

# Climate Change Mitigation and Preparedness Planning



**CITY COUNCIL ROUNDTABLE**  
**JUNE 23, 2014**

# “Warming of our planet is unequivocal”



- Temperatures at Earth's surface, in the part of the atmosphere that's closest to the Earth, and in the oceans have all increased over recent decades.
- The largest increases in temperature are occurring closer to the poles, especially in the Arctic. This warming has triggered many other changes to the Earth's climate:
  - *Snow and ice cover have decreased* in most areas.
  - *Sea level is increasing* because water expands as it warms and because melting ice on land adds water to the oceans.
  - Worldwide, the observed changes in average conditions have been accompanied by *increasing trends in extremes of heat and heavy precipitation events*, and decreases in extreme cold.
  - It is the sum total of these indicators that leads to the conclusion that *warming of our planet is unequivocal*.

# Temperatures/Precipitation Increasing

## Temperature is Rising:

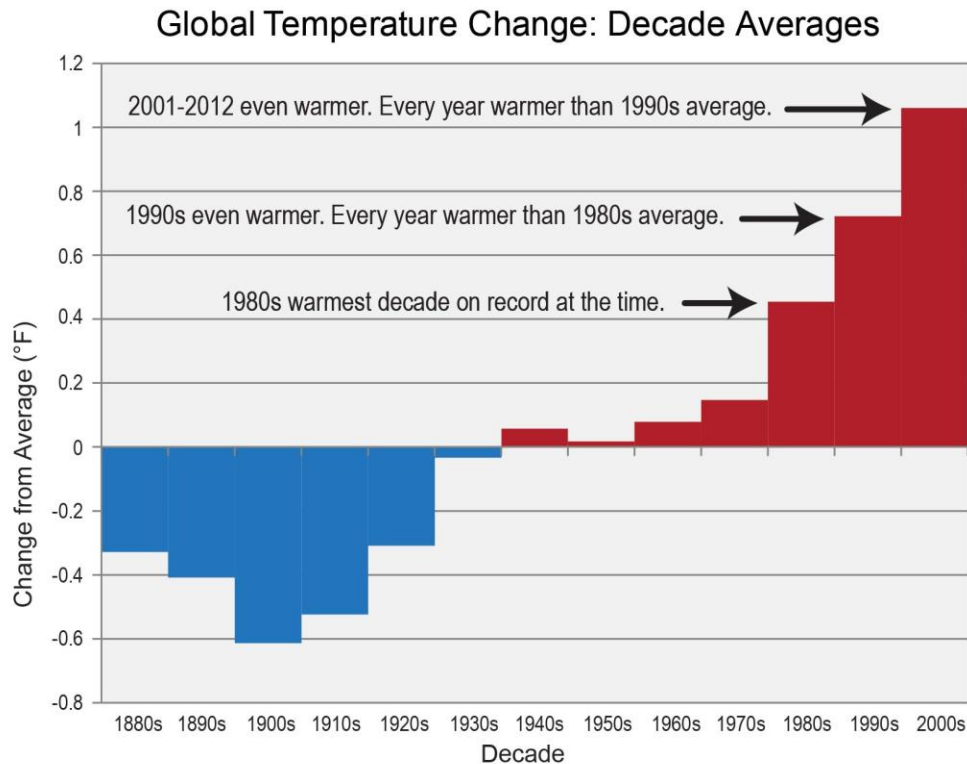


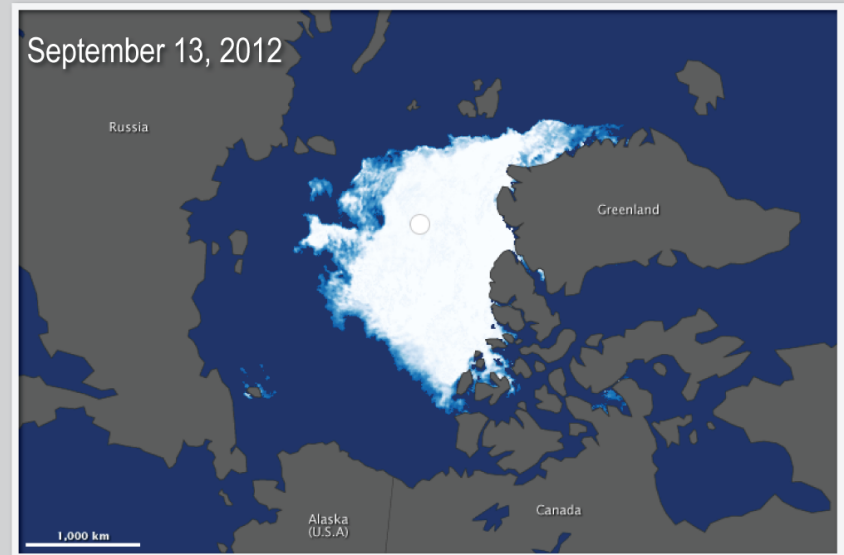
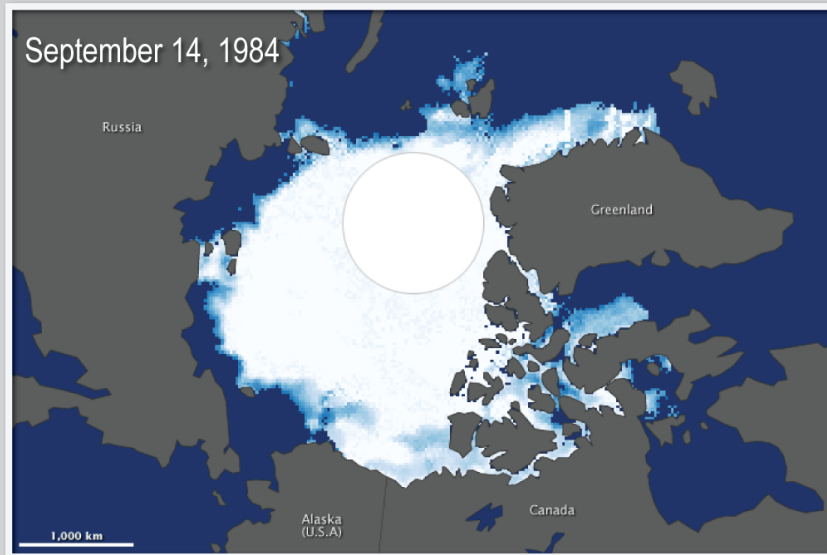
Figure source: NOAA NCDC

**Precipitation is Increasing:**  
The Northeast has experienced greater recent increase in extreme precipitation than any other region in the US; between 1958-2010 the region saw a more than 70% increase in precipitation falling in heavy events.

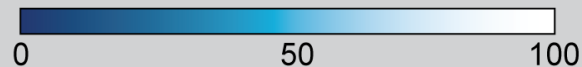
# Arctic Sea Ice is Melting



## Arctic Sea Ice Cover Reaches Record Low



Sea Ice Concentration (percent)



