

City of Cambridge

Getting to Net Zero Action Plan 5-Year Review

Meeting I: Net Zero Task Force Introduction

November 12, 2020



Meeting Objectives

1. Provide an overview of the Net Zero Action Plan (NZAP) history, goals, and underlying principles so that participants are of the same understanding of the work at-hand.
2. Communicate what it means to assess the current context of the NZAP through a framework focused on Policy, Science, Technology, and Equity
3. Review the process for integrating and measuring equity of the NZAP Actions
4. Discuss expectations and next steps for the Net Zero Task Force process

Meeting Agenda

- Part 1: Introductions
- Part 2: Historical Overview of NZAP
- Part 3: Framework for Evaluating NZAP Goals and Actions
- Part 4: Enhancing Equity with the NZAP
- Part 5: Closing: Expectations for NZTF Members
- Part 6: Public Comment

Part 1

INTRODUCTIONS

NET ZERO TASK FORCE

Residents

David Adamian,
CEO of Greener U

Gaurab Basu,
Physician

Peter Crawley,
CPAC Representative

Margery Davies,
Mother Out Front Representative

Henrietta Davis,
Former Mayor of Cambridge

Jan Devereux,
Former Vice Mayor/Representative of Green
Cambridge

Adam Gould,
Representative of Youth Climate Activists

Kolin Loveless,
Representative from Neighborhood Nine

Institutions, Property Owners and Developers

Jane Carbone,
Director of Development for Homeowners Rehab
Deborah Donovan,

VP of Env., Health and Safety at Takeda

Tom Evans,
Executive Director, Cambridge Redevelopment
Authority

Heather Henriksen,
Managing Director of the Harvard Univ. Office of
Sustainability

Eli Herman,
Construction Manager for Akelius Real Estate

Rick Malmstrom,
Executive Director of Sustainable Operations for
Alexandria Real Estate

Ben Myers,
VP of Sustainability for Boston Properties

Julie Newman,
Director of the MIT Office for Sustainability



NET ZERO TASK FORCE

Subject Matter Experts

Lauren Baumann,

VP of New Ecology

David Bisson,

Business Development Manager for Resonant Energy

Andrea Love,

Resident and Green Building Design Expert with Payette Architects

Chris Leary,

VP at Jacobs Architects

Paul Lyons,

Resident and CEO of Zapotec Energy

Steve Miller,

Energy Efficiency Consultant for Eversource

Gabe Shapiro,

Co-founder All-in-Energy

Tom Sieniewicz,

Resident and member of Planning Board

Jen Stevenson Zepeda,

Director of Research and Operations for Climable



NZAP Consulting Team

Douglas Kot, DNV GL

Doug is a Principal Consultant on DNV GL and has been involved with green building and sustainable planning since 1997; he has led the technical development of dozens of high-performance and zero net energy buildings.

Jim Leahy, DNV GL

Jim is a Senior Consultant for DNV GL with diverse background that includes work in engineering design, planning, and policy advisory particularly on issues related to renewable energy, sustainability and program design.

Marie Sorensen, Sorensen Partners

Marie is an architect, master planner, advocate, professor. With a focus on multifamily affordable and market-rate housing, and learning spaces she interactively collects, structures, and shares designs and insights that help shape communities.

Bryndis Woods, Applied Economics Clinic

Bryndis is a researcher with AEC who focuses on climate policy, climate adaptation, and equitable energy transitions. Recently Bryndis help lead the stakeholder input on social equity for Carbon Free Boston.



NZAP City Staff

Seth Federspiel, Climate Program Manager, City of Cambridge

Seth coordinates climate mitigation planning and implementation for the Cambridge Community Development Department within the Environmental and Transportation Planning Division. He has overseen implementation of the Net Zero Action Plan since it was adopted in 2015.

Susanne Rasmussen, Director of Environmental and Transportation Planning, City of Cambridge

Susanne oversees climate mitigation, adaptation, and sustainable transportation planning and implementation work for the Cambridge Community Development Department. She helped to lead development of the 2015 Net Zero Action Plan.



Part 2

HISTORICAL OVERVIEW OF NZAP

1

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.

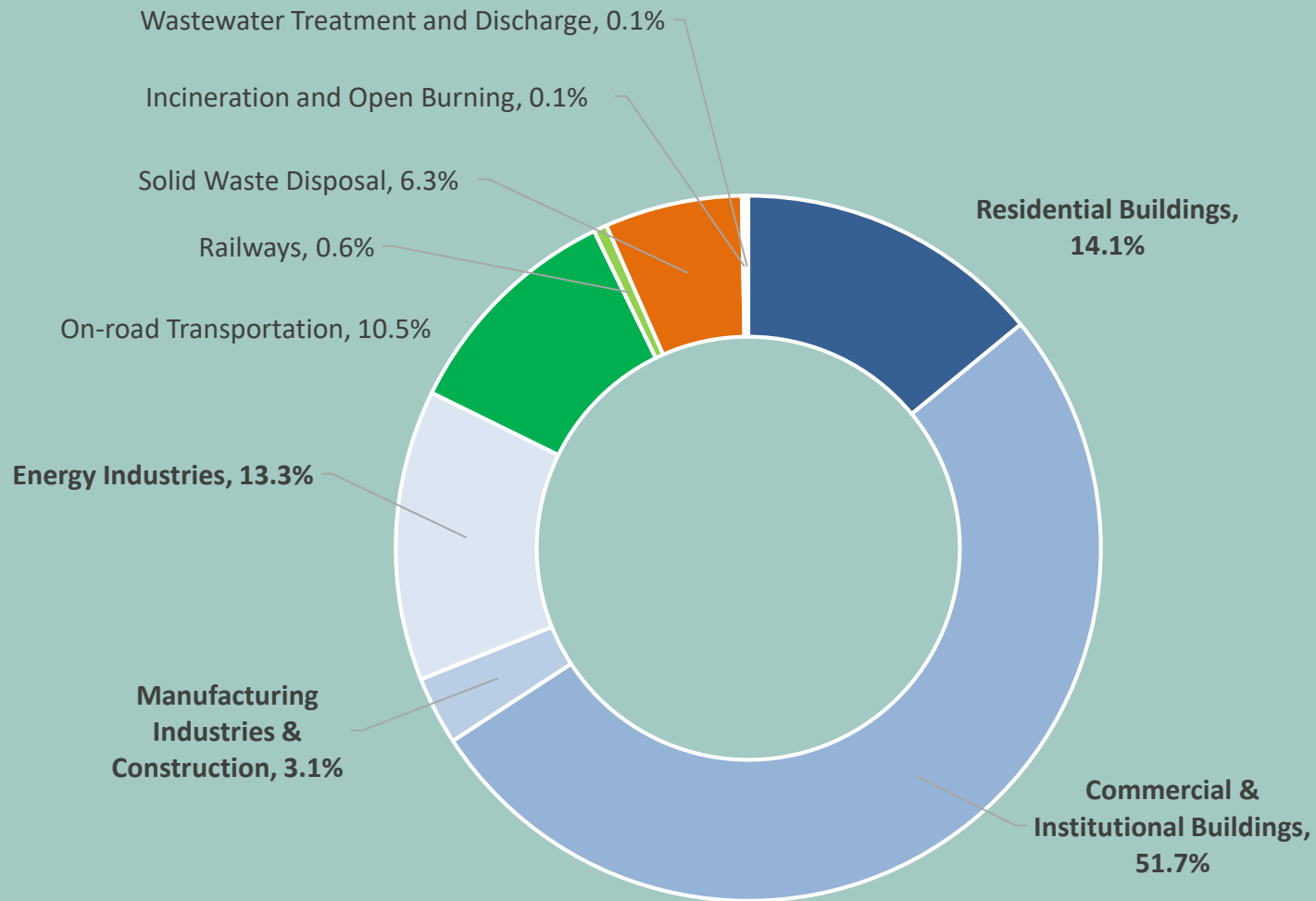
That is why it is Cambridge's aim to achieve

NET ZERO EMISSIONS

from buildings.

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

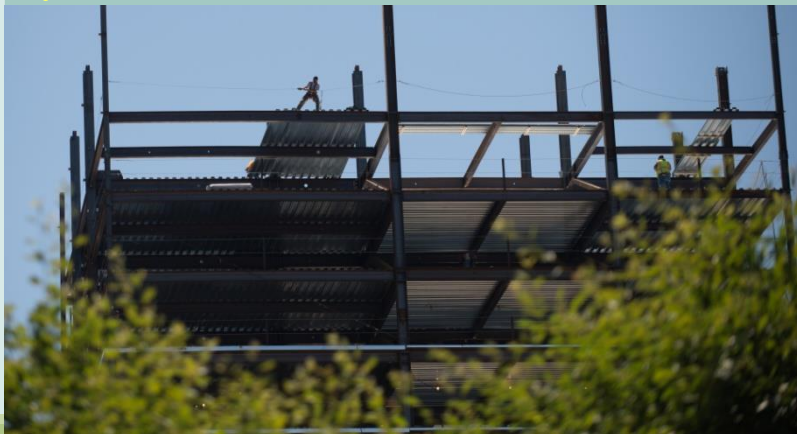
Cambridge Community GHG Inventory



Cambridge Community-wide Emissions by sub-sector (2012)

Net Zero Action Plan Background

- 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



NET ZERO TASK FORCE

- ★ **Jane Carbone,**
Director of Development, Homeowner's Rehab, Inc.
- ★ **Caitriona Cooke,**
Program Director, Conservation Services Group
- ★ **Henrietta Davis,**
Resident and former Mayor of Cambridge
- ★ **Emily Grandstaff-Rice,**
Resident (2014), Boston Society of Architects, Cambridge Seven Associates
- ★ **Heather Henriksen,**
Director of the Office for Sustainability, Harvard University
- ★ **Shawn Hesse,**
Architect, Sustainability Expert at Emersion Design
- ★ **Marc Hoffman,**
Resident and Energy Efficiency Advisor

