

# 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:

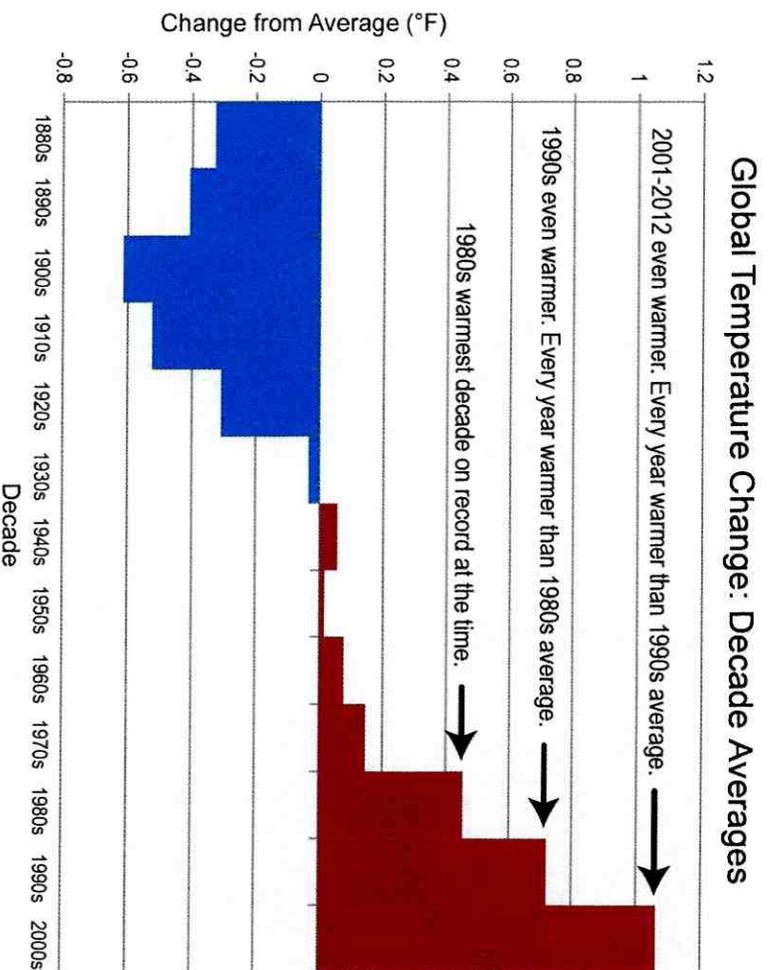
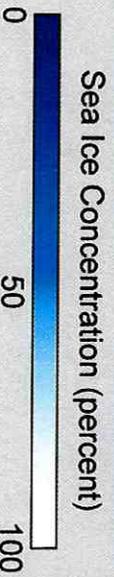
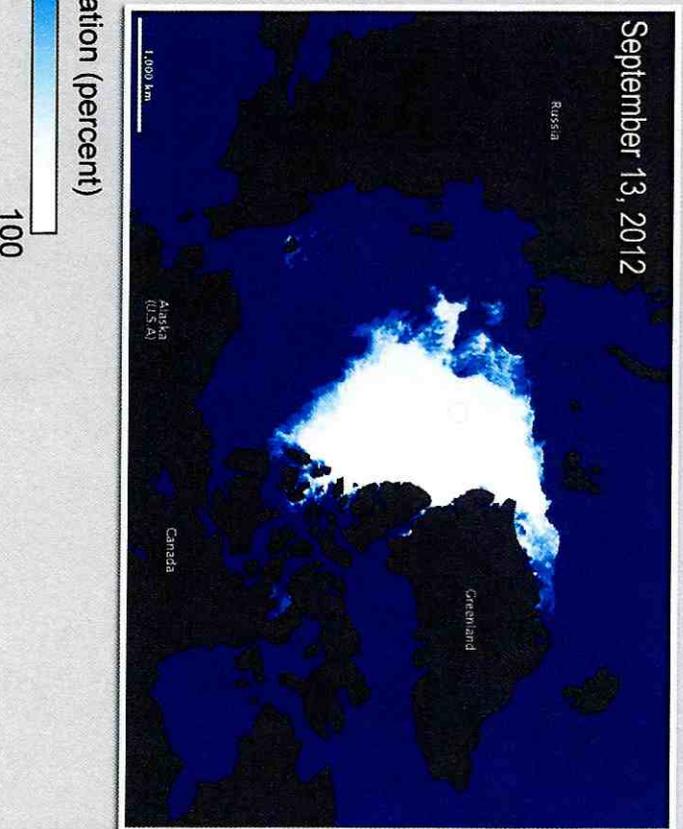
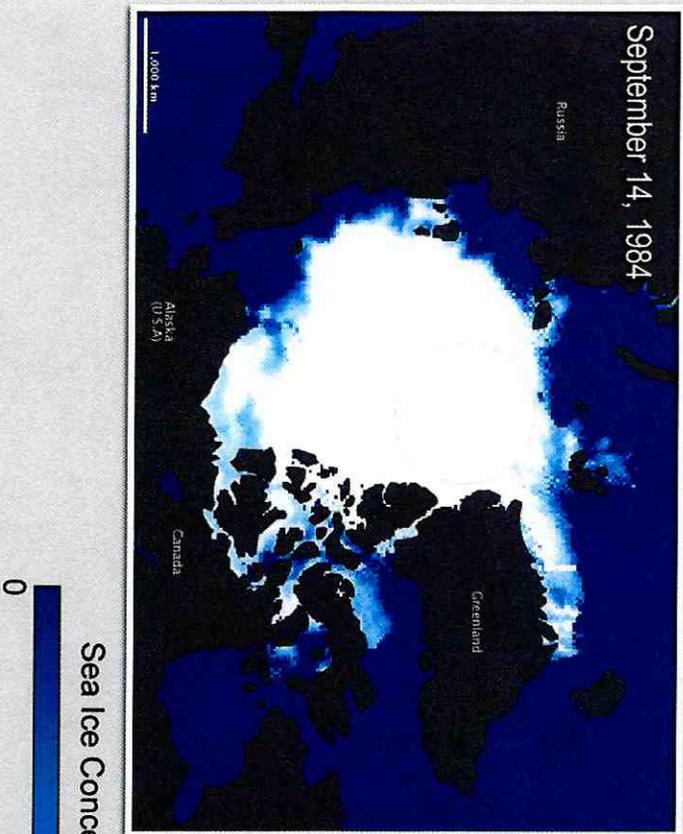