# Rapid Action is Needed

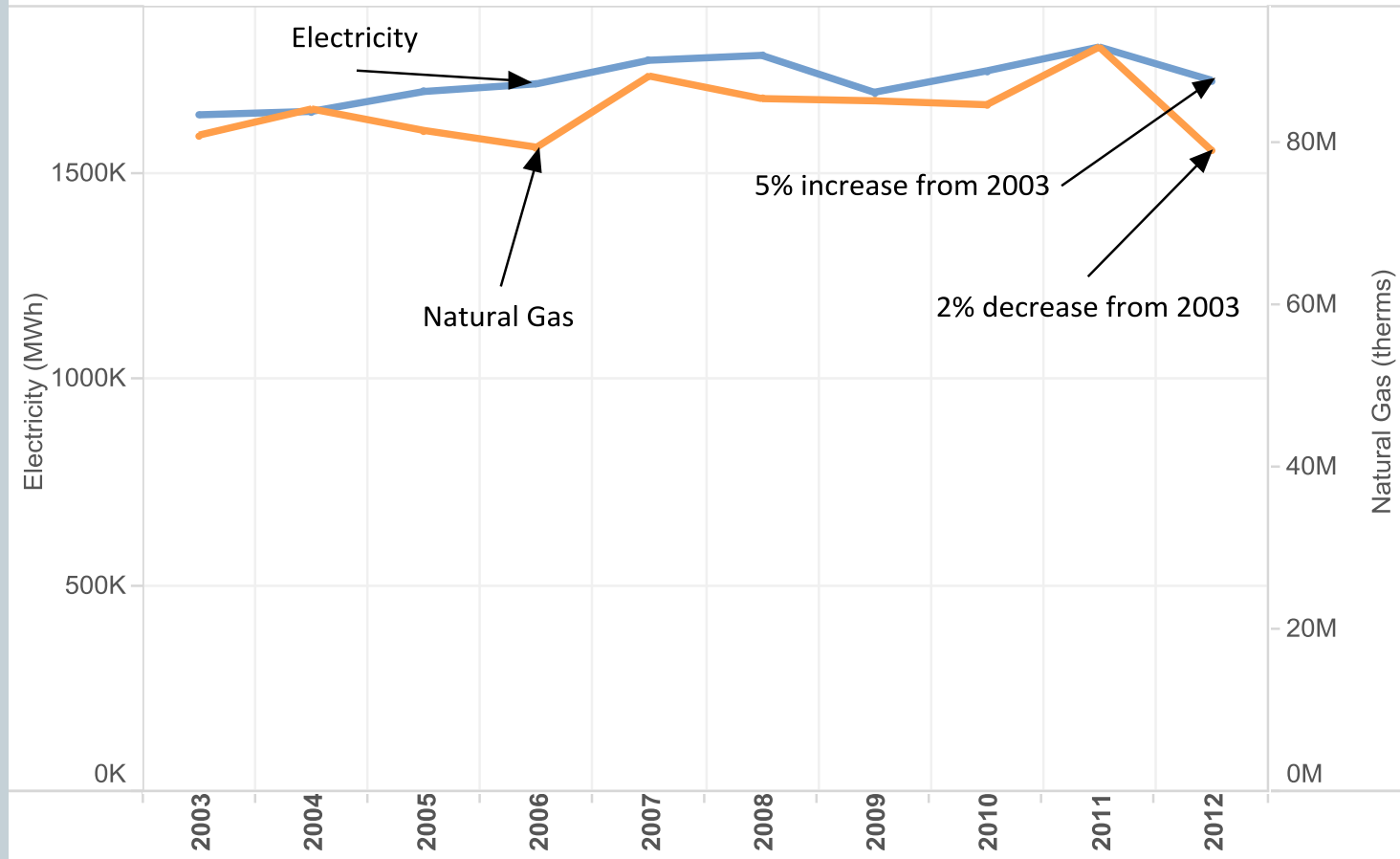


## **International Panel on Climate Change Report, 2014:**

- Carbon emissions have soared in the last decade and are now growing at almost double the previous rate.
- Rapid action can still limit global warming to 2C, the internationally agreed safe limit, if low-carbon energy triples or quadruples by 2050.
- Without more mitigation it is likely that global temperatures will increase 3.7% - 4.8% over the 21<sup>st</sup> century.

# Cambridge Gas and Electricity Use Flat

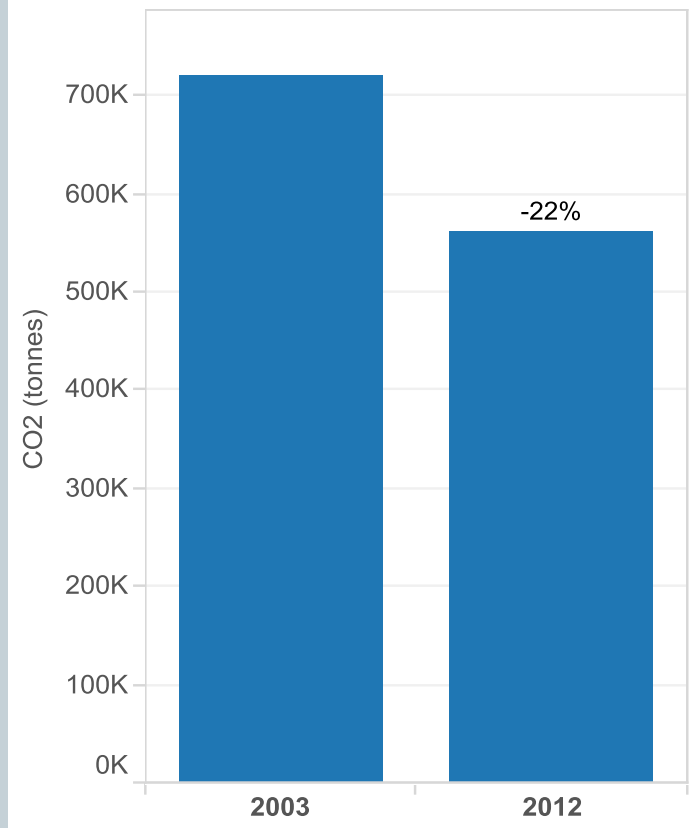
Electricity and Gas Use



# GHG emissions trends in Cambridge

- GHG Emissions from electricity and natural gas use have decreased since 2003 by almost 15%.
- Electricity emissions have gone down by 22%
- Attributable almost entirely to state and regional policies that have made the regional electricity grid cleaner.
- Further reductions will have to come from energy efficiency and conversion to renewable energy.

