City of Cambridge
Getting to Net Zero Action Plan
Zoning Amendments

Presentation to the Planning Board
October 29, 2019

Agenda

- Net Zero Action Plan Background
- Green Building Requirements Background
- Green Building Requirements Zoning Proposal Overview
- Exterior Insulation Background
- Exterior Insulation Zoning Proposal Overview

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Net Zero Action Plan Background

- Significant construction activity in the city and **concern that new development makes reducing GHGs harder**, unless Net Zero
- Net Zero Task Force including residents, businesses, developers, building experts, and other affected stakeholder established 2013 to **develop recommendations for a long-term GHG reduction plan** from all buildings in Cambridge
- Actions proposed for **new buildings**, **existing buildings**, and **renewable energy supply**

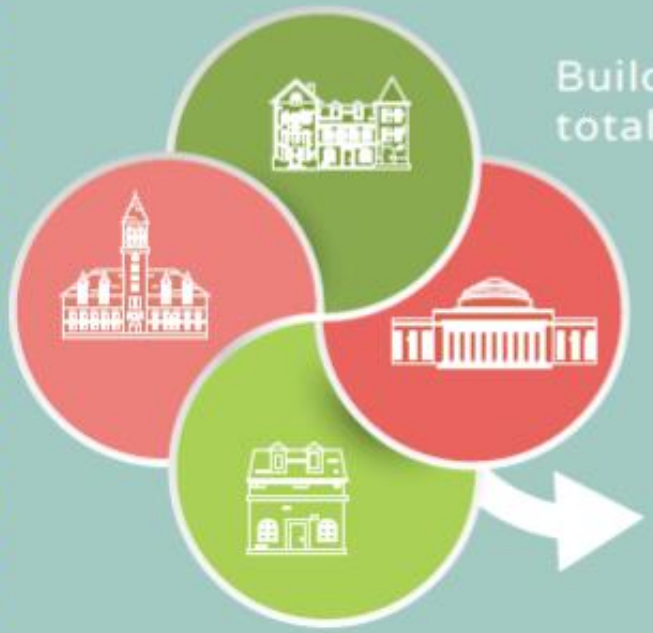
Net Zero Action Plan Background

- Net Zero Action Plan adopted by Council on **June 22, 2015** and currently in its fifth year of implementation
- Net Zero Action Plan **webpage**: https://www.cambridgema.gov/netzero

1 THE CLIMATE IMPERATIVE

Climate change poses a growing set of risks and challenges to cities.

Combating climate change needs to **start locally**



Buildings generate over 80% of Cambridge's total greenhouse gas emissions.

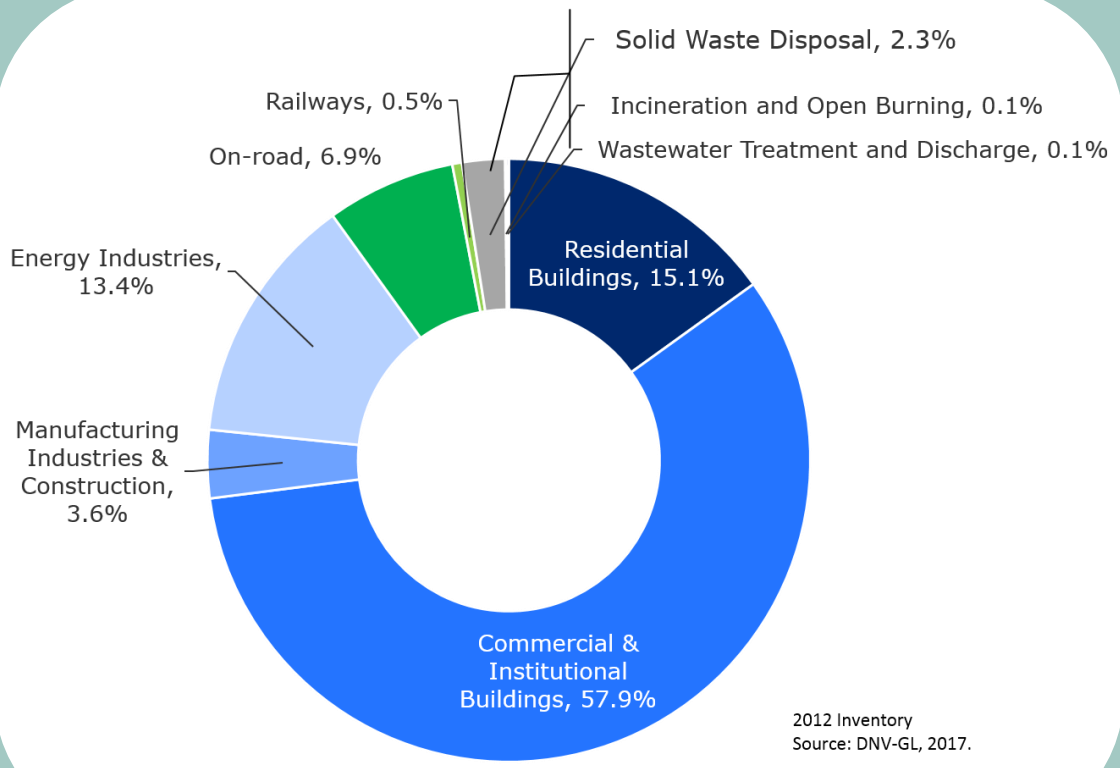
That is why it is Cambridge's aim to achieve

NET ZERO EMISSIONS

from buildings.

Residents, universities, businesses and the City are collaborating to address the immediacy of the climate imperative.

