

Sparking Boston's Climate Revolution

Recommendations of the Climate Action Leadership Committee and Community Advisory Committee



APRIL 2010



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The work of the Climate Action Leadership Committee and Community Advisory Committee was supported by generous grants from the Barr Foundation and The Boston Foundation.

Earth Day, 2010

Dear Mayor Menino,

On behalf of the Climate Action Leadership Committee and Community Advisory Committee, we are honored to present to you the committees' recommendations for addressing the threat of climate change and ensuring that Boston remains a safe, healthy, vital city into the next century and beyond.

When you first met with the Leadership Committee, you gave us a clear message: "Be bold!" Boston's municipal government, the Commonwealth, and the community at large have already taken many steps to build more efficient buildings, increase renewable energy sources, encourage walking, biking, and the use of public transit, raise recycling rates, and expand green jobs and green businesses. To be bold is to push ahead even farther on the path that Boston has already taken.

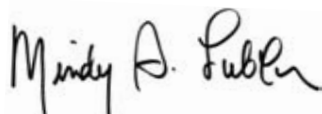
The overwhelming evidence shows that climate change is real, that human activity is a major contributor to the problem, and that potential threats to Boston are significant. In the past month alone, Boston has experienced two "50-year" rain storms with extensive flood damage and then a day of record-setting heat. Although several days of weather cannot be directly tied to global warming, these events presage the types of patterns that climate change will bring in the coming years, the types of patterns we simultaneously need to attempt to avert and prepare for. The time to intensify our efforts is now.

In addition to protecting the city from the potentially disruptive effects of climate change, climate action will bring substantial economic benefits to Boston. Over the next ten years, climate mitigation can reduce our greenhouse gas emissions by 25 percent and produce net savings on energy bills of over \$2 billion for Boston residents and businesses. The demand for climate- and energy-related services and products will create thousands of jobs and many opportunities for businesses and creative entrepreneurs. Climate adaptation will ensure that the city's social and economic infrastructure remains strong.

The committees' recommendations for reducing greenhouse gas emissions and making Boston more resilient to climate impacts result from an intensive public process. Over the past year, leaders of the community and government came together for over 20 working meetings to develop recommendations on buildings, transportation, adaptation, and public engagement. Nearly 500 people participating in five community workshops contributed their voices to the committees' deliberations and overwhelmingly supported Boston's doing as much as possible to tackle climate change. The committees benefited from the advice of experts from local universities, businesses, institutions, and many departments and agencies of City government. Finally, the committees learned from and integrated research and analyses done for the Commonwealth's climate mitigation and adaptation committees.

Mayor Menino, we know that the delivery of this report is only one stage in Boston's ever-deepening commitment to climate action. As your administration turns the recommendations into the City's formal Climate Action Plan and implements them—a process that will require further public hearings and other forms of public participation—you can call on us for additional support and advice. Addressing climate change requires the commitment of every segment of the Boston community. We are ready to do our part.

Sincerely,



Mindy Lubber
Co-chair



James W. Hunt, III
Co-chair



Dear Committee Members,

I accept this report with a tremendous sense of gratitude and an even greater sense of urgency. I want to thank the Climate Action Leadership Committee and the Community Advisory Committee on Climate Action for their service. I am eager to explore all of the committees' recommendations to prepare Boston for a more sustainable future, because climate change demands our attention now.

Thankfully, Boston is in a strong position to further decrease our carbon footprint and create more jobs for our residents in the green economy. Many businesses, institutions, and community organizations, and many of our residents are already pushing the environmental envelope. In city government, we have been just as innovative. My administration has launched the largest public housing energy efficiency project in our country's history; our city is well on its way to planting 100,000 trees by 2020 to cool our neighborhoods; the Renew Boston program has started connecting residents and businesses with energy efficiency resources; and, this summer, we are preparing to kick off a model bike share program.

Boston is also fortunate to have generous philanthropic partners in climate action. I thank the Barr Foundation and The Boston Foundation for providing the financial resources that were essential for obtaining the facilitators, consultants, and logistical support that the committees' work required.

With all of this momentum, I am excited about the committees' recommendations to take our work citywide and engage all stakeholders—from government to businesses, from institutions to neighborhood groups—in our efforts to mitigate and adapt to climate change. That means more energy-efficient homes, healthier and cleaner neighborhoods, and wider economic opportunities for all.

I look forward to continuing our work with the committees and all parts of the Boston community to make sure that our city is at the forefront of climate action.

Sincerely,

A handwritten signature in black ink that reads "Thomas M. Menino". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Thomas M. Menino
Mayor of Boston

Sparking Boston's Climate Revolution

Recommendations of the Climate Action Leadership Committee
and Community Advisory Committee

Full Report, April 2010



Acknowledgments

Members of the Climate Action Leadership Committee and Community Advisory Committee on Climate Action are grateful to the many participants in several working groups who helped to prepare material for the committees' consideration and to the committees' facilitators and City staff who ensured their productive deliberations. They also thank the many partner organizations that recruited participants, facilitators, and volunteers for the five community workshops. All working group participants and workshop partners are listed in the full report.

The committee members are thankful for the participation and support of many municipal departments and quasi-independent agencies in Boston and offices of the Commonwealth of Massachusetts. These include:

Boston Redevelopment Authority
 Boston Water and Sewer Commission
 Boston Public Health Commission
 Boston Transportation Department
 Boston Department of Neighborhood Development
 Mayor's Office of Emergency Preparedness
 Boston Public Works Department
 Massachusetts Executive Office for Energy and Environmental Affairs
 Massachusetts Department of Energy Resources
 Massachusetts Department of Environmental Protection
 Boston Region Metropolitan Planning Organization
 Metropolitan Area Planning Council

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Summary of Boston Climate

| Action | Status Existing, Expanded, Proposed | Jurisdiction Federal, Massachusetts, Boston | Share of 2020 Goal | Description |
|--|--|--|-----------------------|--|
| MITIGATION | | | | |
| Buildings and Energy Sources — 67% of 2020 reduction goal | | | | |
| Renew Boston and Electric Utility Efficiency Programs | Expanded | M, B | 24% | Help residents and businesses access electric utility program resources for energy efficiency |
| Renewable Portfolio Standard | Existing | M | 11% | Increase supply of electricity from new renewable sources |
| Renew Boston and Gas Utility Efficiency Programs | Expanded | M,B | 7% | Help residents and businesses access natural gas utility program resources for energy efficiency |
| Appliance Standards | Existing | F | 5% | Increase energy efficiency of appliances |
| Building Codes | Existing | M | 2% | Raise energy standards for construction and renovation |
| Energy Efficiency Retrofit Ordinances | Proposed | B | 7% | Require energy efficiency upgrades at time of sale |
| Behavior Change—Buildings | Proposed | B | 3% | Motivate public to use buildings more efficiently |
| Oil Heat Efficiency Program | Proposed | B | 3% | Establish energy efficiency program for heating oil and propane customers |
| Benchmarking and Labeling | Proposed | B | 2% | Require publicly accessible energy efficiency ratings for buildings |
| Low-Carbon Standard for Heating Fuels | Proposed | M | 2% | Reduce greenhouse gas from heating fuels |
| Stretch Code or equivalent | Proposed | M,B | 1% | Raise energy standards for building construction above state base |
| Cool Roofs | Proposed | B | 1% | Require light-colored or vegetated roofs |
| Transportation — 31% of 2020 reduction goal | | | | |
| Federal/State Mileage and GHG Standards | Existing | F, M | 14% | Increase fuel efficiency of vehicles |
| Vehicle Miles Traveled Reduction Strategies | | | | Reduce vehicle use |
| Mass Transit/Parking | Expanded | M, B | 5% | Encourage use of mass transit; raise parking costs |
| Car Sharing | Expanded | B | 2% | Encourage use of car sharing |
| Bike Programs | Expanded | B | 1% | Expand bicycle infrastructure |
| Behavior Change—Transportation | Expanded | B | 4% | Motivate public to use vehicles more efficiently |
| Low-Carbon/Renewable Fuel Standards for Gasoline and Diesel | Proposed | F, M | 5% | Reduce greenhouse gas from vehicle fuels |
| Anti-Idling | Expanded | B | <1% | Increase enforcement, expand education on idling |
| Solid Waste — 3% of 2020 reduction goal | | | | |
| Commercial Solid Waste Reduction | Expanded | B | 2% | Increase requirements and incentives for recycling |
| Residential Solid Waste Reduction | Expanded | B | 1% | Increase requirements and incentives for recycling |