Cambridge CO2 Emissions from Grid Electricity



# Municipal Energy Programs

## OBJECTIVE:

REDUCE GHG FROM MUNICIPAL FACILITIES AND OPERATIONS.

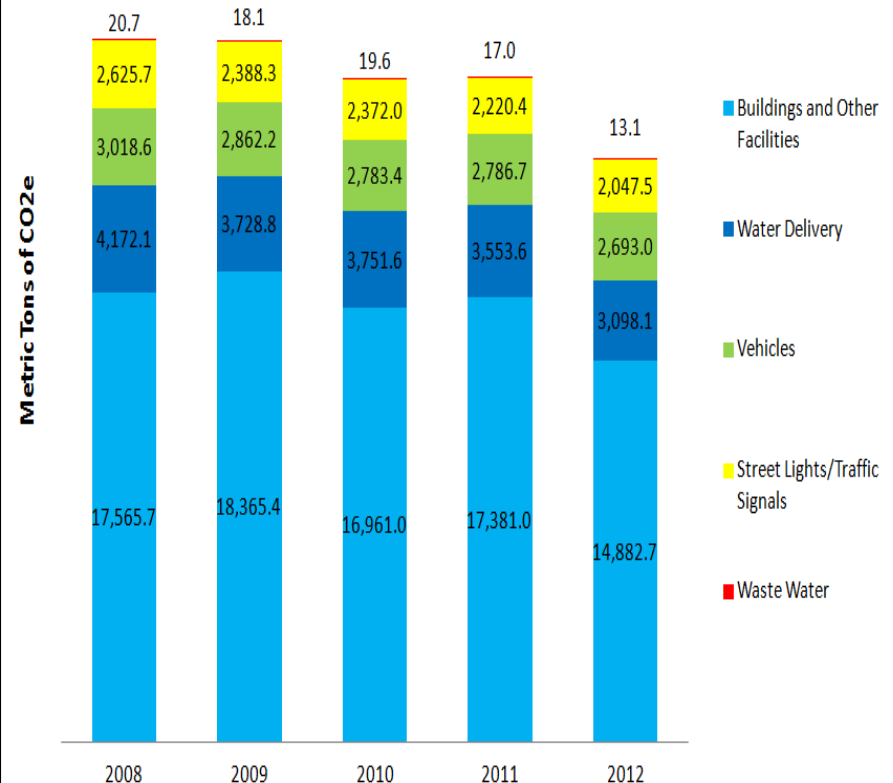
## Programs and Goals:

20% of municipal electricity will be from renewable sources by 2020.

- (1) Reducing electricity use by 10%
  - (a) Green Communities Act program
  - (b) LED Street Light Conversion.
- (2) Municipal Photo-voltaic program
  - (a) MLK School (779,000 Kwh)
  - (b) Water Treatment Plant (122,000 Kwh)
  - (c) King Open School (488,000 Kwh)
  - (d) PV installation at Kennedy Longfellow School (300,000 Kwh)
- (3) DOER Renewable Energy Portfolio Standard (RPS) program  
Presently anticipate a 15% requirement from renewable sources by 2020.