Cambridge GHG Inventory



Commitment: Carbon Neutrality by 2050

Recommended Actions from the Net Zero Action Plan

Action 2.3: Increase Green Building Requirements

- Require higher levels of green building design and energy efficiency for new construction and major renovations for projects over 25,000 square feet that require a special permit
- Shift to LEED Gold citywide
- Require projects to pursue a prescribed number of LEED energy efficiency points, and enhanced commissioning requirements

Action 2.5: Removal of Barriers to Increased Insulation

- Enable the addition of exterior insulation

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History of Green Building Requirements

- 2008-2009 **Green Building/Zoning Task Force**
- 2010 **Article 22.000 zoning adopted** by City Council
- Projects 25,000 SF or more must be **LEED "certifiable"**
  - Silver Level: 50,000+ SF
  - Certified Level: 25,000-50,000 SF
- **Also addressed**: Green Roofs, Insulation, Sun Shading, Solar Energy Systems, Wind Turbine Systems

Goal of Article 22

"To promote **environmentally sustainable** and **energy-efficient** design and development practices in both **new construction** and **renovation** projects."

Project Stats*

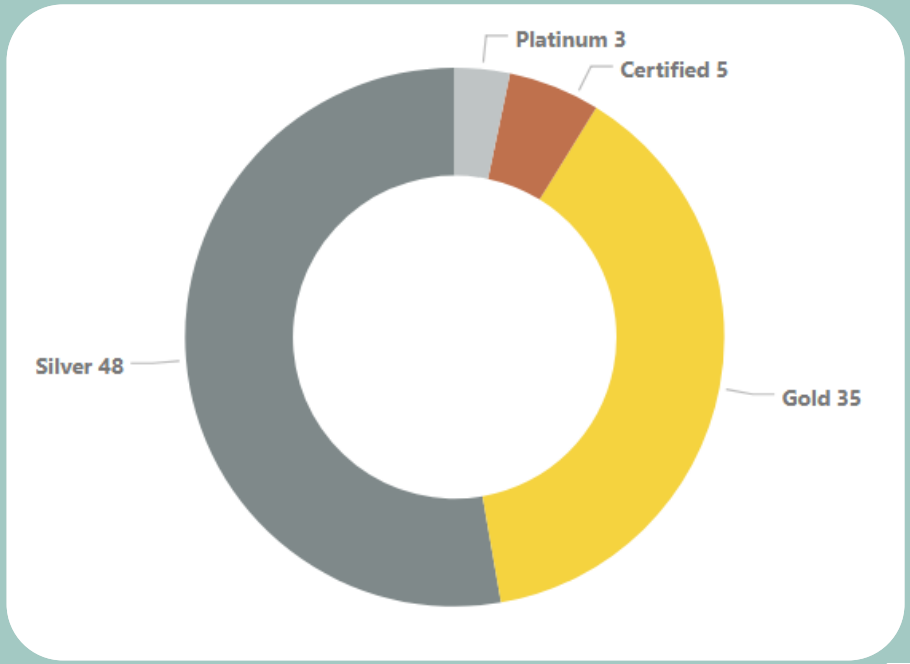
- **92 projects** have been subject to Section 22.20
- approx. **17 million square feet** of development
- **77 new construction, 14 major rehabilitation**

*since August 2010

Project Stats*

LEED Certification levels:

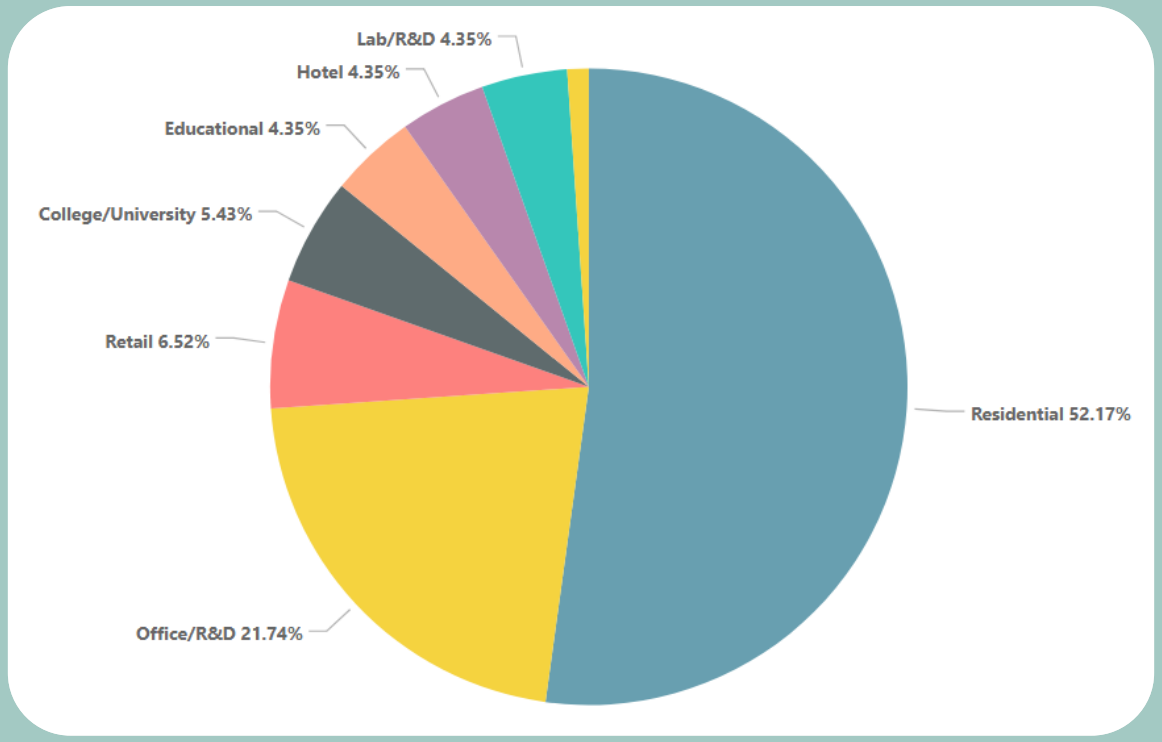
- Platinum
- Gold
- Silver
- Certified



N.B. Graphic reflects rating levels submitted at the permitting phase and does not indicate actual LEED Certification.