- ★ **Bill Kane,**
Vice President of Leasing & Development, BioMed Realty
- ★ **Andrea Love,**
Resident, and Director of Building Science, Payette Architects
- ★ **Paul Lyons,**
Resident and President, Zapotec Energy, Inc.
- ★ **Joseph Maguire,**
V. P. of Development & Asset Management Services, Alexandria Real Estate Equities
- ★ **Julie Newman,**
Director of Sustainability, Massachusetts Institute of Technology
- ★ **Tom Sieniewicz,**
Resident and Planning Board member, City of Cambridge
- ★ **Barun Singh,**
Resident and Founder & CTO of Wegowise
- ★ **Quinton Zondervan,**
Resident and Executive Director, Climate Action Liaison Coalition



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**



2

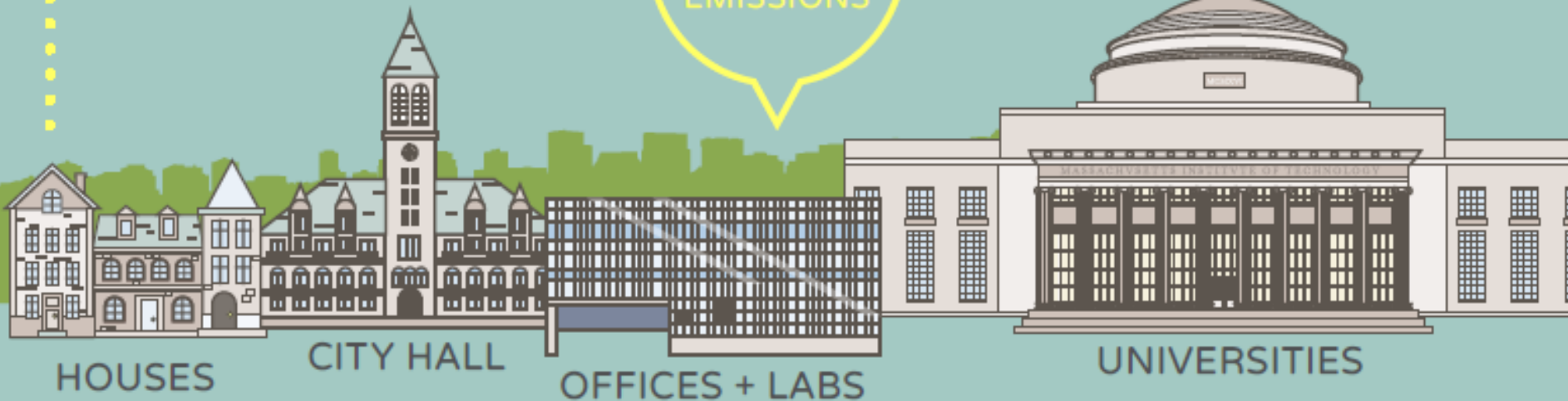
WHAT IS NET ZERO?

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

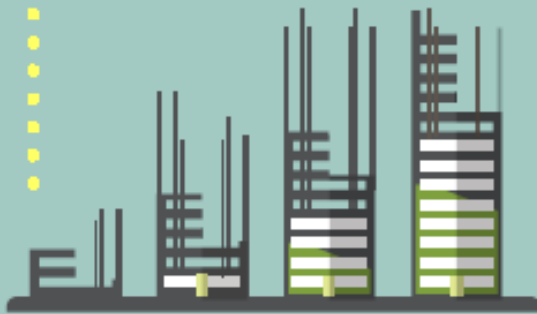


3

HOW TO ADDRESS CARBON REDUCTION

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

EFFICIENT DESIGN & RETROFITS



IMPROVED OPERATIONS



RENEWABLE ENERGY SUPPLY



Net Zero Action Plan Summary



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					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					
	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					
	Labs	Feasibility		Pilot Labs			Review	Potential Net0 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				
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																						
*** Externally Led																						



Net Zero New Construction Targets:

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

Criteria that will be evaluated in order to determine the feasibility:

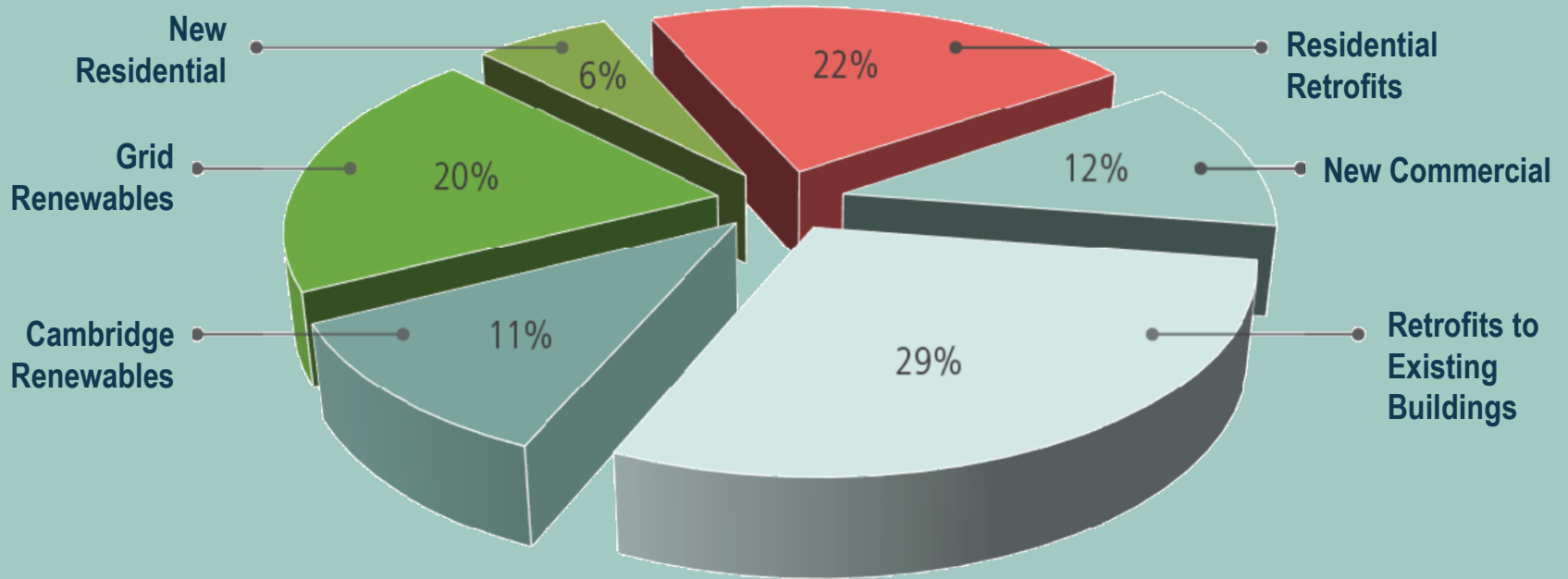
- Number of Net Zero Buildings in that building type
- Technical feasibility/industry capacity
- Access to renewable energy
- Economics including NPV analysis
- Contribution to other goals such as resiliency



NZAP Action Impacts

Key Actions:

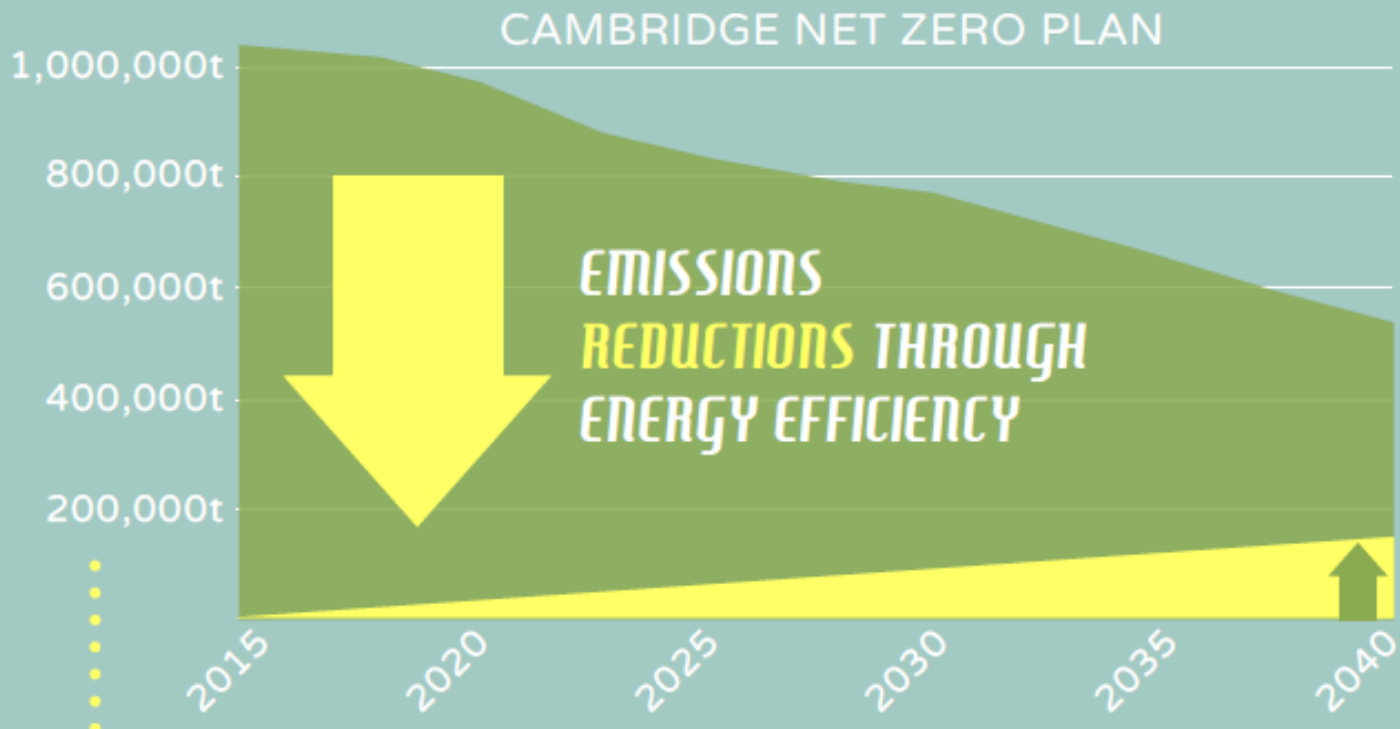
1. Retrofits to Existing Buildings
2. Net-Zero New Construction
3. Energy Supply
4. Local Carbon Fund
5. Engagement & Capacity Building



4

THE 25-YEAR NET ZERO STRATEGY

The net zero action plan aims to cut energy demand significantly, and replace fossil fuels with renewable energy.