Action Recommendations

| Action | Description |
|--|---|
| ADAPTATION | |
| Give adaptation the same priority as mitigation | Develop an adaptation plan; focus on sea-level rise, heat waves, and extreme storms; engage all levels of government |
| Assess vulnerability | Conduct a vulnerability assessment; include a range of projections; give special attention to the most vulnerable; start considering potentially catastrophic, very long-term impacts |
| Remain flexible | Collect and analyze new data, establish an advisory group, revise plan triennially |
| Include climate change in all planning and review | Include in all formal development review and capital planning; identify “no-regrets”, “low-cost”, and “wait-and-see” strategies; begin adaptation planning case studies |
| Review impacts on existing programs and infrastructure | Require every municipal department and agency to undertake a formal review of consequences of climate change |
| ECONOMY | |
| Promote good, green jobs | Extend Boston Resident Jobs Policy to climate action; expand worker and contractor databases and training programs; ensure access |
| Promote economic equity | Ensure that costs and benefits of climate action are shared fairly throughout the community and do not exacerbate existing inequalities |
| COMMUNITY ENGAGEMENT | |
| Promote climate action at the neighborhood level | Partner with community organizations; develop local priorities; facilitate communication; acknowledge local work; create incentives for collective action |
| Collaborate with community in program development and implementation | Establish public commission; actively engage all segments of community in design and implementation of policies and programs |
| Support a citywide awareness campaign | Frame climate action in the context of broad community concerns; customize messages for subgroups; use traditional and new media |
| Equip individuals to take action | Develop accessible, interactive website; establish climate information centers; promote climate education in schools |
| Continue to lead by example | Raise standards for municipal buildings, vehicles, operations, and procurement; engage municipal employees as models of climate action |
| IMPLEMENTATION | |
| Secure sufficient human and financial resources | Draw on public, philanthropic, and private resources; designate official with climate action responsibility |
| Develop a detailed plan and monitor implementation | Specify priorities, sequencing, and responsibilities for climate action; develop indicators, targets, and metrics; gather data on effectiveness, difficulties, costs, and benefits |



CHAPTER 1

Introduction

In March 2009, Mayor Thomas M. Menino announced the formation of the Boston Climate Action Leadership Committee and Community Advisory Committee. The charge to the committees was to give recommendations to the Mayor on the next set of goals, policies, and programs that Boston should establish for itself as it confronts the risks and opportunities of global climate change. This report contains recommendations for reducing Boston's contribution to climate change, addressing changes we cannot avoid, and engaging the entire Boston community in the effort.

Causes and Consequences of Climate Change

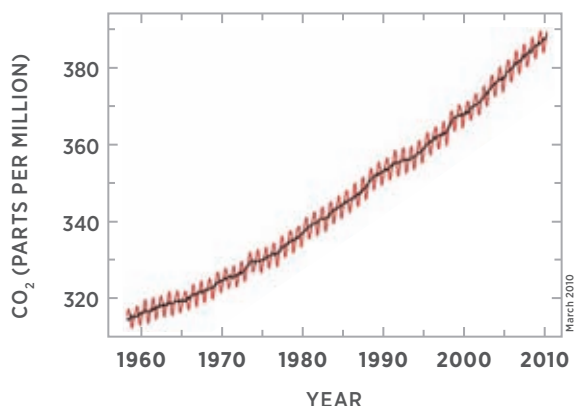
Earth's climate is always changing. Recently, however, many regions have shown unusual patterns of higher temperature and of wetter or drier conditions. Globally, the ten warmest years in the last century have all occurred in the last twelve years. The evidence points to several causes, including the increasing production of carbon dioxide and other greenhouse gases by the burning of oil, coal, and other fossil fuels, the conversion of forests to farms and other uses, and a wide range of other human activities. These greenhouse gases are turning the atmosphere into a warmer and warmer blanket. Unabated, these trends could lead to climate change within this century that would be more radical than at any time in the last several hundred thousand years.

In Boston, heat waves and smog alerts will become more frequent. Sea level will rise, and flooding from coastal storms will be more likely and more extensive. Storms will be more violent. This, in turn, will affect the health of residents and visitors, the safety of neighborhoods, the success of businesses, the viability of parkland plants and animals, and the ability of the government to cope with short-term emergencies and longer-term stresses. There is uncertainty about the speed at which these changes will occur, but they have already started.