## Capital Improvement Plan.

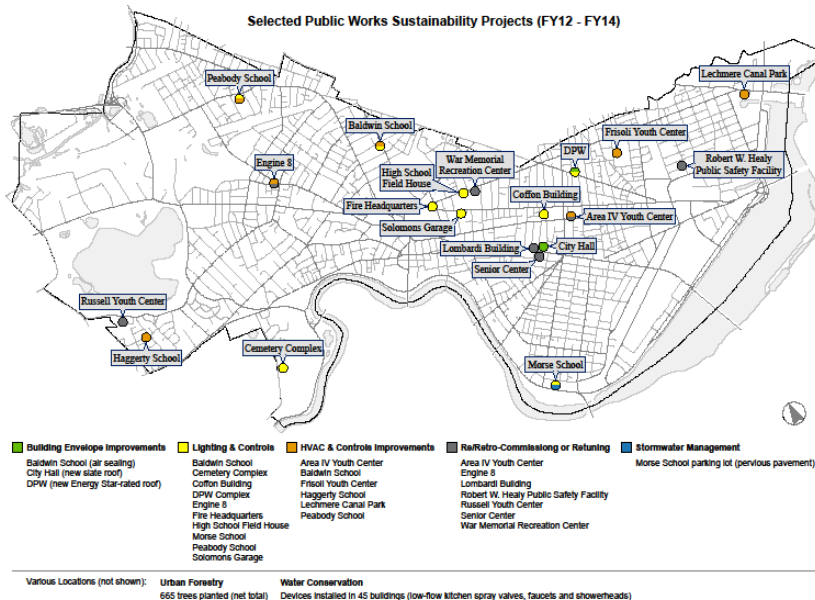
Total Municipal Emissions





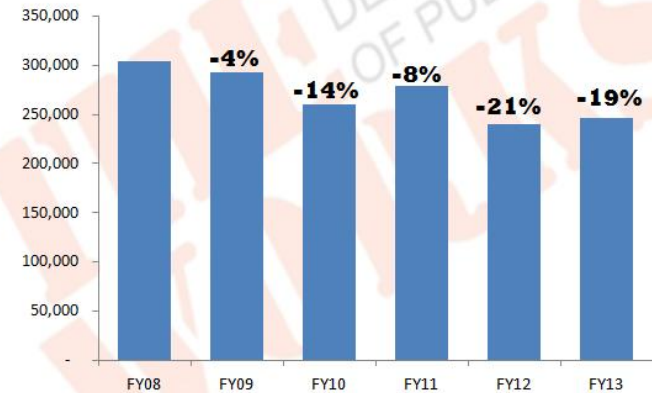
# Municipal Energy Programs

- The Green Communities Act program.



## Green Communities Program

Green Communities Energy Use (mmbtu)



Excludes Healy, War Memorial, Russell Youth Center and Main Library (under construction in FY08) and Foundry Building.

# Capital Improvement Plan

**municipal building median age:**

**79 years.**

**Goal: Create Healthy  
Sustainable Buildings.**



**Cambridge City Hall**  
Constructed 1889  
(Photo: Colleen Bryant)

- Meet program needs.
- Meet Occupant
- Comfort/Access requirements.
- Energy Efficient.
- Safe and sound.



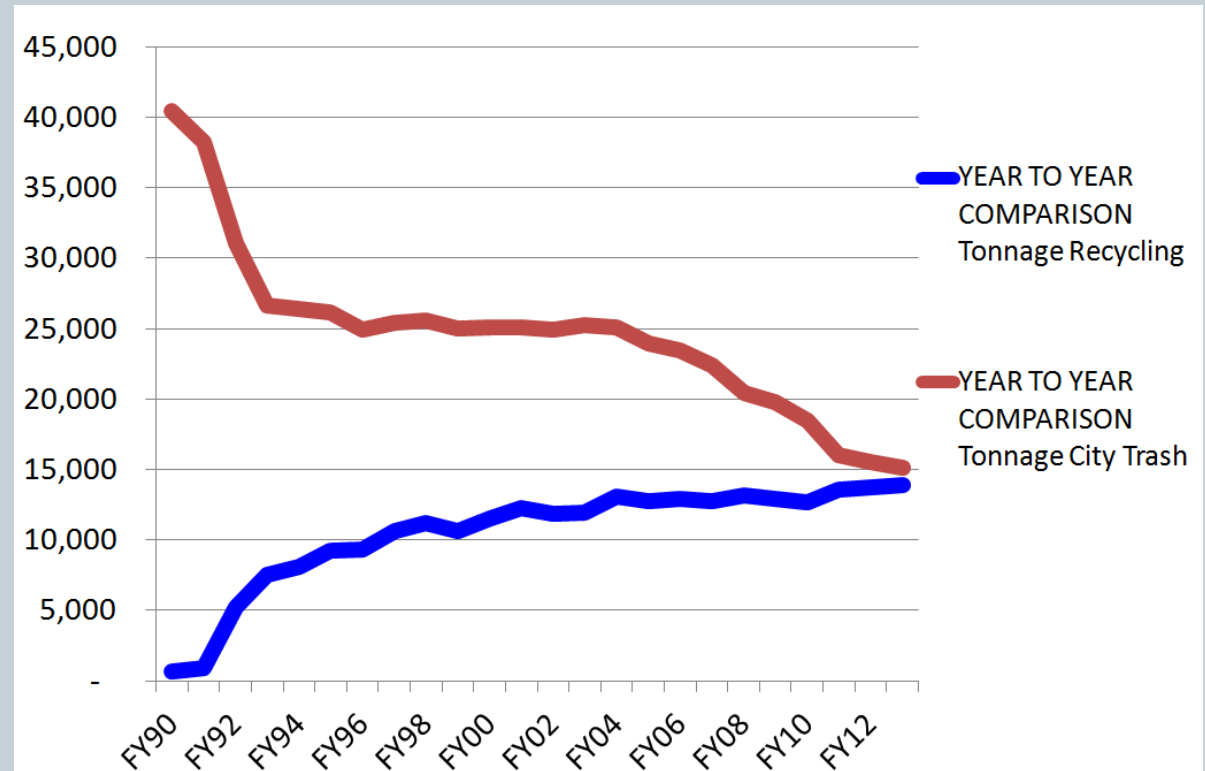
**Inman Square Fire House**  
Constructed 1912  
(Photo: Bill Shaw )