Figure source: NOAA NCDC

**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



# Rapid Action is Needed

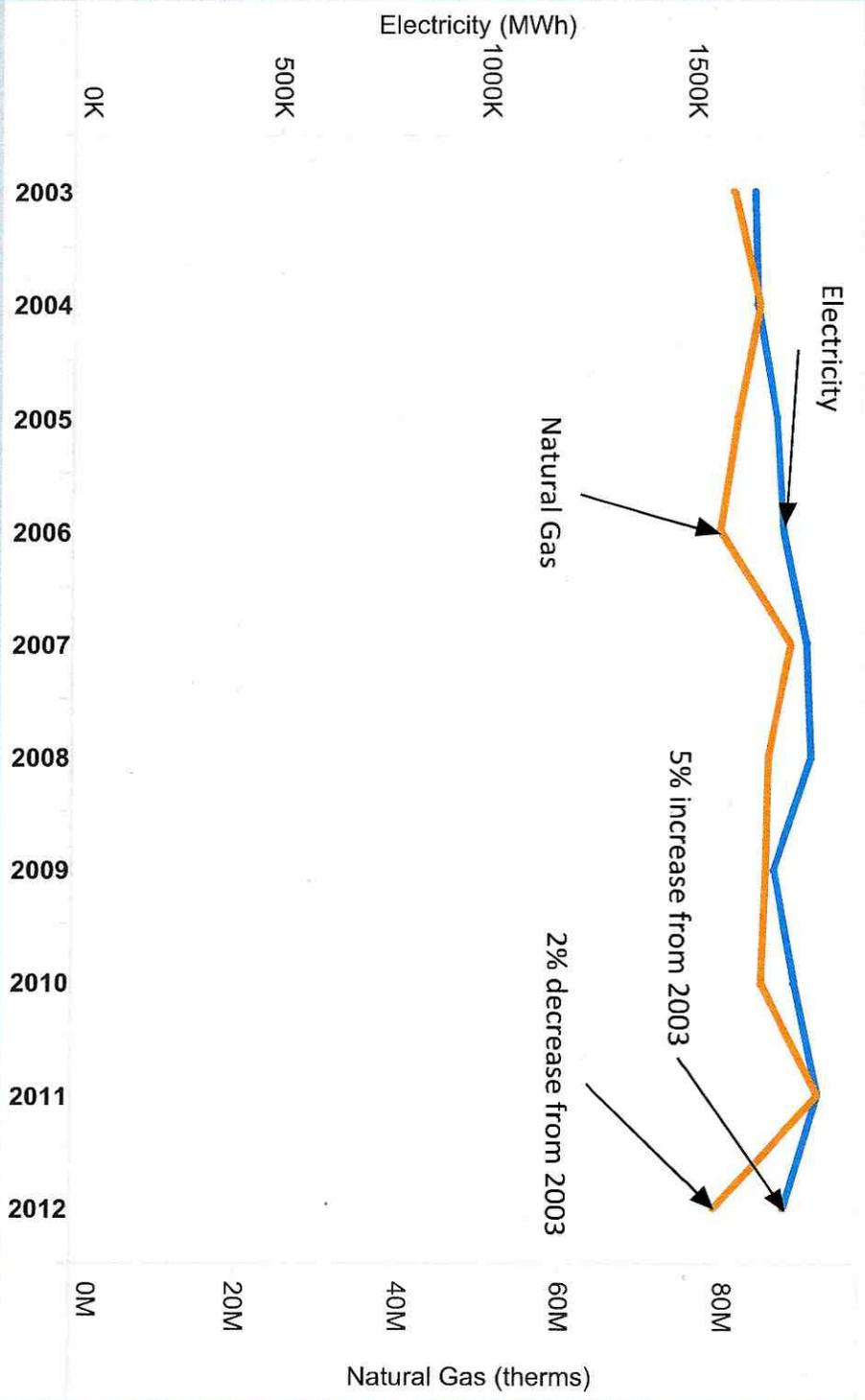


## **International Panel on Climate Change Report, 2014:**

- 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.

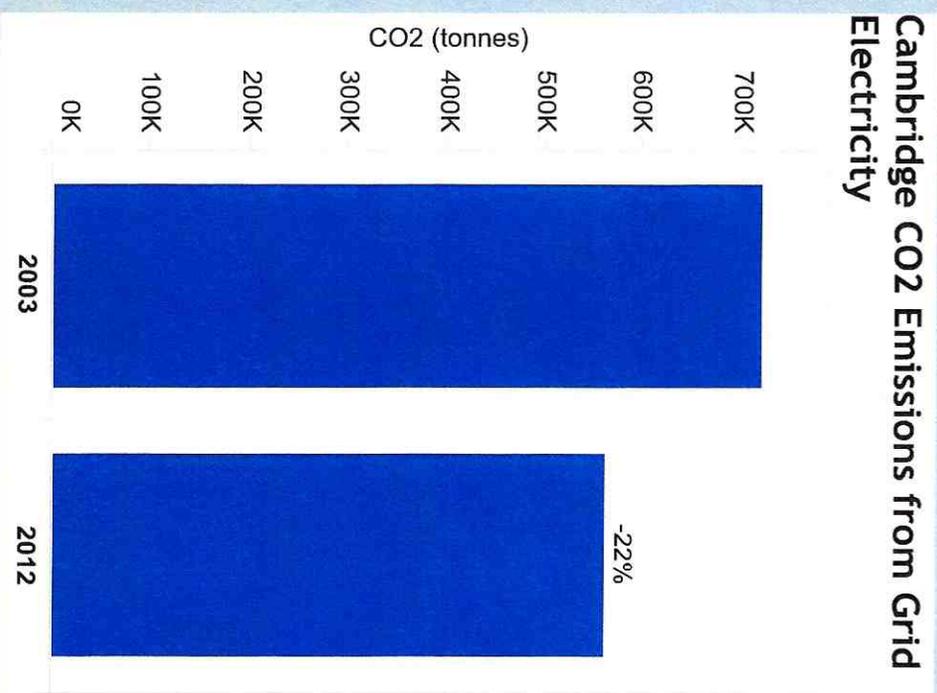
# Cambridge Gas and Electricity Use Flat

