

City of Cambridge Getting to Net Zero Action Plan 2015-2040

Presented at BuildingEnergy16 - March 9, 2016
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THE CLIMATE IMPERATIVE

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



80%



Combating climate change needs to **start locally**



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

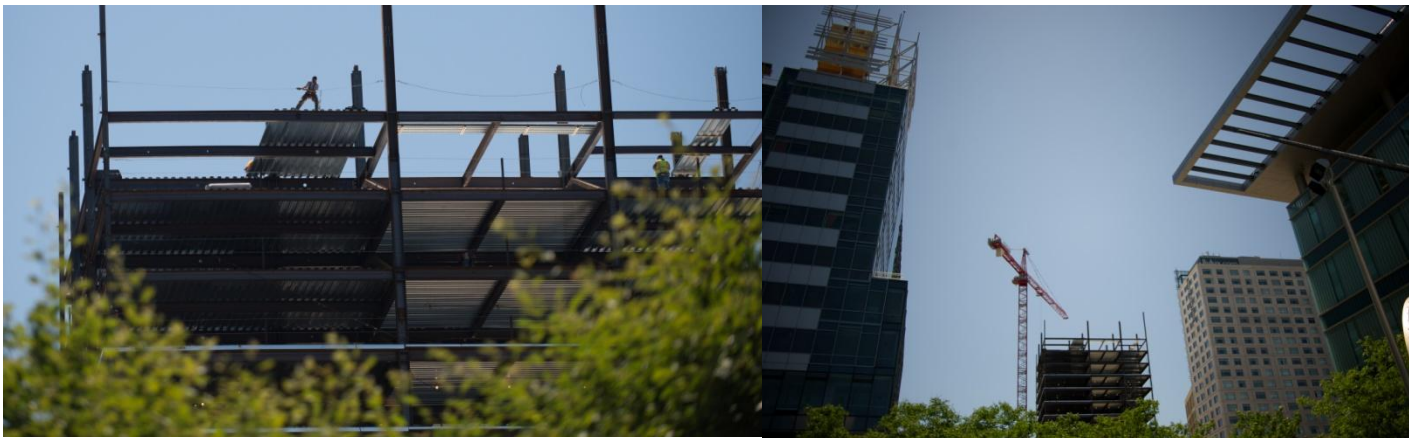
That is why it is Cambridge's aim to achieve

NET ZERO EMISSIONS
from buildings.

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

Net Zero Action Plan: The Impetus

- Significant construction activity in the city and concern that *any* new development makes reducing GHGs harder, unless Net Zero
- Zoning petition filed by residents requiring all new buildings to be Net Zero or annual offsets required (Connolly Petition)
- City Council instead charged Getting to Net Zero Taskforce with developing plan within 12 months
- Net Zero Action Plan adopted by Council on June 22, 2015



Goal is Game Changing

- All sectors are involved: government, universities, residents and business
- How do we get there, not can we get there?
- Demonstrates that bold strategies are needed. Current best practice won't get us there



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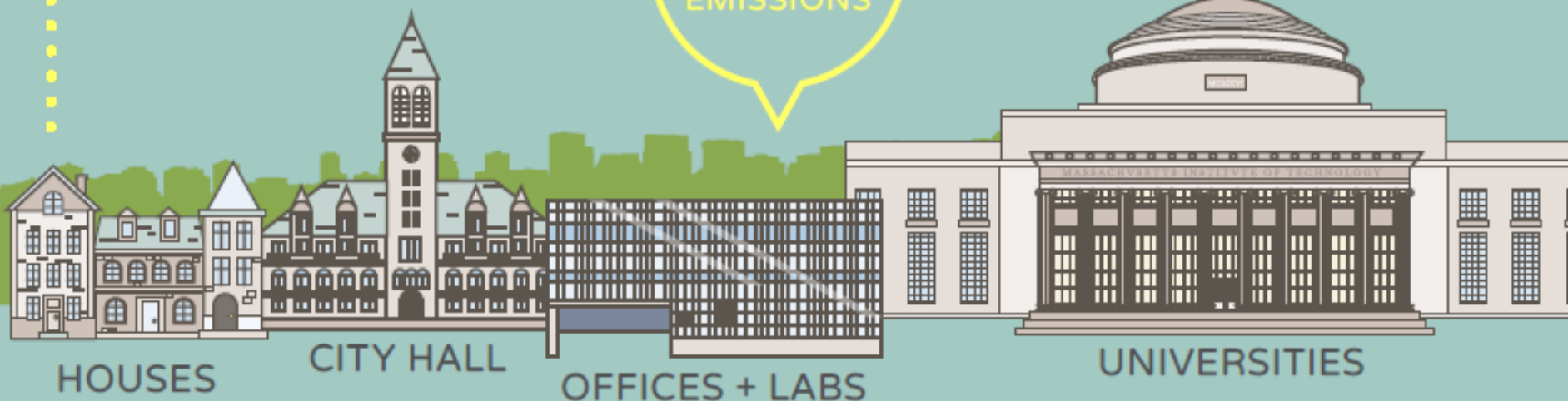
WHAT IS NET ZERO?

A community of buildings for which, annually, all greenhouse gas emissions produced through building operations are offset by carbon-free energy production.

THE TARGET:

Net zero annual emissions from buildings citywide.