# Waste Management



## History of Trash & Recycling

- Total Trash is down by 25,000 tons since 1990.
- 50% of trash collected is now recycled.



# Waste Management



## Toward Zero Waste

- New City Initiatives
- Organics Pilot
- Promote Furniture exchanges
- Advocate for Extended Producer Responsibility
- Repair Cafe



# Cambridge Public School District

## *Office for Sustainability*



- ***Focus on waste reduction and energy reduction*** through strategic energy-efficiency projects, ambitious district-wide composting program, & continual energy data monitoring
- ***Implementation of numerous energy-efficiency projects*** throughout school district, including high-efficiency condensing boiler, lighting and occupancy sensors, variable frequency drives, retrofitting existing lighting fixtures, converting boilers from oil to natural gas, developing plan for first net zero school building, solar energy and renewables planning, and more.
- **Cambridge Green Schools Initiative (CGSI)**

# Cambridge Public School District

## *Office for Sustainability*

### *Cambridge Green Schools Initiative.*

Bringing together sustainability leaders, parents, students & teachers, and all staff to mitigate climate change by taking actions in our schools daily.

- Turning off lights
- Composting
- Recycling
- Climate change education
- Sustainable transportation
- Posters, signs, stickers
- Weekly reminders
- Monthly e-news
- District-wide competitions
- Bioware pilot at CRLS





# Community Goals and Programs



Climate Protection Action Committee, advisory group to city on climate action, has proposed set of goals focused on a vision for Cambridge for 2020:

- Minimizes GHG emissions from all measureable sources
- Drives Energy Efficiency
- Depends on walking, bicycling, and transit for mobility
- Runs on renewable and non-fossil fuel energy sources
- Minimizes the impacts of material consumption and waste
- Minimizes the urban heat island effect
- Anticipates and prepares for the impacts of climate change

# New Collaborations

## Cambridge Sustainability Compact

Signed May 6, 2013 by the City, the presidents of Harvard and MIT, and 8 large businesses. Membership is growing.

Prompted by increasing concern about the crisis of global climate change and its many challenges.



## Kendall Square EcoDistrict

EcoDistricts™ are a comprehensive strategy to accelerate sustainable development at the neighborhood scale.

Stakeholders include MIT, KSA, CRA and multiple large businesses in Kendall Square. Received \$200,00 grant from Barr Foundation for district assessment, goal setting and action plan.



