MASSACHUSETTS BUILDING CONGRESS

City of Boston Planning Department Update

April 2, 2025

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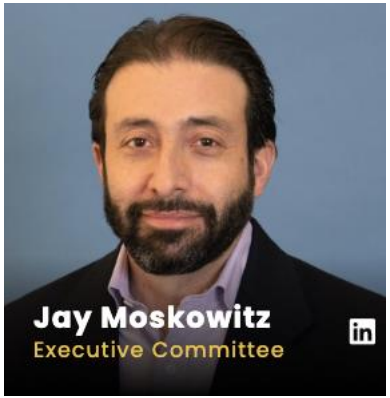

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Net Zero Carbon Zoning

Massachusetts Building Congress - April 2, 2025

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Today's Agenda

1. **Priorities and Goals**

2. **NZC Zoning Summary + Implementation**
   a. NZC Zoning Summary
   b. Implementation Overview

3. **Questions**

Priorities and Goals

Building the forward path

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Net Zero Carbon Zoning - Goals

Affordability, Resilience and Equity

- Net Zero Carbon zoning leads the transition to a low carbon future for both operational energy and building materials.
- Strengthens the City's goal of reducing carbon emissions across the building sector by ensuring new buildings are powered by renewable energy both on and off site.
- Net Zero Carbon will align with Article 80 modernization by creating efficient green building design review processes, expectations and standards.
- The City's adoption of the specialized energy code sets the performance standard for Net Zero Ready buildings

Net Zero Carbon Zoning - Goals

- Net Zero Carbon Zoning works in conjunction with BERDO; a building that is Net Zero Ready under the zoning is a Net Zero Carbon Compliant building under BERDO
- Holds new construction in Boston to the highest standard
- Makes progress on Boston's greenhouse gas reduction goals
- Meaningful benefit but small cost

How is the City complying with its own buildings?

- Fossil fuel free new buildings Executive Order signed in 2023 goes beyond specialized stretch code
- Installing first geothermal for City project with intention for additional deployment
- 2.3 MW of solar installed on City property
- Actively pursuing renewable energy supply contracts with target for 100% renewable electricity by 2030.

Citywide impact

Existing buildings account for nearly **70% of our community's carbon emissions.**