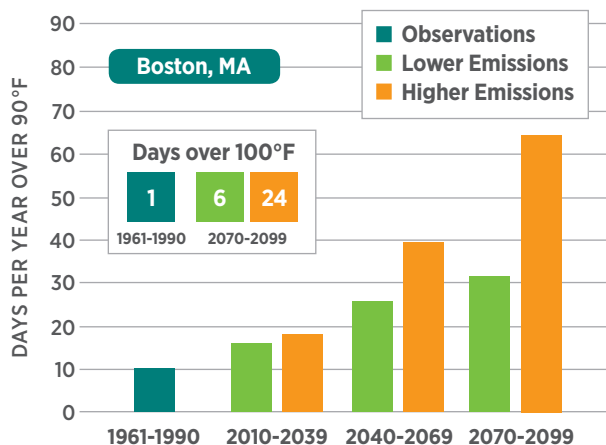
Boston Climate Action Committees



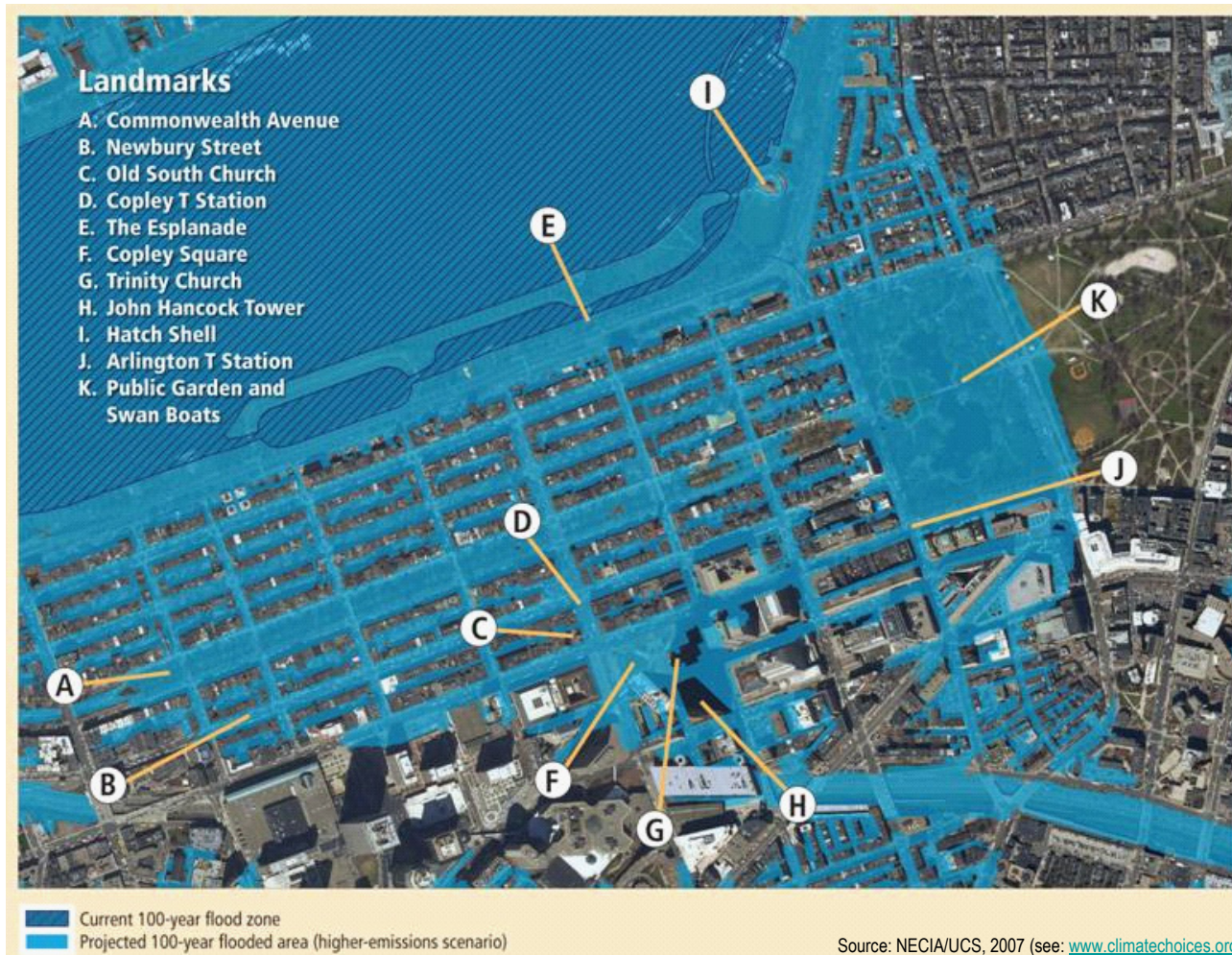
Atmospheric Carbon Dioxide Levels



High-Degree Days—Projections



2100 Flooding Projection for Back Bay



The Ways that Boston Can Respond

Cities are in a unique position to take climate action, to reduce future climate change and prepare for the changes that will come. They are small enough to see the threats concretely, nimble enough to move quickly, big enough to gather resources. City governments know their residents, businesses, and institutions individually, and can work with them as partners, hear their particular concerns, find creative solutions together. And some cities, including Boston, have been taking climate action for ten years or more: they understand the problems and have seen progress in addressing them.

Boston, by itself, did not cause global climate change, but Boston is making its contribution. Similarly, Boston, by itself, cannot stop climate change, but it can contribute to stopping it sooner. The process of reducing emissions of greenhouse gases is called mitigation, and mitigation

primarily involves reducing the use of fossil fuels by reducing total energy use and increasing renewable energy sources. As later chapters in this report make clear, Boston can remain a leader in climate action while saving money for all parts of the community and creating economic opportunities. It is urgent that Boston intensify its efforts immediately.

Lowering emissions now will have significant climate benefits in 20 to 30 years, but the climate will continue to change. We need to prepare for changes that we can foresee and that, in some cases, have already begun: sea-level rise, hotter temperatures, bigger storms. The process of preparation is called adaptation. Adaptation is good planning, the kind that families, businesses, and governments already do, asking, What is likely to happen? What are the risks? What can I do today to be ready for tomorrow? What are the costs and the benefits?

Climate Action in Boston

Boston has been a leader in climate action since at least 2000, when Mayor Menino, recognizing that “carbon dioxide and other greenhouse gases (GHG) released into the atmosphere will have a profound effect on the Earth’s climate” and that “the City of Boston can take important steps to reduce greenhouse gas emissions and increase energy efficiency,” enlisted Boston in the Cities for Climate Protection Campaign of ICLEI—Local Governments for Sustainability. The City pledged to:

Take a leadership role in increasing energy efficiency and reducing greenhouse gas emissions from municipal operations; [and]

Develop and implement a local action plan... to reduce both greenhouse gas and air pollution emissions.

In the succeeding ten years, Boston City Government took many significant steps toward fulfillment of that pledge. Among them:

- In 2002, Boston’s first green municipal building, the George Robert White Environmental Conservation Center, was completed.
- In 2004, the Mayor’s Green Building Task Force issued recommendations that led to the adoption of Boston’s green building zoning requirements.
- In 2005, Boston’s Energy Management Board completed an Integrated Energy Management Plan (IEMP) for 362 municipal buildings.
- In 2006, the Department of Neighborhood Development received a \$2 million grant from the Massachusetts Technology Collaborative to develop green affordable housing.
- In 2007, the Boston Zoning Commission adopted a Green Buildings provision for Boston’s zoning code, which required that large projects meet higher environmental and energy standards.

Also in 2007, Mayor Menino issued an executive order “relative to climate action in Boston,” which established the goal of reducing municipal greenhouse gas emissions by 80 percent by 2050 and set broad guidelines for reaching that goal, including higher efficiency standards for municipal buildings, the purchase of more renewable energy, and a requirement for more efficient vehicles. The executive order also called for Boston to adopt a climate action plan, to be updated every three years, and to form a “community climate action task force.” The first climate action plan was published at the end of that year.



In 2008, with a grant from the federal Department of Energy, Boston City Government formed Solar Boston, a two-year, \$550,000 initiative to increase solar energy installations in Boston by a factor of 50.

In 2009, along with the formation of the Climate Action Leadership Committee and the Community Advisory Committee on Climate Action (see next section), Boston City Government:

- Established the Kill-A-Watt program to help residents to more carefully track their home electricity use
- Began to switch the city to single-stream recycling, which no longer requires residents to separate paper from plastic and metal
- Formed Renew Boston, City Government’s major initiative to assist Boston residents and businesses to become more energy efficient, reducing their energy costs and greenhouse gas emissions.

Renew Boston represents a confluence of federal, state, and city initiatives. The Commonwealth of Massachusetts, in 2008, passed two important laws related to climate action: the Global Warming Solutions Act and the Green Communities Act. One consequence of the Green Communities Act is that Massachusetts electricity and natural gas utilities have to substantially increase their investment in energy efficiency by making financial and other resources available to Boston residents and businesses who want to become more energy efficient. Additional resources for this purpose are coming available from several state and federal programs, including a \$6.5 million federal Energy Efficiency and Conservation Block Grant provided directly to Boston City Government. The Renew Boston program is using the federal funds directly and providing a coordination and verification service to residents and businesses who want to take advantage of state and utility company programs.

During the past year, in a process parallel to Boston's, the Commonwealth of Massachusetts has had two climate committees meeting, as directed by the Global Warming Solutions Act. Wherever possible, Boston consultants and staff learned from and integrated the research and analyses done by the Commonwealth.



Community Workshops on Climate Action

To open up the development of Boston's updated climate action plan to additional public input, Boston City Government, with additional support from the Barr Foundation, sponsored five community workshops on climate action. The workshops, held in February and March of 2010, were planned by a joint working group of Leadership and Community Advisory Committee members. More than thirty neighborhood-based and city-wide partner organizations conducted outreach to encourage participation. (See appendix for list.) One community workshop was focused specifically on engaging Boston's youth; the other four were held in various locations around Boston to attract participants from all over the city.

