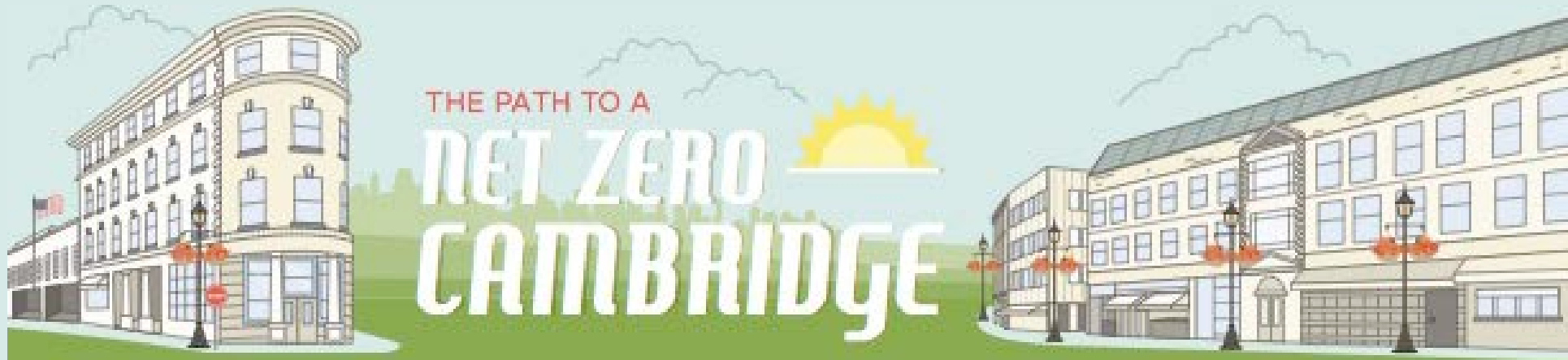


# City of Cambridge

## Getting to Net Zero Action Plan 5-Year Review

### Meeting 5: Review Proposals for NZAP Adjustments

April 15, 2021



# Meeting Objectives

- Discuss prioritization of Actions to determine where resources get directed first, and why
- Jointly Present and Discuss all the NZAP Proposed Action Adjustments
  - Review Equity / Equity implications of Each Proposed Adjustment
  - Consider GHG Impacts of Proposed Actions

# Meeting Agenda

## **4:00 – 4:20 Part 1: Framing**

- > Recap activities to-date and where we are in the process
- > Discuss prioritizing Actions
- > Estimating GHG Impacts from Actions
- > Understand how design of Actions builds in Equity / Equity implications of each Action

## **4:20 – 5:45 Part 2: Presentation of Proposed Adjustments to NZAP (7 min per Action)**

- > Working Group (WG) members to present propose changes to the larger NZTF
- > WG, Consultant Team and City will field questions from the NZTF
  1. Energy Efficiency
  2. New Construction
  3. Energy Supply

## **5:40 – 5:50 Part 3: Expectations for Mtg. 6**

- > Review TF prioritization poll
- > Discuss process / expectations for Mtg. 6

## **5:50 – 6:00 Part 4: Public comment**

# Framing NZTF Work To-date

Part 1

# NZAP Meeting Timeline

January			February			March			April			May					
		Mtg. 3				WG		WG			Mtg. 4					Mtg. 5	

- NZTF Mtg. 3 – Jan 21, 2021
  - NZAP Action Adjustment Frameworks
- Working Group Mtgs – March, 2021
  - Adjustment Proposals by Action Category
- **Reconvene NZTF April 15, 2021 (Mtg. 4)**
  - Review Working Group Adjustment Proposals
- NZTF Mtg. 5 – Late May
  - Discuss Implementation Plan

# Frames of Reference for NZAP Adjustments

1. Original **NZAP Principles**
2. Current **Science, Policy, Technology and Equity** conditions
3. Overall **potential impacts and co-benefits** to the community



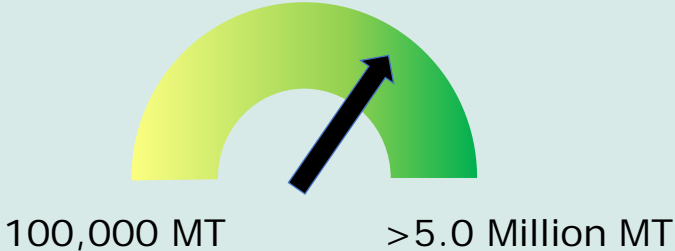
## Net Zero Action Plan Principles:

- Supports **climate goals** and **healthy economic** strategies
- Uses **science, market, and data-driven** analysis to inform decision making
- Support an openness **to new ideas** when circumstances change
- Commitment to allowing the principle of **offsets**
- Commitment to **measuring and monitoring** impact over time
- Ensures consultation is comprehensive and **engages affected stakeholders**
- Commitment to developing informative and **replicable models**
- **NEW:** Commitment to implementing the Net Zero Action Plan through a **racial equity and social justice lens**



# GHG Impacts of Proposed Actions

Indicates expected level GHG impacts over the lifetime of the Action (based on initial estimates)



## City of Cambridge Emissions by the Numbers

Average CO2e Emissions Generated per year (2012-2020):	1,083,000 MT
BAU Projection Through 2021-2030:	11,153,000 MT
BAU Projection 2021-2050:	34,592,000 MT



# Review of the Equity Implications of Actions

# Equity Implications of Net Zero Action Plan Adjustments

The Net Zero Task Force has developed a list of adjustments to Cambridge's Net Zero Action Plan—ranging from building retrofits to renewable energy development to a community energy program.

The equity considerations of the NZAP adjustments fall into two primary buckets:

1. **Equitable Adjustment Design**—how can the adjustment be *designed* to enhance equity?
2. **Equitable Adjustment Implementation**—how can the adjustment be *implemented* to enhance equity?



# Equity Implications of Net Zero Action Plan Adjustments

## 1. Equitable Adjustment Design—

- Broader and deeper engagement, access, participation and feedback
- Community knowledge building
- Avoid burdens for the most vulnerable
- Target benefits to the most vulnerable
- Equity/diversity guidelines
- Sometimes, equity impacts are conditional and indirect



# Equity Implications of Net Zero Action Plan Adjustments

## 2. Equitable Adjustment Implementation—

- Track as many adjustment metrics as possible (i.e. housing and energy costs, program participation, improvements made, retrofits undertaken, payouts, renewable energy installations, etc.)
- Commit to transparency and accountability
- Provide publicly available updates that are easy to find and understand, available in multiple languages



# NZAP Proposals for Adjustments

Part 2


# Overarching Adjustments

Change goal timelines to:

- *Short-term*: Within next 2-years
- *Medium-term*: 3 – 5 Years
- *Long-term*: 5+ Years

Electrification (Renewable Thermal) and Resilience improvements are embedded in each action where appropriate

Equity aspects will be explicitly called out for each action, similar to GHG reductions, in the NZAP report

 Where there is a CCA bubble shown, this indicates that the activity is supportive of the CCA / Community Aggregation Action (Action 4)

# NZAP ENERGY EFFICIENCY ACTIONS

Questions to consider for each proposed adjustment:

1. How well does this Proposed Action Adjustment align with NZAP principles?
2. How much effort will be required to implement the action relative to the impact we expect? How does the magnitude and timing of this impact align with the science based GHG reduction goals?

# Action 1 – Energy Efficiency in Existing Buildings Proposed Structural Adjustment

## Current Structure:

- Action 1.1.1 Custom Retrofit Program
- Action 1.1.2 Additional BEUDO Requirements
- Action 1.1.3 Upgrades at Time of Renovation
- NEW Financing Access Action
- Action 1.1.4 Operations and Maintenance (being addressed under BEUDO)

## Proposed Structure:

- Action 1.1 Custom Retrofit Program for Residential (up to 50 units) and Small Commercial
  - Action 1.1.1 Multifamily
  - Action 1.1.2 Small Commercial
- Action 1.2 BEUDO Requirements
  - Action 1.2.1 Performance Requirements
  - Action 1.2.2 BEUDO Resource Hub
- Action 1.3 Upgrades at Transaction Points
- \*NEW\* Action 1.4 Financing and Capacity Building



# 1.1 Custom Retrofit Program for Residential (up to 50 units) and Small Commercial

## Overview

The intent of this action is to ensure that **small-med residential and small commercial** buildings are operating optimally and, where **possible**, are retrofitted to maximize efficiency. In addition to these requirements, other tools and policies will be directed broadly across all building types, where appropriate, in order to achieve the necessary emissions savings.

This Action will have 3 areas of focus:

- Multifamily Custom Retrofit
- LMI Multifamily Engagement
- Small Commercial Custom Retrofit

## Contribution to Net Zero Objective

This set of actions is instrumental to increasing the energy efficiency of **those buildings that are not covered by the BEUDO performance requirements**. Cambridge's existing building stock. It will build significant capacity among building owners and industry, and it will also generate significant greenhouse gas reductions

## Anticipated Level of GHG Reductions



100,00 MT

>5.0 Million MT

## Key Actions:

### Short Term (1-2 Years)

1. ~~Continue to work with the utilities to adapt current incentive programs to take a performance-based approach, where the incentive amount is determined by the relative GHG reductions associated with a given retrofit project (e.g. \$/ton).~~
2. Verify the value of the technical support in this area
3. Continue to coordinate and align Retrofit Advisor services with MassSave, framing the sector-based support in a similar manner to the State energy efficiency programs.
4. Identify a clear path for engaging LMI housing in retrofit activities (as a sub-sector of multi-family)
5. Establish the CEA as a resource hub for energy management information for homes and small businesses
6. Build in as part of any energy audit an electrification opportunities and resilience improvement assessment

### Medium Term (3-5 Years)

1. Link the retrofit activities to capital and needs
2. Determine an appropriate energy data sharing and access platform for engaging residents and small businesses

### Long Term (5+ Years)

1. Roll financing and engagement activities into a 3<sup>rd</sup> party administered CCA program

CCA

CCA

CCA

CCA

## Equitable Design

Leverage Cambridge Energy Alliance (CEA) to engage residents and small businesses in retrofit programs and facilitate their participation.