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.



# Municipal Energy Programs

## OBJECTIVE:

REDUCE GHG FROM MUNICIPAL FACILITIES AND OPERATIONS.

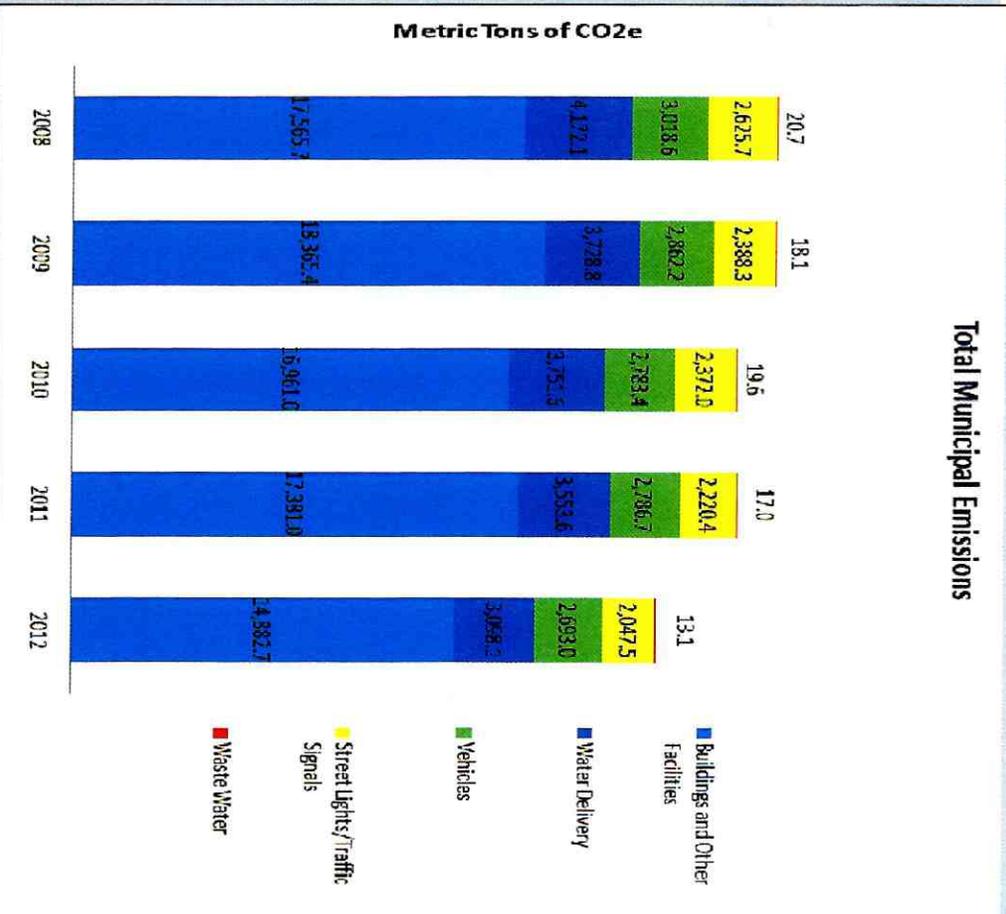
## Programs and Goals:

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) MILK 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) DERF Renewable Energy Portfolio Standard (RPS) program  
Presently anticipate a 35% requirement from renewable sources by 2020.

## Capital Improvement Plan.

Total Municipal Emissions





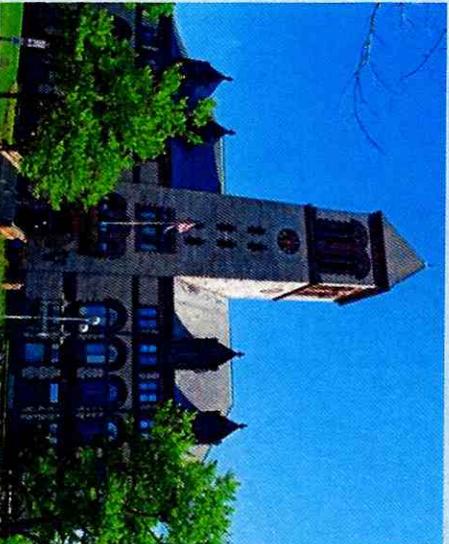
# Capital Improvement Plan

municipal building median age:

## 79 years.

Goal: Create Healthy Sustainable Buildings.