Achieve **70%** reductions

INCREASED RENEWABLE ENERGY SUPPLY



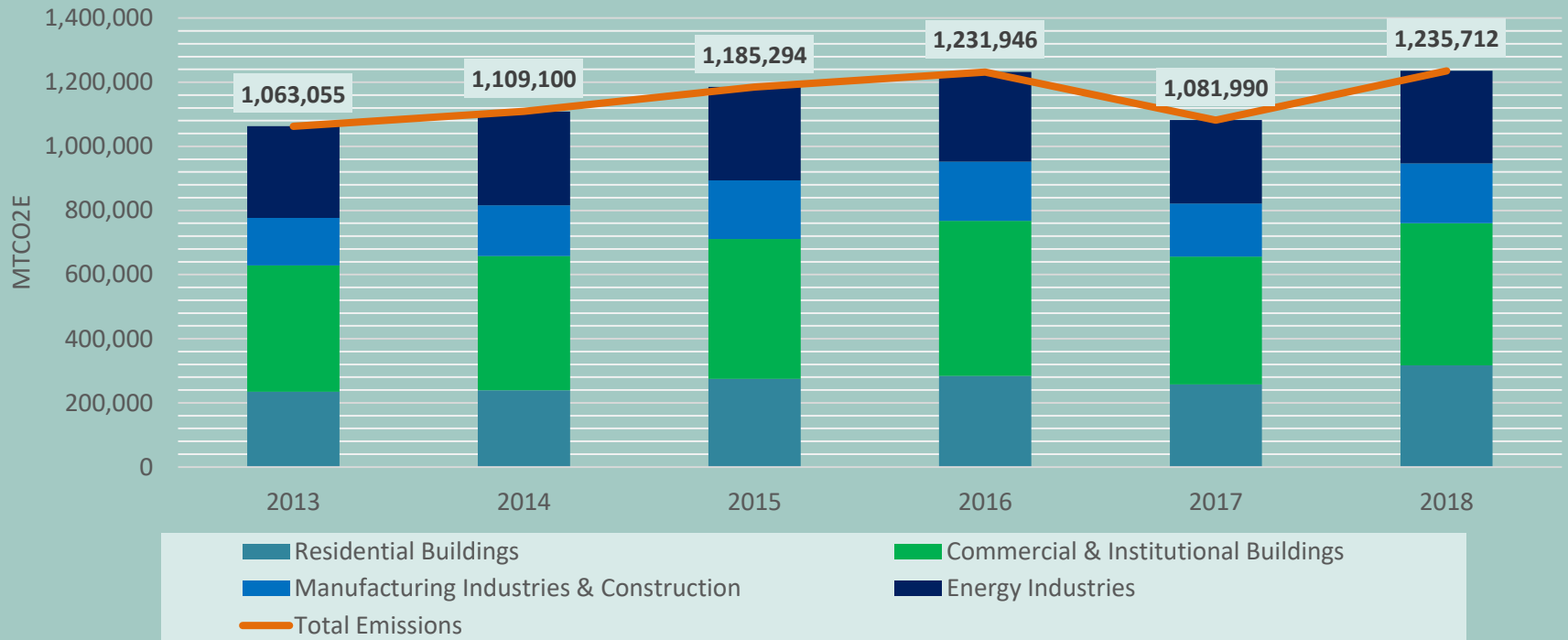
THE PATH TO A
NET ZERO CAMBRIDGE



Cambridge's Commitment: Carbon Neutrality by 2050



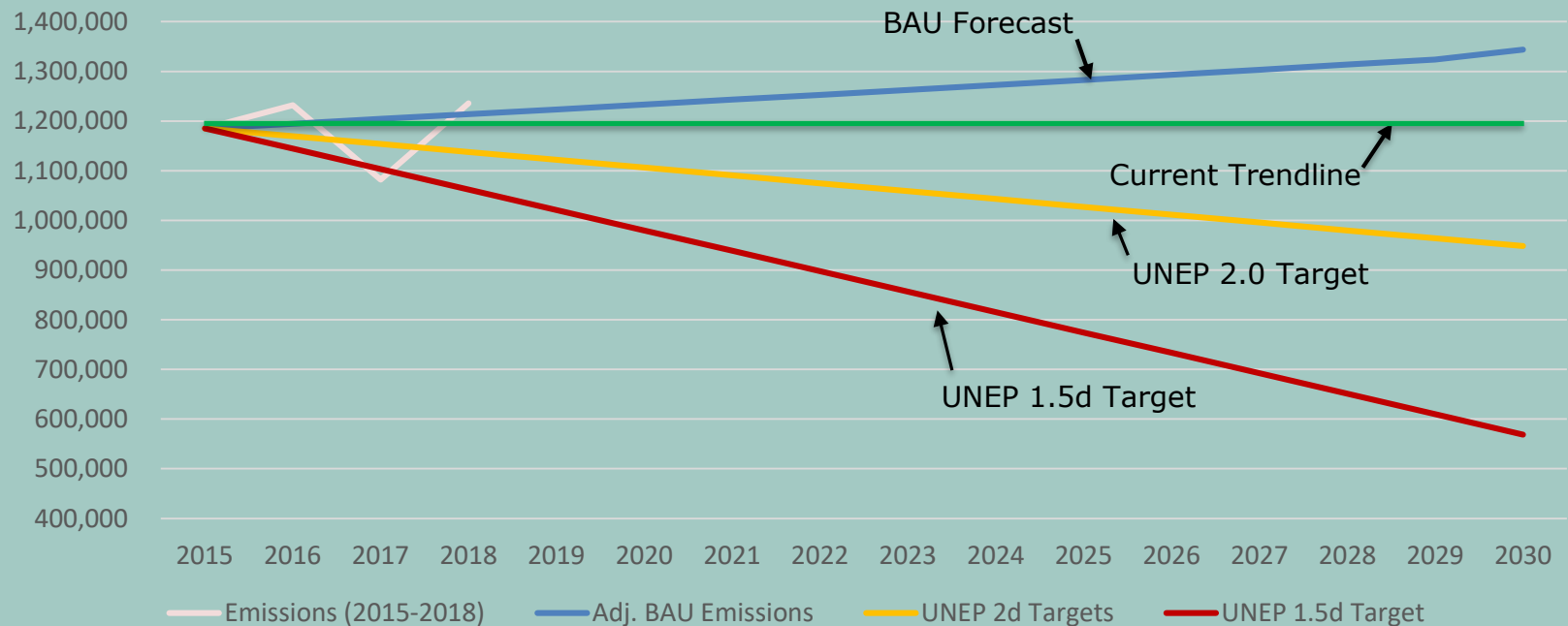
GHG Emissions Trends from Building Stock



Building Sector CO2e emissions 2013-2018

GHG Emissions Trend Cont.

- Actual emissions 2013-2018 deviated from forecast emissions
- External factors limit the insight and it's difficult to conclude the impacts of NZAP on building sector emissions from a top-down assessment
- If the current trends continue through 2030, the city will not achieve our GHG reduction goals



Part 3:

FRAMEWORK FOR EVALUATING NZAP GOALS AND ACTIONS

Framework for Evaluating NZAP Goals and Actions

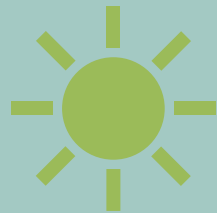
Science



Policy



Technology



Equity



Science

- Since the adoption of the Net Zero Action Plan in June 2015, the International Panel on Climate Change (IPCC), the United Nations body responsible for assessing the science related to climate change, issued a special report on the impacts of global warming of 1.5 deg C above pre-industrial levels. Emissions need to be reduced 45% below 2010 levels by 2030 and 100% by 2050 maintain the ability to reach this target.
- With every passing year, there is more urgency in the scientific imperative, the years since 2015 have been the hottest on record



Policy

- Cambridge has now committed to achieving carbon neutrality by 2050. The faster Cambridge can reduce emissions within its borders, the more the City can lead by example in the global effort to combat climate change
- **Federal Alignment**
 - Slowdown in federal policy for energy efficiency, especially for plug loads has created a gap in behavioral energy use reductions
 - Federal tax credits will play a role in clean energy procurement for the City
 - National building codes such as the 2021 IECC set the baseline for state code updates



Policy

- **State Policy Alignment**, the current Three-Year Energy Efficiency Plan for gas and electric utilities expires in 2021 and although the Plan is implemented at the state level, the City can advance programs for hard-to-reach sectors like multifamily buildings.
- Recent State Legislation:
 - An Act Setting Next Generation Climate Policy (S.2477) sets statewide net-zero emissions limit for the year 2050: It also sets sub-limits for specific sectors
 - An Act Relative to Energy Savings Efficiency (S.2478) that enacts appliance efficiency standards



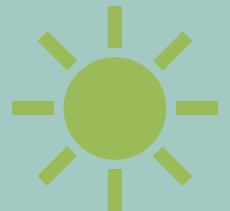
Policy

- **Local alignment** includes:
 - Cambridge voted on the proposed changes to the IECC in December 2019 that would advance EE in new construction.
 - The City should work with MAPC and other cities to advance a net zero stretch code at the state level to avoid the issue of preemption if Cambridge tries to adopt its own.
 - A note on Brookline's effort to ban on fossil fuel, this was struck down by the State Attorney General, but other pathways are still open for consideration, the decision stated: *"If we were permitted to base our determination on policy considerations, we would approve the by-law."*



Technology

- There are many enabling technologies that have emerged since the 2015 NZAP efforts
- Energy and Efficiency Technologies
 - Cold-climate Heat Pumps
 - Electric Vehicles (connected load to buildings)
 - Battery Energy Storage
 - Microgrids
 - Lighting and Controls
 - Efficiency Gains/Cost Reduction of Renewable Technology
- **What technologies are you working with that should be included on our list?**



Equity

- New Metric for our current work
- Cambridge recognizes the social equity implications of such consequential policy choices.