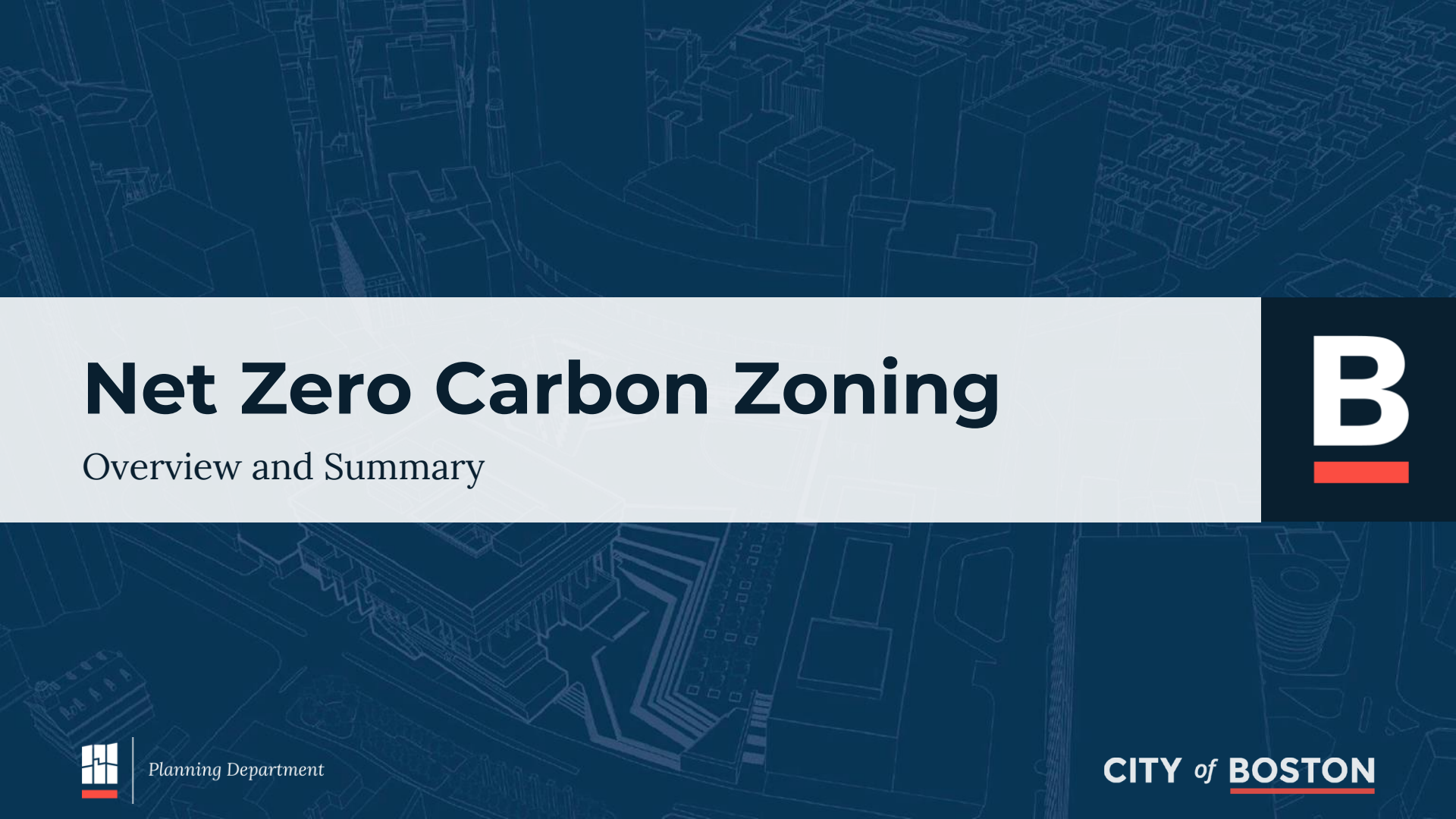
If NZC zoning had been in place in 2023, the equivalent of 0.58% of annual Boston-wide GHG emissions would have been avoided.

- 2023 Article 80 large project filings* totaled an estimated 35,271 annual metric tons CO2e.
- This is approximately the same as all of Boston's GHG emissions from waste.

**Large projects are 50,000 GSF or greater and report modeled annual carbon emissions via Article 37 review*
NOTE: The estimated annual CO2e does not include the Massachusetts Class 1 RPS

Net Zero Carbon Zoning

Overview and Summary



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Net-Zero Carbon Zoning - Article 37

1. Requires **net zero operational emissions upon opening**
    a. Phased in for Hospital, General Manufacturing, and Lab uses
        i. New Hospital and General Manufacturing will be net zero in 2045
        ii. New Lab will be net zero in 2035
2. Requires **reporting on embodied carbon** (emissions from materials/construction)
    a. Operational carbon reduces over time whereas embodied carbon does not
3. Continues **LEED certifiable** requirement (no change from current Article 37)
4. Applies to **new buildings with 15+ units or 20,000+ SF and additions of 50,000 SF**.

NZC Zoning exemptions

Net Zero Carbon Zoning **does not** apply to:

- ➔ Renovations
- ➔ Additions < 50,000 gsf
- ➔ Change of Use

Compared to constructing a new building of similar size, large-scale adaptive reuse projects combined with energy efficiency upgrades have the potential to significantly reduce carbon emissions.