*since August 2010

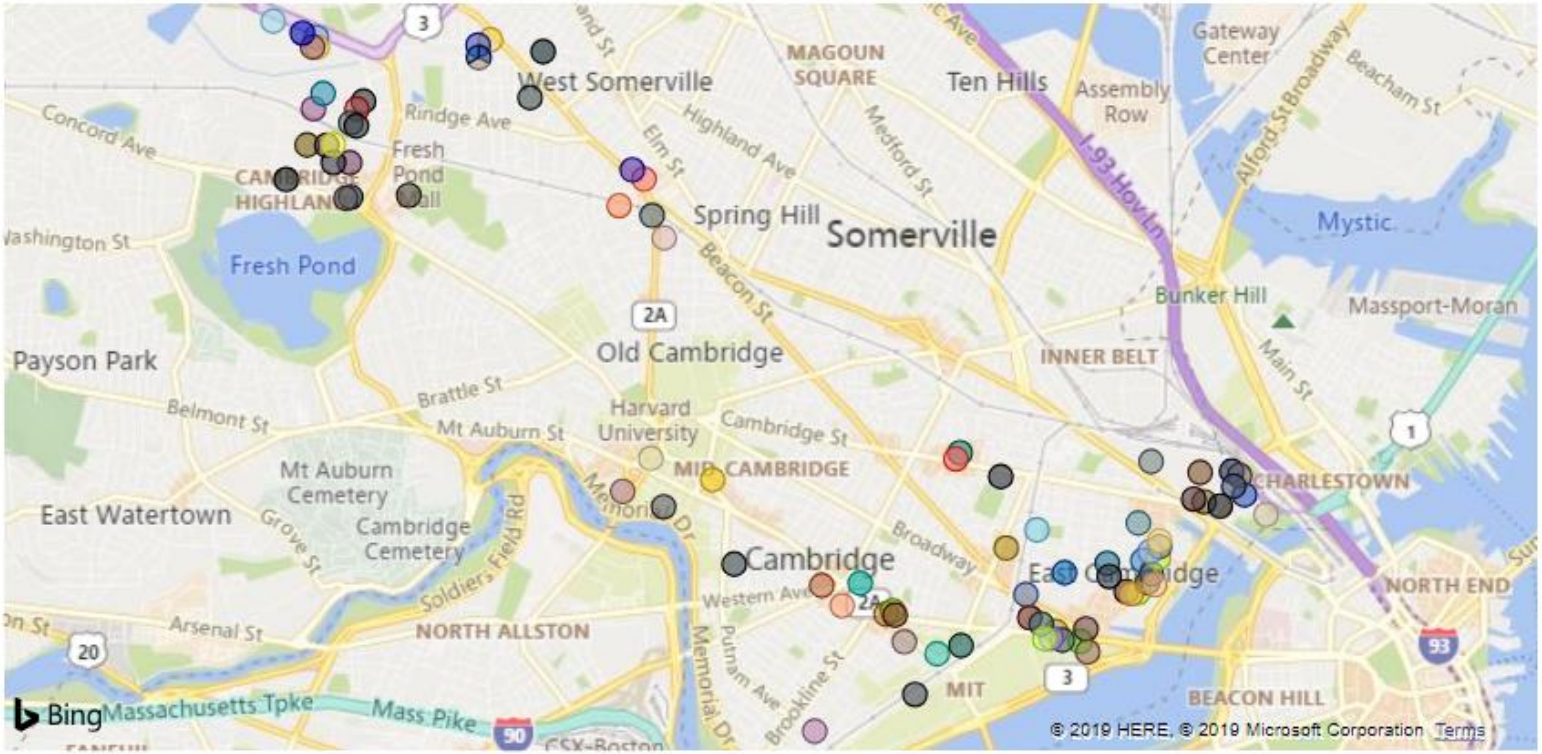
Primary Project Use*



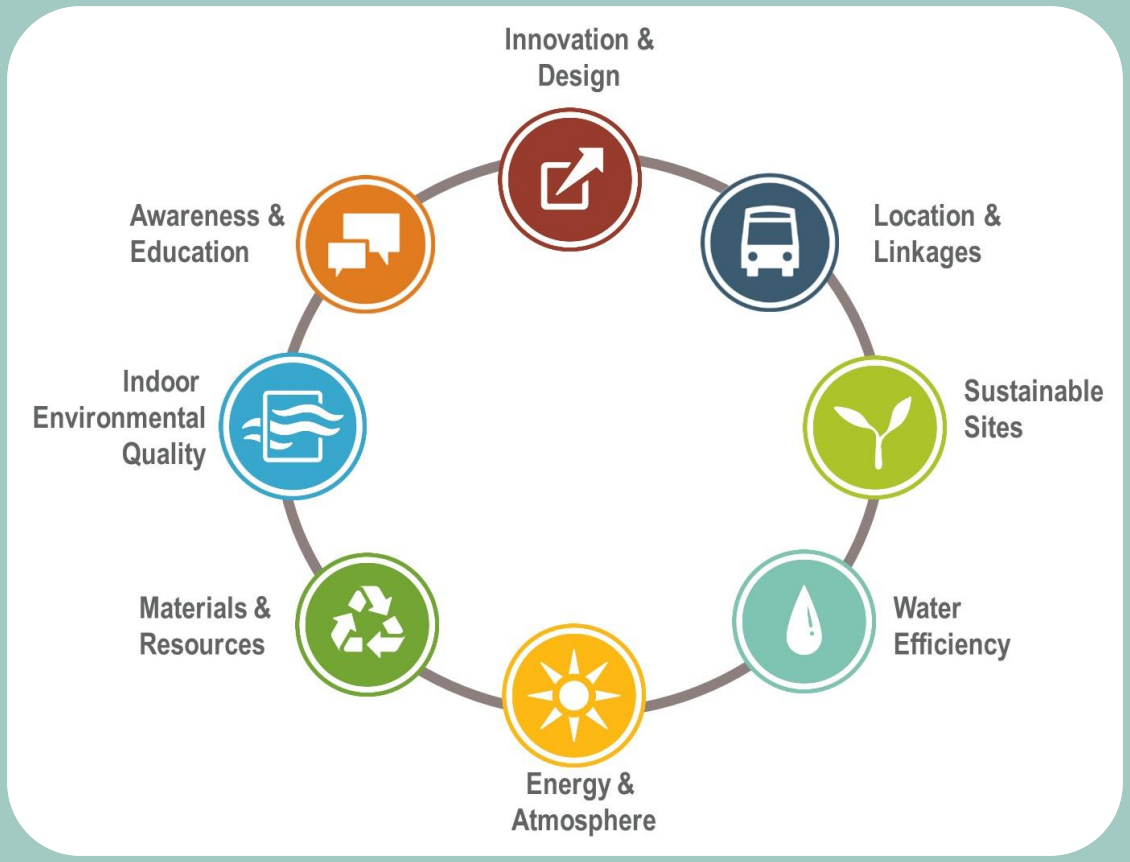
*since August 2010

Project Locations

Project Name, Latitude and Longitude

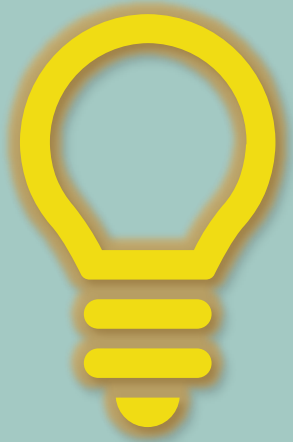


LEED Categories