0
TOTAL
EMISSIONS



3

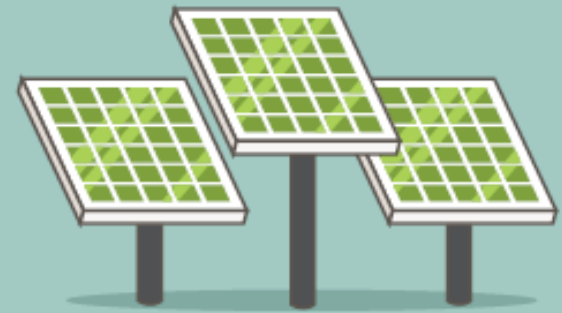
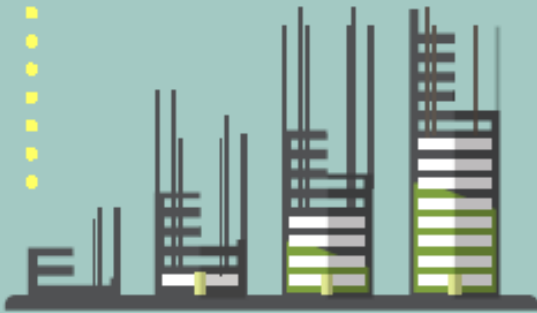
HOW TO ADDRESS CARBON REDUCTION

There are **3** ways to reduce emissions from buildings:

EFFICIENT DESIGN & RETROFITS

IMPROVED OPERATIONS

RENEWABLE ENERGY SUPPLY



THE PATH TO A
NET ZERO
CAMBRIDGE



**TASK FORCE
WORK PROGRAM**

Research Early Action Items Public & Stakeholder Input Public Events Recommendations

Series of Short Primers on Energy, Policy, Renewables

Working Groups formed

Long list of ideas generated

Alignment & Analysis of Options

Prioritization

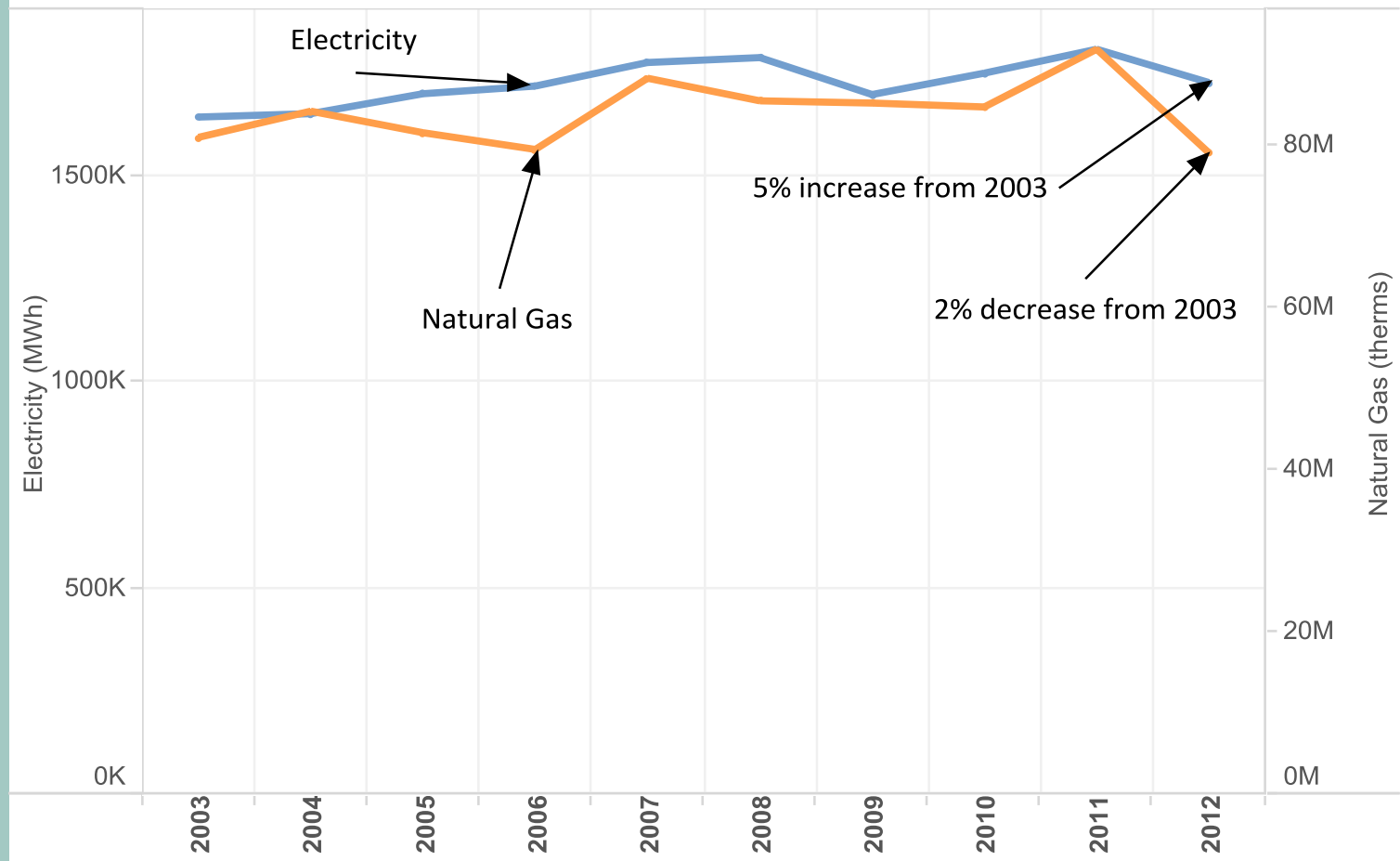


ENERGY USE IN CAMBRIDGE

Electricity and natural gas have been nearly flat over the last decade.

Year to year, use has varied due to variations in weather and economic activity.