## Equitable Implementation:

Track retrofits and provide publicly available updates about the distribution of retrofits

## Cross-cutting Issues

**Renewable Thermal Systems** – Retrofits present an opportunity for replacement of fuel-based systems with electric systems

**Climate Change Preparedness / Resilience** – consider incorporating resilience improvement assessments as part of any audit or EE improvement

**Electric Transport** – Consider access to charging stations and implications for buildings electrical equipment

**Capacity / Local Carbon Fund** – Consider designing carbon fund to supplement costs of improvements for LMI families; provide owners greater access to capital

# 1.2 BEUDO Requirements (Part 1)

## Overview

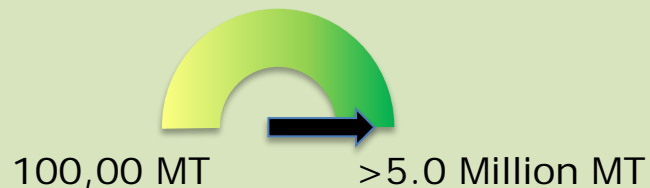
The Building Energy Use Disclosure Ordinance covers commercial buildings >25,000sf and residential buildings >50 units. While a small proportion of the total number of buildings in Cambridge, these largest buildings account for over 50% of the square footage and approximately 70% of the GHG emissions in Cambridge. By targeting these buildings for improvement, Cambridge will see significant progress in GHG emission reductions. This Action will have two tracks:

- 1.2.1 Performance Requirements
- 1.2.2 BEUDO Resource Hub

## Contribution to Net Zero Objective

This set of actions is instrumental to increasing the energy efficiency of Cambridge's existing building stock **and reducing emissions**. BEUDO arms building owners with the knowledge and the tools to identify areas of improvement and take action to implement improvements to their buildings.

## Anticipated Level of GHG Reductions



## Key Actions: 1.2.1 Performance Requirements

### Short Term (1-2 years)

1. Finalize performance requirement proposal with stakeholder input and submit amendments to City Council for adoption
2. Formalize off-site renewable electricity procurement criteria and establish pathways (see Action 3.3)
3. Establish revolving fund for alternative compliance payments (see CCA 3.0) CCA
4. Integrate performance requirements into BEUDO administration and data platform
5. Establish stakeholder advisory committee to oversee implementation and inform regulations

### Medium Term (3-5 years)

1. Monitor building performance and support compliance

### Long Term (5+ years)

1. Following completion of first compliance cycle, review performance requirement impacts and adjust ordinance as appropriate

## Equitable Design

Facilitate feedback from building owners and allow for program reiteration to provide the knowledge and tools that different kinds of building owners require.

## Equitable Implementation

Track cost impacts on residents, particularly vulnerable tenants including low-and moderate-income tenants and energy-burdened tenants and provide publicly available updates to facilitate transparency and accountability.

## Cross-cutting Issues

### Renewable Thermal Systems

Similar to Retrofits, building performance improvements also present an opportunity for replacement of fuel-based systems with electric systems

### Climate Change Preparedness / Resilience

Consider incorporating resilience improvement assessments as part of any building improvement project

### Electric Transport

Consider access to charging stations and implications for buildings electrical equipment

### Capacity / Local Carbon Fund

Pursue sharing of best practices through the Cambridge Climate Leaders Initiative

## 1.2 BEUDO Requirements (Part 2)

### Overview

The Building Energy Use Disclosure Ordinance covers commercial buildings >25,000sf and residential buildings >50 units. While a small proportion of the total number of buildings in Cambridge, these largest buildings account for over 50% of the square footage and approximately 70% of the GHG emissions in Cambridge. By targeting these buildings for improvement, Cambridge will see significant progress in GHG emission reductions. This Action will have two tracks:

1.2.1 Performance Requirements

1.2.2 BEUDO Resource Hub

This set of actions is instrumental to increasing the energy efficiency of Cambridge's existing building stock **and reducing emissions**. BEUDO arms building owners with the knowledge and the tools to identify areas of improvement and take action to implement improvements to their buildings.

### Projected GHG Reductions

This is an emissions reduction enabling action intended to help facilitate the requirements of 1.2.1 (BEUDO Performance)

### Key Actions: 1.2.2 BEUDO Retrofit Support

#### Short Term

1. Continue and expand Building Energy Retrofit Program and Resource Hub to support BEUDO buildings to achieve performance requirement goals, including assistance with energy efficiency, electrification, and renewable electricity
2. Provide financing options for BEUDO buildings (see Action 1.4)
3. Consider merging current Steering Committee with BEUDO advisory committee

#### Medium Term

1. Monitor support program effectiveness and adjust to meet building needs

#### Long Term

1. Integrate support program with Aggregation 3.0 (See CCA 3.0)

CCA

### Equitable Design

Facilitate feedback from building owners and allow for program reiteration to provide the knowledge and tools that different kinds of building owners require.

### Equitable Implementation

Track cost impacts on residents, particularly vulnerable tenants including low- and moderate-income tenants and energy-burdened tenants, and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Renewable Thermal Systems** – Similar to Retrofits, building performance improvements also present an opportunity for replacement of fuel-based systems with electric systems

**Climate Change Preparedness / Resilience** – consider incorporating resilience improvement assessments as part of any building improvement project

**Electric Transport** – Consider access to charging stations and implications for buildings electrical equipment

**Capacity / Local Carbon Fund** – Pursue sharing of best practices through the Cambridge Climate Leaders Initiative

# 1.3 Transaction Points Upgrade Requirements

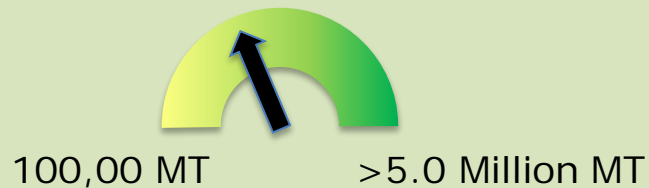
## Overview

The intent of this action is to ensure that all buildings are updated and operating optimally when an owner or new tenant transaction occurs. Further, this action is intended to deliver decarbonized buildings in a way that is financially feasible. Transaction points may include time of sale, time of lease, and time of renovation/permit application. Transactions may also include time of replacement for heating and cooling systems, recognizing that there are few replacement opportunities for this equipment before 2050.

## Contribution to Net Zero Objective

This set of action is key to both increasing the energy efficiency of Cambridge's existing building stock and replacing fossil fuel-based equipment with renewable thermal systems.

## Anticipated Level of GHG Reductions



## Key Actions: 1.1.3 Upgrades at Transaction Points

### Short Term (1-2 Years)

- Initiate a study to explore a requirement for energy upgrades at transaction points (time of renovation permit or time of sale of property or time of lease).
- Determine means for tracking triggering events (i.e. what information does the city have that can be used to identify an intervention opportunity?)
- Create an electrification feasibility template/toolkit that can be used by owners/contractors at the time of transaction
- Study options for time of lease improvement requirements, considering affordability for tenants and revenue for landlords, especially in affordable housing
- Implement a contractor education/certification program to utilize trade allies to drive progress
- MassSave Audit will be required at turnover for applicable customers

### Medium Term (3-5 Years)

- Institute initial upgrade requirements at transaction points (sale, lease, renovation, replacement) based on short term lessons learned
- Provide technical and economic support to building owners to achieve upgrades

### Long Term (5+ Years)

- Increase the performance improvement thresholds at time of renovation or sale of property to achieve net zero emissions.
- Integrate upgrades into Aggregation 3.0 (See CCA 3.0)

CCA

CCA

## Equitable Design:

These improvements would greatly enhance indoor environmental conditions and enhance EE (and potentially lower energy costs), which would be of the greatest benefit to the most vulnerable households that tend to have higher energy burdens and lower indoor air quality. However, these improvements could also increase property values and rents, which would be of the greatest burden to low- and moderate-income households.

## Equitable Implementation:

Track impacts on energy costs, property values and rents and provide publicly available updates to facilitate transparency and accountability

## Cross-cutting Issues

**Renewable Thermal Systems** – Time of renovation also presents an opportunity for replacement of fuel-based systems with electric systems

**Climate Change Preparedness / Resilience** Consider incorporating resilience improvement assessments as part of any audit or EE improvement

**Electric Transport** – Consider access to charging stations and implications for buildings electrical equipment

**Capacity / Local Carbon Fund** – Consider designing carbon fund to supplement costs of improvements or offsetting losses incurred while units are vacant

# 1.4 Financing and Capacity Building (New Action)

## Overview

Access to capital is often cited as the greatest obstacle to building owners completing more energy retrofit projects. This new action is aimed at providing building owners the resources they need to make informed decisions about energy improvements and a means to access financing or funding for their projects. Further this action is intended to lay the groundwork for various aspects of the CCA 3.0 model, and over the longer term, merge with the Community Energy Aggregation program (Action 4).