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



**Cambridge City Hall**

Constructed 1889

(Photo: Colleen Bryant)



**Inman Square Fire House**

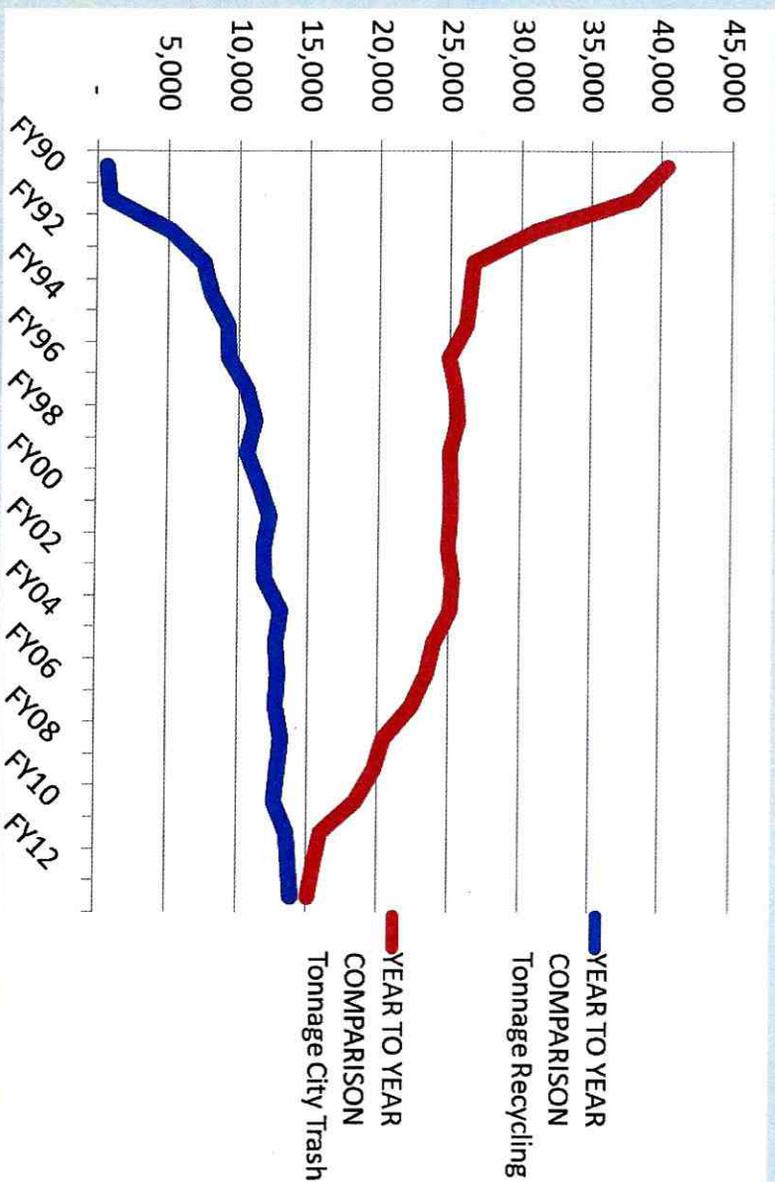
Constructed 1912

(Photo: Bill Shaw )

# Waste Management

## History of Trash & Recycling

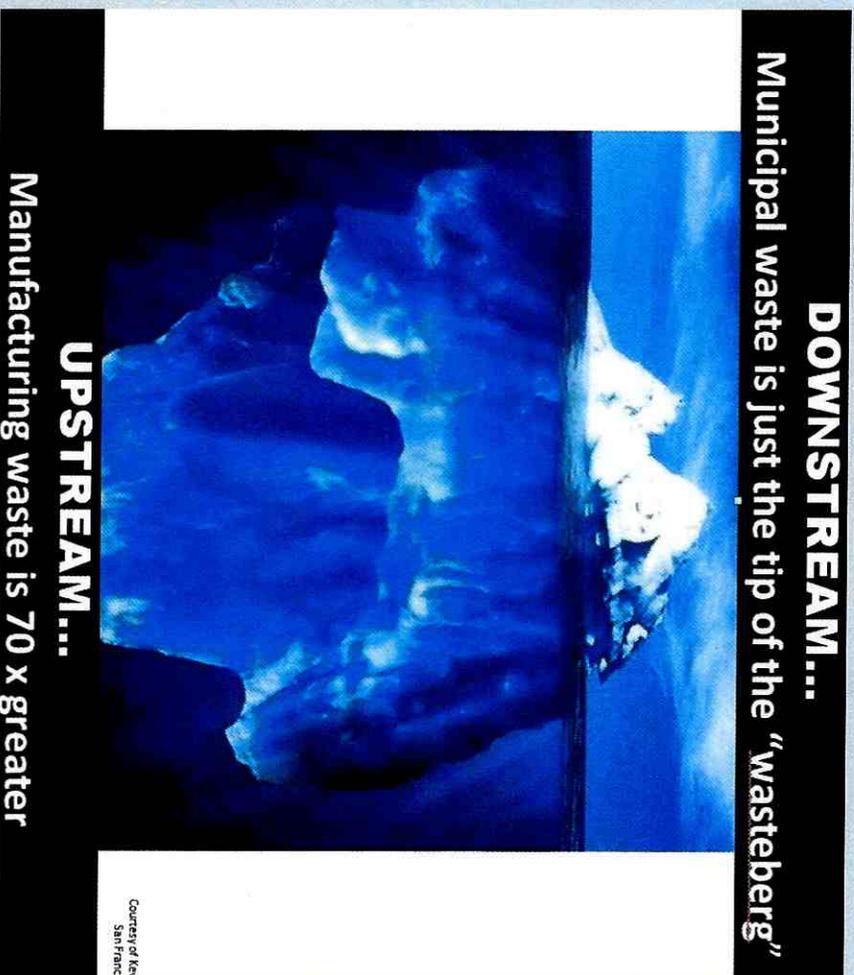
- Total Trash is down by 25,000 tons since 1990.
- 50% of trash collected is now recycled.



# 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 \$200,000 grant from Barr Foundation for district assessment, goal setting and action plan.