Electricity and Gas Use

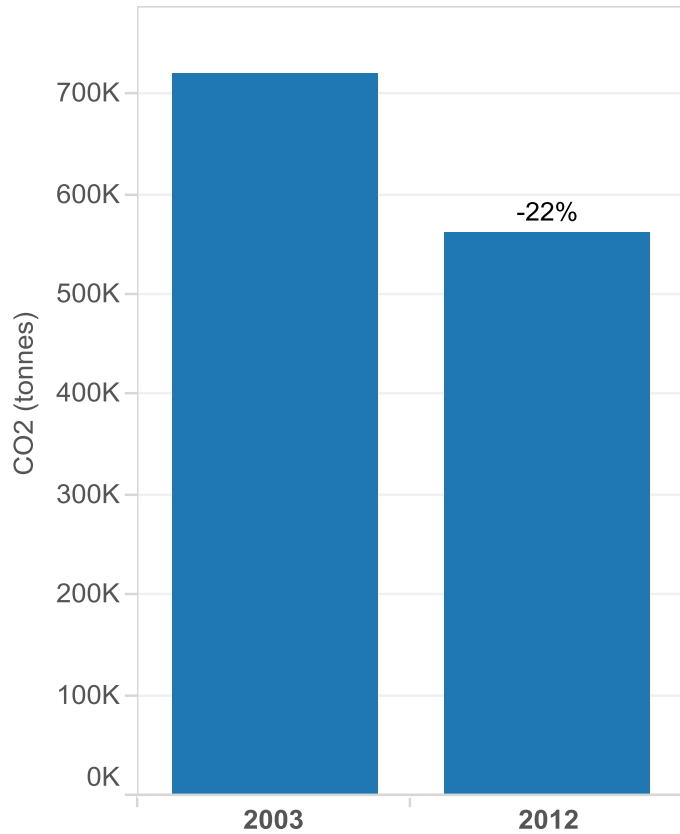


Source: NSTAR

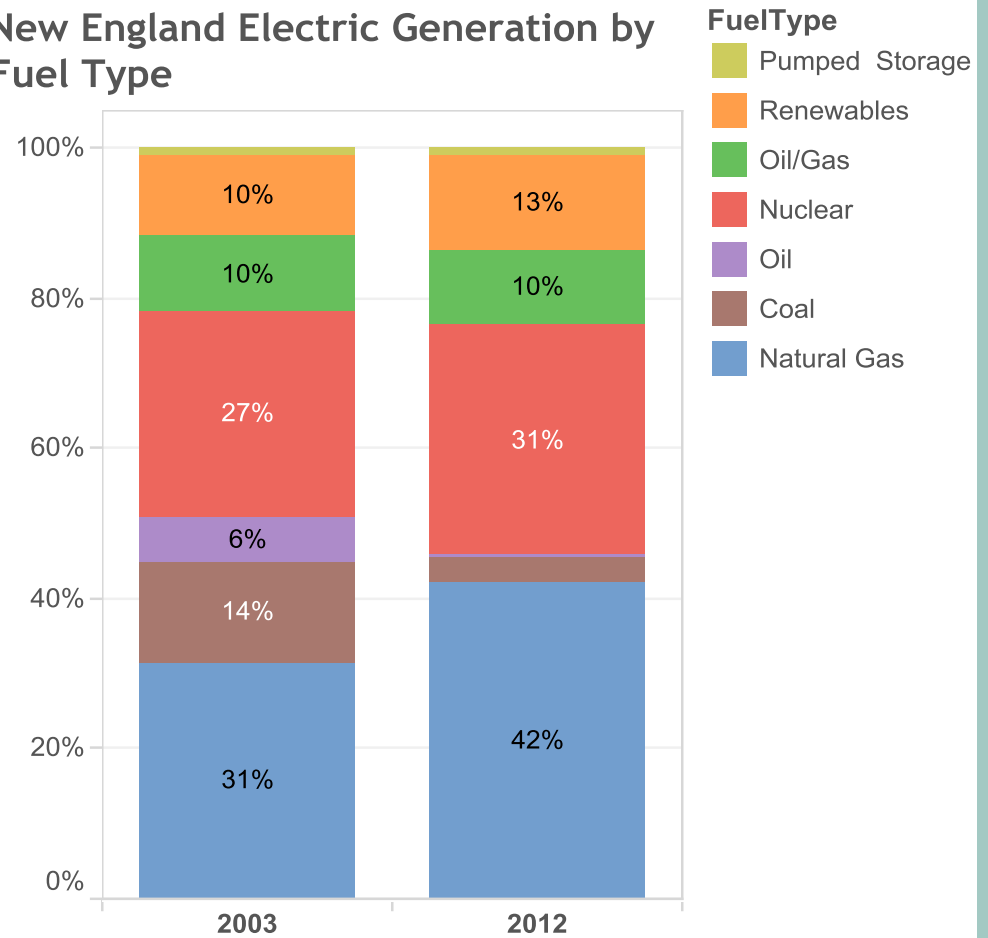
ENERGY USE IN CAMBRIDGE

Although electricity use has been flat, CO2 emissions have declined as generation has become cleaner.