In all, nearly 500 people participated. The workshops focused on two topics: climate mitigation measures affecting housing and personal transportation, and the community engagement strategy. The workshops included brief presentations, facilitated small-group discussions, and keypad polling to solicit participants' thoughts and opinions regarding draft committee recommendations. Participants also contributed written comments to address ideas or topics not covered by the polling.

Both committees reviewed the results of the workshops, and had an opportunity to incorporate community feedback into their final recommendations. The detailed results of the polling are contained in another appendix.

Organization of the Report

This report contains the consensus recommendations of the two committees, as follows:

CHAPTER 2

Climate Mitigation: Reducing Emissions

- Boston's current greenhouse gas emissions
- Greenhouse gas reduction targets for 2020 and 2050
- Mitigation measures to reach the 2020 target

CHAPTER 3

Climate Adaptation: Reducing Vulnerability

- Risks of climate change
- Adaptation measures to protect Boston

CHAPTER 4

The Economic Benefits of Climate Action

- Economic benefits of climate action
- Opportunities for business growth
- Measures to enhance opportunities

CHAPTER 5

Community Engagement Strategy

- Importance of community engagement
- Community engagement strategy

APPENDIX

- Workshop partners
- Working group participants
- Community workshop results (separate document)

In addition to the formal report and appendixes, all presentations, draft documents, and other materials used in the committees' work are posted on the City of Boston's Climate Action web page. In particular, the details of calculations, assumptions, and data sources used to estimate the reductions and benefits from climate mitigation are contained in a downloadable Excel spreadsheet.

Note on language. In this report, "Boston City Government" refers primarily to the central municipal government directly under the leadership of the Mayor, but often includes, more broadly, quasi-independent authorities—for example, the Boston Public Health Commission and the Boston Water and Sewer Commission—whose executives are appointed by the Mayor. Similarly, "the Boston community" is inclusive, encompassing residents, businesses and their employees, institutions, and all other people and entities with a role in the life of Boston. In principle, the

community includes the government; when a distinction is made between them, it is a comment on the way that authority and resources are organized, not a reflection of any split between the community and its government.

Beyond the Report

Upon acceptance of this report by the Mayor, Boston City Government will have to incorporate the recommendations into its own Climate Action Plan and implement specific policies and programs. Implementation will require the combined efforts of Boston City Government and of the Boston community—its residents, businesses, institutions, and organizations of all kinds. The committees offer the following implementation guidance, which should be kept in mind when reading the recommendations in other sections.

Collaborate with the Boston community and beyond in program development, implementation, and oversight.

Climate commission: A commission that brings together leaders from all segments of the community should be established to provide a regular forum for discussing progress, obstacles, and new ideas, evaluating and coordinating public and private efforts, and continually energizing and engaging the entire Boston community in climate action. Members should include business, institutional, youth, and community leaders, as well as technical experts, who are willing to serve as ambassadors for climate action amongst their constituencies. The commission should hold public meetings at least semi-annually.

Design: The detailed design of climate action policies and programs should be informed by the active engagement of a broad range of community, business, institutional, and other groups.

Outreach and implementation: Boston City Government should work with residents, community-based organizations, institutions, and businesses, forming partnerships to implement climate policies and programs.

Regional leadership: Boston City Government should work with government authorities and other organizations outside of Boston to address issues requiring or benefiting from larger-scale study, coordination, and implementation.

Secure human and financial resources to support successful climate action.

Resources: Boston City Government needs to ensure that sufficient resources are dedicated to achieving the city's climate action goals. Resources include staffing and funding, which may come from city government budgets and from other public, philanthropic, and private sources.

Coordination: The Mayor should assign to one official responsibility for coordinating across all government departments and reporting on climate action in Boston citywide.

City staff: Boston City Government should ensure that its employees understand climate action so that they can exemplify its principles in their daily work and use their ongoing contacts with residents and businesses to support the city's climate action plan.

Develop a detailed plan and monitor implementation

Planning: The Boston City Government's updated climate action plan, due to be completed by the end of 2010, should include an implementation strategy, with prioritization, sequencing, and assignment of responsibilities, for all new mitigation, adaptation, and community engagement measures.

Measurement: Boston City Government should develop specific, concrete, citywide and community-based indicators, targets, and metrics to gauge the progress of policies and programs in the Climate Action Plan, and report annually on Boston's overall greenhouse gas emissions and efforts to adapt to climate change. Information on progress should be transparent and easily accessible.

Data gathering: Boston City Government and the Boston community should work together to gather data about the effectiveness, difficulties, costs, and benefits of mitigation and adaptation measures (which may change as technology changes) and about the city's demographic and economic changes, and should adjust implementation priorities accordingly.

Equity: Implementation of the climate action recommendations should not exacerbate existing social and economic inequalities and should, whenever possible, contribute to reducing those inequalities. This includes ensuring that economic status, language, or other factors do not restrict access to the economic opportunities created through climate action or the services and resources available from city and state government and from local utilities.



CHAPTER 2

Climate mitigation: reducing emissions

The entire Boston community—residents, businesses, institutions, and government—must accept its share of responsibility for reducing the risks of global climate change by collectively adopting aggressive goals and actions for reducing its emissions of greenhouse gases (GHGs). To accomplish that:

- Mayor Menino, as the leading representative of the community, should publicly announce a goal of reducing the GHG emissions of the Boston community 25 percent by 2020 and 80 percent by 2050.
- Boston City Government should take the necessary steps to help ensure that Boston meets these goals by setting an example with its own buildings, vehicles, and operations; by providing public leadership and education, coordination, and financial and other resources; and by using its regulatory authority.
- Boston City Government should develop and implement a visible, long-term engagement strategy with all sectors of the Boston community to ensure that they have the information, motivation, and resources necessary to take aggressive GHG mitigation action.

This chapter discusses:

- Quantities and sources of Boston's greenhouse gas emissions
- Recommended greenhouse gas reduction goals for the city
- Policies, programs, and laws that would enable the city to reach the recommended goals

The recommended community engagement strategy, essential for successful mitigation and adaptation efforts, is described in chapter 5.

Boston's Greenhouse Gas Inventory

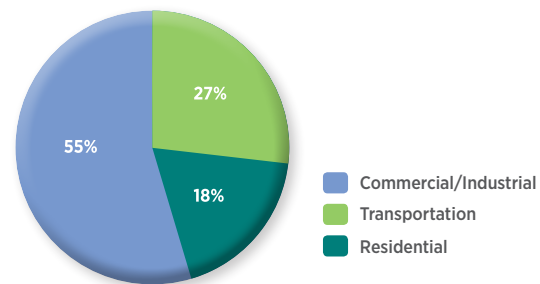
Every year, the Boston community is responsible for the emission of about eight and a half million tons of greenhouse gas, about 14 tons per resident (per capita). Those emissions include commercial, institutional, and industrial emissions related to the employment of a work force that doubles Boston's population every working

day. Per capita GHG emissions in the Commonwealth of Massachusetts are about 16 tons per year, and in the entire U.S., 24 tons.

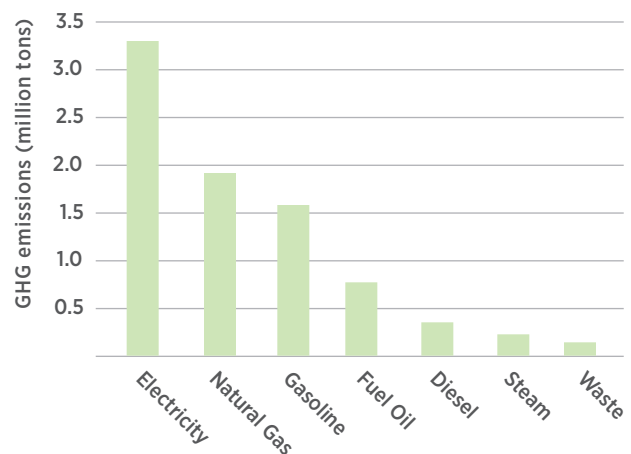
Boston's emissions largely come from energy used in buildings and transportation. Activities in commercial, industrial, and institutional buildings account for about 55 percent of the total; activities in residential buildings, 27 percent; and the transportation sector, of which personal vehicle use is the largest part, accounts for the remaining 18 percent.

