordable housing pipeline is coming online

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*The Kenzi – Passive House certified; construction completion in 2023*