Cambridge CO2 Emissions from Grid Electricity



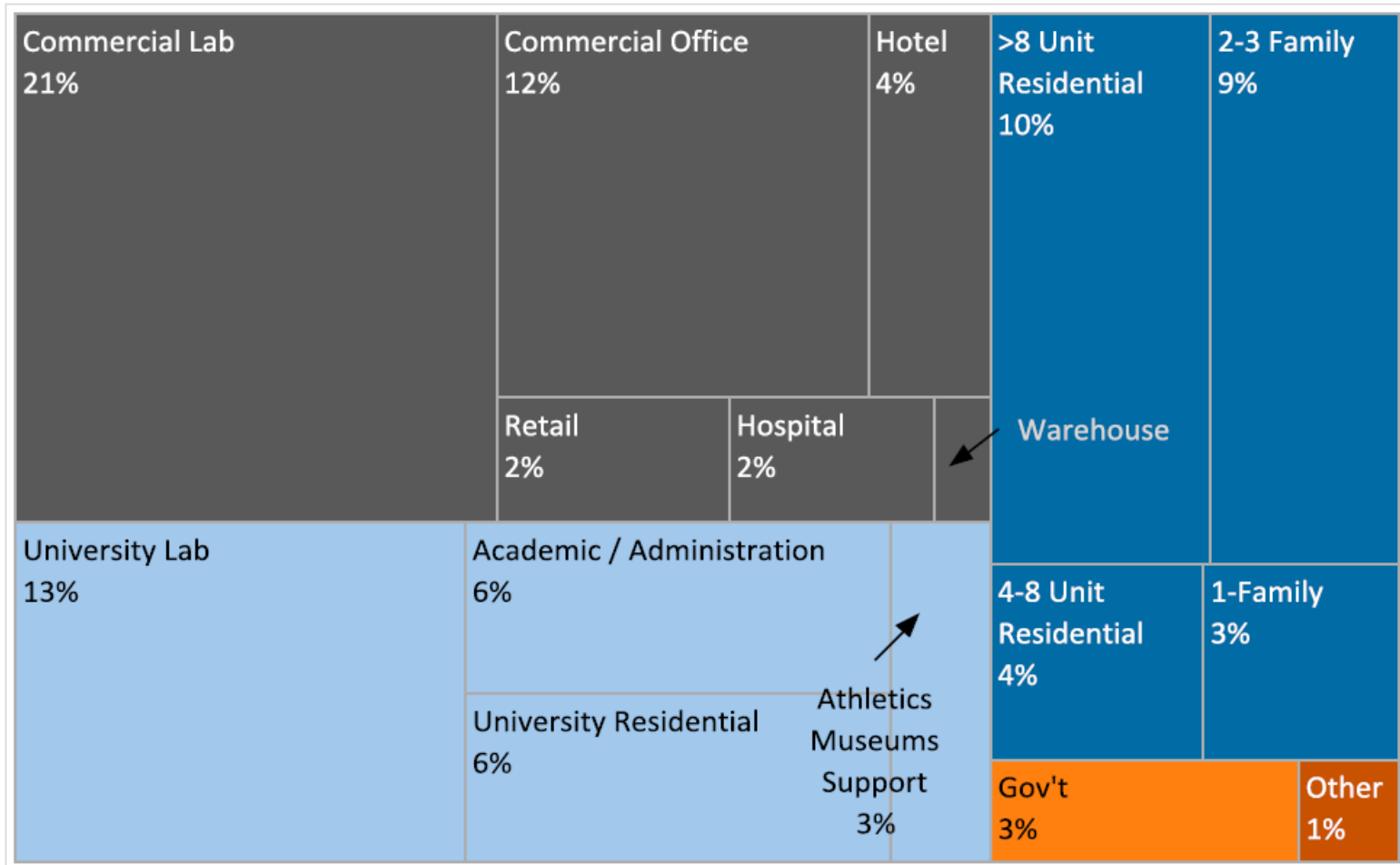
New England Electric Generation by Fuel Type



Sources: NSTAR and ISO-New England.