In regard to fuel type, the most GHG emissions (38 percent) are associated with electricity (which itself uses many carbon-emitting fuel sources, including coal, natural gas, and oil). Natural gas (23 percent) and gasoline (19 percent) are the next two largest contributors.

Boston 2008 GHG Emissions by Sector



Boston 2008 GHG Emissions by Fuel



Boston's GHG Baseline and Reduction Goals

The exact level of Boston's emissions fluctuates from year to year, but it appears that total emissions have remained relatively steady since 1990. This reflects the effect of many energy and transportation laws, policies, and programs already put in place by Boston, the Commonwealth of Massachusetts, and the federal government. There is a reasonably complete inventory of Boston emissions going back only to 2005, but the Commonwealth of Massachusetts has conducted a more detailed analysis for the entire state that goes back to 1990. Nationally and internationally, 1990 GHG emission levels have generally become the standard (the baseline) for measuring changes in emissions, as exemplified in Mayor Menino's previously established goals for Boston.

To establish a GHG reduction goal, it is important to determine what future emissions would be from expected changes in macroeconomic factors such as population and job growth and without any major changes in current policies. This is called the "business-as-usual" (BAU) projection. The Commonwealth is projecting that greenhouse gas emissions from transportation will rise and emissions from electricity, fall—with the net effect of a relatively flat baseline through 2020. In line with the Commonwealth's projections, the Leadership Committee has adopted a flat BAU projection through 2020 for Boston, assuming emissions in 2020 of 8.4 million tons.

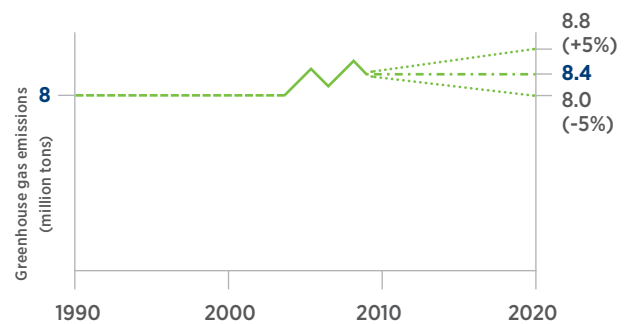
Mayor Menino asked the Leadership Committee to set community-wide goals for GHG reductions. The Committee is recommending both long-term and medium-term goals. In the past several years, a general consensus has emerged that developed nations should, by 2050, reduce their GHG emissions about 80 percent below 1990 levels, which could help limit the average temperature rise on Earth to about 3.5 degrees Fahrenheit. This 2050 reduction goal has also been established for the Commonwealth of Massachusetts by its 2008 Global Warming Solutions Act. (The act also specifies that the Commonwealth must pick a 2020 reduction target of between 10 and 25 percent). The Leadership Committee recommends that the Boston community adopt the same goal: 80 percent reduction by 2050.

Relatively straight-line progress toward this goal would imply that, by 2020, the Boston community would reduce emissions by 20 percent. After developing a complete set of recommended measures for reducing greenhouse gas emissions (described below), the Leadership Committee thinks that the Boston community is capable of exceeding

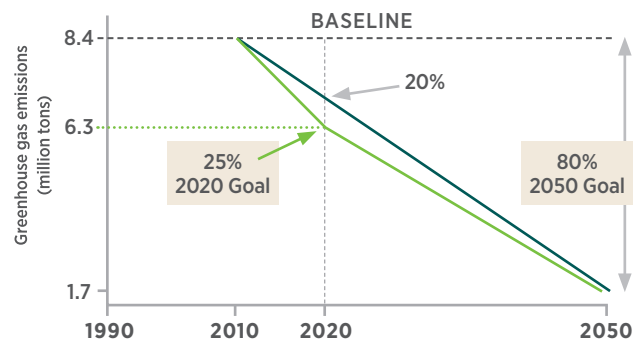
a linear rate of progress. Therefore, the Leadership Committee recommends that the Boston community adopt a goal of reducing its greenhouse gas emissions by at least 25 percent by 2020.

Notwithstanding this emissions reduction goal for the city, Boston can and should help the state and region reduce greenhouse gas emissions by continuing to implement policies that grow Boston's population and economy. Living and working in the city is, on the average, more efficient regarding energy and greenhouse gases than living and working in less urban parts of the Commonwealth. Multi-unit buildings and mass transit are among many factors that bring this about. To the extent that Boston can attract population and jobs that might otherwise locate in less efficient areas of the state, Boston's total greenhouse emissions might grow, but the effort would provide a net reduction for the Commonwealth and region as a whole.

Boston GHG Business as Usual 2020 Projection



Greenhouse Gas Reduction Goals to 2050



Recommendations for GHG Mitigation — Overview

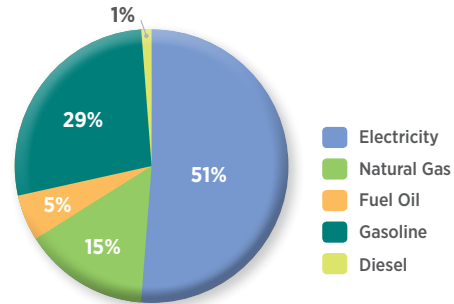
Reducing greenhouse gas emissions in Boston will involve existing and currently proposed federal and state mitigation measures, existing municipal policies and programs, and the committees' recommendations for new and expanded policies and programs. If all of these measures are fully implemented, annual GHG emissions in Boston would decrease by about 25 percent.

By fuel type, over half the reductions relate to electricity. As discussed below, the electricity-related savings come both from reducing demand for electricity and from using cleaner sources for electricity generation.

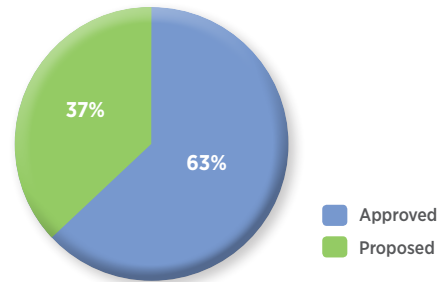
Nearly two-thirds of the reductions would come from laws, policies, and programs that have already been approved in some shape or form, but a little more than one-third will need to come from new initiatives. Of all the measures, those under the jurisdiction of the Commonwealth of Massachusetts account for about half the reductions; Boston City Government's share is about a third; and federal rules take the rest. Under this mix of old and new programs, and of multiple jurisdictions, nothing should be taken for granted. Existing programs will require strong implementation, oversight, and adjustment to new data or new conditions. City Government, residents, and businesses may have to aggressively pursue resources available through the state or federal government or press for implementation and enforcement.

Reducing Boston's greenhouse gas emissions will involve all segments of the Boston community. Nearly half of the reductions would come from sources largely under the control of individual residents and commuters—emissions from homes, apartments, and automobiles—as opposed to business and institutional sources.