**Equity
Checklist**



Dimensions



Pitfalls

- We will be using AEC's equity assessment framework helps guide our process



Part 4:

ENHANCING EQUITY WITH THE NZAP

Equity Assessment Framework

Climate damages have a larger impact on vulnerable populations than on other groups. In the Net Zero Action Plan 5-Year Review, Cambridge recognizes the social equity implications of climate program and policy choices. Using AEC's equity assessment framework helps guide a process that:

- considers the context of society's vulnerable groups;
- proactively prioritizes equitable outcomes;
- intentionally avoids common pitfalls; and
- is reactive to any issues that arise during implementation.



Equity Assessment Framework



Equity Checklist

The checklist provides a method to ensure a robust treatment of climate and social equity.



Dimensions

Social equity cuts across many dimensions, each of which requires consideration.



Pitfalls

Each equity dimension has common equity pitfalls that should be acknowledged, addressed, and intentionally mitigated should they arise.



Dimensions

Social equity cuts across many dimensions, each of which requires consideration:

Stages of Policy	Sectors
Planning/Agenda Setting	Buildings
Formulation	Transportation
Adoption	Energy
Implementation	Waste
Evaluation	Industry
Termination/Renewal/Update	Agriculture, Forestry and Other Land Use
Communities	Intergenerational
Low to No Income	Most to gain
People of Color	Most to lose
Children/Youth/Older Adults	Lacks a voice
Immigrants/Legal Status	Ecological sustainability
People with Disabilities	Balance inter- and intragenerational
Limited English Proficiency	2050/2100 equity implications
LGBTQIA+	
Gender	



Pitfalls

Each equity dimension has common equity pitfalls that should be acknowledged, addressed and intentionally mitigated should they arise. Pitfalls include:

- Negative policy/program interactions
- Regressive cost impacts
- Policy/program inflexibility
- Inadequate outreach/representation
- Unequal access to information
- Workforce impacts
- Unknowable equity implications
- Reducing options, quality and/or access
- Myopic policy/program
- Hidden value judgements
- Pricing out
- Exacerbate historical inequities



Pitfalls

For example, in the buildings sector, common equity pitfalls include:

Buildings	
Displacement	Upgrades to buildings and transportation infrastructure can increase rents and home values, pricing communities out of their own neighborhoods.
Homeowner focus	Policies that benefit homeowners may not benefit renters, or provide incentives to landlords.
Access to credit	Low-income households are more likely to be denied access to credit or offered less credit to energy retrofit their homes or switch to renewable energy sources.
Energy insecurity	Increasing energy prices to pay for efficiency and renewables measures can have the unintended consequence of increasing customer bills and pricing families out of necessary energy services.
Sectoral overlap	To avoid unintended consequences, transition planning must be cross-sectoral and comprehensive, considering interactions among measures' effects and cumulative cost impacts across all measures.





Equity Checklist

Today, we begin to address the first three items on the Equity Checklist:

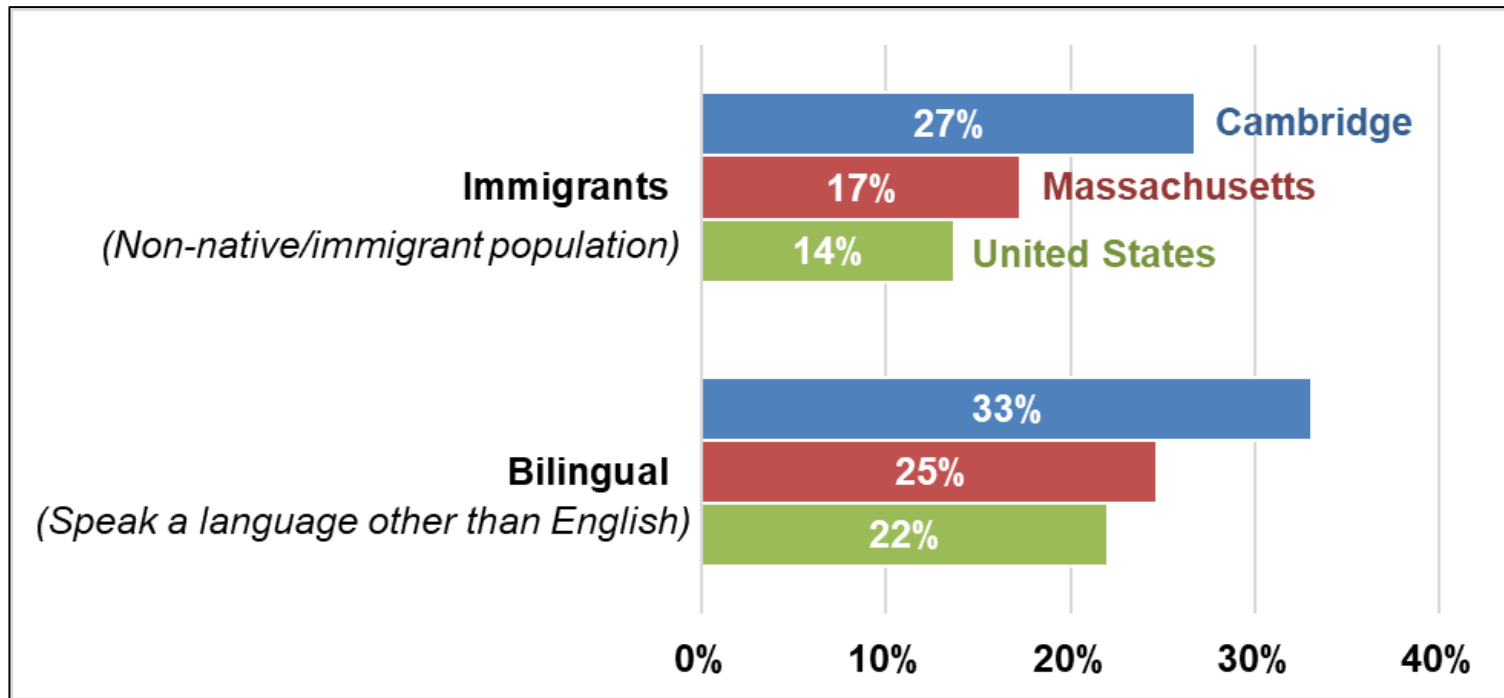
- 1) Inclusive planning and decision-making
- 2) Establish baseline equity context
- 3) Plan carefully to focus on equity outcomes and avoid unintended consequences



Cambridge Equity Context

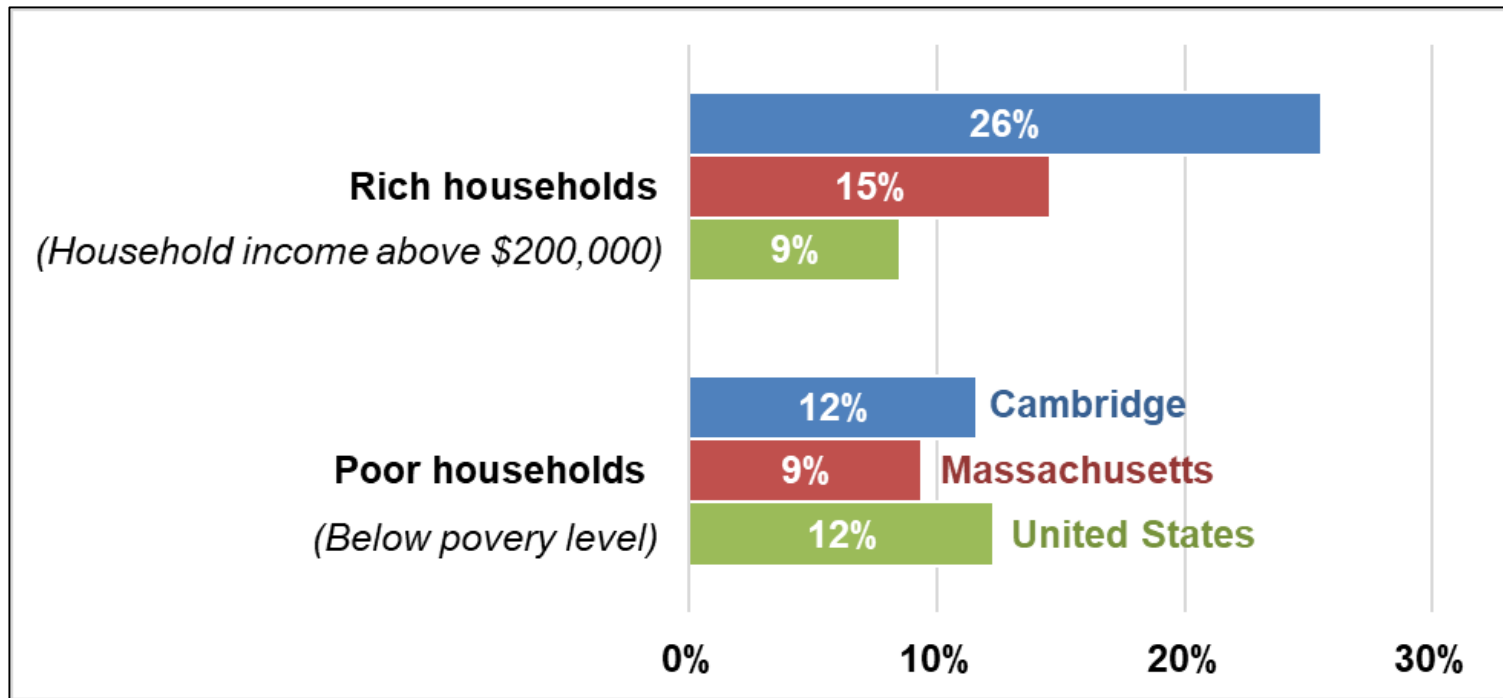


Cambridge: a city of multilingual immigrants



Source: American Community Survey 1-Year Estimates Subject Tables. 2019. Language Spoken at Home [Table S1601] and Nativity and Citizenship Status in the United States [Table B05001].