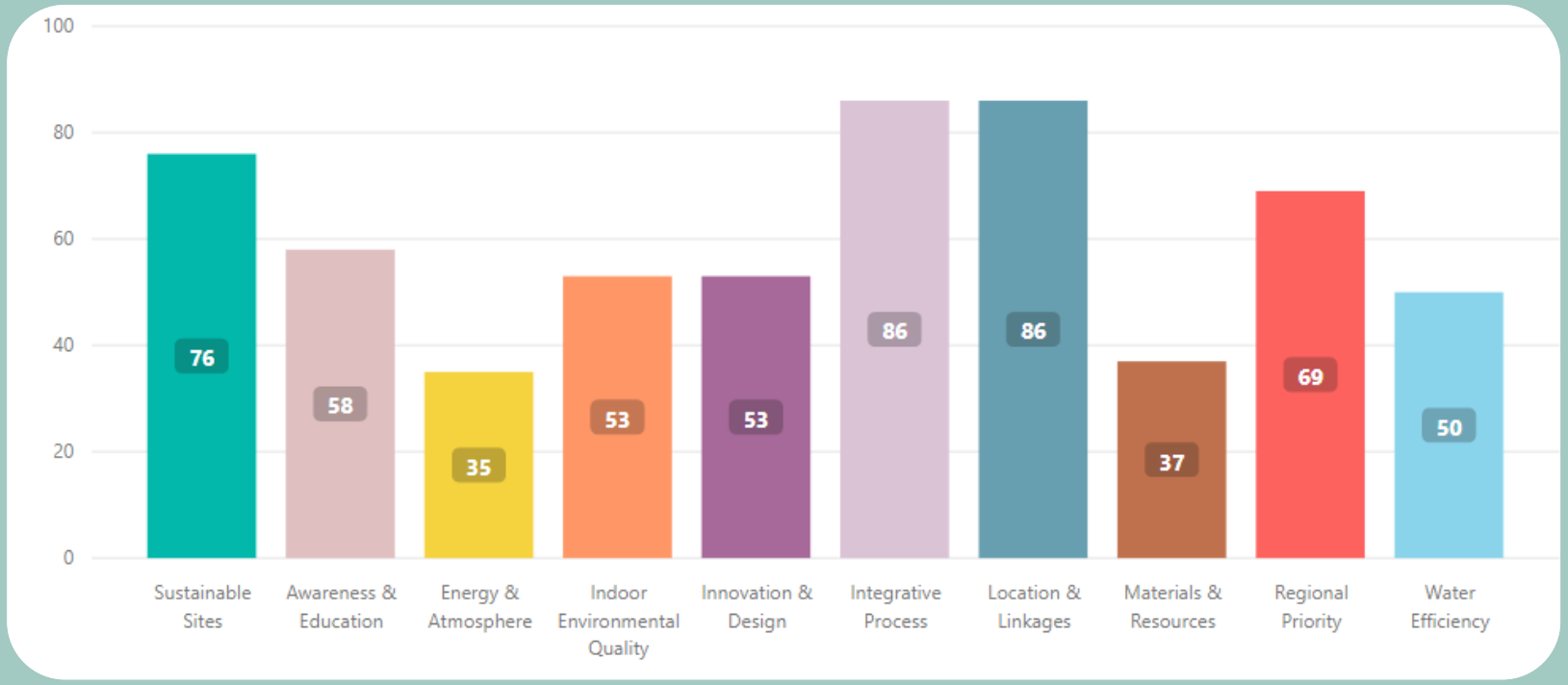


Optimize Energy Performance

"To achieve **increasing levels of energy performance** beyond the prerequisite standard to **reduce environmental and economic harms** associated with excessive energy use."