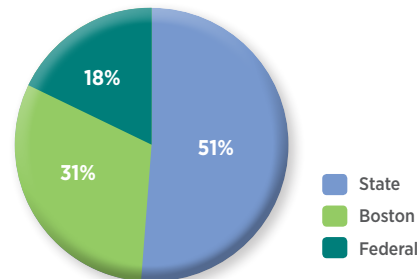
Boston 2020 GHG Reductions by Fuel Type



Boston 2020 GHG Reductions by Program Status



Boston 2020 GHG Reductions by Jurisdiction

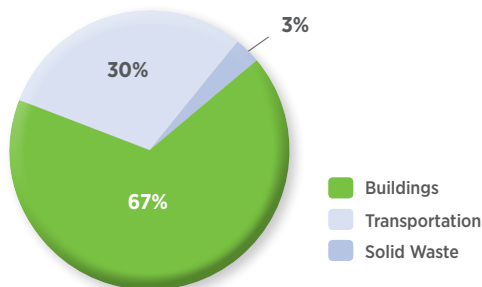


| | 2020 Baseline Emissions | | 2020 Reductions | | |
|------------------------|-------------------------|-------------|-----------------|--------------|----------------|
| | Tons (000) | % | Tons (000) | % | % of 2020 goal |
| Buildings | 6,018 | 71% | 1,458 | 17.1% | 67 |
| Transportation | 2,310 | 27% | 651 | 7.6% | 30 |
| Solid Waste/ Recycling | 216 | 3% | 58 | 0.7% | 3 |
| TOTAL | 8,544 | 100% | 2,166 | 25.4% | 100 |

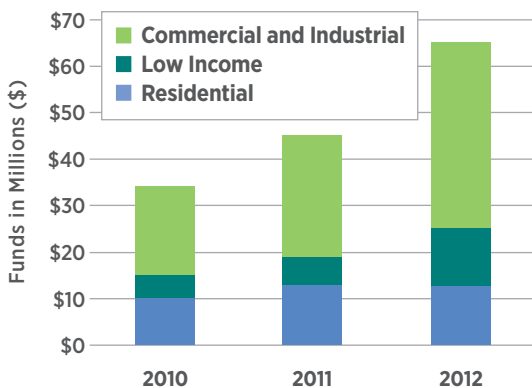
Buildings

GHG reductions from the buildings sector constitute over two-thirds of the projected total. The largest savings are expected from state-mandated, utility-run energy efficiency programs, which will provide financial and technical assistance to Boston residents and businesses. Over the next three years, Boston ratepayers will pay roughly \$145 million to fund these programs. In 2009, Mayor Menino announced the Renew Boston program to ensure that Boston residents and businesses access their fair share of these resources and achieve the maximum benefit from these programs. The capability of Renew Boston to assist the utilities in meeting their energy efficiency goals in Boston and help residents, businesses, and institutions to collectively exceed them is essential for Boston to meet the 25 percent GHG reduction goal. The Leadership Committee is recommending the establishment of a similar utility-type efficiency program specifically focused on buildings heated with oil or propane.

GHG Reductions by Program Area



Projected Utility Efficiency Program Spending in Boston



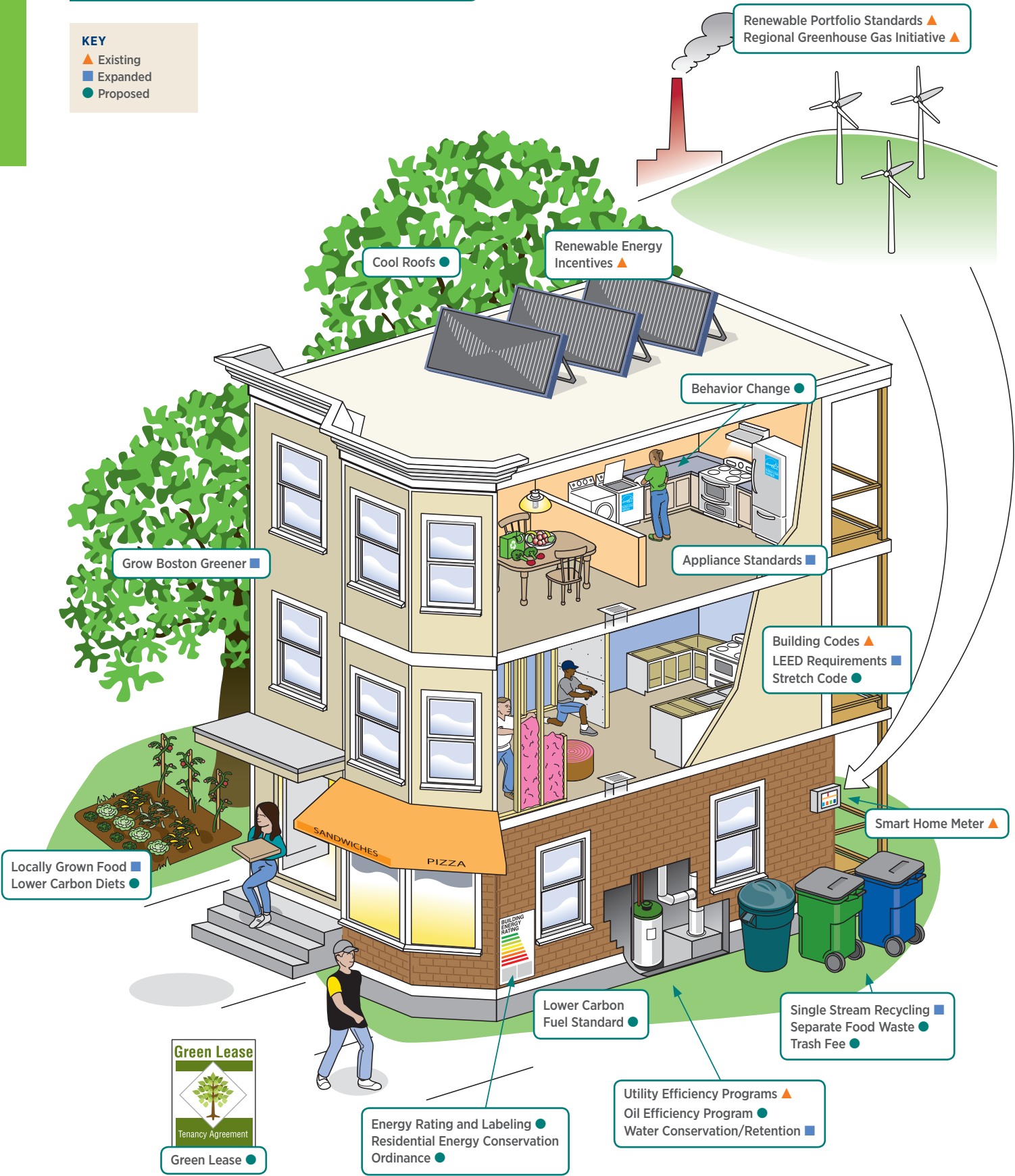
Additional federal and state programs will also decrease GHG emissions associated with buildings:

- The Massachusetts Renewable Portfolio Standard requires suppliers of electricity to increase the proportion of their electricity coming from new renewable energy resources, reaching a level of 15 percent by 2020.
- New state building energy codes—including the optional “stretch” code, which Boston should consider adopting—will make sure that all buildings are built and renovated to high efficiency standards.
- Federal appliance standards will raise the efficiency of all major appliances over time.
- Ten northeastern governors recently agreed to develop a low-carbon fuel standard for transportation and heating fuels to lower greenhouse gas emissions from those sources.

Climate Mitigation Policies and Programs for Buildings

KEY

- ▲ Existing
- Expanded
- Proposed



The Leadership Committee is recommending additional building-related GHG mitigation measures.