## Contribution to Net Zero Objective

This action is considered essential for increasing the number of energy efficiency and electrification projects completed. To-date the City, CEA and Energy Advisor programs have had good success in engaging building owners in energy efficiency programs, but few projects have moved forward through completion. This action will ensure the building and homeowners have the resources they need to take action and implement improvements.

## Projected GHG Reductions

This is an GHG emissions reductions enabling action. Emissions reductions stemming from this action will be captured as part of the retrofit action.

## Key Actions:

### Short Term (1-2 Years)

1. Generate a listing of financing mechanisms and capital building programs that housing developers and owners may access organized by sector CCA
2. Clearly define responsibilities of the CEA, CCA, Solar Advisor with respect to financing/funding access and capacity building as well as level of interaction between the administrators. CCA
3. Align or integrate the C-PACE program as part of the portfolio for financing resources (note C-PACE will also support on-site RE); advocate for R-PACE or Green Bank at state level CCA

### Medium Term (3-5 Years)

1. Determine method of collecting and distributing funding for energy projects CCA
2. Identify a financing assistance path to help provide the capital needed to complete energy efficiency & electrification projects CCA
3. Investigate process for acquiring State energy efficiency funds

### Long Term (5+ Years)

1. Integrate this action with the aggregation program, including potential control of state EE funding CCA

## Equitable Design

May greatly improve access to more capital for owners of LMI low- and moderate-income properties.

## Ensuring Equity

Track implementation to monitor the distribution of improvements and provide publicly available updates to facilitate transparency and accountability.

## Cross-cutting Issues

**Climate Change Preparedness / Resilience** - Covered by improvements

**Electric Transport** - Limited (unless we want to encourage the installation of charging infrastructure through incentives or more favorable financing)

**Capacity / Local Carbon Fund** - Could be one mechanism for providing owners greater access to capital; Would align support the development of a carbon fund/aggregation program and later merge with the CCA program

# NZAP NEW CONSTRUCTION ACTIONS

Questions to consider for each proposed adjustment:

1. How well does this Proposed Action Adjustment align with NZAP principles?
2. How much effort will be required to implement the action relative to the impact we expect? How does the magnitude and timing of this impact align with the science based GHG reduction goals?

# Action 2 – Net Zero New Construction

## Proposed Structural Adjustments

### Current Structure:

- Action 2.1 Net Zero Targets for New Construction
- Action 2.2 Net Zero Incentives
  - 2.2.1 Market-based Incentive Programs
  - 2.2.2 Height + FAR Bonus
- Action 2.3 Increase Green Building Requirements
- Action 2.4 Net Zero Requirements for Municipal Buildings
  - 2.4.1 Net Zero Requirement for New Construction
  - 2.4.4 Deep Retrofits of Municipal Buildings
- Action 2.5 Removal of Barriers to Increased Insulation

### Proposed Structure:

- Action 2.1 Net Zero Requirements for New Construction
- Action 2.2 Market-based Incentives Program
- Action 2.3 Increase Green Building Requirements
- Action 2.4 Net Zero Requirements for Municipal Buildings
- \*NEW\* Action 2.5 Embodied Carbon Management

# 2.1 Create Net Zero Targets for New Construction (Updated)

## Overview

The initial targets developed for the NZAP are considered outdated and require alignment with current standards practices, state-level code initiatives, and the urgency of addressing climate impacts from new construction activities. These original targets can be used as a reference point, and as more information about the state net zero stretch code along with the rate of market adoption and feasibility of achieving NZE in new buildings, the target dates for adopting sector-based NZE will need to be updated. ~~are proposed here as policy goals for both industry and Cambridge staff to work toward.~~

## Contribution to Net Zero Objective

The recommended targets are intended to show leadership and create an environment of innovation. The recommended net zero target years will be reassessed pending regulatory changes will be proposed at least 24 months prior to final enactment. Any Net Zero goal is to account for emissions related to all ongoing operations of a facility, including on-site combustion and purchased energy.

## Anticipated Level of GHG Reductions



100,00 MT

>5.0 Million MT

## Key Actions:

### Short Term (1-2 Years)

1. In alignment with state-level code, accelerate timeline for Net Zero requirement by buildings by typology
2. State-level advocacy will continue to encourage a state-level net zero code approach to align with the City's interest.
3. Develop a tool kit of resources and case studies to educate A+E community about NZ impacts by construction type.
4. Develop sub-standards for emissions, onsite renewables, and offsite renewables
5. Phase out pathways for fossil fuel use in new construction

### Medium Term (3-5 Years)

1. Reevaluate timeline based of current technologies

### Long Term (5+ Years)

1. Require all building typologies to achieve Net Zero New Construction.

## Target Dates

Type	Muni Bldgs	Small Resi	Multi-Family	Comm	Inst.	Labs
Target Year	2020	2022	<i>2025</i>	<i>2025</i>	<i>2025</i>	<i>2030</i>

*\*Italicized dates need to be revisited*

## Equitable Design

Equitable action design: To avoid any negative effects on housing cost and production, the timeline needs to be balanced with education of market actors should be aware (or made aware) of the costs and benefits of net zero buildings.

## Equitable Implementation

Track the impact of Net Zero requirements on the costs borne by vulnerable tenants, including low- and moderate-income tenants and energy-burdened tenants, and provide publicly available updates to facilitate transparency and accountability.

## Cross-cutting Issues:

**Climate Change Preparedness / Resilience:** Ensure that NZE aligns with all-electric construction with resilient design strategies. Consider requiring a resilience narrative as a part of permit process

**Electric Transport:** Consider requiring charging station access or charging station ready design

**Capacity / Local Carbon Fund:** For any building unable to achieve ZNE, contributions should be made to the carbon fund; will need to determine what those contributions are and when the fund/CCA will be able to accept payments



## 2.3 Increase Green Building Requirements in Cambridge Zoning Ordinance (Proposed)

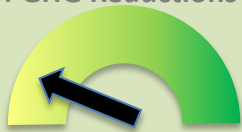
### Overview

The Zoning Ordinance is a regulatory tool that Cambridge can use to incrementally require higher standards of green building and energy efficiency for large commercial projects. Projects are required to exceed the building code, and, further, to strive toward exemplary green building performance. **By requiring an equivalent design to LEED or other similar green building standards, projects will deliver buildings that are higher quality, more resilient, and have less negative impact on the environment. In addition to reducing energy consumption, Green Building requirements provide opportunities for overlapping sustainability outcomes including social equity, human-health, and environmental stewardship.**

### Contribution to Net Zero Objective

This regulatory approach is a strong tool to demonstrate the City's commitment and leadership on **sustainable new construction. In alignment with future state-level Net Zero requirements, continually increasing Green Building requirements provide additional carbon reduction benefits in the areas of embodied energy and transportation along with comprehensive sustainability measures.**

### Anticipated Level of GHG Reductions



100,00 MT

>5.0 Million MT

### Key Actions:

#### Short Term (1-2 Years)

1. ~~Require LEED Gold plus a minimum of 10 points for Optimize Energy Performance credit and the Enhanced Commissioning credit.~~
2. Prioritize Life Cycle Analysis LEED credits
3. Implement equivalent pathways for alternative green building rating systems such as WELL and Living Building Challenge
4. Implement the use of Carbon Intensity targets (see Action 2.x, Embodied Carbon)

#### Medium Term (3-5 Years)

1. Revisit green building requirements to ensure current standards are being implemented

#### Long Term (5+ Years)

1. Develop alternative performance metrics to be implemented ~~for incentives~~ including but not limited to zero water, zero waste, and social equity benchmarks

### Equitable Design

Equity benefits in this case are conditional and indirect. LEED-certified green large commercial buildings provide many benefits beyond energy including site sustainability, indoor environmental quality, non-toxic and socially just building materials, reductions in waste generation and water use, and increasing access to alternative transportation. For example, if a large commercial building produces less waste than it used to, then less waste goes to landfills, and vulnerable populations near landfills benefit—but the equity benefit is indirect and conditional on building performance.

### Equitable Implementation

Track the impact of Net Zero requirements on the costs borne by vulnerable tenants, including low- and moderate-income tenants and energy-burdened tenants, and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Climate Change Preparedness / Resilience** – Align with recommendations with Climate Resilient Zoning Task Force

**Electric Transport** – See Net Zero New Construction

**Capacity / Local Carbon Fund** - Limited

## 2.5 Embodied Carbon (New Action)

### Overview

Structural materials are responsible for over 10% of global carbon dioxide emissions, with particular impact in the short-term. The purpose of this action is to reduce GHG emissions of construction in Cambridge through the calculation and analysis of and potential standards for embodied carbon used in the construction and renovation of new and existing buildings.

### Contribution to Net Zero Objective

Net Zero projects should consider the impact of both embodied carbon and operational carbon. Including Embodied carbon neutrality in the NZAP is an important step in the pathway to achieve a net zero carbon future.