Image: 259-267 Summer St.
Office to Resi pilot program

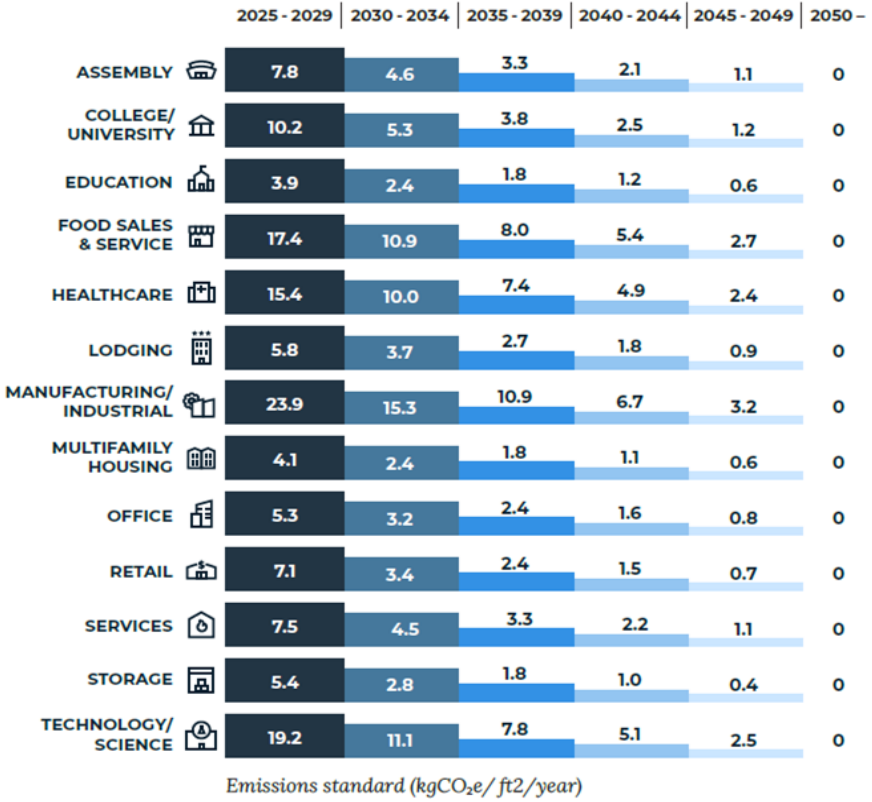
Net-Zero Carbon Zoning - Timing

Starting July 1, 2025: New project filings will be required to meet Net Zero Carbon emissions standard

Once a building is constructed and in operation, compliance with net-zero emissions will be demonstrated through
BERDO compliance mechanisms and annual reporting.

NZC Zoning is based on BERDO

- Background: BERDO requires existing buildings to decrease emissions over time and achieve net zero emissions by 2050.
- **Net Zero Zoning will require new buildings to be Net Zero Ready** or for, high intensity uses, accelerate their emissions reductions in comparison to BERDO.
- Once in **operation** a new building will need to **demonstrate net zero compliance** under BERDO.
- Net Zero Zoning will use **BERDO to track compliance**



NZC Zoning accelerates the BERDO net-zero year for new buildings.

Most building types will open with net zero emissions
(e.g. Multifamily, Office, Assembly, Schools, Retail, University, Lodging)

2025	→	2025
0		0

Emissions standard (kgCO2e/ ft2/year)

Three building types have a longer timeline

Industrial Manufacturing

2025	→	2045
15.3		0

Emissions standard (kgCO2e/ ft2/year)

Healthcare

2025	→	2045
10		0

Emissions standard (kgCO2e/ ft2/year)

Technology Science Labs

2025	→	2035
5.1		0

Emissions standard (kgCO2e/ ft2/year)

How can a building be net-zero emissions under BERDO?

Compliance with emissions limits set under NZC zoning will be demonstrated annually through the Building Emissions Reduction and Disclosure Ordinance (BERDO).

Reduce direct building emissions

For a new building, this means designing an energy efficient, low-carbon building.

Install renewable energy systems

Typically, rooftop solar.

Purchase eligible renewable energy

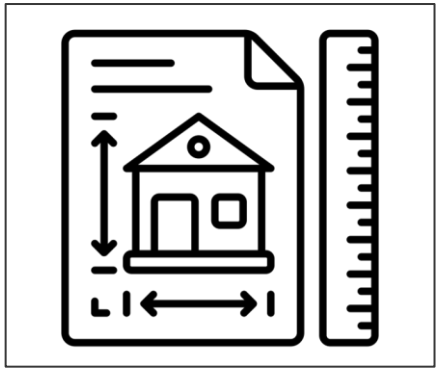
Purchase eligible renewable energy to reduce emissions from electricity only.