# Building Energy Efficiency

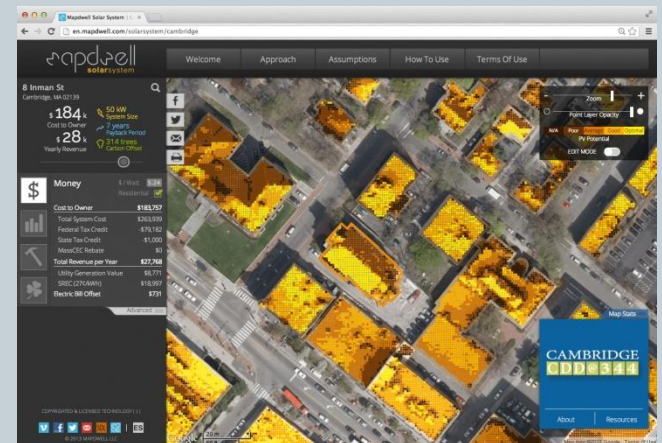


- A ***Building Energy Use Disclosure Ordinance*** is being proposed to make information available to the marketplace, improve the efficiency of existing large buildings and provide data for planning.
- In December 2013, the City of Cambridge created the “***Getting to Net Zero Task Force***” charged with advancing the goal of putting Cambridge on the trajectory towards becoming a “net zero community”, with focus on carbon emissions from building operations.
- ***Cambridge Energy Alliance*** assists residents and small business in accessing energy efficiency and solar programs and incentives.
- Working with MIT and NSTAR on a ***Multifamily Energy Efficiency pilot*** to be launched in fall aimed at increasing the participation in energy efficiency programs.
- Competing for the ***\$5 million Georgetown Energy Prize competition*** aimed at reducing energy consumption in the residential and municipal sectors in 2015-16.

# Solar Programs



- ***Permit streamlining and guidance documents*** created to help homeowners install solar on their homes, developed in collaboration with Department of Energy Resources.
- Supporting ***HEET's Race to Solar*** program aimed at assisting ***non-profit organizations*** install solar.
- Submitting Pathways to Solar DOE grant application in collaboration with DOER and the City of Boston aimed at creating ***10-year roadmap for significantly increasing solar*** in Cambridge.
- Cambridge ***Solar Map*** assist property owners in understanding solar potential and available incentives.



# Transportation Planning

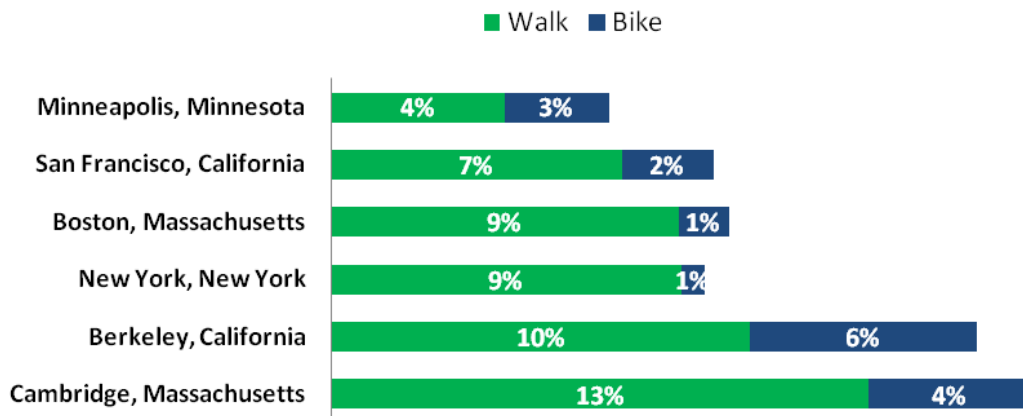
- ***America's Most Walkable City***

*Source: Prevention Magazine, 2008, 2012*

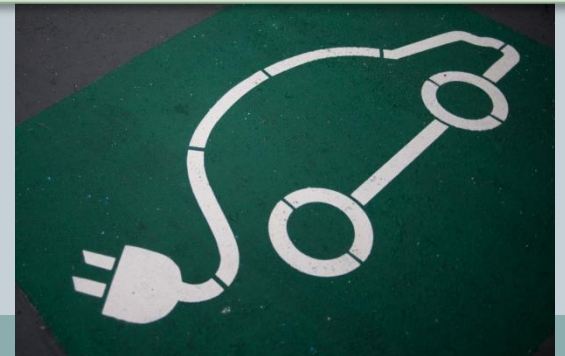
- ***Gold Level Bicycle Friendly Community Award***