ENERGY USE IN CAMBRIDGE

Estimated Energy Use by Space Type



**ESTABLISHMENT OF
WORKING GROUPS**

**Net Zero
Toolkit**

Regulation &
Planning
Approaches

Incentives &
Financing
Tools

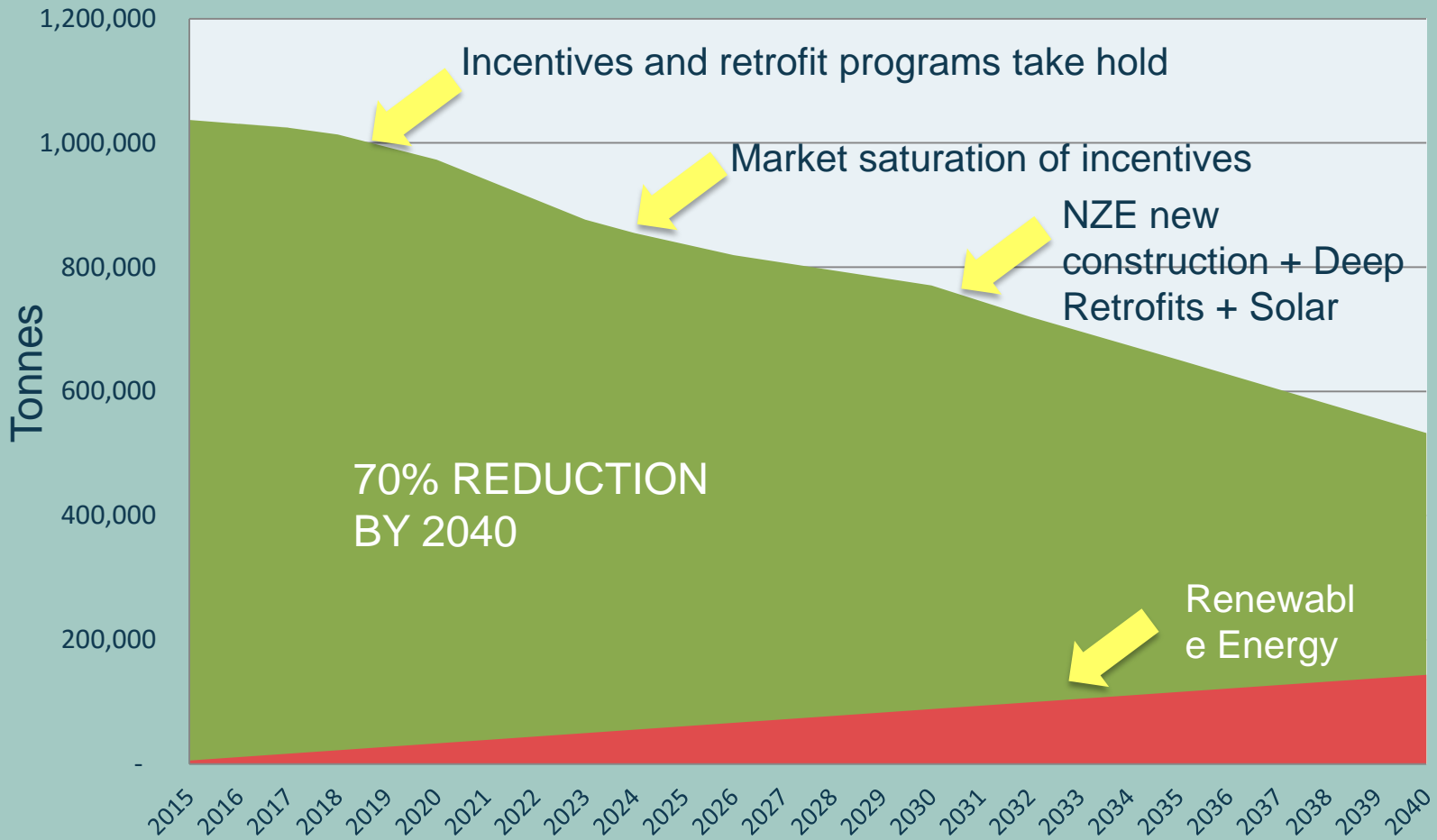
Energy
Supply &
Offsets

Engagement
& Behavior
Change

32 Members



CAMBRIDGE EMISSIONS REDUCTION MODEL



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ACTION PLAN



Energy Efficiency in Existing Buildings

Reduce energy use in buildings through retrofits and improved operations.

Net Zero New Construction

Require low carbon new construction.

Local Carbon Fund

Option to invest in a net zero community.

Renewable Energy Supply

Replace fossil fuels with low carbon energy.

Engagement and Capacity Building

Industry training and community involvement.



DETAILED ACTION PLAN

1. Energy Efficiency in Existing Buildings

1.1.1 Custom Retrofit Program

1.1.2 Additional BEUDO Requirements

1.1.3 Upgrades at Time of Renovation or Sale

1.1.4 Operations and Maintenance Plan

Requirement for New Construction



DETAILED ACTION PLAN

2. Net Zero New Construction

2.1 Create Net Zero Targets for New Construction

2.2 Net Zero Incentives

Market-based Incentive Programs

Height + FAR Bonus

2.3 Increase Green Building Requirements in the Cambridge Zoning Ordinance

2.4 Net Zero Requirement for New Construction + Deep Retrofits of Municipal Buildings

Net Zero Requirement for New Construction

Municipal Buildings Improvement Program

2.5 Removal of Barriers to Increased Insulation



Net Zero New Construction Targets

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

The **criteria** that will be evaluated in order to determine the the feasibility is:

- Number of Net Zero Buildings in that building type
- Technical feasibility/industry capacity
- Access to renewable energy
- Economics including NPV analysis
- Contribution to other goals such as resiliency

DETAILED ACTION PLAN

3. Energy Supply

3.1 Low Carbon Energy Supply Strategy

3.2 Rooftop Solar Ready Requirement

3.3 Develop a Memorandum of Understanding with Local Utilities



DETAILED ACTION PLAN

4. Local Carbon Fund

Investigate Local Carbon Fund



DETAILED ACTION PLAN

5. Engagement & Capacity Building

5.1 Communication Strategy

5.2 Develop Ongoing Capacity to Manage Getting to Net Zero Project

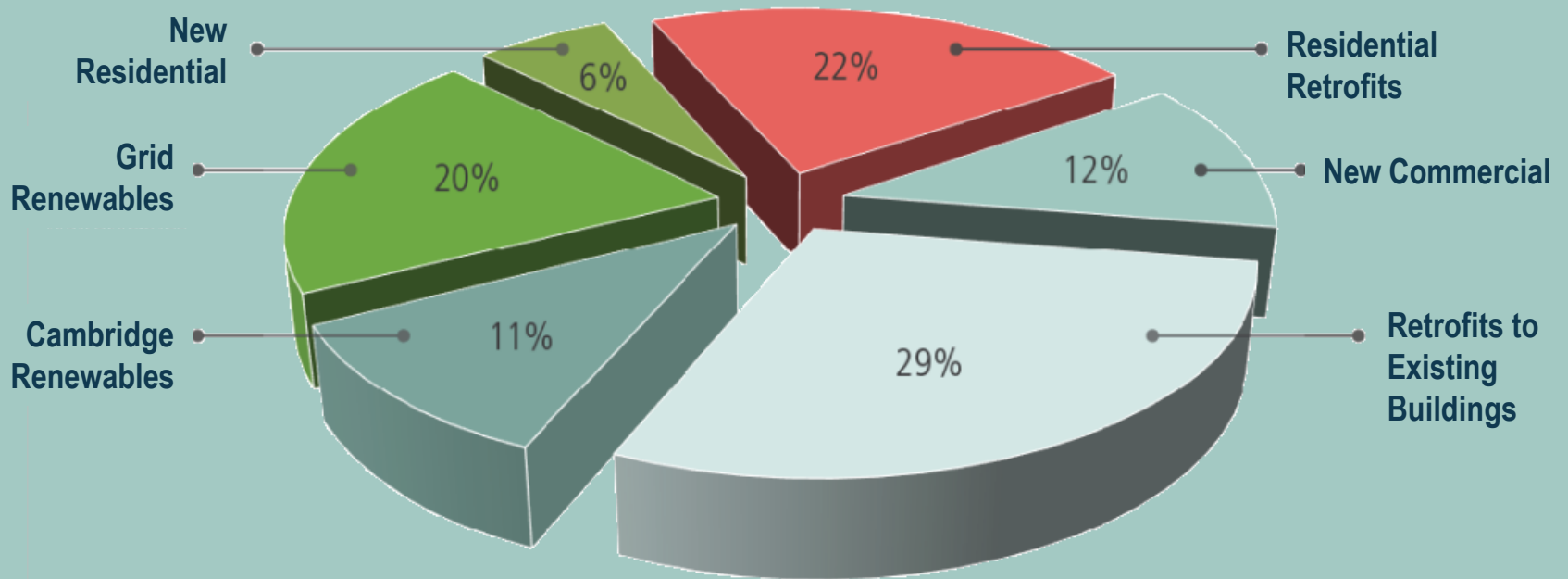
5.3 Net Zero Lab Standards and Maintenance Plan Requirement for New Construction