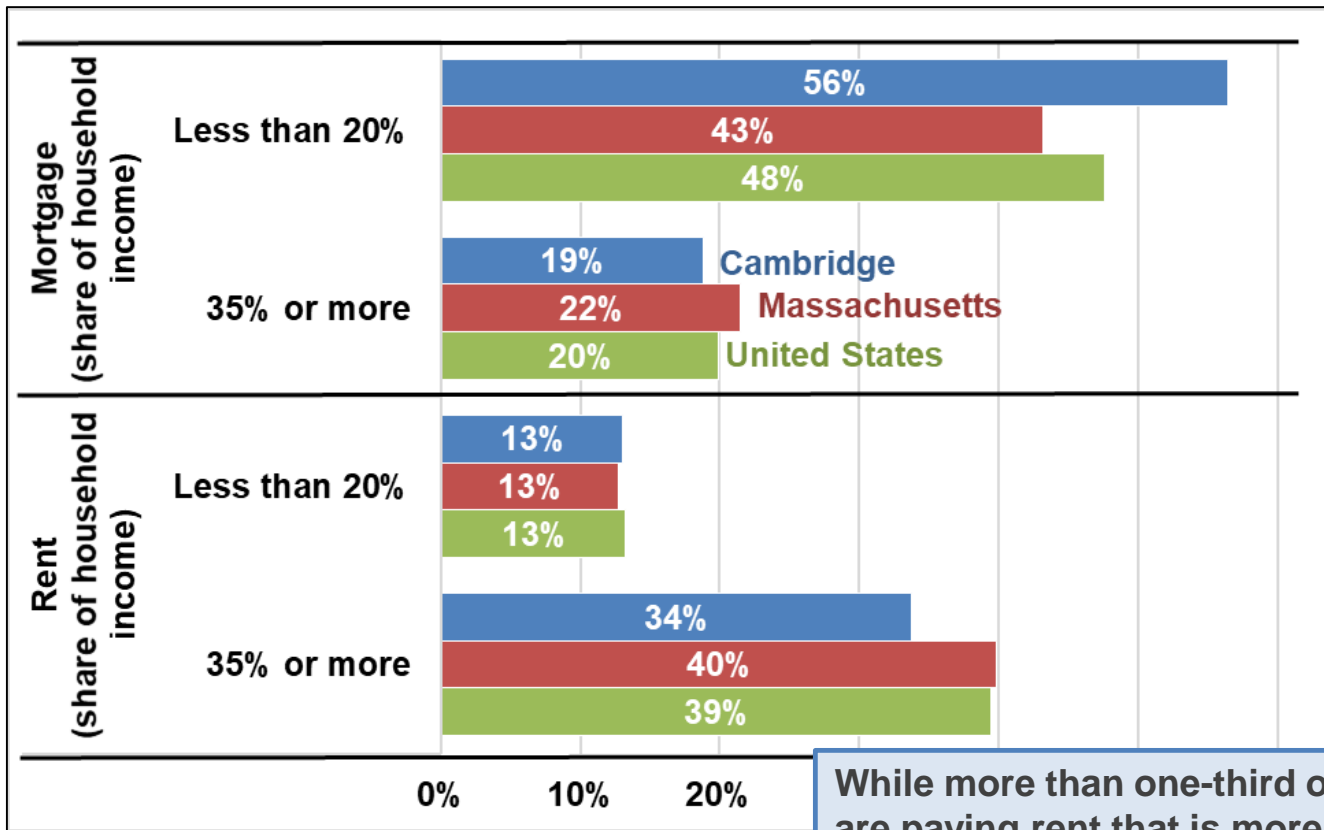
Cambridge: poor or rich— and both sides overrepresented



Source: American Community Survey 1-Year Estimates Subject Tables. 2019. Income in the past 12 months (in 2019 inflation-adjusted dollars) [Table S1901] and Poverty Status in the Past 12 Months [Table S1701].



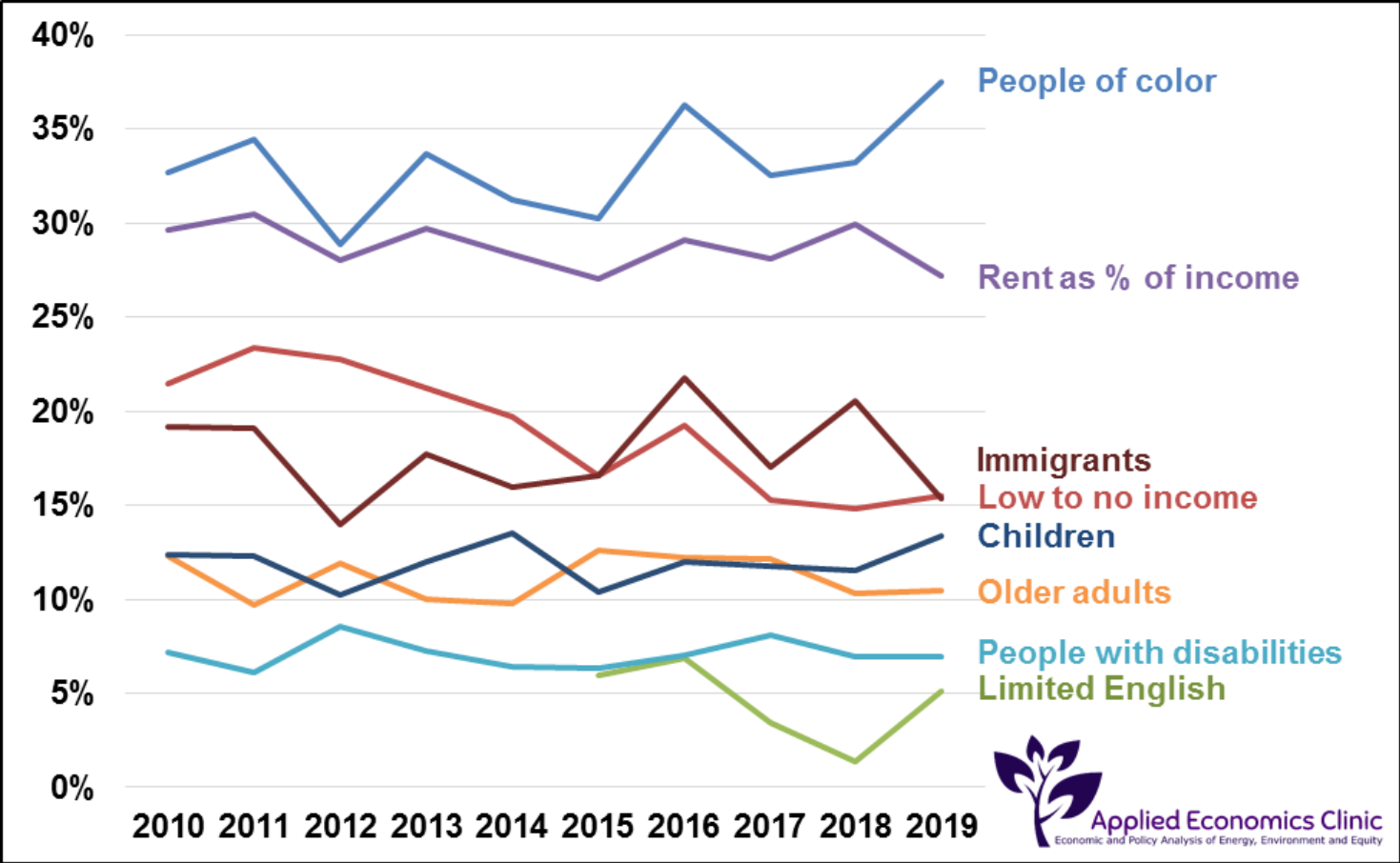
Cambridge: homeowner-renter divide



Source: American Community Survey 1-Year Estimates Subject Tables. 2019. Selected Housing Characteristics [Table DP04].