Percent of Points Achieved per LEED Category*



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Key Zoning Changes

- **LEED Gold** minimum (vs. LEED Silver) for 50,000+ SF
- **Enhanced Commissioning**
- **Enterprise Green Communities** and **Passive House** (optional compliance pathways)
- **Net Zero Narrative**
- **Process clarifications**

Current v. Proposed Zoning

	Current Zoning	Proposed Zoning
Applicable Development	25,000+ SF projects subject to review under Article 19.000	25,000+ SF projects subject to review under Article 19.000
Applicable Rating System	USGBC "LEED" system only	LEED, Passive House (PH), or Enterprise Green Communities (EGC)
Minimum Rating Level	LEED Silver for 50,000+ SF LEED Certified for <50,000 SF	LEED Gold for 50,000+ SF LEED Silver for <50,000 SF Certifiable under PH and EGC
Commissioning	No requirement (except LEED prerequisite)	Enhanced commissioning program required

Procedural Changes and Clarifications

Special Permit Required Submission

Checklist and Narrative

+ "Net Zero" Narrative

Building Permit Required Submission

Updated Checklist and Narrative

+ Energy Simulation Tool Results

+ Rater/verifier (Passive House)

Certificate of Occupancy Required Submission

Updated Checklist and Narrative

+ Commissioning Plan

+ Testing report (Passive House)

Procedural Changes and Clarifications

Certification

Affidavit by **Green Building Professional who is a registered architect or engineer**

(program certification not required)

Timing of Review

Submit documents prior to completing application

CDD review/feedback within 30 days

Questions?

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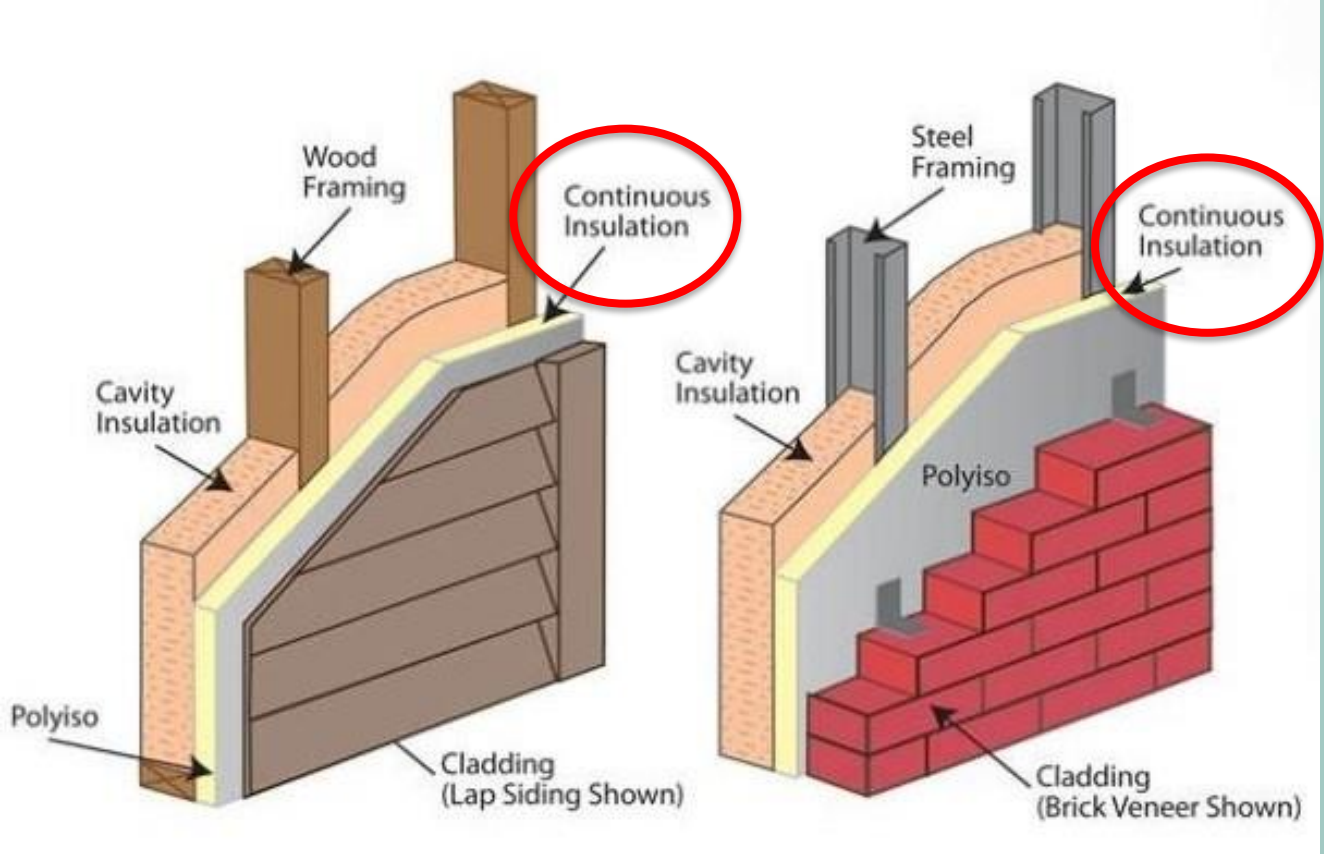
Importance of Exterior Insulation

Continuous insulation is a proven energy efficiency measure that leads to significant energy savings by reducing "thermal bridging"

Thermal bridging in a wood-framed house

Reduced thermal bridging with continuous exterior insulation

What is Exterior Insulation?