Make Alternative Compliance Payments (ACPs)

Payments go into the Equitable Emissions Investment Fund support building decarbonization projects that prioritize benefits to Environmental Justice communities in Boston. ACPs are set at $234/ton of CO_2.

Example timeline

Planning



NZC ZONING

Step 1 - Submit PNF - July 15th, 2025

Includes; Streamlined Checklist, Energy Code Pathway, LEED checklist (Large Projects only) and preliminary Energy Model

*Step 2 - Board approval- Q2, 2026

Includes; Net Zero Carbon Acknowledgement Letter

Step 3 - Building Permit- Q4, 2026

Includes; Embodied carbon analysis (Large Projects), updated Energy model, Climate Resilience Checklist, LEED checklist - as needed

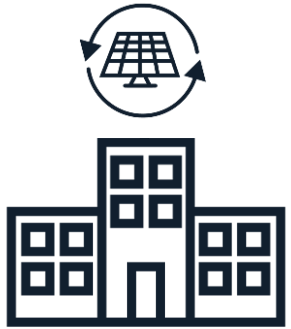
Step 4 - Construction Complete- Q1, 2028

Includes; Final Energy model, Climate Resilience Checklist, LEED checklist, BERDO ID number established

**Note: Key project Milestones will align with Article 80 modernization.*

Example timeline

Operation



Net Zero Operations

Step 5 - Certificate of Occupancy - Q1, 2028

Renewable Energy Service Begins

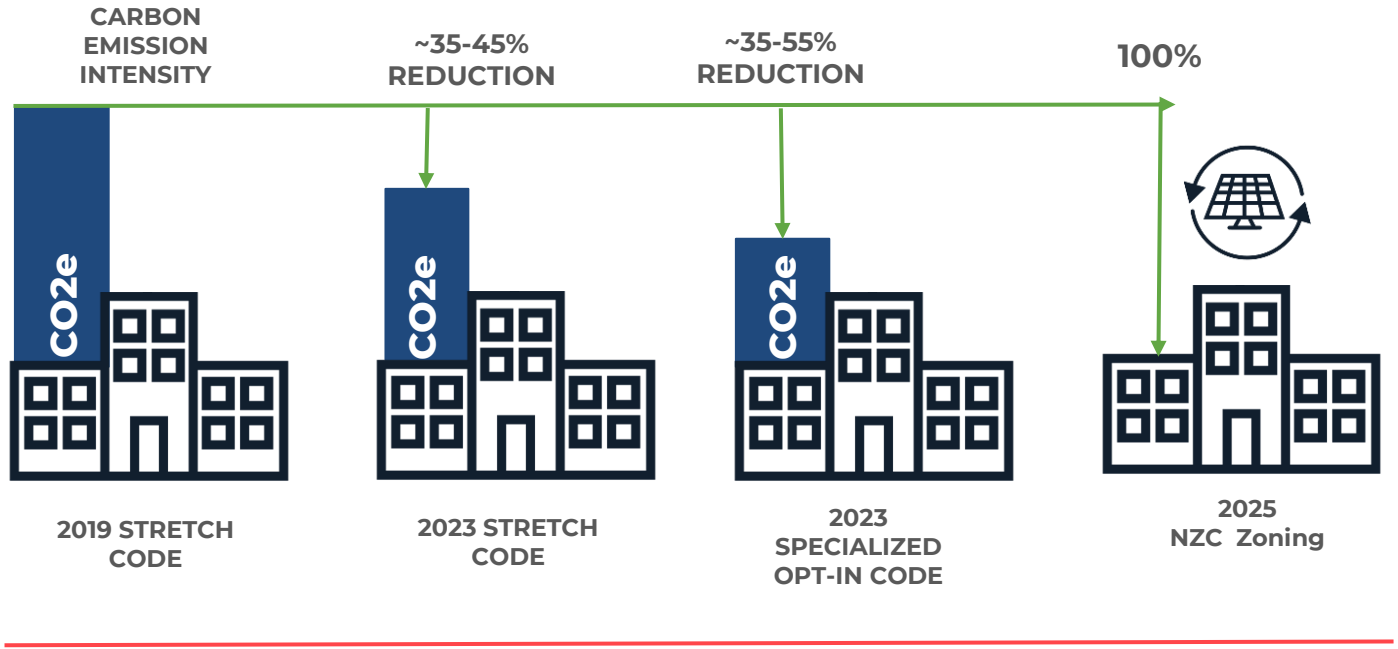
Step 6 - Project Reports Net Zero Compliance via BERDO - May 15, 2030