### Projected GHG Reductions

Additional investigation is needed to quantify the impact of embodied carbon on the Net Zero pathways

### Key Actions:

#### Short Term (1-2 Years)

- Require an embodied carbon narrative for all new construction projects and adaptive reuse study for existing buildings.
- Develop a policy that requires developers to prioritize the re-use of existing structures in their developments
- Create education materials and toolkit for implementation of embodied carbon calculations
- Perform a technical assessment on carbon impacts of using biogenic carbon materials.
- Participate in peer learning sessions with the City of Boston and others exploring this issue

#### Medium Term (3-5 Years)

- Require a whole building Life Cycle Analysis of the primary structural materials demonstrating a **20% reduction** of embodied carbon

#### Long Term (5+ Years)

- Require a Life Cycle Analysis of the primary structural materials demonstrating a **50% reduction** of embodied carbon
- Investigate the use of a Zero Carbon certification mandate for new construction projects.

### Equitable Design

Track implementation and provide publicly available updates to facilitate transparency and accountability.

### Ensuring Equity

When considering embodied carbon, also consider the cost implications, including how and that incremental costs are unfairly passed onto may be distributed across tenants and small business owners.

### Cross-cutting Issues

**Climate Change Preparedness / Resilience** n/a

**Electric Transport** - n/a

**Capacity / Local Carbon Fund** - Limited

# NZAP ENERGY SUPPLY ACTIONS

Questions to consider for each proposed adjustment:

1. How well does this Proposed Action Adjustment align with NZAP principles?
2. How much effort will be required to implement the action relative to the impact we expect? How does the magnitude and timing of this impact align with the science based GHG reduction goals?

# Actions 3 – Energy Supply

## Proposed Structural Adjustments

### Current Structure:

- Action 3.1 Low Carbon Energy Supply Strategy
- Action 3.2 Rooftop Solar Ready Requirement
- Action 3.3 Develop a MOU with Local Utilities

### Proposed Structure:

- Action 3.1 Low Carbon Energy Supply
- Action 3.2 On-site Renewable Energy Access
  - 3.2.1 Rooftop Solar Requirement
  - 3.2.2 On-site Renewable Energy Access
- \*NEW\* Action 3.3 Off-site Renewable Energy Access

## 3.1 ~~Low Carbon Energy Supply~~ Carbon-free Thermal Energy (Updated)

### Overview

To achieve net zero and improve community resiliency will require a significant shift in the supply of energy to Cambridge buildings away from fossil fuel-based sources and toward low- or zero-carbon sources. This will include realizing a significant portion of the city's solar potential (both PV and thermal), ~~taking advantage of all opportunities to harvest waste heat, and expanding and developing~~ additional district energy capacity. The objective of this strategy is for the City of Cambridge to ~~define how it will support the broad implementation and transition to development of renewable and~~ low carbon thermal energy in Cambridge.

### Contribution to Net Zero Objective

Roughly half of the emissions attributed to the building sector are from thermal energy use. While opportunities for emissions free district energy are limited, there may be opportunities with new developments to encourage the use of district energy as well as opportunities to support private developers with microgrid and other renewable thermal district energy concepts. Further, as more systems are electrified, additional opportunities to decarbonize will be realized if those systems are supplied with electricity produced from renewable resources.

### Anticipated Level of GHG Reductions



### Key Actions:

#### Short Term (1-2 Years)

- Engage with development teams to explore options for clean district or renewable thermal energy systems for new buildings
- Engage the electric utility in conversations aimed at identifying and deploying flexible/grid-interactive technologies or other pilots such as a geothermal microdistrict
- Identify one virtual microgrid demonstration project

#### Medium Term (3-5 Years)

- Seek to achieve no new new fossil fuel supplied buildings
- Implement virtual microgrid demonstration ensuring that benefits are captured through proper M&V
- Continue to encourage the development or expansion of district energy systems.
- Identify a pathway to build out building-to-grid interactive capabilities through the CCA program or other policy mechanisms

#### Long Term (5+ Years)

- Continue to work with building owners to decarbonize building systems and role out and expand grid interactive technology, enabling virtual microgrids and transactional energy capabilities

CCA

### Equitable Design

Developers could be further prioritized according to equity guidelines, such as diversity criteria.

### Equitable Implementation

Track cost impacts stemming from this requirement and publicly report impacts on vulnerable residents including low- and moderate-income, energy-burdened households and small businesses to facilitate transparency and accountability.

### Cross-cutting Issues

**Renewable Thermal Systems** – This action would be supportive of and have direct influence over the expansion of renewable thermal systems in the city

**Climate Change Preparedness / Resilience** – Safety and occupant health may be improved when using electric systems over systems that combust fuels on-site, while also offering an opportunity to raise equipment above projected flood elevations

**Electric Transport** – Limited

**Capacity / Local Carbon Fund** – Limited

## 3.2 On-site Renewable Energy Access (Updated)

### Overview

On-site renewable energy access is intended to promote on-site renewable energy systems and provide support to building owners who may install these types of systems. This may include, rooftop photovoltaics (PV), solar thermal, battery storage or other system capable of providing a renewable energy to the host building. This Action will have two tracks:

3.2.1 Rooftop Solar Requirements

3.2.2 Improved Access to On-site Renewable Energy

### Contribution to Net Zero Objective

The purpose of this requirement is to ensure that all new buildings, and **in the future**, existing buildings **have access to** on-site solar generation or could easily be retrofitted at a later date **where feasible**.

### Anticipated Level of GHG Reductions



### Key Actions:

(See on-site renewable energy tracks)

### Equitable Design

May enable greater access to solar, but costs and financing may result increased energy and/or housing cost burdens on residents, which is of particular concern for vulnerable residents including low- and moderate-income and energy-burdened households.

### Equitable Implementation

Track solar development and cost impacts and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Renewable Thermal Systems** – Improved the costs-effectiveness of renewable thermal options

**Climate Change Preparedness / Resilience** – Strong overlap, enables greater access to on-site power supply for when larger grid is down

**Electric Transport** – n/a

**Capacity / Local Carbon Fund** – Carbon fund may be used to offset costs of solar installations especially for those LMI communities

## 3.2.1 Rooftop Solar **Ready** Requirement (**Updated**)

### Overview

Cambridge **will continue to pursue** a requirement for onsite renewable energy generation **for new buildings**, with a focus on solar. **By 2022**, all roofs on new construction projects **must include solar PV and/or thermal** ~~must be designed to be solar ready.~~

### Contribution to Net Zero Objective


The purpose of this requirement is to ensure that all new buildings, and **in the future**, existing buildings **have access to** on-site solar generation or could easily be retrofitted at a later date **where feasible**.

### Projected GHG Reductions

The GHG emissions impacts of this action are rolled up at the primary action-level, Action 3.2.

### Key Actions:

#### Short Term (1-2 Years)

- Adopt a Solar **Ready** Requirement: All new buildings should be 'solar ready' –  designed to accommodate the installation of roof mounted solar panels both photovoltaic and solar thermal.
- **Implement a** Solar Requirement for New Buildings and **Integrate requirements with potential Green Roof requirements**
- Confirm the feasibility and financial implications of a solar energy generation requirement **for existing buildings**, e.g. 5-10% of a given building's energy load

#### Medium Term (3-5 Years)

- Expand solar ready requirement **to existing buildings** by applying the requirements for solar ready to major roof replacements.

#### Long Term (5+ Years)

- Enhanced solar requirement: Determine means to increase on-site renewable generation requirements on existing buildings.

### Equitable Design

May enable greater access to solar, but costs and financing may result increased energy and/or housing cost burdens on residents, which is of particular concern for vulnerable residents including low- and moderate-income and energy-burdened households.

### Equitable Implementation

Track solar development and cost impacts and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Renewable Thermal Systems** – Improved the costs-effectiveness of renewable thermal options

**Climate Change Preparedness / Resilience** – Strong overlap, enables greater access to on-site power supply for when larger grid is down

**Electric Transport** – n/a

**Capacity / Local Carbon Fund** – Carbon fund may be used to offset costs of solar installations especially for those LMI communities

## 3.2.2 On-site Renewable Energy Access

### Overview

Building off the solar initiatives undertaken to-date, Cambridge will pursue implementing a third-party administered on-site solar action initiative. The primary aim of this program will be to offer a no-cost opportunity for Cambridge building owners to participate in the development of solar projects. The program will have similar aspects to the Cambridge Energy Alliance (CEA) but is designed to overcome previous shortfalls including funding issues, developer/owner partnerships, and design.

### Contribution to Net Zero Objective

This program will be designed to facilitate further development of solar and other distributed energy resources on-site. While reducing emissions, the program is also intended to promote resilience and enable access to solar for community-members where there would otherwise exist economic barriers.

### Projected GHG Reductions

The GHG emissions impacts of this action are rolled up at the primary action-level, Action 3.2.

### Key Actions:

#### Short Term (1-2 Years)

- Determine funding source for third-party administered program
- Issue RFP for administrator
- Establish core functions of program
- Negotiate agreements with solar developers
- Commence matchmaking process
- Establish data collection and compilation practices

#### Medium Term (3-5 Years)

- Continue to expand access to solar for all populations
- Integrate program with Virtual Microgrid concepts
- Review progress to-date

#### Long Term (5+ Years)

- Investigate and seek out additional ways to continue to develop on-site solar in the city.
- Integrate with the CCA3.0 program

CCA

CCA

### Equitable Design

May enable greater residential and commercial access to solar and spur new pathways to mitigate initial cost impacts, which would be of the greatest benefits for vulnerable residents including low- and moderate-income and energy-burdened households. Costs and financing may result in increased energy and/or housing cost burdens on residents, which is of particular concern for vulnerable residents including low- and moderate-income and energy-burdened households.