- 1 Every home and commercial building should be evaluated for energy use and efficiency, and receive an energy usage label similar to the comparative energy labels currently affixed to cars and appliances.
- 2 The Boston Zoning Code requirement for green building (Article 37) should have a lower size threshold.
- 3 By mid-decade, all buildings should be required to meet minimum energy efficiency standards before they can be sold. This requirement will help to overcome barriers such as the “split incentive” between owners and renters. Nearly two-thirds of Boston’s housing is rental housing, and most commercial space is leased.
- 4 New and replaced roofs on commercial and institutional buildings should be cool roofs (light-colored or vegetative) to reduce air-conditioning load.
- 5 A public educational campaign should motivate Bostonians to make building- and car-related behavior changes that will reduce GHG emissions and save them money.

| Climate Mitigation Measures for Buildings | Proportion of 2020 reduction goal |
|---|-----------------------------------|
| Existing and Expanded Policies and Programs | |
| Renew Boston and Electric Utility Efficiency Programs | 24% |
| Renewable Portfolio Standard | 11% |
| Renew Boston and Gas Utility Efficiency Programs | 7% |
| Appliance Standards | 5% |
| Building Codes | 2% |
| Proposed Policies and Programs | |
| Energy Efficiency Retrofit Ordinances | 7% |
| Behavior Change—Buildings | 3% |
| Oil Heat Efficiency Program | 3% |
| Benchmarking and Labeling | 2% |
| Low-Carbon Standard for Heating Fuels | 2% |
| Stretch Code or equivalent | 1% |
| Cool Roofs | 1% |
| TOTAL | 67% |

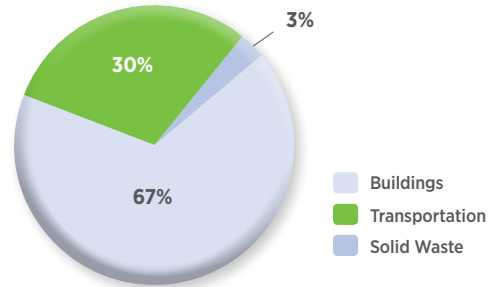


Transportation

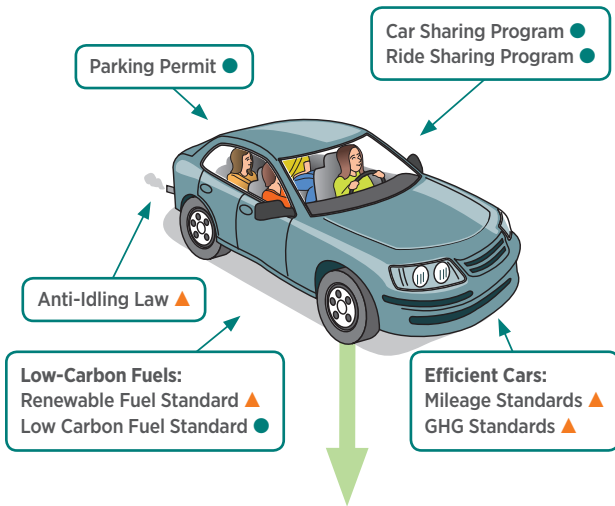
Nearly one-third of the 2020 GHG reductions will come from the transportation sector. The biggest savings are projected to come from making cars more efficient through the federal government's mileage (CAFE) standards and Massachusetts's adoption of California's GHG standards for automobiles. Also important is the northeastern governors' agreement to pursue a low-carbon fuel standard for transportation and heating fuels. Boston drivers can also reduce fuel use and GHG emissions by driving more efficiently, reducing idling, and improving car maintenance.

To achieve the overall greenhouse gas emissions goal, residents and commuters to Boston will need to reduce their use of personal cars and increase their use of alternative modes of transportation, including walking, biking, and transit. Metropolitan Boston is already a national leader in alternative transportation: about 14 percent of people walk to work and 33 percent use mass transit compared to the U.S. average of 3 percent and 5 percent, respectively; vehicle travel continues to rise, however. The Leadership Committee is recommending several measures to promote alternative transportation and discourage car use and ownership in the city.

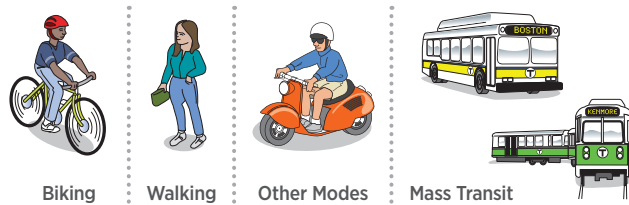
GHG Reductions by Program Area



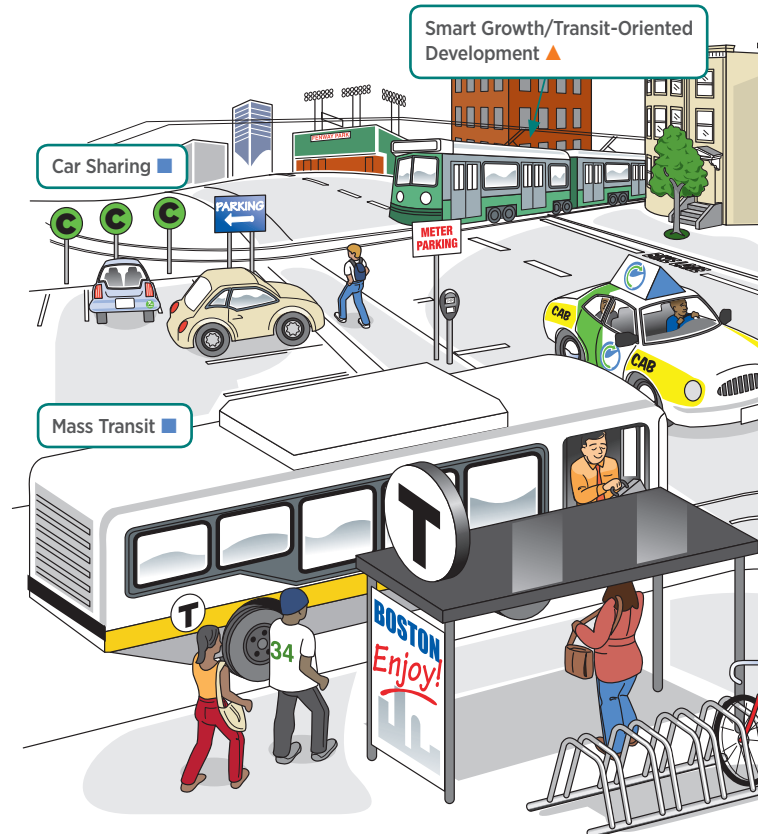
Climate Mitigation Policies and Programs for Personal Automobiles



Promote Alternative Transportation Modes



Climate Mitigation Policies and Programs for Transportation



| Climate Mitigation Measures for Transportation | Proportion of 2020 Reduction Goal |
|--|-----------------------------------|
| Existing and Expanded Policies and Programs | |
| Federal/State Mileage and GHG Standards | 14% |
| Proposed Policies and Programs | |
| Vehicle Miles Traveled Reduction Strategies | 5% |
| Mass Transit/Parking Car Sharing | 2% |
| Bike Programs | 1% |
| Behavior Change—Transportation | 4% |
| Low-Carbon/Renewable Fuel Standard for Gasoline and Diesel | 5% |
| Anti-Idling | < 1% |
| TOTAL | 31% |





Solid Waste

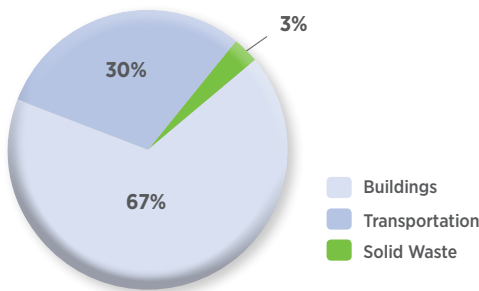
Compared to buildings and transportation, solid waste disposal is a relatively small contributor to the community’s GHG inventory, but the way we dispose of waste is almost completely under our control. Furthermore, it is a process visible to the community, and amenable to individual and community efforts. The Boston community should set a long-term goal of zero waste. In the near term, Boston City Government should raise recycling rates by expanding recycling programs (including in new areas such as food waste) and developing disincentives (for example, pay-as-you-throw fees) or requirements to decrease non-recyclable trash for both residential and commercial properties.