Annual reporting and compliance through BERDO is required for the first full calendar year of operations (2029 data) following issuance of COO. Third party data verification is also required this year.

Step 7 - Annual BERDO reporting and compliance 2030 onward

Building-level impact

Net Zero Carbon Zoning captures the remaining 45%-65% net-emissions associated with new buildings operations when compared to the 2019 stretch code.



Source: Energy Modeling Analysis Summary ZNC Zoning vs. 2023 Stretch Code, BR+A Engineers

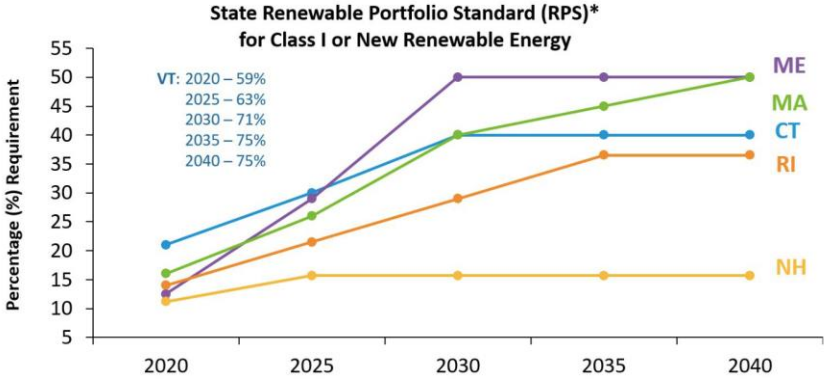
Embodied carbon impact

- Embodied carbon emissions would be tracked and reduced. **We do not have embodied carbon data for Boston**. Currently, embodied carbon is not accounted for in Article 80 review, and is also not accounted for in the City's greenhouse gas inventory.
- What are other cities doing on embodied carbon?
  - Case study from Vancouver (new office building) showed a **45% reduction** with strategies that address embodied carbon: mass timber, building reuse, low carbon concrete.
  - **City of Vancouver** established embodied carbon benchmarking in 2023. Starting in 2025, Vancouver has proposed:
    - **10% embodied carbon reduction target** against baseline
    - 5% embodied carbon reduction target against baseline with industry leadership credits

Source: https://vancouver.ca/files/cov/proposed-embodied-carbon-requirements-vancouver-building-by-law-2025.pdf

Increased renewable energy in the grid reduces compliance costs.

- The Massachusetts Class I Renewable Portfolio Standard (RPS) **increases by 3%** each year between **2025-2029 (27%-39%)** and by **1% each year thereafter.**
- The Massachusetts Renewable Energy Portfolio Standard (RPS) requires retail electricity suppliers to obtain a minimum percentage of their electricity from renewable energy sources.
- **Moving forward projects will benefit from the Massachusetts RPS in their Net Zero compliance reporting under BERDO**



Source: NE-ISO Newswire

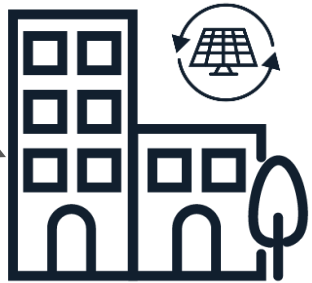
Estimated Compliance Costs Decrease overtime

600,000 kWh

(RPS in 2030 = 40%)

$14,400
Estimated Cost in 2030

2030



First Full Year of Operation
NZC Compliant

20% Reduced Grid Emission per current RPS Requirements

$9,600
Estimated Cost in 2050

2050

(RPS in 2050 = 60%)