Example of Exterior Insulation

Exterior Insulation Benefits

Energy Star estimates that approximately **20% reductions in energy used for heating and cooling needs** could be realized if existing structures were to perform continuous insulation retrofits

As approximately 60% of Cambridge's building energy consumption is attributed to heating and cooling, these potential savings could make **significant reductions in the City's carbon emissions** across the building sector

For existing buildings, **exterior insulation is often the least disruptive way to improve the energy performance** without requiring extensive renovations which interrupt use of the interior space

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2010 Zoning Amendment

Yard Exceptions for Added Exterior Insulation (22.43.2)

Existing buildings can encroach into required setback to add external insulation if:

- Thickness of exterior wall not increased more than 4” compared to existing
- Resulting wall plane no closer than 7’-2” to nearest property line (unless district setbacks are less)

Article 22.43.2 Illustrated (not to scale)

at least 7’2”

PROPERTY LINE

Up to 4” added thickness

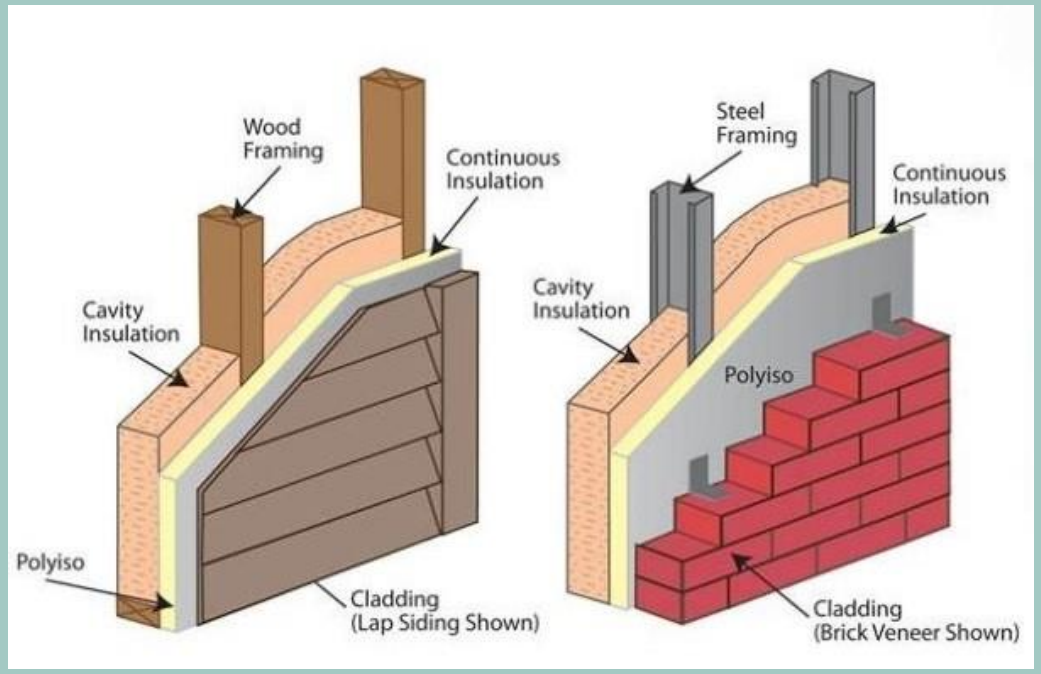
Technical Study

2015 Net Zero Action Plan **recommended revisiting**

2017 **technical study** evaluated:

- Performance and compatibility of potential insulation approaches within current ordinance
- Technical options to achieve increased exterior insulation during retrofits to residential buildings in Cambridge

Question 1: Is 4” of additional insulation enough?



Yes for some building types, **no** for others

Residential Buildings in Cambridge by Cladding Type

Exterior Wall Type	# of Properties	% of Total Properties
Clapboard	2,876	33.8%
Wood shingle/shake	2,249	26.4%
Aluminum vinyl	1,841	21.6%
Brick	526	6.2%
Asbestos shingle	483	5.7%
Stucco	168	2.0%
Asphalt shingle	145	1.7%
Brick veneer	98	1.2%
Concrete block	31	0.4%
Stone veneer	14	0.2%
Metal/glass	12	0.1%
Stone	4	0.05%

Range of Increase in Wall Thickness by Type

Structural Type	Insulation Type	Cladding Type	Min. Increase	Max. Increase
Stud-framed	EIFS	Stucco	7/8"	3 5/16"
Brick	EIFS	Stucco	7/8"	3 5/16"
Concrete block	EIFS	Stucco	2"	3 ½"
Stud-framed	Rigid foam	Traditional siding	1 ¾"	4 ¾"
Concrete block	Sprayed foam	Brick veneer	-	5 5/8"
Stud-framed	Mineral wool	Traditional siding	2"	5 ¾"
Brick	Rigid (all)	Traditional siding	1 9/16"	6 5/16"
All	Rigid (all)	Specialized cladding	1 7/11"	6 ½"
Concrete block	Rigid foam	Brick veneer	5 1/8"	7 5/8"
Stud-framed	Rigid (all)	Brick veneer	5 1/8"	7 5/8"
All	Full SIP	Traditional siding	3 ¼"	12 ½"