*Source: League of American Bicyclists, 2013*

Percentages of Workers who Walk and Bike to Work  
in Select US Cities

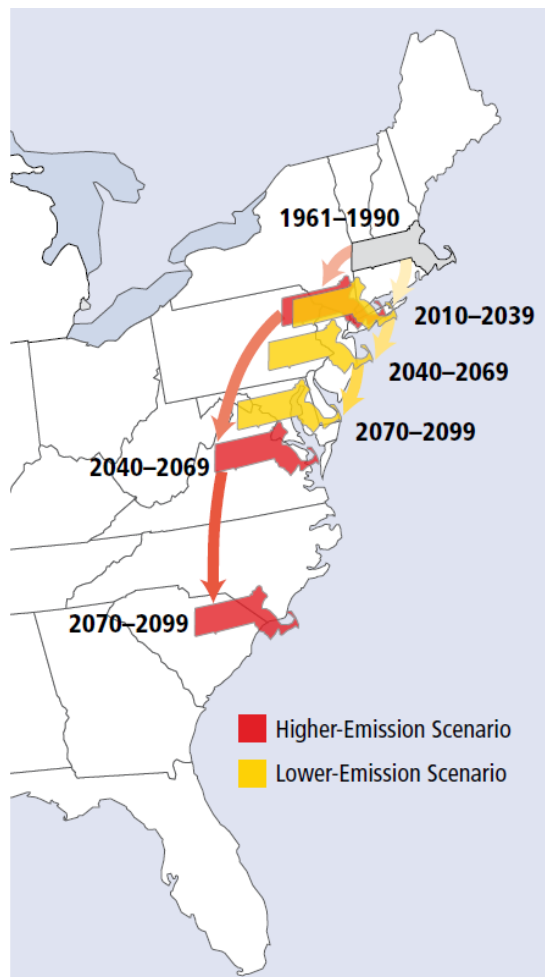


- Streets designed for all users
- Businesses required to support sustainable modes
- Car-sharing, bike-sharing programs available
- City working to grow EV charging infrastructure



# Primary Climate Change Effects of Concern to Cambridge

## Temperature



## Precipitation



## More extreme events



## Sea level rise



# Vulnerability Assessment Goals



Understand vulnerabilities and risks to Cambridge population, buildings, and infrastructure in economic and public health terms

Rate and prioritize vulnerabilities

Engage the community and key stakeholders and bring them along as we develop our understanding of the vulnerabilities and risks

# Project Team & Stakeholders

## CLIENT:

City Departments

**CITY OF CAMBRIDGE**

Steering Committee [PM: John Bolduc]

## PUBLIC ENGAGEMENT:

Public Workshops

**Tech Advisory Committee**

Infrastructure and Services

**Expert Advisory Panel**

Academics/Researchers  
(7 members)

**Individual requests /  
Access to Public  
Information**

Consulting firms  
Others

## ADDITIONAL EXPERTISE & STAKEHOLDERS:

**MAPC**

Adaptation Strategy Plan

**State & Regional Initiatives**

**Cities' Initiatives**

**Academic Initiatives**

## CONSULTANT:

**Kleinfelder**

Principal-in-Charge [Lisa Dickson]  
Project Manager [Nathalie Beauvais]

**Vulnerability & Risk Assessment**  
UNH [Paul Kirshen]  
AMEC [Peter Nimmrichter]

**Public Health**  
Columbia University [Pat Kinney]

**Vulnerability Ranking**

**Economic Assessment**

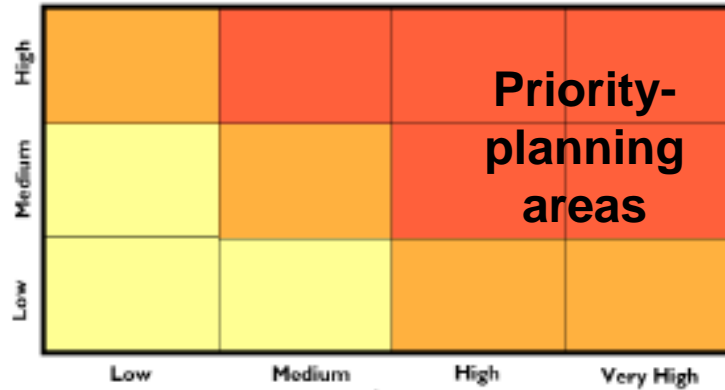
**Climate Projections**  
ATMOS [Katharine Hayhoe]

**Public Engagement**  
CBI





# Project Process



## Step 1

### Climate Projections 2030 & 2070

### Scenario Development

#### Technical analyses

- Coastal storm surges
- Inland flooding
- Public health
  - heat & vectors
- Social vulnerability
- Economic
- Urban forest

## Step 2

### Vulnerability & Risk Assessment

- Physical infrastructure
  - Buildings
  - Energy
  - Transportation
  - Water
  - Wastewater
  - Telecommunications
- Critical services
- Community facilities

## Step 3

### Preparedness Planning & Design

- Commence early 2015
- Plan for “new normals” & extreme events
- Strategies, actions, & implementation plan
- Regional implications
- Broad community engagement

# Combined Impacts and Interdependencies