Estimates are based on modeled data, RECs at $40 MWh, and 2024 Boston Community Choice Electricity Supply Rates

Residential: Estimated Range of Costs

$0-$220 Per unit

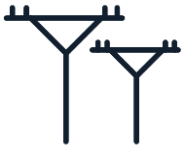
Mass Class I RECs

Estimated Cost in 2025

2025

Affordable Housing

20% Reduced Grid Emission per current RPS Requirements



$0-$170 Per unit

Mass Class I RECs

Estimated Cost in 2040

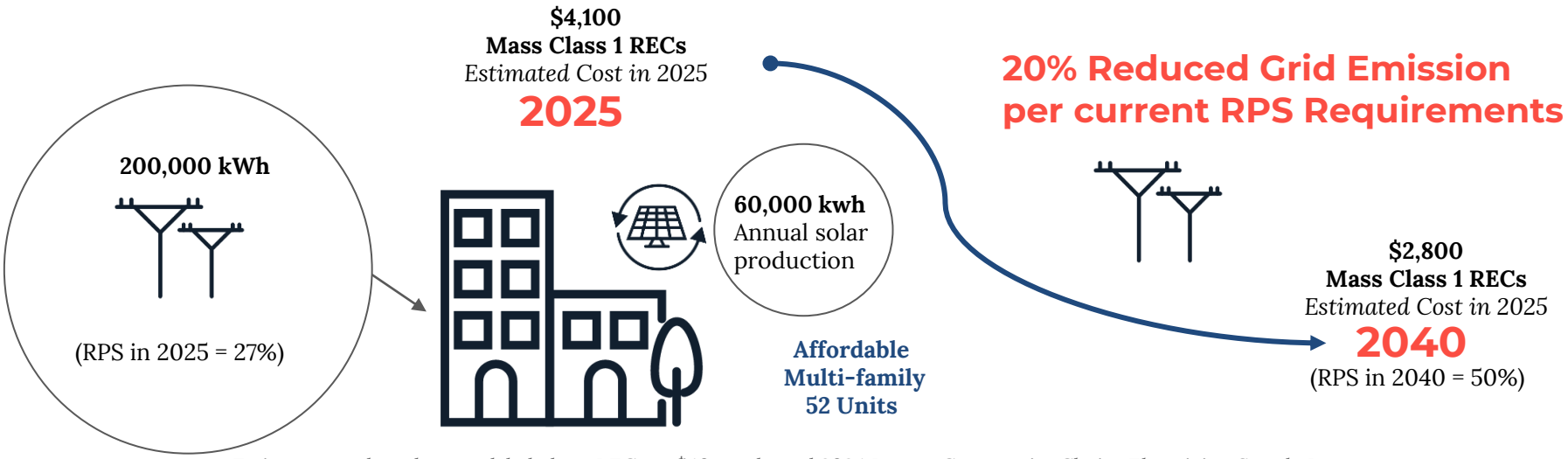
2040

(RPS in 2040 = 50%)

- Electricity cost estimates for supply (BCCE Standard Rate) and delivery (Eversource Delivery Rate) range from $0 to ~$685,000 in 2025 depending on the size and scale of the building (15 units - 300+ units).
- Additional renewable energy increases these costs by 0-8%.

Estimates are based on modeled data, RECs at $40 MWh, and 2024 Boston Community Choice Electricity Supply Rates and Eversource residential delivery rates