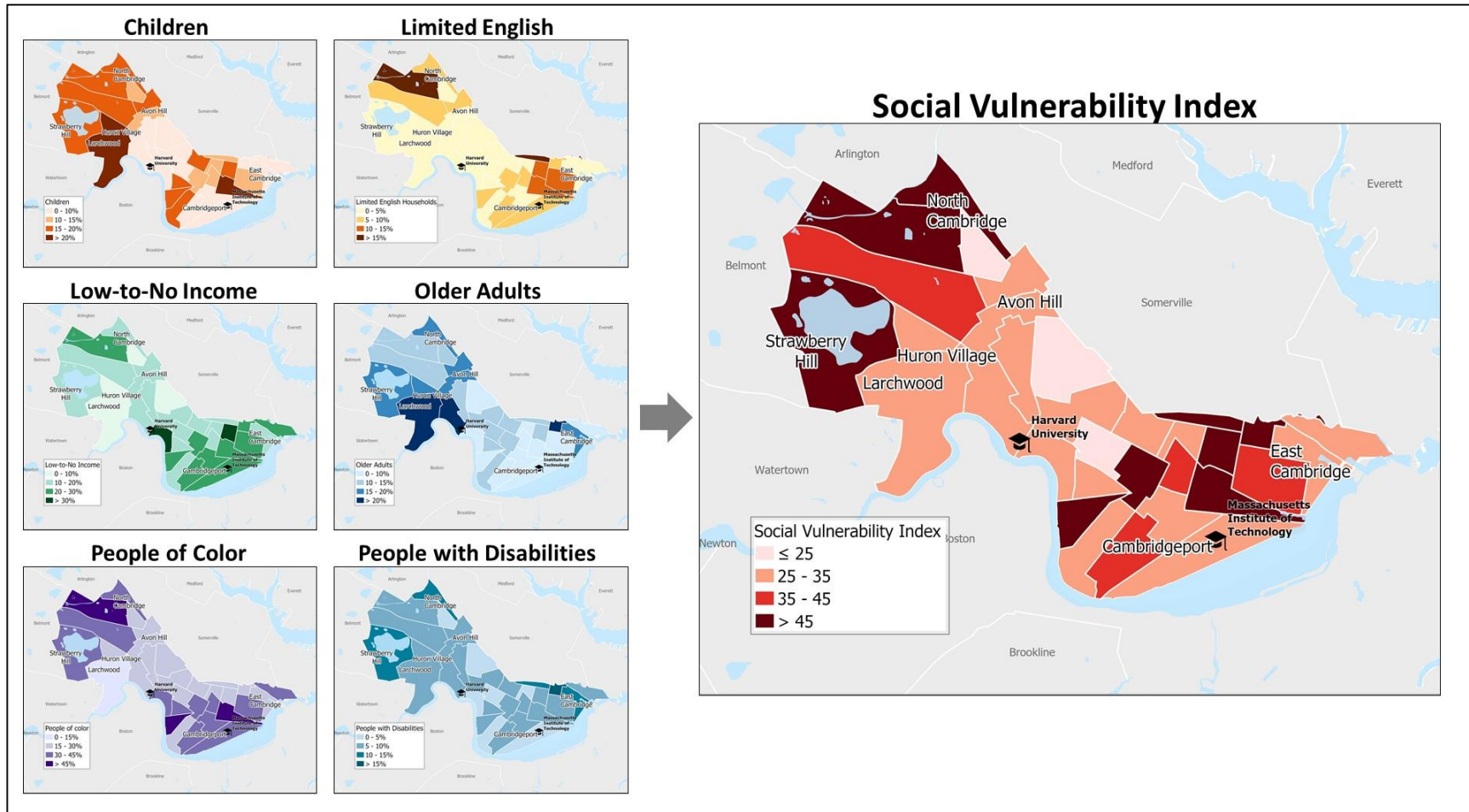
While more than one-third of Cambridge renters are paying rent that is more than 35 percent of their income, fewer than one-fifth of the city's homeowners pay that much in mortgage costs. And the opposite is true as well: more than half of homeowners pay less than 20 percent in mortgage costs, but only 13 percent of renters pay that little.

Cambridge demographics remarkably stable over last 10 years

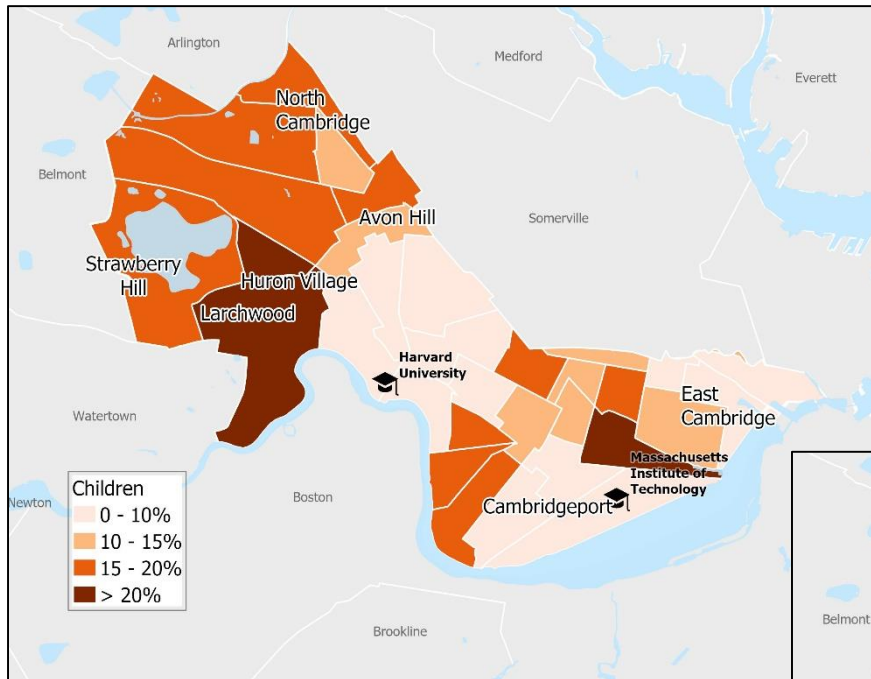


Source: American Community Survey 1-Year Estimates Subject Tables. 2019. Nativity and Citizenship Status in the United States [Table B05001], Race [Table B02001], Poverty Status in the Past 12 Months [Table S1701], Limited English Speaking Households [Table S1602], Disability Characteristics [Table S1810], Age and Sex [Table S0101].