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4"

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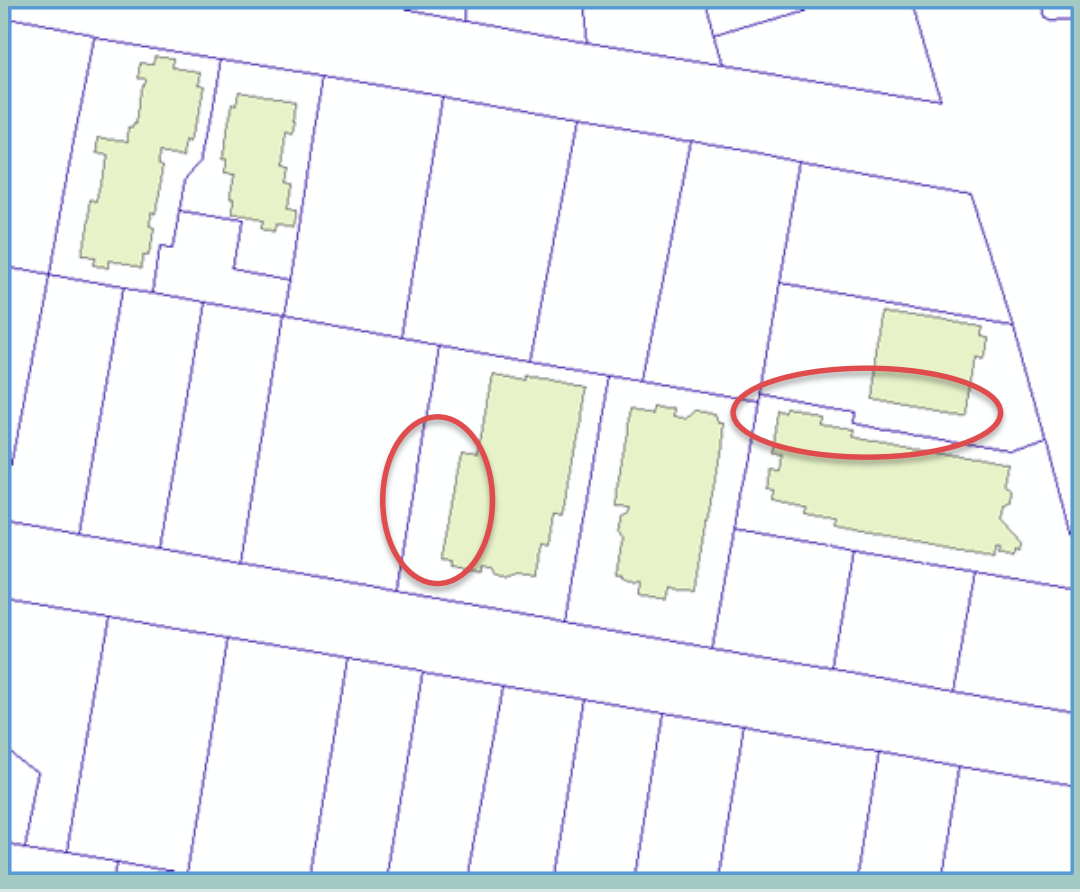
8"

Question 1: Is 4” of additional insulation enough?

RECOMMENDATION

Most wall assembly types could include continuous exterior insulation with increased thickness of **8” or less**

Question 2: Is 7’2” a reasonable setback requirement?



THE PATH TO A NET ZERO CAMBRIDGE

Setbacks of Existing Residential Buildings in Cambridge

Distance to Nearest Property Line (approx.)	% of Existing Residential Buildings (approx.)
More than 1’	63%
More than 2’	51%
More than 3’	**41%**
More than 4’	33%
More than 5’	27%
More than 6’	22%
More than 7’	**18%**
More than 8’	15%
More than 9’	12%
More than 10’	10%

Source: CDD analysis using Cambridge GIS data, 2017. ALL FIGURES APPROXIMATE

Question 2: Is 7’2” a reasonable setback requirement?

RECOMMENDATION

Changing the minimum buffer from **7’-2” to 3 feet** would allow many more buildings to comply, while maintaining setbacks typical of existing neighborhoods.