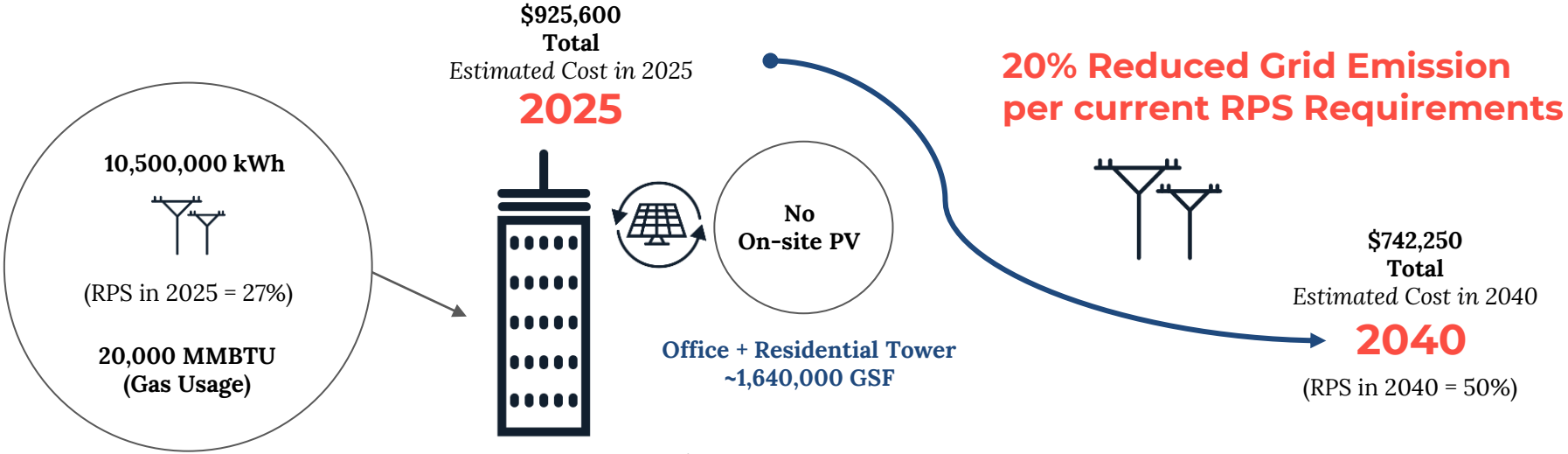
Residential example 1: cost projections



Estimates are based on modeled data, RECs at $40 MWh, and 2024 Boston Community Choice Electricity Supply Rates

Project Example	**Key Features**	**BCCE Green 100 additional compliance cost (w/ PV)** *Average 1st year cost*	**Mass Class I REC compliance cost additional (w/ PV)** *Average 1st year cost*	**Estimated annual electric supply + delivery costs without renewables (No PV)** *Based on BCCE standard rate + Eversource Delivery rate*
Affordable multi-family (50 units), ~48,000 SF	Passive House, PV installed (50kW), Battery Backup, all electric	+ ~$2,500 ($48 per unit)	+~$4,100 ($78 per unit)	~$68,000

Commercial Example 1: Office / Residential Tower



Estimates are based on modeled data, RECs at $40 MWh, and 2024 Boston Community Choice Electricity Supply Rates

Project Example	**Key Features**	**Mass Class 1 Recs** *Average 1st year cost* *Emission Limit = 0*	**Alternative Compliance Payments** *Average 1st year cost* *Assumes $234 per metric ton of CO2e*	**Estimated annual energy costs** *Before renewables and ACPs*
Residential/ Office Tower	Passive House Electric + Fossil Fuel onsite	~$306,600 ($0.18 /SF)	~$629,000 ($0.38 /SF)	~$2,125,500 ($1.29 /SF)

The City will help with renewable energy procurement

- **Existing Resources**
  - Renewable Energy Request for Information - Includes vendors who offer renewable energy products and services to make it easier to find a vendor.
  - BERDO Renewable Energy Quick Guide
  - BERDO webinars on renewable energy

- **Resources and support under development**
  - Improvements to reporting of BCCE in BERDO
  - Evaluate raising BCCE supply cap to include larger accounts (1.5M kWh/year)
  - Exploration of bulk procurement for renewable energy (RECs, PPA, etc.)
  - Additional technical assistance and engagement on renewable energy market and procurement

Feedback and City response

1. Renewable energy procurement new and complex for some building owners, particularly affordable housing. Technical assistance and procurement support from the City is needed. **City will provide technical assistance and procurement support.**
2. Cost estimates for affordable housing are small, but all costs are critical. **City will continue to factor in all development costs for affordable housing.**
3. Developers need to understand NZC zoning fits into BERDO is important to planning. **BERDO compliance, including hardship, applies to NZC zoning-covered projects.**
4. We have heard support for the embodied carbon reporting component of NZC zoning. **Planning Dept moving forward with embodied carbon data collection and analysis.**