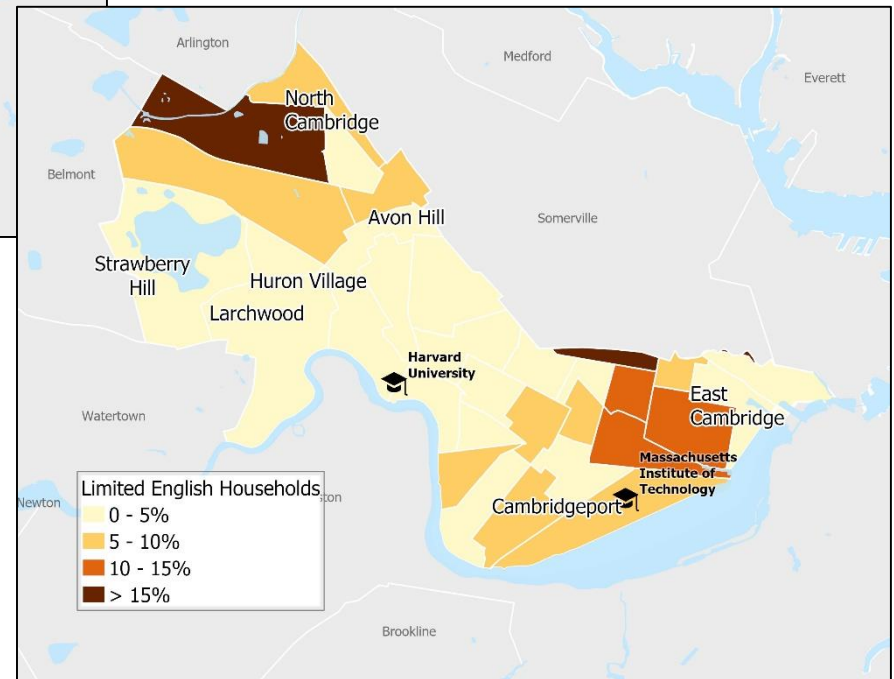
Cambridge social vulnerability index



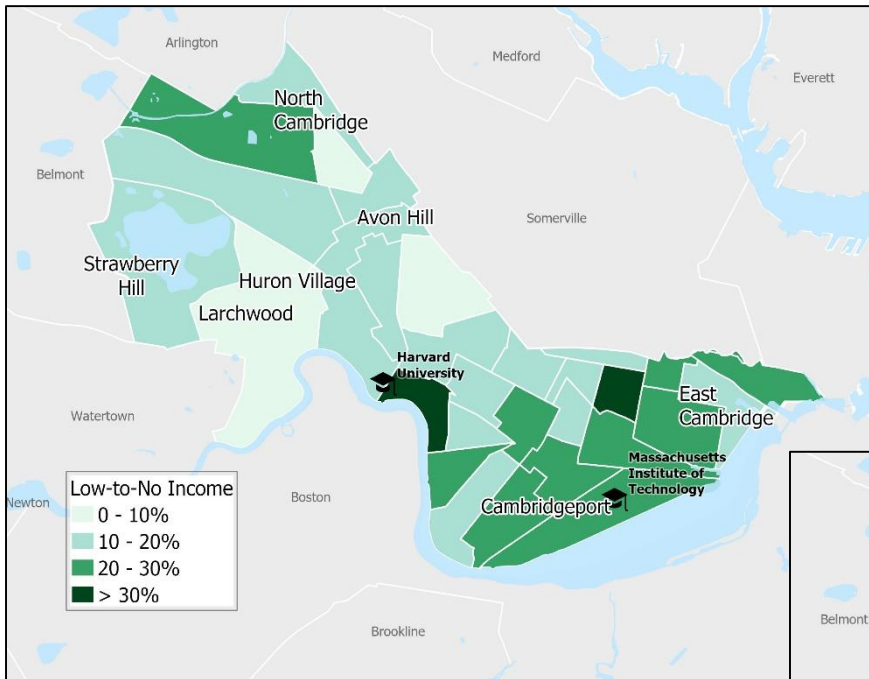
Children



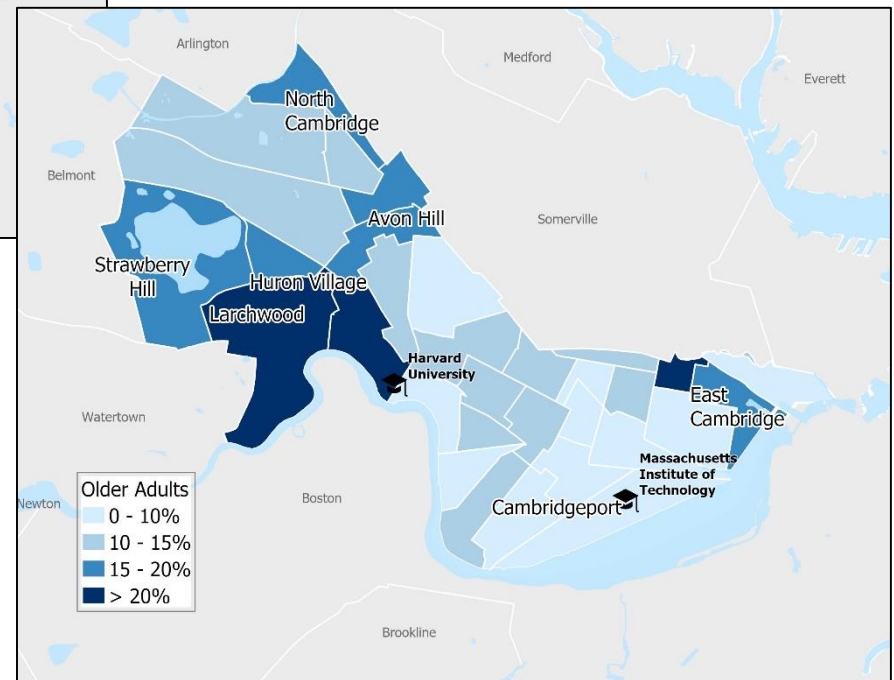
Limited English



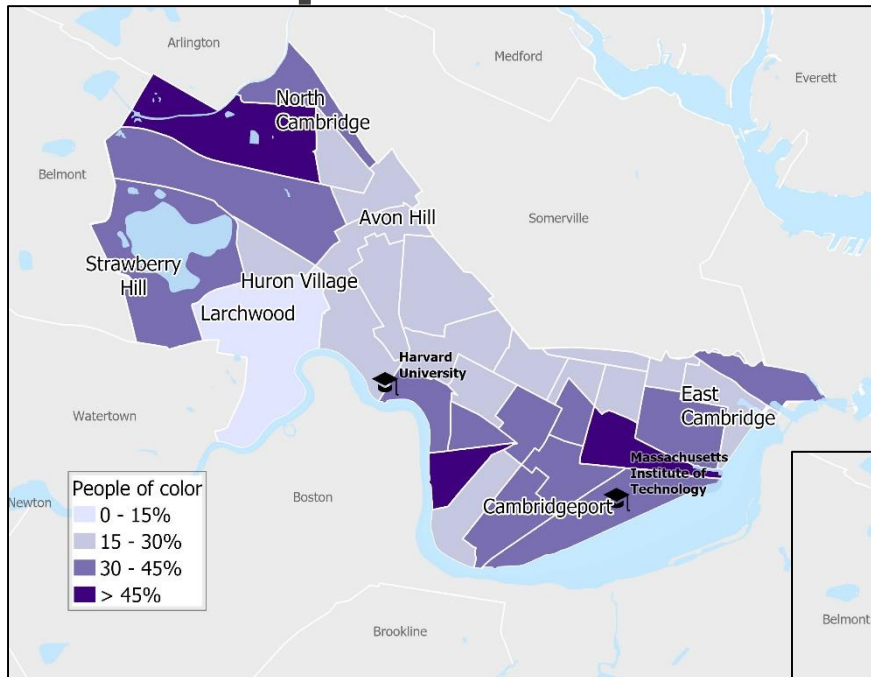
Low to no income



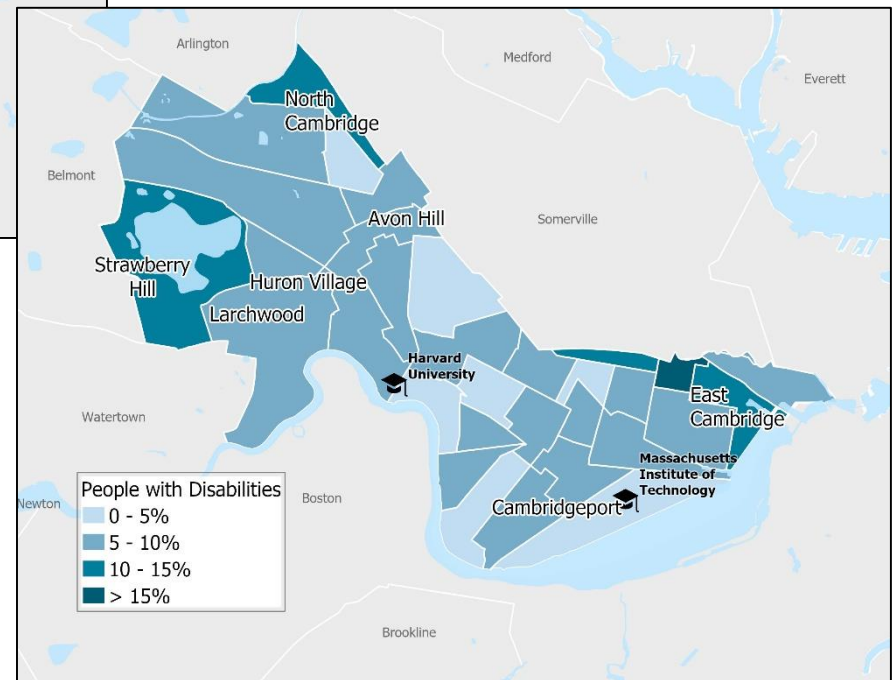
Older adults



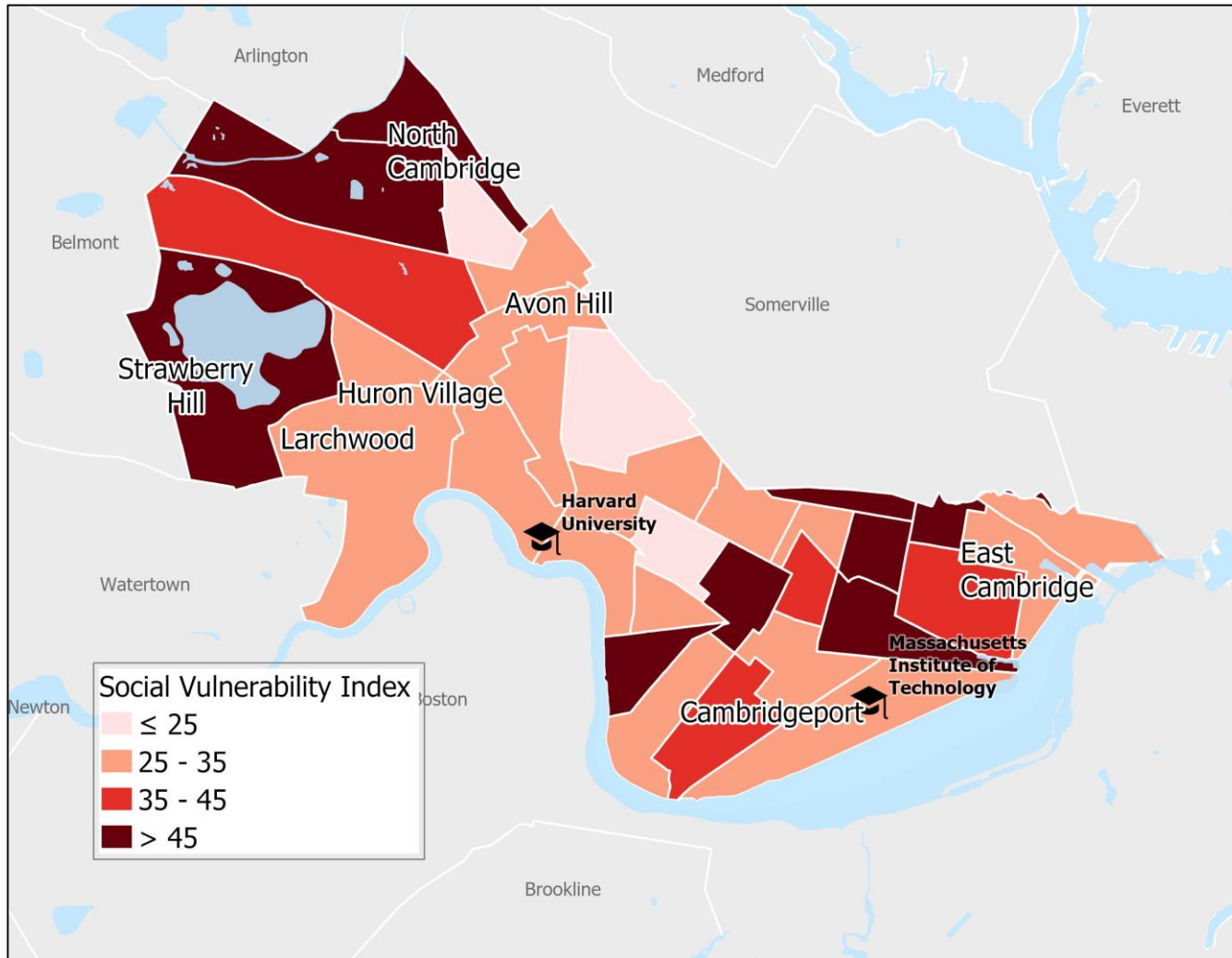
People of color



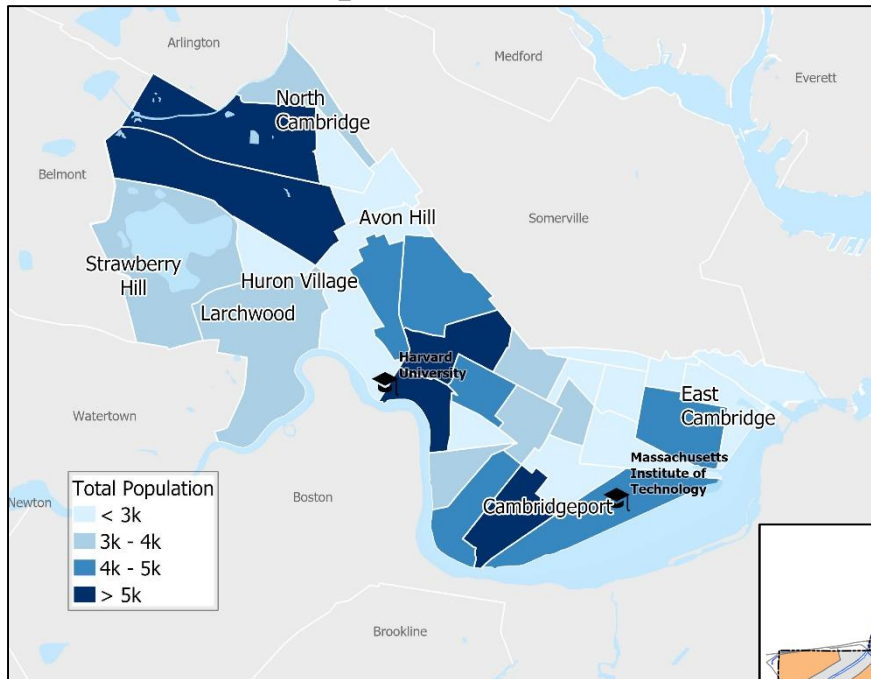
People with disabilities



Cambridge vulnerability hotspots

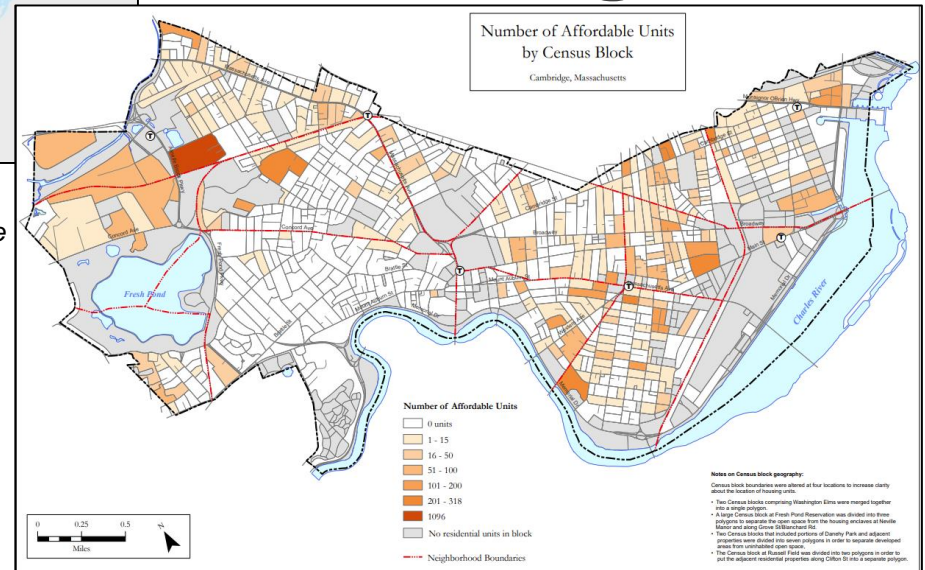


Population

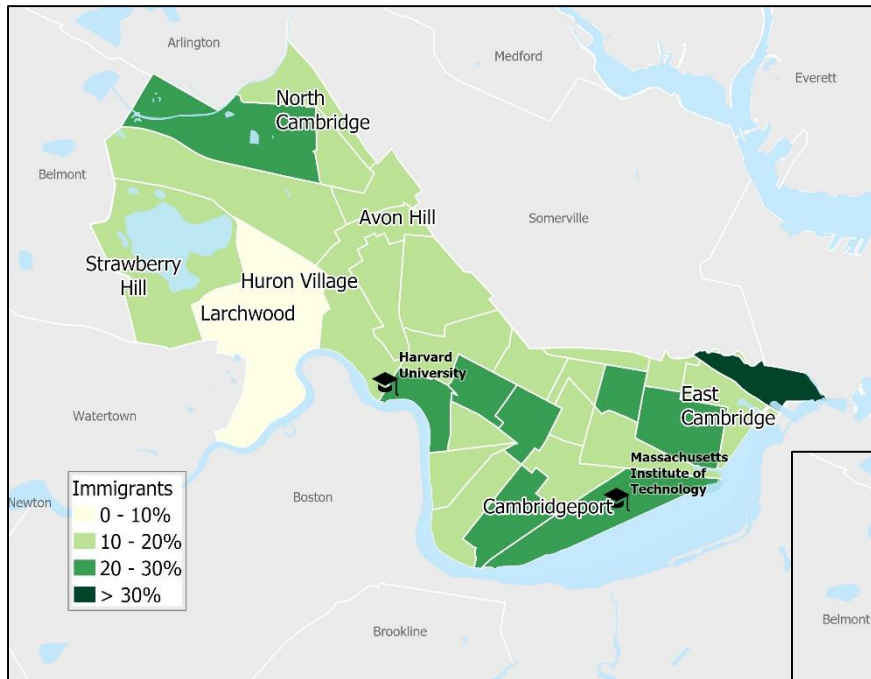


Sources: American Community Survey 1-Year Estimates Subject Tables. 2019. Age and Sex [Table S0101]. Affordable housing data from City of Cambridge Housing Division.

Affordable Housing

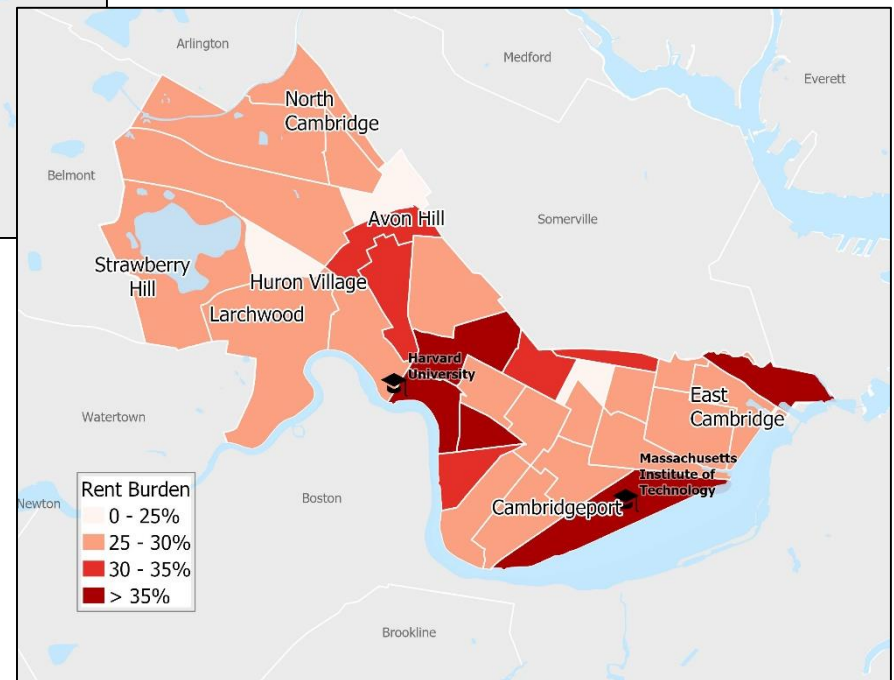


Immigration status



Sources: American Community Survey 1-Year Estimates Subject Tables. 2019. Selected Housing Characteristics [Table DP04] and Age and Sex [Table S0101].

Rent burden



Equity Metrics



Outcome Metrics

Measure whether equity goals were met in absolute terms. Upon program completion, it is important to assess how the communities the program was intended to benefit perceive the program's impacts.

Key Questions

Did you meet program goals?

Were there any unintended consequences?

Does the policy need iteration?



Distributional Dimensions

Measure the distribution of equity gains and losses across different groups in society in comparative terms.

Key Questions

Who gained and who lost in the program community?

Are policy gains and losses equitably distributed?

Have existing vulnerabilities been exacerbated or new vulnerabilities created?

Process Metrics

Measure inclusion and representation over all stages of policy development. These measures include number of participants, types of participation, communities represented, etc.

Key Questions

Is institutional feasibility accounted for?

Did you facilitate stakeholder participation?

How was stakeholder/community input used?

Example #1: Energy Efficiency

Outcome Metric

Dollars saved through energy efficiency measures

Focuses on the total impact of programs on all customers.

Distributional Dimensions

Average dollars saved through energy efficiency measures by race/ethnicity

Focuses on the savings experienced by specific groups of customers.

Process Metric