### Equitable Implementation

Track solar development and cost impacts and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Renewable Thermal Systems** – Improves the cost effectiveness of renewable thermal systems

**Climate Change Preparedness / Resilience** – Strong overlap, enables greater access to on-site power supply for when larger grid is down

**Electric Transport** – N/A

**Capacity / Local Carbon Fund** – Carbon fund may be used to offset costs of solar installations especially for those LMI communities



## 3.3 Off-site Renewable Energy Access

### Overview

While energy efficiency and on-site renewable generation will contribute to buildings achieving NZE, they will not be enough. The dense urban context in Cambridge requires that off-site renewable electricity access be a part of the NZE mix as well. Not all off-site renewable contracts will have the same impact, however. When seeking to procure Off-site renewables projects must meet the following criteria: 1. A procurement supports a renewable energy project that is new; 2. projects located where the energy can be delivered to the building site by ISO New England are preferred; 3. RECs are assigned to the building or aggregated portfolio of buildings in Cambridge for the duration of the contract; 4. The source is an approved renewable energy generating system.

### Contribution to Net Zero Objective

This action is designed to facilitate access to renewable energy resources when demand reduction, and on-site renewables are not adequate for meeting NZE performance targets.

### Projected GHG Reductions

This action is considered an emissions reductions enabling action intended to support BEUDO performance requirements, and net zero new construction as well as provide an option for off-site RE purchasing through aggregation for smaller businesses.

### Key Actions:

#### Short Term (1-3 Years)

1. Develop dual pathways for building owners to choose as a compliance option; City sponsored aggregation and VPPA pathway for corporate entities
2. Continue to consider the location criterion and a potential incentive for procurement from in-region projects;
3. Specify criteria for VPPAs for Large Commercial entities
4. Identify how the off-site criteria administration can be best integrated with existing building regulations and permitting processes;
5. Create a central repository of informational resources and technical support to address the questions and information needs of building owners and property managers.

CCA

CCA

#### Medium Term (3-5 Years)

1. Implement City-sponsored aggregation pathway for residences and small businesses
2. Integrate funding / revenue generating opportunities with financing vehicle established in Financing and Capacity Action

CCA

CCA

#### Long Term (5+ Years)

1. Integrate with the CCA program

CCA

### Equitable Design

Costs and financing may result increased energy and/or housing cost burdens on residents, which is of particular concern for vulnerable residents including low- and moderate-income and energy-burdened households.

### Equitable Implementation

Track cost impacts and provide publicly available updates to facilitate transparency and accountability

### Cross-cutting Issues

**Renewable Thermal Systems – Limited**

**Climate Change Preparedness / Resilience Limited** (greater supply of RE energy for transport)

**Electric Transport – N/A**

**Capacity / Local Carbon Fund – CCA 3.0** to be key vehicle for delivering off-site renewable electricity

# Actions 4 – Carbon Fund

## Proposed Structural Adjustments

### Current Structure:

- Action 4 Investigate Local Carbon Fund

### Proposed Structure:

- Action 4 Cambridge Community Energy Program (Aggregation 3.0)

## 4: Cambridge Community Energy Program (Aggregation 3.0- NEW)

### Overview

For Cambridge to become a net zero community, it will require an annual emissions balance across the entirety of the city's building stock. This new approach to Community Choice Aggregation moves away from the boilerplate green energy business products of deregulated energy retailers and utilities towards a local ownership pathway allowing for widespread local deployment of DERs, and energy improvements including efficiency improvements and electrification. In addition, the Aggregation program will provide funding and financing access and other technical resources for helping to implement clean energy projects. This action is intended to build upon the short- and medium-term actions described in previous actions with the goal of merging into one multi-purpose aggregation program to serve the city's decarbonization strategies over the longer term.

### Contribution to Net Zero Objective

This action provides a mechanism by which projects, companies and individuals can achieve net zero emissions through the direct purchase of electricity, access to energy efficiency and electrification resources, ability to participate in renewable energy purchasing programs. It will be designed to catalyze purchasing and participation for the development of local renewable energy projects or energy retrofits.

### Projected GHG Reductions

This action is considered an emissions reductions enabling action intended to facilitate the emission reductions goals of other actions including 1.1 Retrofits, and 3.2 On-site Renewable Energy Access.

### Key Actions:

#### Short Term (1-2 Years)

1. Continue to explore and define the structure for a CCA 3.0 model for Cambridge leveraging supporting activities\* from other actions to build the case for the comprehensive aggregation program.
2. \*Establish the CEA as a resource hub for energy management information for homes and small businesses
3. \*Enhance technical and economic support through the CEA to building owners to achieve upgrades
4. \*Clearly define responsibilities of the CEA, CCA, Solar Advisor with respect to financing/funding access and capacity building as well as level of interaction between the administrators.

#### Medium Term (3-5 Years)

1. Reassess and confirm the practicality and feasibility of pursuing a CCA 3.0 model for the city. If not longer practical, confirm that the other Actions in place (if continued as is) will meet NZAP goals.
2. Develop the operational model for the CCA 3.0
3. \*Link the retrofit program activities from Action 1.1.1 to capital and needs
4. \*Determine method of collecting and distributing funding for energy projects

#### Long Term (5+ Years)

1. Implement the CCA3.0 and establish the program as the primary vehicle for facilitating NZE for homeowners, renters and business owner's by providing them access resources for demand reduction and electrification projects and accessing renewable energy resources

### Equitable Design

A primary goal of the CCA 3.0 model is facilitating an equitable and just energy transition. This action may provide access to funding that may otherwise have not been available to residents and businesses.

### Equity Implementation

Track purchasing and participation and provide publicly available updates to facilitate transparency and accountability

### Cross-cutting Issues

#### Renewable Thermal Systems –

Electrification will be incorporated as a key component of the energy improvement program

#### Climate Change Preparedness / Resilience

– May be used to promote local on-site RE generation that could serve as backup power

#### Electric Transport – TBD

**Capacity / Local Carbon Fund** – Carbon fund may be used to offset costs of solar installations especially for those LMI communities

# PREPARATION FOR NZTF MEETING 6

## Part 3

- > Review TF prioritization polling tool (consider-it)
- > Discuss process / expectations for Mtg. 6

# OPEN COMMENT

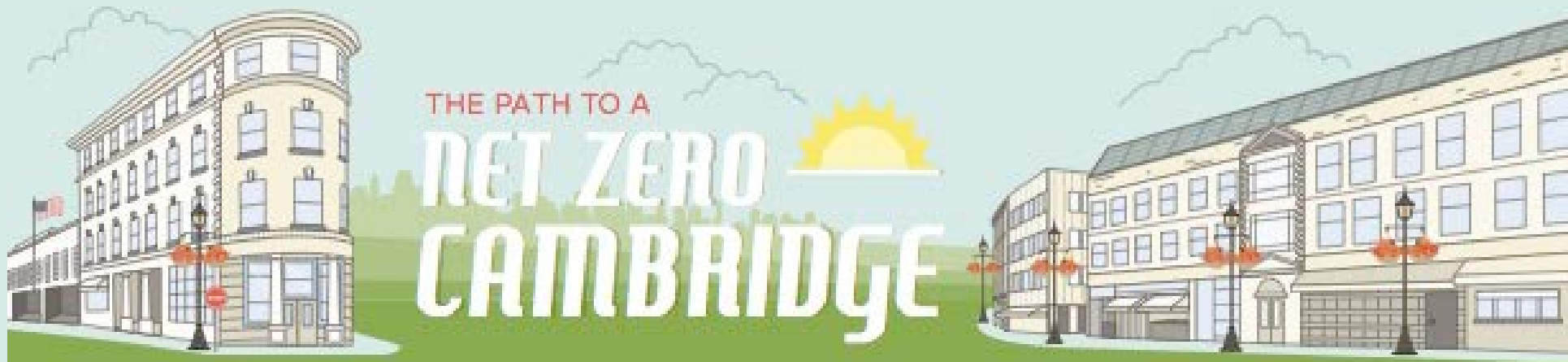
Part 4

# Thank You!

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# Appendix A – Original Actions

# 1.1.1 Custom Retrofit Program (Original)

## Overview

The intent of this action is to ensure that all buildings are operating optimally and, where necessary, are retrofitted to maximize efficiency.

## Cross-cutting Items to consider

- Equity - Leverage CEA to engage residents and small businesses in retrofit programs
- Renewable Thermal Systems – Retrofits present an opportunity for replacement of fuel-based systems with electric systems
- Climate Change Preparedness / Resilience - consider incorporating resilience improvement assessments as part of any audit or EE improvement
- Electric Transport - Consider access to charging stations and implications for buildings electrical equipment
- Capacity / Local Carbon Fund - Consider designing carbon fund to supplement costs of improvements for LMI families; provide owners greater access to capital
- COVID Recovery - Consider ventilation needs and improvements for MF buildings; consider effects of remote working and CRE management

## Goals by Action: 1.1.1 Custom Retrofit Program

### Short Term (1-4 Years)

Continue to work with the utilities to adapt current incentive programs to take a performance-based approach, where the incentive amount is determined by the relative GHG reductions associated with a given retrofit project (e.g. \$/ton).