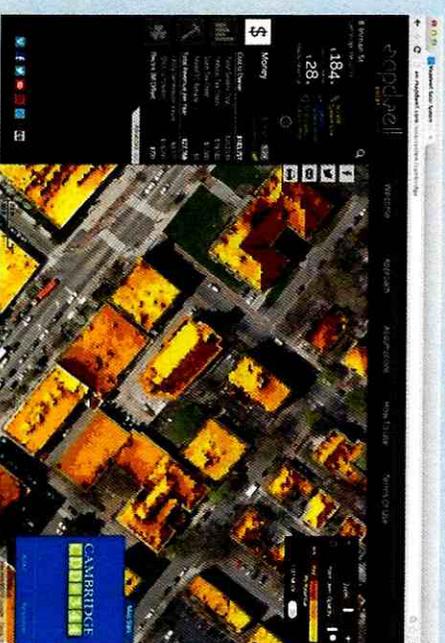
# Building Energy Efficiency



- ***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

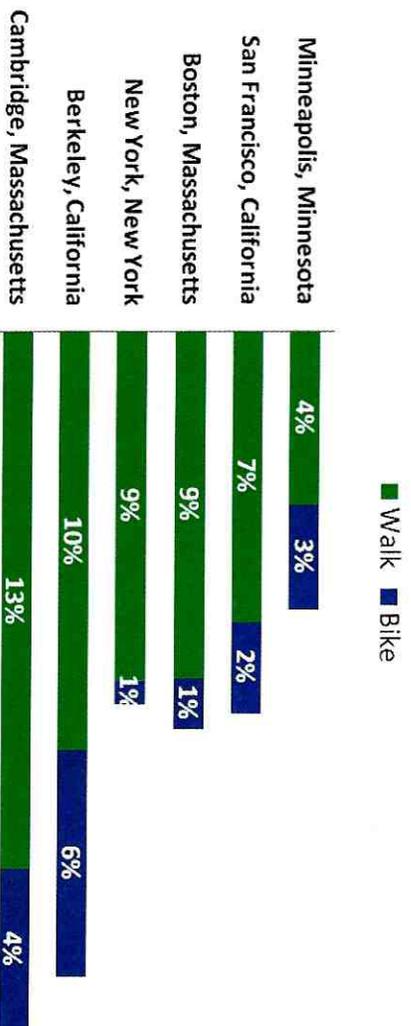
- **America's Most Walkable City**

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

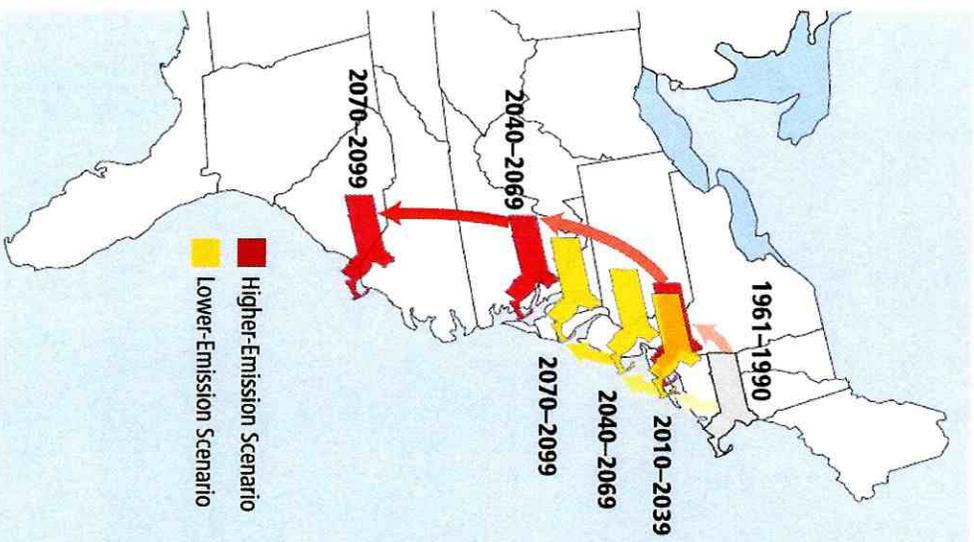


- Streets designed for all users
- Businesses required to support sustainable modes
- Car-sharing, bike-sharing programs available
- City working to grow EV charging infrastructure