Number of public comments and participants at EEAC meetings

Focuses on how impacts are measured and whether the energy efficiency program is inclusive across all stages.



Example #2: Rooftop Solar

Outcome Metric

Amount of rooftop solar (MW)

The overall amount of solar, aggregated for the entire city.

Distributional Dimensions

Share of rooftop solar by zip code (percent of total MW)

Considers individual neighborhoods, and how they relate to the total.

Process Metric

Distribution of outreach materials in different communities and languages

Illuminates how benefits are distributed to the specific geographies.



Discussion and Feedback



Cambridge NZAP Equity Metrics

- **What does a successfully equitable Net Zero Action Plan look like to you?**
 - How would you measure “success”?
- **Do you have any equity-related concerns about potential impacts of a Net Zero Action Plan?**
 - How would you measure negative impacts?



Part 5:

CLOSING: EXPECTATIONS FOR NZTF MEMBERS

Closing

- Our primary goal for the NZTF meetings is to work with representatives from throughout the community to determine adjustments to the NZAP that:
 1. Adhere to the NZAP Principles
 2. Are based on current science, policy, and technology
 3. Result in an equitable plan

Closing

- To accomplish this goal there are six meetings currently planned to occur on monthly basis

Meeting	Meeting Objective
1. NZTF Introduction	Communicate the NZAP goals and work to-date and how to assess equity within the plan
2. NZAP Impact Analysis	Review the approach to measuring impacts and progress, data and considerations for equity moving forward
3. NZAP Strategy Adjustments	Determine a broad range of possible strategies to consider for NZAP adjustments
4. Prioritization for NZAP Updates	Develop a prioritized list of adjustments to NZAP
5. Assess Equity & Outline Implementation Plan	Define the implementation plan for new NZAP actions
6. Finalize NZAP Updates	Confirm updates to NZAP actions and the implementation plan

Closing

Meeting Logistics

- Going forward, meetings to be held on 2nd Tuesday of each month from 4:00 – 6:00
- All meeting to be held using the Zoom platform
- NZTF members may be asked to review materials or consider possible solutions outside of meetings

Part 6:

PUBLIC COMMENT

Thank You!

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