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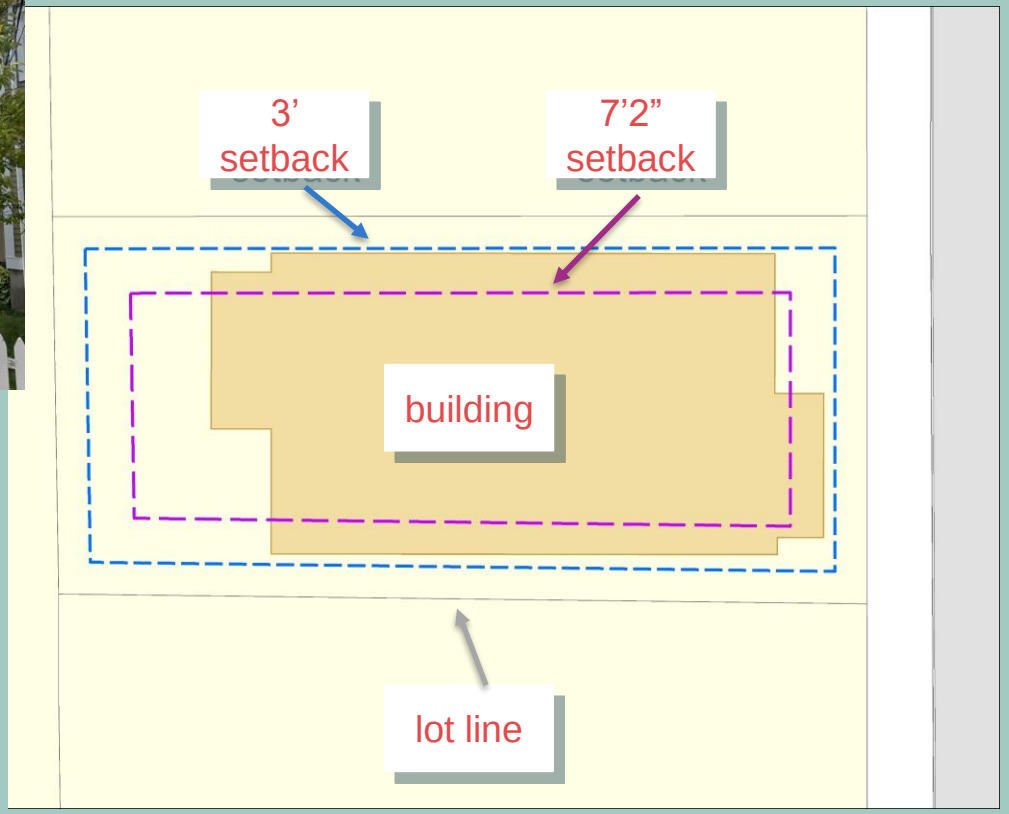


Current v. Proposed Zoning

	Current Zoning	Proposed Zoning
Maximum reduction in existing setback (as-of-right)	4 inches	8 inches
Minimum resulting distance from property line (as-of-right)	7 feet 2 inches, or required setback if less	3 feet, or required setback if less
Allowed variations (special permit)	None	Variations allowed with BZA special permit approval

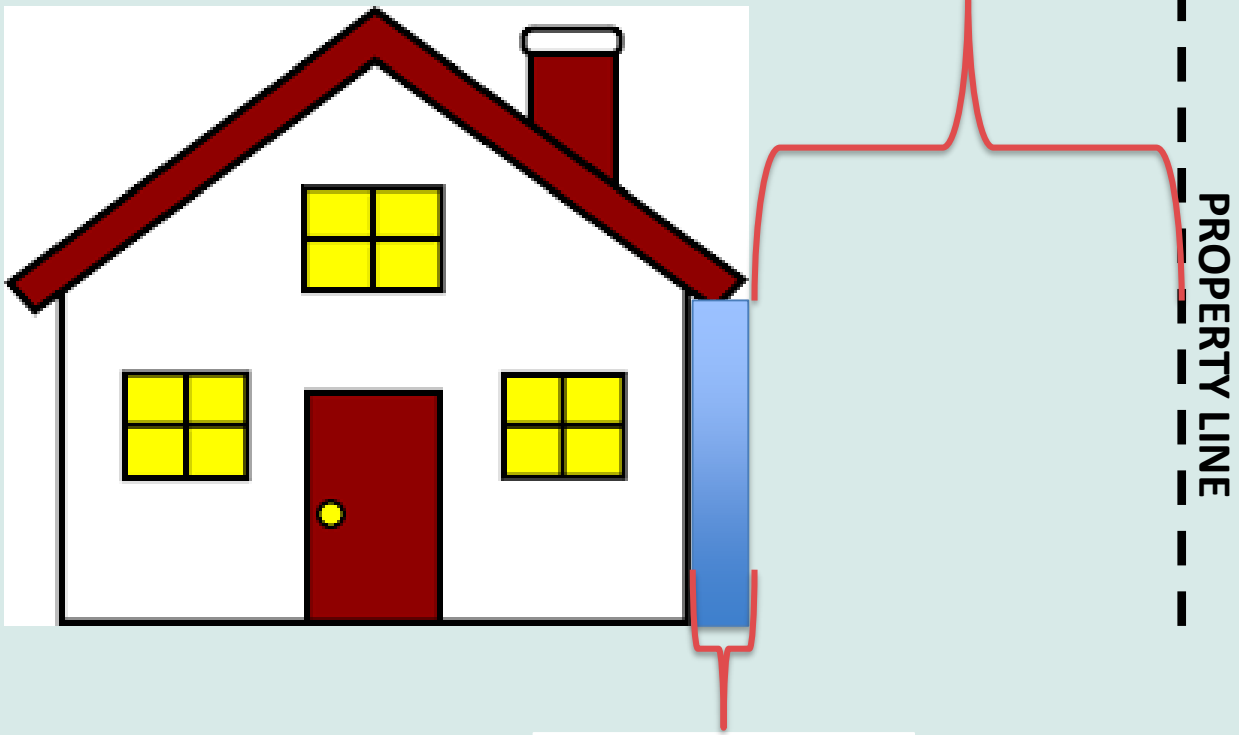
Current Rules Illustrated (not to scale)

at least 7’2”

PROPERTY LINE

Up to 4” added thickness

Proposed Rules Illustrated (not to scale)



Considerations

- Many existing buildings **do not conform** to setback standards in zoning
- Alterations often require **variances**, which can be costly and time-consuming for small property owners
- **Greater zoning flexibility** is one way the City can help encourage positive change
- Limitations should be set to provide **case-by-case review** where necessary, but not so limiting that it discourages improvements

Questions?