# Primary Climate Change Effects of Concern to Cambridge

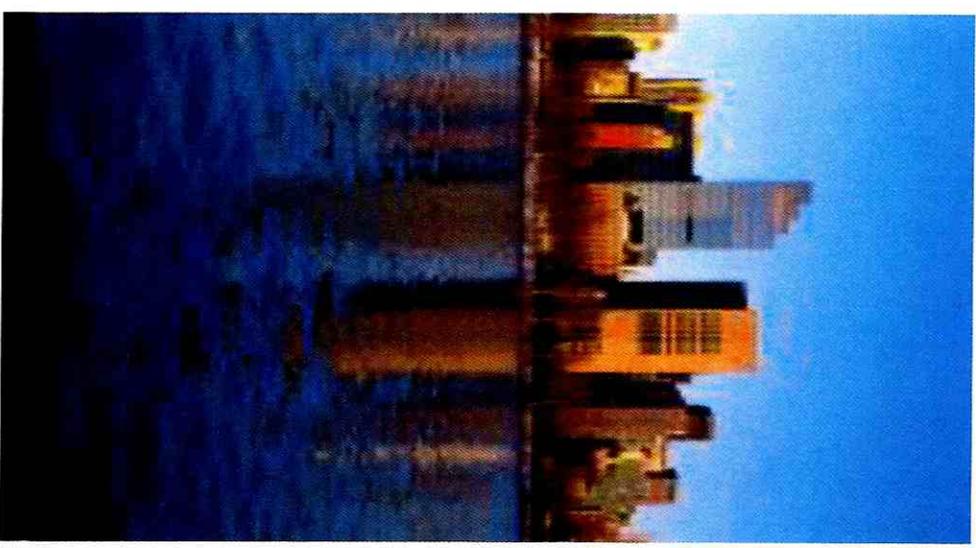
## Temperature



## Precipitation



## Sea level rise



## More extreme events



# Vulnerability Assessment Goals

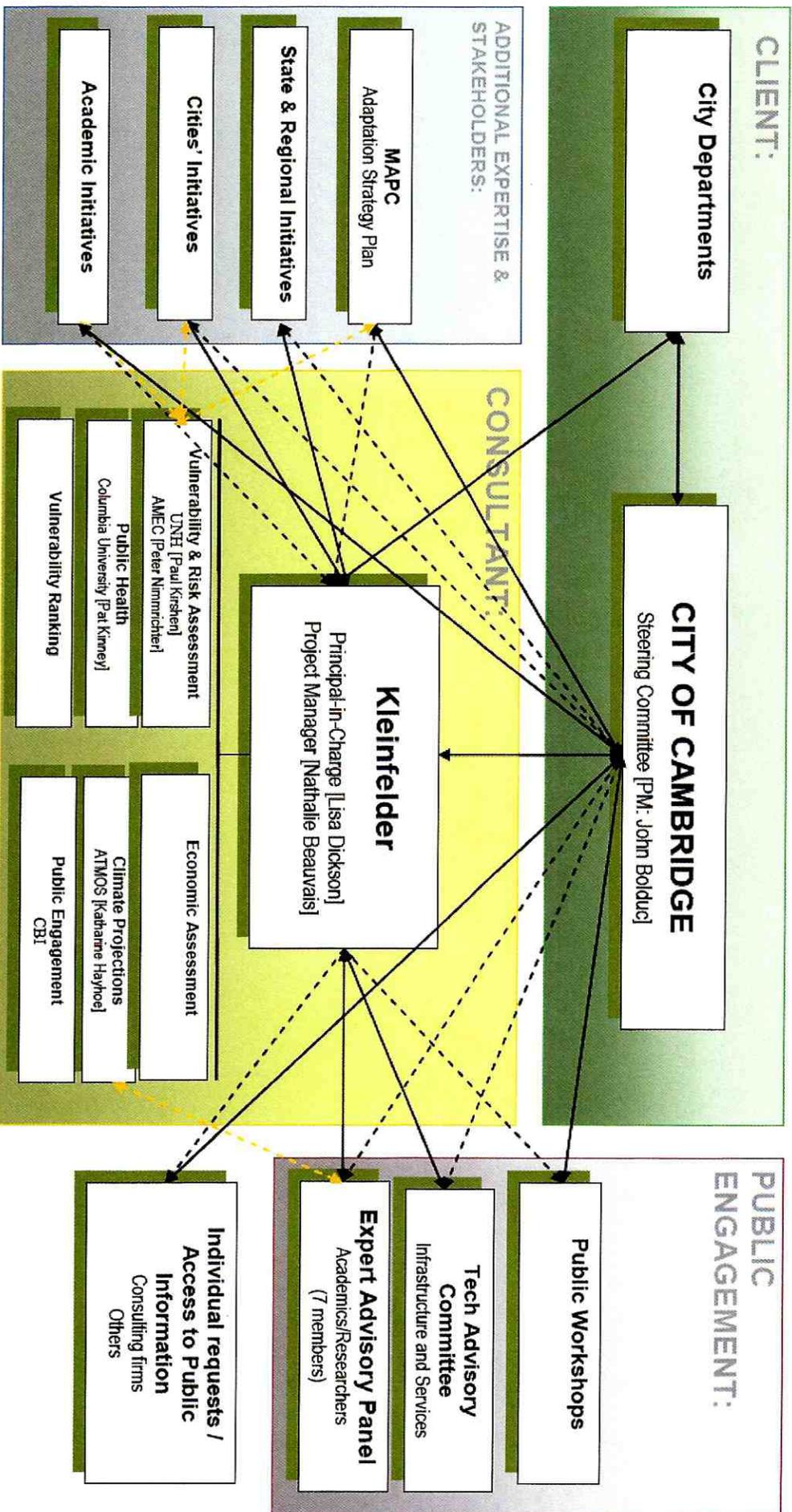


Understand vulnerabilities and risks to Cambridge population, buildings, and infrastructure in economic and public health terms

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



# Project Process



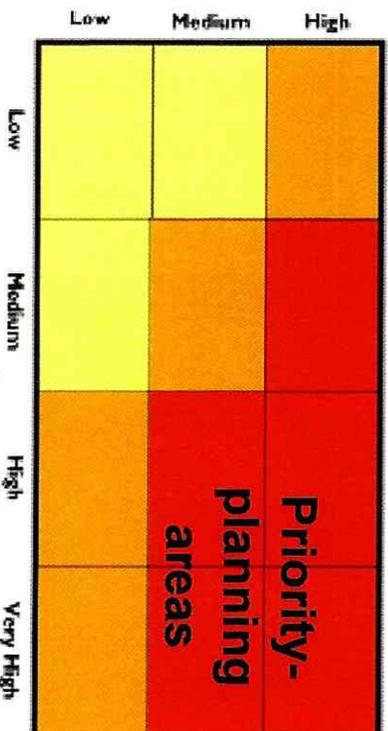
## Step 1

### Climate Projections 2030 & 2070

### Scenario Development

### Technical analyses

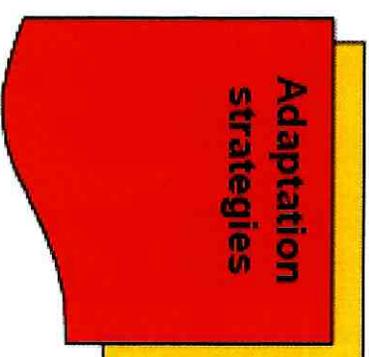
- Coastal storm surges
- Inland flooding
- Public health
  - heat & vectors
- Social vulnerability
- Economic
- Urban forest