CAMBRIDGE EMISSIONS REDUCTION MODEL

Key Actions:

1. Retrofits to Existing Buildings
2. Net-Zero New Construction
3. Energy Supply
4. Local Carbon Fund
5. Engagement & Capacity Building



CAMBRIDGE NET ZERO ACTION PLAN

Net Zero + Net Positive Targets

YEAR	July 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Action 1 - Energy Efficiency in Existing Buildings																						

Action 2 - Net Zero New Construction

Action 3 - Energy Supply

Action 4 - Local Carbon Fund

Action 5 - Engagement and Capacity Building



PROGRAM WIDE REVIEW – EVERY 5 YEARS

Stakeholder-Based
Program Wide Review

Net Zero + Net Positive Targets																					
YEAR	July 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Action 1 - Energy Efficiency in Existing Buildings																					
Action 2 - Net Zero New Construction																					
Action 3 - Energy Supply																					
Action 4 - Local Carbon Fund																					
Action 5 - Engagement and Capacity Building																					



NET ZERO + NET POSITIVE TARGETS

Net Zero/Positive Target

Stakeholder-Based Program Wide Review

Net Zero + Net Positive Targets					Net Zero Municipal					Net Zero Residential 1-3 Units					Net Zero Commercial Multi-Family Institutional					Net Zero Labs					Net + Municipal				
YEAR	July 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035								
Action 1 - Energy Efficiency in Existing Buildings																													
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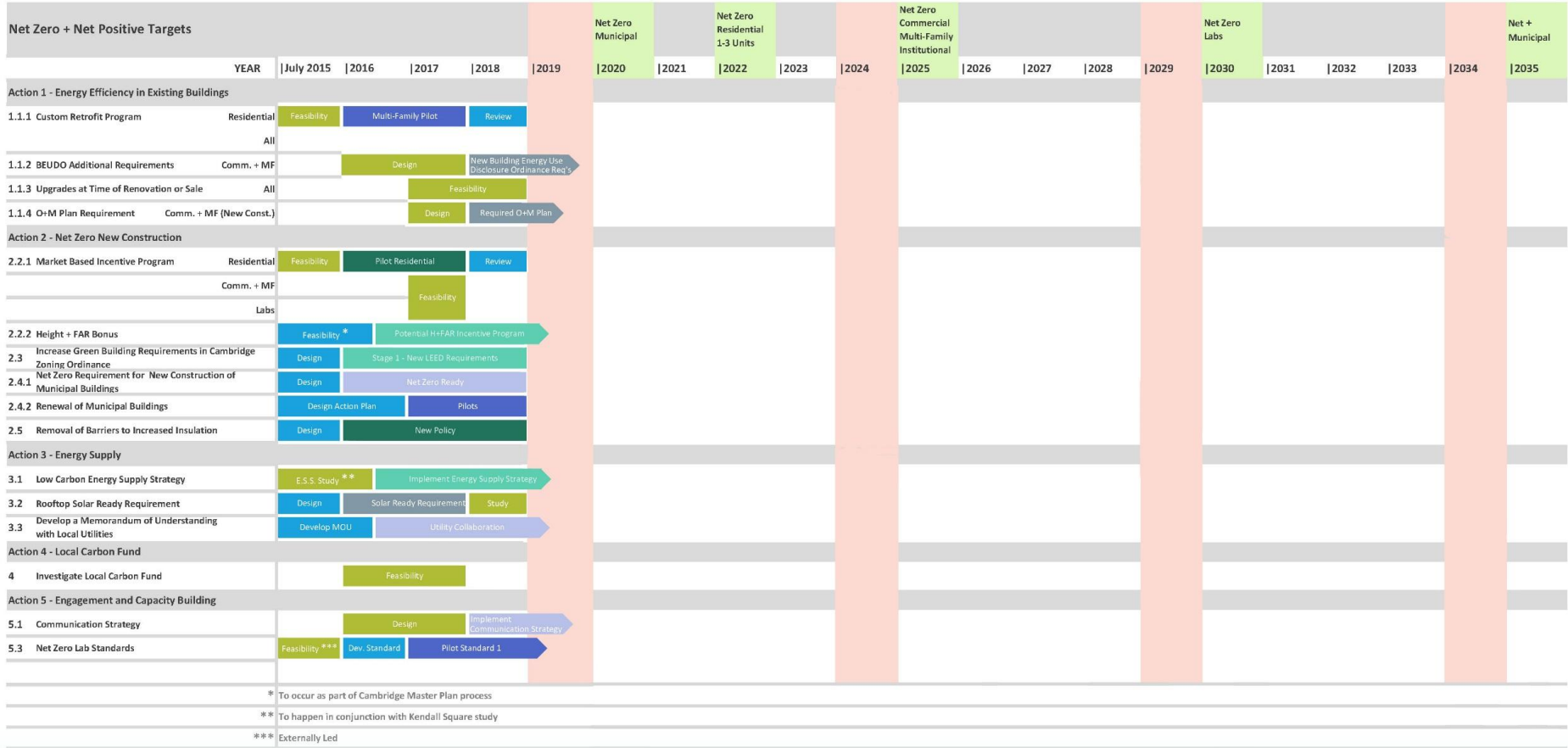
SPECIFIC ACTIONS