Net Zero Carbon Zoning

Drafting the process

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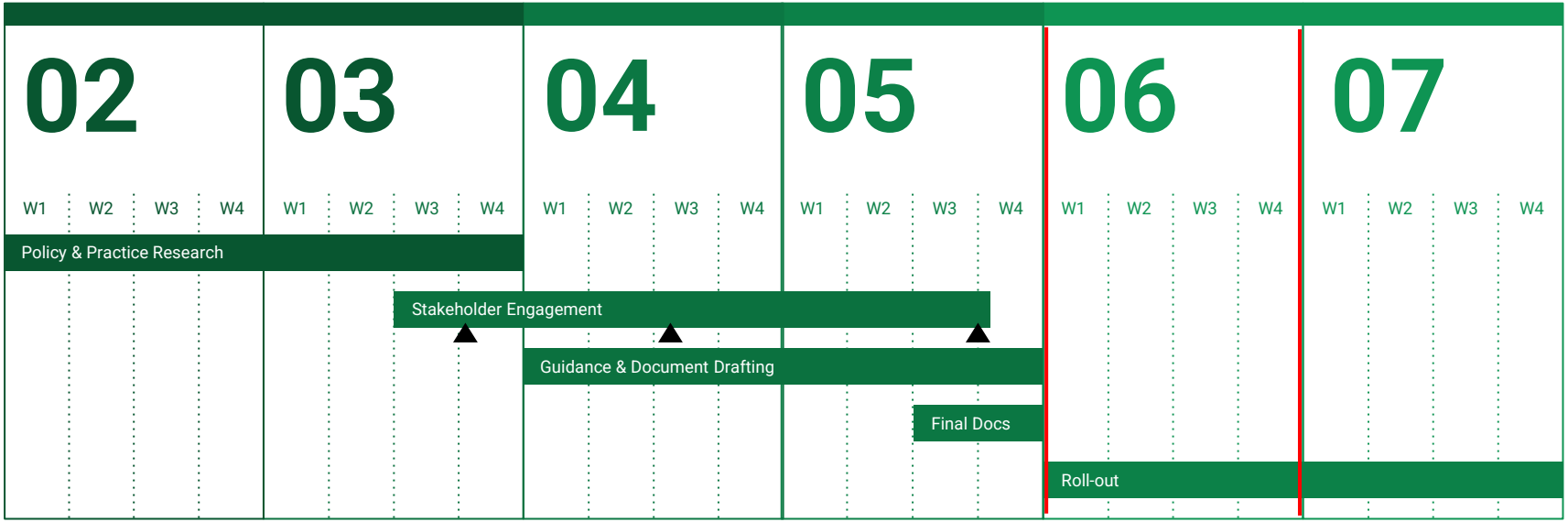
Implementation - Timeline

Key Phases & Dates:

- July 1st – ZNC requirements effective
- June 1st – Post updates guidance & documents for new filings
- March to May – Stakeholder Engagement



Design and Operations Under NZC (Article 37)

Specialized Energy Code set projects up for success

Meet the requirements of the specialized energy code. For many housing projects Passive House certification is the ideal code pathway.

Low embodied materials

Recent updates to stretch energy code include prescriptive options for low embodied carbon materials.

Green Energy Procurement

Net Zero Carbon Zoning (Article 37) focus is on operational emissions. Green electrons can come from both on and off-site

INTRODUCE EMBODIED CARBON REPORTING

1. Large buildings (> 50,000 SF) required to **provide structure and enclosure life cycle assessment**.

1. Smaller buildings (<50,000 SF) required to report on their embodied carbon through a checklist/**sustainability narrative**.

E.G. - What is your low carbon and healthy material strategy?

Questions

Thank you!

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Upcoming Events

Healthcare Panel 2025
April 29, 2025

Save the Date:

MBC's Annual Golf Outing
June 23, 2025