## Step 2

### Vulnerability & Risk Assessment

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

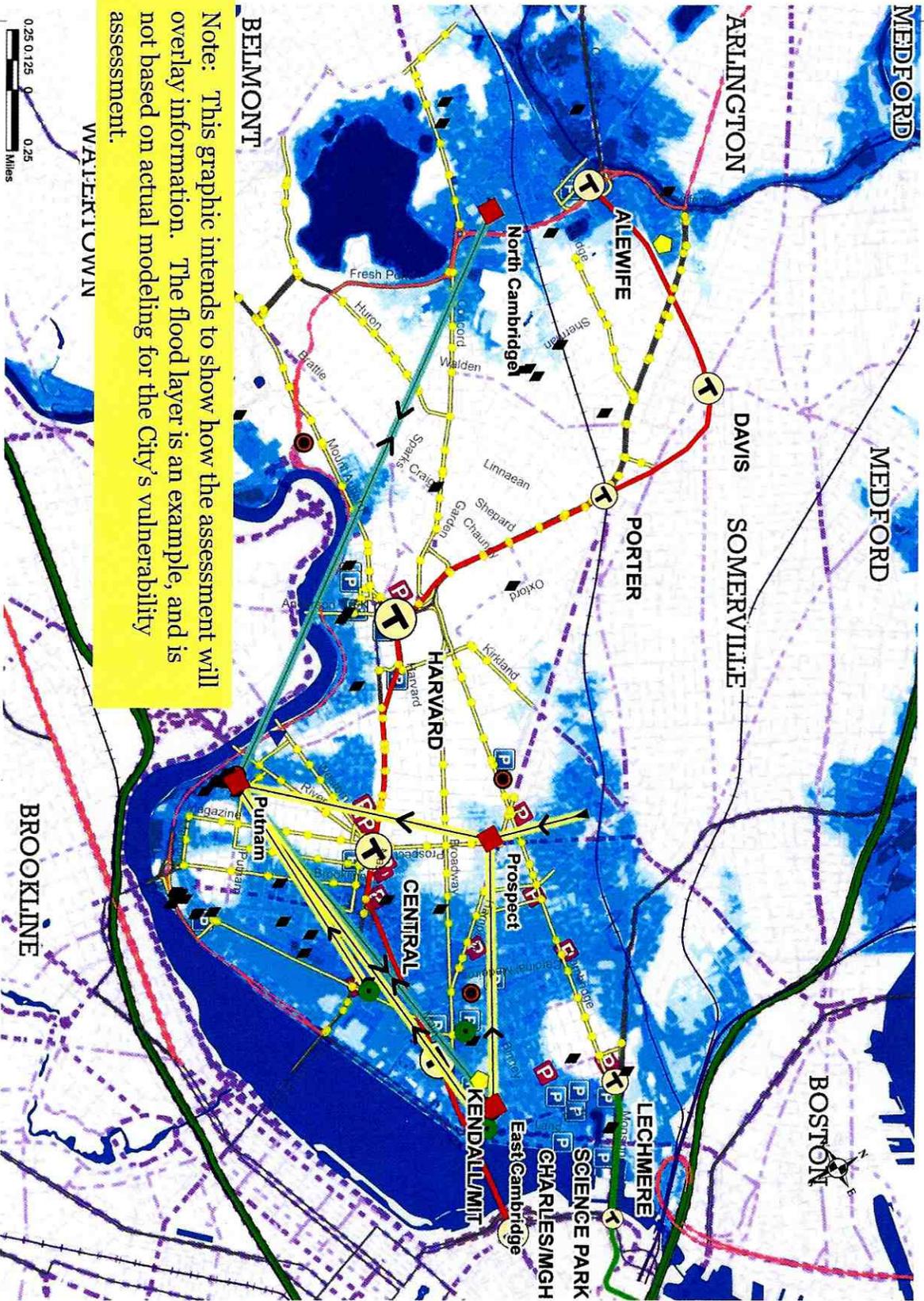


## Step 3

### 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



Note: This graphic intends to show how the assessment will overlay information. The flood layer is an example, and is not based on actual modeling for the City's vulnerability assessment.



- Surge from Cat 2 Hurricane**
- Depth of Flooding**
- 0 - 3 feet
  - 3 - 6 feet
  - 6 - 9 feet
  - > 9 feet
- Legend:**
- NSTAR electrical substation
  - Power Generating Plant
  - Natural Gas Gas Station
  - Steam Generating Facilities
  - Backup Electrical Generators
  - Fuel Storage Tanks
  - 13.8 KV (undirectional)
  - 115 KV (bi-directional)
  - MBTA (Ridership %)
  - < 1.2
  - 1.2 - 8.6
  - 8.6 - 11.7
  - 11.7 - 14.6
  - 14.6 - 21.9
  - MBTA Bus Stops
  - Green Line
  - Red Line
  - Silver Line
  - Commuter Rail
  - Mass DOT Roads
  - Interstate
  - US Highway
  - State Route
  - MBTA Bus Routes
  - Commercial Parking
  - Commercial Parking
  - Parking Garage
  - Parking Lot
- Average Daily Traffic (ADT)**
- Low (<5,000 ADT)
  - Med-Low (5,001 - 10,000 ADT)
  - Medium (10,001 - 50,000 ADT)
  - Med-High (50,001 - 100,000 ADT)
  - High (>100,000 ADT)

**Cosgrove, Marybeth**

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**From:** Lopez, Donna  
**Sent:** Monday, June 23, 2014 8:27 AM  
**To:** Cosgrove, Marybeth  
**Subject:** FW: GreenPort's suggestions for Roundtable on climate change preparedness planning

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**From:** Steve Wineman [mailto:steven.wineman@gmail.com]  
**Sent:** Sunday, June 22, 2014 11:11 AM  
**To:** City Council; Lopez, Donna  
**Subject:** GreenPort's suggestions for Roundtable on climate change preparedness planning

To the City Council:

I am writing on behalf of the GreenPort Coordinating Committee with our thoughts about climate change preparedness planning, which you will be discussing at the June 23 Roundtable. Emergency planning related to climate change is currently GreenPort's primary focus at the neighborhood level, and we have enlisted a number of Houses of Worship in Cambridgeport to serve as places of refuge in the event of emergencies. We view preparedness for climate-related emergencies dividing into two main areas: discrete emergencies, and the potential collapse of systems. We are organizing our comments to the Council accordingly.