### Medium Term (4-10 Years)

Continue, as applicable, to collaborate with the utilities or through the development of new third-party programs such as a local carbon fund (see Action 4) to offer a 'custom' retrofit program that offers cash incentives determined by the total tons of GHG savings (\$/ton).

### Long Term (10+ Years)

None identified

## Actions:

- Undertake study to determine impact of proposed amendments (i.e. GHG reductions over time)
- Conduct a study of cost and emissions impacts of proposed mandatory upgrades



# 1.1.2 Additional BEUDO Requirements (Original)

## Overview

A key tool is the data collected through the Building Energy Use and Disclosure Ordinance (BEUDO). By targeting the most inefficient buildings (e.g. buildings that rank in the bottom 20%) for improvement, Cambridge will see the greatest reductions in terms of energy use and GHG emissions.

## Cross-cutting Items to Consider:

- Equity - Ensure BEUDO requirements don't unfairly burden tenants in large MF buildings
- Renewable Thermal Systems – Similar to Retrofits, building performance improvements also present an opportunity for replacement of fuel-based systems with electric systems
- Climate Change Preparedness / Resilience - consider incorporating resilience improvement assessments as part of any building improvement project
- Electric Transport - Consider access to charging stations and implications for buildings electrical equipment
- Capacity / Local Carbon Fund - Pursue sharing of best practices through the Cambridge Climate Leaders Initiative
- COVID Recovery - Consider effects of remote working and CRE management; explore changes and energy use patterns

## Goals by Action: 1.1.2 Additional BEUDO Requirements

### Short Term (1-4 Years)

To build on the BEUDO, Cambridge should introduce the following addenda to the existing ordinance:

- Require energy audits and retro-commissioning every five years for buildings that perform below a predetermined threshold. With this information, building owners will have a better understanding of their building's performance, supporting a shift toward more efficient, higher performing buildings.
- Require buildings that score below a certain percentile performance rating (i.e. as calculated by Portfolio Manager) to submit an operations and energy management plan up to every five years articulating what actions will be taken to improve energy efficiency and/or shift to renewable or low-carbon fuel sources.

### Medium Term (4-10 Years)

None identified

### Long Term (10+ Years)

None identified

## Actions:

- Undertake study to determine impact of proposed amendments (i.e. GHG reductions over time)
- Conduct a study of cost and emissions impacts of proposed mandatory upgrades

## 1.1.3 Upgrades at Time of Renovation or Sale (original)

### Overview

The intent of this action is to ensure that all buildings are operating optimally and, where necessary, are retrofitted to maximize efficiency.

### Cross-cutting Items:

- Equity - On the plus side, these improvements would greatly enhance indoor environmental conditions and enhance EE (and potentially lower energy costs); on the minus side, they could increase property values and rents
- Renewable Thermal Systems – Time of renovation also presents an opportunity for replacement of fuel-based systems with electric systems
- Climate Change Preparedness / Resilience - consider incorporating resilience improvement assessments as part of any audit or EE improvement
- Electric Transport - Consider access to charging stations and implications for buildings electrical equipment
- Capacity / Local Carbon Fund - Consider designing carbon fund to supplement costs of improvements or offsetting losses incurred while units are vacant
- COVID Recovery - Consider ventilation needs and improvements for MF buildings

### Goals by Action: 1.1.3 Upgrades at Time of Renovation/Sale

#### Short Term (1-4 Years)

None Identified

#### Medium Term (4-10 Years)

Initiate a study to explore a requirement for energy upgrades at the time of renovation permit or time of sale of property. Renovations are an appropriate time to require upgrades, while investments are being made and work is being done on the buildings. The sale of property can also be an opportune time to invest in building improvements if buildings have amassed equity.

#### Long Term (10+ Years)

Pending the feasibility and cost benefit analysis of this set of proposed actions, if favorable, the City could increase the performance improvement thresholds at time of renovation or sale of property.

### Key Actions:

- Undertake study to determine impact of proposed amendments (i.e. GHG reductions over time)
- Conduct a study of cost and emissions impacts of proposed mandatory upgrades

## 2.1 Create Net Zero Targets for New Construction (Original)

### Overview

The proposed Cambridge targets for net zero new construction for most building types is approximately five years ahead of the industry benchmarks adopted by ASHRAE, Architecture 2030 and USGBC for commercial buildings. The policy target dates for low-rise residential construction are two years behind California, which is targeting net zero by 2020 (but began the process in advance of Cambridge). The recommended requirements are intended to show leadership and create an environment of innovation. The process and governance framework in which they reside is to ensure that meaningful financial analysis can take place and industry capacity is commensurate with the requirements. The recommended net zero target years will be evaluated at regular intervals and regulatory changes will be proposed at least 24 months prior to final enactment. Note: Net zero for new construction does not include embodied emissions generated from the manufacture of building materials, building construction activities, occupant transportation or waste. The scope does include emissions from Scope 1 and Scope 2 GHG emissions sources as defined by the widely used Greenhouse Gas Protocol.<sup>2</sup> This protocol calculates emissions related to all ongoing operations of a facility, including on-site combustion and purchased energy.

### Goals:

The target dates are proposed as policy goals for both industry and Cambridge staff to work toward. It is recommended that regular meetings be held with stakeholders to evaluate the evolving state of technology and construction practices as they relate to targets dates identified below. Specifically, Cambridge staff will consult with industry and other key stakeholders at least two years in advance of proposing regulations requiring buildings to be net zero. The factors that will be reviewed as part of this assessment and consultation are as follows:

- The number of existing net zero buildings of that building type in Cambridge and Northeast
- Technical feasibility/industry capacity
- Access to renewable energy supply on-site or in the region
- Economics including a 'net present value' analysis
- Contribution to other goals such as resiliency

### Target Dates:

The variation in target years reflects the varying degree of complexity associated with achieving net zero in different building sectors and specifically recognizes the challenges faced by lab buildings in meeting these aggressive targets.

Type	Municipal	Residential	Multi-Family	Commercial	Institutional	Labs
Target Year	2020	2022	2025	2025	2025	2030

## 2.2 Net Zero Initiatives (Original)

### Overview

In order to encourage early action among developers, owners and design and construction professionals, the City should explore the development of an incentive program to reward projects that demonstrate a commitment toward achieving net zero objectives. Incentive amounts may vary by level of achievement seeing that while some early adopters may be successful in achieving a net zero balance, others may achieve deep energy reduction targets but may be challenged to meet the energy supply requirement.. The purpose of the incentive is to drive developers to achieve net zero in advance of net zero new construction requirements being phased in by sector between 2022-2030.

### Contribution to Net Zero Objective

Incentives are a key component to the net zero strategy, recognized as a market driver to push early adopters and compel innovation. While Cambridge will move forward with more stringent regulations, an effective incentive program is a necessary complement, expected to generate increased activity and momentum toward the target.

### Projected GHG Reductions

This incentive program could result in approximately 85,000 tons of annual greenhouse gas reductions when combined with the proposal to require all new construction to be net zero emissions at various target years through 2030. This incentive lays the groundwork to enable a future requirement.

### Goals:

#### Short Term (1-4 Years)

- Introduce incentive to reward net zero projects (explore market-based incentive model & FAR bonus)
- 2.2.1 Market-based incentive program
- 2.2.2 Height + FAR bonus (new construction)

#### Medium Term (4-10 Years)

- Incentives to reward net zero construction
- 2.2.1 Market-based incentive programs (continued)

#### Long Term (10+ Years)

- Incentive to reward exemplary performance in net positive design
- 2.2.1 Reward Net-Positive Construction

### Key Actions:

- Initiate costing and feasibility study to determine financial implications, appropriate performance thresholds, target market impact and potential risks in order to develop a program design that is revenue-neutral and poses no financial risk to the city.
- Review opportunities with land use planning staff to increase FAR or height in appropriate areas for commercial buildings targeting net zero.
- Review tradeoffs with other density bonus allowances currently in zoning code or under consideration through the upcoming citywide planning process.

## 2.3 Increase Green Building Requirements in Cambridge Zoning Ordinance (Original)

### Overview

The Zoning Ordinance is a regulatory tool that Cambridge can use to incrementally require higher standards of green building and energy efficiency for large commercial projects. Projects are required to exceed the building code, and, further, to strive toward exemplary green building performance. While requiring LEED projects will deliver buildings that are greener overall, the prescribed LEED energy points will ensure that projects are being built to increasingly improved energy efficiency standards. Over time, the City can incrementally increase the stringency of the requirements of this tool to require improved energy efficiency and potentially renewable energy production. Ultimately, what is required by the ordinance should become business as usual for construction and substantial rehabilitation projects.

### Contribution to Net Zero Objective

This policy update will build capacity among the development industry in energy efficient design and construction. Energy efficient new large developments will contribute to curbing increases in GHG emissions. This regulatory approach is a strong tool to demonstrate the City's commitment and leadership on greenhouse gas reduction.

### Projected GHG Reductions

This policy, updated incrementally through 2025, is expected to generate up to 39,000 tons of greenhouse gas emissions reductions over the baseline growth estimates, primarily through the replacement of older, inefficient buildings with highly efficient green buildings.

### Goals:

#### Short Term (1-4 Years)

- Require LEED Gold plus a minimum of 6 points for Optimize Energy Performance credit and the Enhanced Commissioning credit.
- Update compliance process to include verification of rating system, LEED registration and initial scorecard submittal, and final scorecard and design documents.