Net Zero + Net Positive Targets					Net Zero Municipal					Net Zero Residential 1-3 Units					Net Zero Commercial Multi-Family Institutional					Net Zero Labs					Net + Municipal				
YEAR	July 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035								
Action 1 - Energy Efficiency in Existing Buildings																													
1.1.1 Custom Retrofit Program	Residential																												
	All																												
1.1.2 BEUDO Additional Requirements	Comm. + MF																												
1.1.3 Upgrades at Time of Renovation or Sale	All																												
1.1.4 O+M Plan Requirement	Comm. + MF (New Const.)																												
Action 2 - Net Zero New Construction																													
2.2.1 Market Based Incentive Program	Residential																												
	Comm. + MF																												
	Labs																												
2.2.2 Height + FAR Bonus																													
2.3 Increase Green Building Requirements in Cambridge Zoning Ordinance																													
2.4.1 Net Zero Requirement for New Construction of Municipal Buildings																													
2.4.2 Renewal of Municipal Buildings																													
2.5 Removal of Barriers to Increased Insulation																													
Action 3 - Energy Supply																													
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5.1 Communication Strategy																													
5.3 Net Zero Lab Standards																													



SHORT TERM ACTIONS



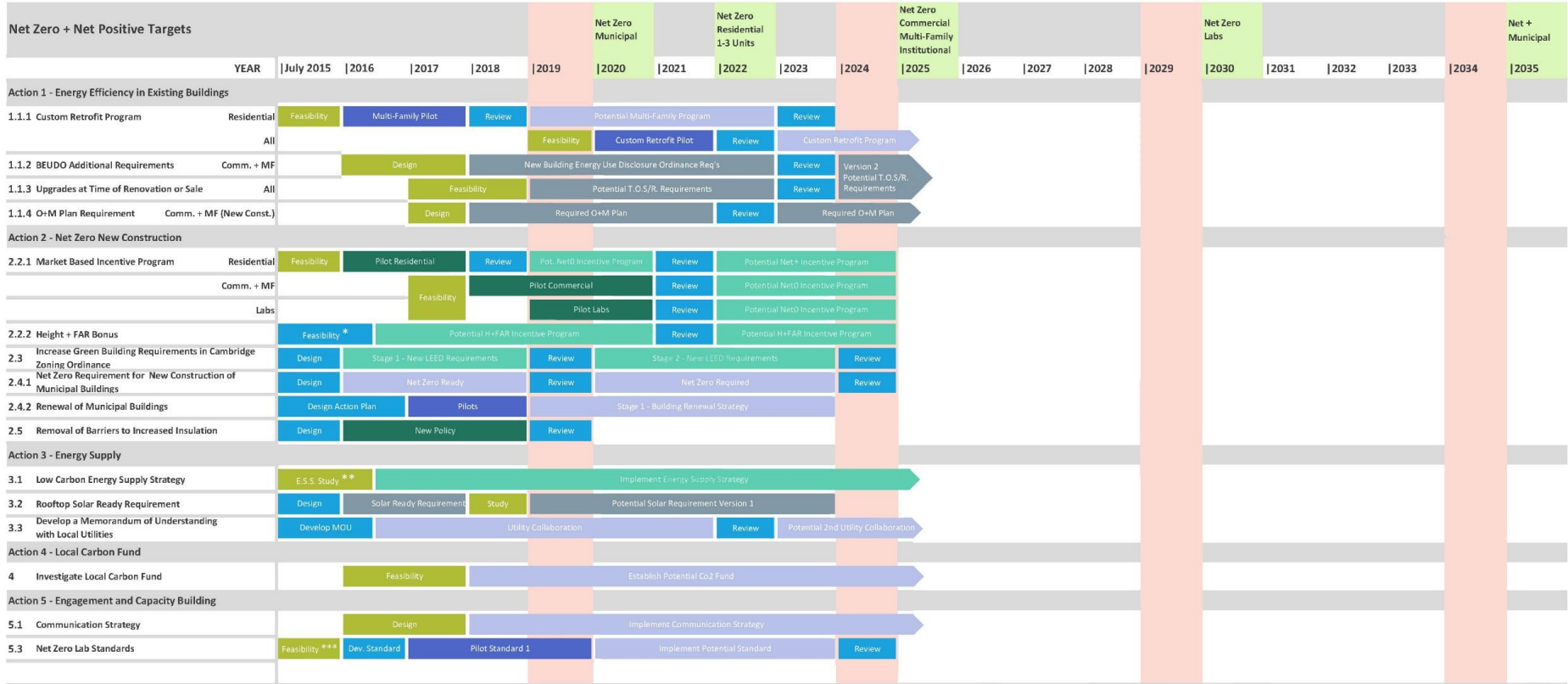
* To occur as part of Cambridge Master Plan process

** To happen in conjunction with Kendall Square study

*** Externally Led



MEDIUM TERM ACTIONS



* To occur as part of Cambridge Master Plan process
 ** To happen in conjunction with Kendall Square study
 *** Externally Led