**Part One: Preparing for Discrete Emergencies**

These events may include flooding, extended heat waves, power outages and the like, and they are increasingly in the awareness of the public and of planners with ongoing increases in the frequency and severity of extreme weather events. We offer the following recommendations for creating resilience to manage these types of emergencies:

- Preparedness at the neighborhood level, including identified gathering places and local first responders as well as material resources such as water, food, blankets, and cots, should be a central component of emergency planning. An account of emergency preparedness in San Francisco (<http://www.citiscopes.org/story/2014/san-francisco-neighborhood-models-resilience-planning-grassroots>) emphasizes the role of neighborhoods and offers many examples of measures that could be applied or adapted to Cambridge. One of the key points made in this article is that it typically takes three to five days for larger, more centralized emergency agencies to arrive on the scene. Effective preparation at the neighborhood level can be indispensable in filling this critical gap.
- Houses of Worship can play an important role as places for people to gather during emergencies - for material assistance, emotional support, and mutual aid. In Cambridgeport, we have had a very positive response from Houses of Worship we have reached out to. The same appears to be true in San Francisco. Community centers - such as Margaret Fuller House, the Cambridge Community Center, and the Senior Center - likewise should play a vital role in emergency planning.
- Once meeting spots are identified, there is a host of practical details that need to be attended to to make them operational. Materials (bottled water, blankets, etc) need to be assembled and safely stored. Individuals need to be identified who can reliably get to each gathering spot during an emergency and hold keys to open doors. Neighborhood residents need to be informed in advance of emergency plans and gathering spots. This is an area where partnerships between the City and neighborhood organizations, both for planning and support with material resources, could be extremely helpful.

- Vulnerable people, including elders and people with disabilities, should be identified block by block. Information about identified vulnerable people should be available to first responders. Simple resources such as door hangers saying "need help" on one side and "safely out" on the other (described in the San Francisco article) can make a huge difference.
- The actual occurrence of emergency events is unpredictable: we have no way of knowing how soon we may need to be prepared for a Sandy-type event. The City should move forward with emergency preparedness measures as soon as possible. In addition, implementation of a neighborhood based response system to fill immediate gaps is something that can happen now while more long term planning is developed.

## **Part Two: Preparing for System Collapse**

Climate change also poses tangible threats to systems that support our basic daily needs. The clearest example is the food system: flooding, drought, and the drying up of water resources needed for irrigation (for example in California) could result in food shortages that impact Cambridge (along with everyone else in the US). Other potential system collapses include energy shortages and economic collapse. These vulnerabilities do not involve discrete emergencies, but rather extended crises in which basic structures we take for granted and rely on have ceased to function effectively. They require a different type of planning and resilience than preparation for time-limited events, no matter how severe.

The main point we want to make about potential system collapse is that this should be on the City's **current** agenda for climate change preparedness planning, rather than being viewed as distant threats that do not need immediate attention. We have no way of knowing how long it will take for water resources to dry up in the West, and no way of knowing how soon the patterns of flooding and drought will severely compromise the nation's agricultural output. Fracking has produced a spike in production of natural gas and oil, but it is fraught with environmental and climate costs, and some observers believe that there is a fracking production bubble which will burst sooner than later. The economic collapse of 2008 serves as a clear indicator of the speed and unexpectedness with which system collapse can occur.

We recommend two prongs to preparedness planning for system collapse. The first is to identify aspects that are far beyond the capacity of Cambridge to manage alone and require regional planning (such as increasing local food production to build resilience in the face of possible national food shortages). We encourage the City to play a leadership role in advocating for this type of regional planning.

The second prong is to promote practices of mutual aid in Cambridge, both by fostering a culture of citizens taking care of each other, and by putting concrete local resources in place, such as an infrastructure for sharing meals and for food distribution in the event of an extended food emergency. The ethos should be: Cambridge is a place where no one goes hungry; Cambridge is a place where we are prepared to manage extended emergencies together, as a community.

Our thanks to the Council for taking on these difficult issues, and for considering our suggestions.

Sincerely,  
Steve Wineman for the GreenPort Coordinating Committee

**Cosgrove, Marybeth**

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**From:** Lopez, Donna  
**Sent:** Monday, June 23, 2014 3:37 PM  
**To:** Cosgrove, Marybeth  
**Subject:** FW: Cambridge action for climate mitigation

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**From:** Marilyn Wellons [<mailto:marilyn.wellons@yahoo.com>]  
**Sent:** Monday, June 23, 2014 3:06 PM  
**To:** City Council; Lopez, Donna  
**Subject:** Cambridge action for climate mitigation

(Dear City Clerk,

Please enter this in the next Council meeting's communications.)

To the Cambridge City Council:

To mitigate ongoing climate change, the City should revise its policy on tree removals for reasons other than public safety. As I mentioned in a previous e-mail, all trees--of whatever species--sequester carbon and provide shade.

Removing mature trees for a more trivial reason belies the city's oft-invoked commitment to "green." Replacing them with saplings either misses the point or misleads.

Like many others in the city, this policy needs to be put on hold, pending a serious rethink with the Master Plan. Please include this issue in your June 23, 2014 Round Table discussion.

Yours sincerely,

Marilyn Wellons  
651 Green Street  
Cambridge, MA 02139  
tel. 617-354-3858