#### Medium Term (4-10 Years)

- Require a minimum of 17 points for Optimize Energy Performance credit.

#### Long Term (10+ Years)

- All building types will be required to achieve net zero by 2030.

### Key Actions:

- Develop new processes to accommodate the updated compliance process.
- Leverage green building requirements to foster capacity building among design and construction firms and greater owner acceptance of sustainability goals through education, training, and engagement.
- Engage with industry to allow lead to understand new processes and requirements before the policy goes into effect.
- Develop communications package detailing future changes and the effective date.
- Foster an ongoing dialogue and capacity development through the sponsorship of workshops and net zero training programs.

## 2.4 Net Zero Requirement for New Construction + Deep Retrofits of Public Buildings (Original)

### Overview

The City should commit to all future projects being net zero or near net zero effective immediately. This will demonstrate a commitment to the net zero objective and provide a showcase as to how to achieve energy efficient design.

### Contribution to Net Zero Objective

There is significant benefit to the City demonstrating leadership by committing to achieving net zero in its own building stock. This shows the City's commitment, demonstrates that net zero is achievable, will generate savings and chart a path to net zero for private industry.

### Projected GHG Reductions

This policy is expected to generate up to 14,000 tons of greenhouse gas emissions reductions over the baseline growth estimates.

### Key Actions:

- Formalize a net zero policy for municipal building projects
- Announcement city's commitment to achieving net zero or near net zero performance in all future communication with City Council and the public
- Determine a clear definition of the target for new and existing buildings that can be incorporated into capital planning
- Implement staff training on net zero design and construction to ensure the capacity exists to meet this goal
- Select, track, and report on future net zero projects as case studies describing design, process, and objectives to be used as a learning tool for the community

### Goals:

#### Short Term (1-4 Years)

- **2.4.1 Net Zero Requirement for New Construction of Municipal Buildings** Establish a formal policy that new construction of municipal buildings should target net zero. Buildings must be designed to optimum energy efficiency standards such that all or a high percentage of energy loads could be met by renewable sources.
- **2.4.2. Renewal of Municipal Buildings** Develop a phased municipal building improvement strategy where (1) greenhouse gas reduction is a priority when constructing facility improvement projects and (2) operational improvements are implemented to achieve targets established and tracked by the Cambridge Department of Public Works. The strategy will involve continuous self-evaluation requiring increased performance levels as technology and local capacity is improved.

#### Medium Term (4-10 Years)

- **2.4.1. (Cont.) Net Zero Requirement for New Construction of Municipal Buildings** Once there is improved local capacity, all new construction should achieve net zero (target date 2020), five years ahead of citywide requirement.
- **2.4.2. (Cont.) Renewal of Municipal Buildings** Continue to implement municipal building improvement strategy that is informed by new technology and best practices, and track improvements (GHG reduction) annually.

#### Long Term (10+ Years)

- **2.4.1. (Cont.) Net Positive Requirement for New Construction of Municipal Buildings** Require new construction to be net positive, (i.e. producing more energy than it consumes on an annual basis) exceeding the citywide requirement for net zero buildings.
- **2.4.2. Renewal of Municipal Buildings** Continue to implement municipal building improvement strategy that is informed by new technology and best practices, and track improvements (GHG reduction) annually.

## 2.5 Removal of Barriers to Increased Insulation (Original)

### Overview

The purpose of this action is to resolve policy barriers with regard to improving insulation of buildings. One strategy to improve building efficiency is to increase the amount of insulation on the exterior of buildings. Because the addition of insulation effectively increases the footprint of a building and may incur into side yard set-back requirements, the Zoning Ordinance can introduce regulatory barriers to this retrofit. This action is to develop an approach to remove barriers in the Zoning Ordinance to enable the addition of exterior insulation with the purpose of improving the energy efficiency of buildings.

### Contribution to Net Zero Objective

Given the Cambridge context for residential development, if many existing buildings are going to achieve net zero, there will be a need for buildings to increase levels of insulation. Adding exterior insulation is the quickest and generally the most effective way to achieve higher R-values for envelopes. Finding a way to easily add this insulation from an administrative perspective will be critical to the proliferation of deep energy retrofits and net zero new construction.

### Projected GHG Reductions

Not applicable

### Goals:

#### Short Term (1-4 Years)

- Resolve policy barriers to increased insulation. Explore with advice from the Planning Board, Cambridge Inspectional Services the best method of allowing external insulation in built-out compact residential neighborhoods in a manner sensitive to historic preservation principles.

#### Medium Term (4-10 Years)

- Evaluate the success of the policy changes. Interview stakeholders and review planning approval if necessary, to determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

#### Long Term (10+ Years)

- Evaluate the success of the policy changes over time. Interview stakeholders and determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

### Key Actions:

- Adopt or enact policy or administrative amendments to remove barriers to increased insulation in residential buildings.

## 3.1 Low Carbon Energy Supply (Original)

### Overview

To achieve net zero and improve community resiliency will require a significant shift in the supply of energy to Cambridge buildings away from fossil fuel-based sources and toward low- or zero-carbon sources. This will include realizing a significant portion of the city's solar potential (both PV and thermal), taking advantage of all opportunities to harvest waste heat, and expanding and developing additional district energy capacity. The objective of this strategy is for the City of Cambridge to define how it will support the broad implementation and development of renewable and low carbon energy in Cambridge.

### Contribution to Net Zero Objective

Roughly one-third of the emissions reductions can come from renewable energy generation. While the majority of this supply will come from the statewide Renewable Portfolio Standard (RPS), there remains a significant opportunity to develop renewable energy both within the city and potentially on City-owned assets outside of Cambridge city limits.

### Projected GHG Reductions

This strategy could achieve approximately 60,000 tons of avoided emissions annually. This estimate is based on the development of 90MW solar by 2030 and the development and growth of co-gen systems by 5% per year after 2020.

### Goals:

#### Short Term (1-4 Years)

- In order for the City to better understand the full potential of renewable energy and low carbon district heating and cooling in Cambridge, the City requires an energy supply strategy (scope detailed in NZAP)

#### Medium Term (4-10 Years)

- Implement the key directions of the citywide energy supply strategy. The medium-term time horizon is the opportune time for City to consider developing or partnering on the expansion or development of district energy systems.

#### Long Term (10+ Years)

- The development of larger smart grids and district scale energy systems could occur by 2025 and beyond. The city could also expect to see large-scale deployment of renewables and potentially city or public-private partnership owned solar installations outside the civic boundary by this time.

### Key Actions:

- Engage and develop a collaborative approach with the utilities on energy supply objectives and address energy supply through an MOU through shared objectives and targets
- Begin strategy with the scope outlined in Short-term Actions
- Conduct a detailed feasibility analysis to understand feasibility of large-scale solar on city property
- Integrate relevant outcomes of the energy strategy into city-wide planning efforts and capital planning



## 3.2 Rooftop Solar Ready Requirement (Original)

### Overview

Cambridge should introduce a requirement for onsite renewable energy generation, with a focus on solar. The action would begin with the exploration of a requirement that all roofs on new construction projects must be solar ready.

### Contribution to Net Zero Objective

The purpose of this requirement is to ensure that all new buildings, and potentially existing buildings having their roofs repaired, either have onsite solar generation or could easily be retrofitted at a later date.

### Projected GHG Reductions

There are no direct GHG reductions associated with this action, however, it is an enabling action that supports local development of renewable energy.

### Key Actions:

- Investigate and quantify the incremental costs for this requirement
- Review findings with industry prior to adoption
- Perform economic and engineering analysis
- Explore development of thresholds for a solar ready retrofit requirement for major renovations

### Goals:

#### Short Term (1-4 Years)

- **Adopt a Solar Ready Requirement:** All new buildings should be 'solar ready' – designed to accommodate the installation of roof mounted solar panels both photovoltaic and solar thermal.
- **Explore Solar Requirement:** Explore the feasibility and financial implications of a solar energy generation requirement, e.g. 5-10% of a given building's energy load

#### Medium Term (4-10 Years)

- **Expand solar ready requirement:** Undertake a feasibility analysis of applying the requirements for solar ready to major roof replacements.

#### Long Term (10+ Years)

- **Enhanced solar requirement:** Investigate increasing renewable generation requirements.

## 3.3 Develop MOU with Local Utilities (Original)

### Overview

Taking action towards net zero emissions will require the City of Cambridge to work closely with the utilities specifically in the following areas:

- Investigating and piloting smart grid projects
- Investing in incentive programs
- Data sharing
- Investigation, development and expansion of district energy systems
- Interconnection issues that limit deployment of solar PV and co-generation
- Using solar PV to strategically address distribution congestion
- Work to increase resiliency of the electric, gas, and steam systems.

### Contribution to Net Zero Objective

The purpose of this initiative is to ensure that there is a framework and a common set of priorities and commitments that the City of Cambridge and the utilities can agree to, that support moving towards net zero, but also support improved working relationships between the parties.

### Projected GHG Reductions

This is a foundational action that, while it has no directly attributable emissions reductions, will broadly support several strategies that will generate significant emissions reductions

### Goals:

#### Short Term (1-4 Years)

- Develop a memorandum of understanding (MOU) based on areas of mutual interest and have senior officials meet regularly to monitor and manage progress. Explore if there is benefit to including the state government and regional partners to this collaboration.

#### Medium Term (4-10 Years)

- Senior officials meet regularly to monitor and manage progress and further develop the MOU as new priorities and projects develop.