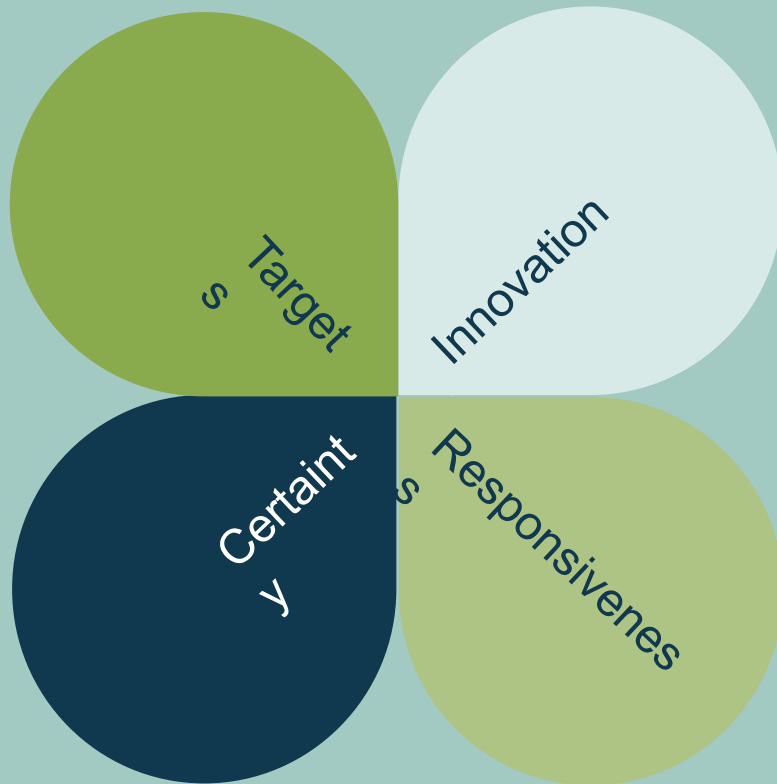
LONG TERM ACTIONS



Net Zero + Net Positive Targets																							
YEAR (fiscal year July - June)		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Action 1 - Energy Efficiency in Existing Buildings																							
1.1.1 Custom Retrofit Program	Residential	Feasibility	Multi-Family Pilot	Review	Potential Multi-Family Program					Review	Potential Multi-Family Program												
	All				Feasibility	Custom Retrofit Pilot	Review	Custom Retrofit Program				Review	Custom Retrofit Program										
1.1.2 Additional BEUDO Requirements	Comm. + MF		Design	New Building Energy Use Disclosure Ordinance Req's					Review	Version 2 Potential T.O.S/R. Requirements				Review	Version 2 Potential T.O.S/R. Requirements								
1.1.3 Upgrades at Time of Renovation or Sale	All			Feasibility	Potential T.O.S/R. Requirements					Review	Potential T.O.S/R. Requirements												
1.1.4 O+M Plan Requirement	Comm. + MF (New Const.)		Design	Required O+M Plan					Review	Required O+M Plan				Review	Required O+M Plan		Review	Required O+M Plan					
Action 2 - Net Zero New Construction																							
2.2.1 Market Based Incentive Program	Residential	Feasibility	Pilot Residential	Review	Pot. Net0 Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program
	Comm. + MF			Feasibility	Pilot Commercial	Review	Potential Net0 Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program
	Labs				Pilot Labs	Review	Potential Net0 Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program	Review	Potential Net+ Incentive Program
2.2.2 Height + FAR Bonus		Feasibility*	Potential H+FAR Incentive Program					Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program	Review	Potential H+FAR Incentive Program
2.3 Increase Green Building Requirements in Cambridge Zoning Ordinance		Design	Stage 1 - New LEED Requirements	Review	Stage 2 - New LEED Requirements				Review	Stage 3 - New LEED Requirements				Review	Stage 4 - Potential New Green Building Requirements								
2.4.1 Net Zero Requirement for New Construction of Municipal Buildings		Design	Net Zero Ready		Review	Net Zero Required				Review	Net Positive Required				Review	Net Positive Required							
2.4.2 Renewal of Municipal Buildings		Design Action Plan	Pilots		Stage 1 - Building Renewal Strategy					Stage 2 - Building Renewal Strategy													
2.5 Removal of Barriers to Increased Insulation		Design	New Policy		Review	New Policy																	
Action 3 - Energy Supply																							
3.1 Low Carbon Energy Supply Strategy		E.S.S. Study**	Implement Energy Supply Strategy																				
3.2 Rooftop Solar Ready Requirement		Design	Solar Ready Requirement	Study	Potential Solar Requirement Version 1					Potential Solar Requirement Version 2													
3.3 Develop a Memorandum of Understanding with Local Utilities		Develop MOU	Utility Collaboration					Review	Potential 2nd Utility Collaboration														
Action 4 - Local Carbon Fund																							
4 Investigate Local Carbon Fund			Feasibility	Establish Potential Co2 Fund																			
Action 5 - Engagement and Capacity Building																							
5.1 Communication Strategy		Design	Implement Communication Strategy																				
5.3 Net Zero Lab Standards		Feasibility***	Dev. Standard	Pilot Standard 1	Implement Potential Standard				Review	Pilot Standard 2	Implement Potential Standard												
* To occur as part of Cambridge Master Plan process																							
** To happen in conjunction with Kendall Square study																							
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THE FRAMEWORK



The Net Zero framework is a balance of:

- Defined Targets
- A process to adapt and respond to changes in the market and technology
- Costing & impact / opportunity assessment when appropriate
- Regulations & incentives
- New construction & existing buildings
- Equally targets savings from all sectors (no one sector is punished)



SUPPORT FROM STAKEHOLDERS

Key Stakeholder meetings:

- Massachusetts Biotech Council
- Cambridge Sustainability Compact Steering Committee
- Climate Protection Action Committee
- Cambridge Chamber of Commerce
- Cambridge Historical Commission Staff
- Cambridge Department of Public Works



Massachusetts
Institute of
Technology



FISCAL YEAR 2016 ACTIONS

- Update Green Building Requirements in Zoning Ordinance
- Develop Rooftop Solar Ready Requirement
- Removal of Barriers to Increased Insulation
- Develop a City-wide Low Carbon Energy Supply Strategy
- Establish Net Zero Labs working group
- Collaboration on research for Market-Based Incentives
- Begin Municipal Building renewal strategy
- Continue developing a MOU with Local Utilities
- Develop Communication Strategy
- Staff and Consultant Budget Approved



THANK

www.cambridgema.gov/GDD/Projects/Climate/netzerotaskforce

YOU