#### Long Term (10+ Years)

- Senior officials meet regularly to monitor and manage progress and further develop the MOU as new priorities and projects develop

### Key Actions:

- Formulate a list of objectives for a proposed MOU
- Meet with utilities to begin discussions of an MOU including content, structure, and ongoing maintenance.

## PROPOSE TO REMOVE

- Discussion item for TF: The role of the utilities in implementing the NZAP

# 4 Investigate Local Carbon Fund (Original)

## Overview

For Cambridge to become a net zero community, it will require an annual energy balance across the entirety of the city's building stock. To achieve such an objective will require radical transformation of the existing building stock and the introduction of aggressive standards for new construction combined with the proliferation of affordable renewable energy. Where it is not possible or is exceptionally challenging for individual projects to achieve net zero emissions through the combination of efficiency and renewable energy generation, an alternative approach is to introduce a locally managed carbon fund.

## Contribution to Net Zero Objective

The development of a carbon fund could serve two important purposes: (1) provide a mechanism by which projects, companies or individuals can achieve net zero emissions through the purchase of offsets; (2) it could be designed in such a way as to keep funds from the purchase of those offsets in Cambridge to catalyze the development of local renewable energy projects or energy retrofits.

## Projected GHG Reductions

While the GHG reduction impact of this action has yet to be determined, it could provide significant funds to invest in GHG reduction strategies and be a valuable tool to help projects achieve net zero emissions, and therefore could have significant impact.

## Goals:

### Short Term (1-4 Years)

- The associated fund should be developed with the needs of the real estate market in mind. The development of such a tool should be based on an economic potential study that weighs both the costs of robust carbon reduction strategies and the needs and constraints of the local development market. The price of offsets should be established such that an investment is both an attractive tool for the market and also generates actual reductions. (Cont. in NZAP)

### Medium Term (4-10 Years)

- The medium and long-term implications of these actions will be determined by the initial investigation of the tool's viability.

### Long Term (10+ Years)

- The medium and long-term implications of these actions will be determined by the initial investigation of the tool's viability.

## Key Actions:

- Undertake an economic analysis to determine carbon pricing, projected impact of a fund in terms of industry and potential for fund to realize carbon savings.

# Appendix B – Proposed Adjustments not Discussed

## 2.2 Net Zero Incentives (**Updated**)

### Overview

In order to encourage early action among developers, owners, and design and construction professionals, the City **will continue to develop** of an incentives program to reward projects that demonstrate a commitment toward achieving net zero objectives. Incentive amounts **shall** vary by level of achievement **and will be tailored to project typology**. The purpose of the incentive is to drive developers to achieve net zero in advance of net zero new construction requirements being phased in by sector between 2022-2030.

### Contribution to Net Zero Objective

Incentives are a key component to the net zero strategy, recognized as a market driver to push early adopters and compel innovation. While Cambridge will move forward with more stringent regulations, an effective incentive program is a **useful** complement, expected to generate increased activity and momentum toward the target. **This incentive lays the groundwork to enable a future NZ requirement or other environmental benefits.**

### Projected GHG Reductions

If this were adopted, this would be an enabling action, supportive of the emissions reductions estimated for Action 2.1, Net Zero New Construction

### Key Actions:

#### Short Term (1-2 Years)

1. Introduce incentives to reward net zero projects completed in advanced of target requirements
2. Prioritize incentives for residential, multi-family, commercial, and institutional project types
3. Explore **Market-based incentive programs (2.2.1), Height + FAR bonus for new construction (2.2.2), and accelerated review timelines (new).**
4. Review tradeoffs with other **density** bonus allowances currently in zoning code or under consideration through the upcoming citywide planning process.

#### Medium Term (3-5 Years)

1. **Continue incentives for multi-family, commercial, and institutional projects**
2. **Prioritize incentives for labs**

#### Long Term (5+ Years)

1. **Continue incentives for labs**
2. Incentive to reward exemplary performance in net positive design

**PROPOSE TO ELIMINATE THIS ACTION FOR NOW AS IT RELATES TO NET ZERO CONSTRUCTION**

### Equitable Design

**Incentives could be further prioritized according to equity guidelines, such as diversity/vulnerability/marginalized criteria.**

**Ensuring Equity** - Track incentives to ensure equitable distribution of payouts and provide publicly available updates to facilitate transparency and accountability.

### Cross-cutting Issues

**Climate Change Preparedness / Resilience** – Need to consider is climate resilience strategies or other strategies such as EV infrastructure be weaved into the requirement for Density Bonusses? Ex: Stronger buildings, backup power, essential

**Electric Transport** – See above

**Capacity / Local Carbon Fund** - Assumed, Buildings will still be required to achieve ZNE and therefore any building unable to achieve ZNE may contribute to carbon fund

## 2.4 Net Zero Requirement for New Construction + Deep Retrofits of Public Buildings (Updated)

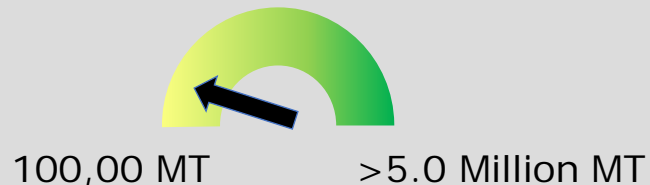
### Overview

The City should commit to all future projects being net zero **and all electric** or near net zero effective immediately. This will demonstrate a commitment to the net zero **and renewable thermal objectives** and provide a showcase as to how to achieve energy efficient design.

### Contribution to Net Zero Objective

There is significant benefit to the City demonstrating leadership by committing to achieving net zero **and all-electric** in its own building stock. This shows the City's commitment, demonstrates that net zero is achievable, will generate savings and chart a path to net zero for private industry.

### Anticipated Level of GHG Reductions



### Goals: Key Actions:

#### Short Term (1-2 Years)

**2.4.1 Net Zero Requirement for New Construction of Municipal Buildings** Establish a formal policy that new construction of municipal buildings **will achieve net zero and be all-electric.**

**2.4.2. Renewal of Municipal Buildings** Formalize as a policy that (1) greenhouse gas reduction is a priority when constructing facility improvement projects and (2) operational improvements **will be** implemented to achieve targets established and tracked by the Cambridge Department of Public Works.

- Define the aforementioned targets for operational improvements
- City of Cambridge to prioritize evaluation of Embodied Carbon

#### Medium Term (3-5 Years)

**2.4.1. (Cont.) Net Zero Requirement for New Construction of Municipal Buildings** all new construction should achieve net zero and all-electric **ahead of citywide requirement.**

**2.4.2. (Cont.) Renewal of Municipal Buildings** Continue to implement municipal building improvement strategy **piloting new technologies and emerging practices**, and track improvements (GHG reduction) annually.

#### Long Term (5+ Years)

**2.4.1. (Cont.) Net Positive Requirement for New Construction of Municipal Buildings** Require new construction to be net positive, (i.e. producing more energy than it consumes on an annual basis)

**2.4.2. Renewal of Municipal Buildings** Continue to implement municipal building improvement strategy

### Equitable Design

Equity benefits in this case are conditional and indirect. LEED-certified municipal buildings have benefits beyond energy, promoting healthy indoor environments, more env. friendly materials use and waste reduction and access to transport options. For example, if a municipal building produces less waste than it used to, then less waste goes to landfills, and vulnerable populations near landfills benefit—but the equity benefit is indirect and conditional on building performance.

### Equitable Implementation

Track implementation and provide publicly available updates to facilitate transparency and accountability

### Cross-cutting Issues

**Climate Change Preparedness / Resilience -**  
See Net Zero New Construction

**Electric Transport –** See Net Zero New Construction

**Capacity / Local Carbon Fund – Limited**

## 2.5 Removal of Barriers to Increased Insulation (**Updated**)

### Overview

The purpose of this action is to resolve policy barriers with regard to improving insulation of buildings. One strategy to improve building efficiency is to increase the amount of insulation on the exterior of buildings. Because the addition of insulation effectively increases the footprint of a building and may incur into side yard set-back requirements, the Zoning Ordinance can introduce regulatory barriers to this retrofit. This action is to develop an approach to remove barriers in the Zoning Ordinance to enable the addition of exterior insulation with the purpose of improving the energy efficiency of buildings.

### Contribution to Net Zero Objective

Given the Cambridge context for residential development, if many existing buildings are going to achieve net zero, there will be a need for buildings to increase levels of insulation. Adding exterior insulation is the quickest and generally the most effective way to achieve higher R-values for envelopes. Finding a way to easily add this insulation from an administrative perspective will be critical to the proliferation of deep energy retrofits and net zero new construction.

### Projected GHG Reductions

Not estimated

### Goals: Key Actions:

#### Short Term (1- 2 Years)

- Resolve policy barriers to increased insulation. Explore with advice from the Planning Board, Cambridge Inspectional Services the best method of allowing external insulation in built-out compact residential neighborhoods in a manner sensitive to historic preservation principles.

#### Medium Term (4-10 ~~3-5~~ Years)

- Evaluate the success of the policy changes. Interview stakeholders and review planning approval if necessary, to determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

#### Long Term (10+ ~~5+~~ Years)

- Evaluate the success of the policy changes over time. Interview stakeholders and determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

PROPOSE TO REMOVE OR  
INTEGRATE W/EE

### Cross-cutting Issues

Addressed through EE Actions