Municipal Operations — Leading by Example

Municipal operations of Boston City Government—schools, libraries, police and fire, public works, and so on—account for about three percent of the community’s total greenhouse gas emissions. Municipal emissions are included in the Commercial and Institutional category of the inventory. Because of government’s leadership role, it is especially important that it set a climate-action example for the rest of the city. Boston City Government has already made significant efforts to reduce its greenhouse gas emissions, as summarized in Mayor Menino’s 2007 executive order on climate action. It must continue to forge ahead in all aspects of its operations:

- In accordance with the goal for the entire community and consistent with leading by example, municipal operations should emit at least 25 percent less greenhouse gas by 2020.
- Municipal buildings, existing and planned, need better energy monitoring and benchmarking, and even higher standards than those now in effect.
- More municipal energy must come from renewable sources, including installations on municipal buildings and purchased energy.
- Internal recycling and green procurement should be expanded.

GHG Reductions by Program Area



| Climate Mitigation Measures for Solid Waste | Proportion of 2020 Reduction Goal |
|---|-----------------------------------|
| Commercial Solid Waste Reduction | 2% |
| Residential Solid Waste Reduction | 1% |
| TOTAL | 3% |

GHG Mitigation Measures—Catalog

This section lists all existing mitigation measures—federal, state, and local—and Leadership Committee recommendations that will enable Boston to reach its mitigation goals. Each item includes a description of the measure, recommendations, and an estimate of the measure's percentage reduction of total Boston community greenhouse gas (GHG) emissions in 2020. Some measures do not have separate GHG calculations, because they are essentially sub-components of other measures or produce relatively small reductions—though they might still be important for other reasons.

In this section, GHG reductions are stated relative to the Boston baseline. Previous charts and tables in this chapter—as well as all but one of the charts and tables in the summary—have stated GHG reductions relative to the 2020 goal.

For the detailed calculations and assumptions for the GHG reductions, see the Excel spreadsheet posted on the Boston Climate Action Web page.

Growing Boston as a Regional GHG Reduction Strategy

EXPANDED MEASURE

Because of Boston's lower per capita greenhouse gas emissions, concentrating regional residential and commercial growth in the city will contribute to the reduction of state and regional greenhouse gas emissions—as long as city residents and businesses continue to lower their emissions per capita and per dollar of GDP. Notwithstanding the effects on its own greenhouse gas emissions, Boston should strive to maintain robust residential and commercial growth.

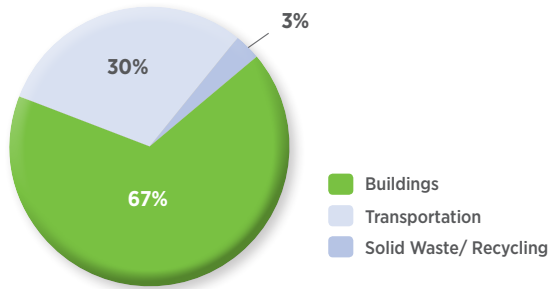
- Use land use and transportation planning to enhance Boston's economic, social, and cultural richness and its urban density, walkability, and transit system as an important regional climate mitigation strategy.
- Continue to work with the Commonwealth, the Metropolitan Area Planning Council, and the MBTA to promote and support population and employment growth in Boston and ensure that it remains the vibrant center of regional development.
- In updating the community GHG inventory, include an assessment of regional GHG benefits from urban development and from travel changes made by those commuting to jobs in Boston.

| Measure | Reduction from 1990 Baseline | | | Percentage of 2020 goal |
|---|------------------------------|--------------|--------------|-------------------------|
| | Residential | Commercial | Total | |
| Renew Boston/Electric and Natural Gas Utility Efficiency Programs (M/B) | 1.5% | 6.4% | 7.9% | 31.1% |
| Vehicle Mileage and GHG Standards (F/M) | 3.4% | | 3.4% | 13.6% |
| Renewable Portfolio Standard (M) | 0.5% | 2.4% | 2.9% | 11.4% |
| Behavior Change — Transportation and Buildings (B) | 1.9% | | 1.9% | 7.3% |
| Energy Efficiency Retrofit Ordinances (B) | 0.4% | 1.2% | 1.6% | 6.5% |
| Low-Carbon/Renewable Fuel Standards (R/M) | 1.5% | 0.1% | 1.6% | 6.5% |
| Appliance Standards (F/M) | 0.6% | 0.6% | 1.3% | 5.0% |
| Mass Transit/Parking (B) | 1.1% | 0.1% | 1.2% | 4.8% |
| Oil Heat Efficiency Program (B) | 0.4% | 0.4% | 0.8% | 3.0% |
| Solid Waste Reduction (B) | 0.2% | 0.5% | 0.7% | 2.7% |
| Benchmarking and Labeling (B) | 0.1% | 0.5% | 0.5% | 2.2% |
| Car Sharing (B) | 0.5% | 0.0% | 0.5% | 2.0% |
| Building Codes (M/B) | 0.1% | 0.4% | 0.5% | 1.9% |
| Stretch Building Code or equivalent (M/B) | 0.0% | 0.2% | 0.2% | 0.9% |
| Bike Programs (B) | 0.2% | | 0.2% | 0.8% |
| Cool Roofs (B) | | 0.1% | 0.1% | 0.4% |
| Anti-Idling (M/B) | 0.0% | 0.0% | 0.0% | 0.2% |
| Total | 12.4% | 12.9% | 25.4% | 100.0% |

■ Building
 ■ Transportation
 ■ Behavior

Buildings

GHG Reductions by Program Area



Renew Boston and Utility Energy Efficiency Programs (Electricity and Natural Gas)

2020 GHG reduction: 7.9%

EXPANDED MEASURE

The Massachusetts 2008 Green Communities Act requires electric and natural gas utilities to procure power from the least-cost options. Because the least-cost option is usually energy efficiency, utility spending on energy efficiency—in the form of rebates and other assistance programs—is expected to triple by 2012 to more than \$60 million per year for Boston (and over \$145 million from 2010 to 2012), split about 25-75 between residential customers and commercial, industrial, government, and institutional customers combined. These expenditures include money from the state-wide energy efficiency and renewable energy System Benefit Charges, the auctioning of GHG allowances under the Regional Greenhouse Gas Initiative (RGGI), and other sources.

Renew Boston, a program announced by Mayor Menino in March 2009, will offer coordination and verification to Boston businesses and residents who want to obtain energy efficiency and alternative energy services and resources. Renew Boston is using Boston's federal Energy Efficiency Community Block Grant and working closely with local utilities, neighborhood and business groups, and other government departments to ensure that all segments of the Boston community can take maximum advantage of federal, state, and utility energy programs.

- Strengthen and expand the Renew Boston program to ensure that, with utilities and other partners, it can effectively bring widespread energy efficiency measures to the Boston community, especially harder-to-reach low-income residents, renters, and small businesses.

Oil Heat Efficiency Program

2020 GHG reduction: 0.8%

NEW MEASURE

About a quarter of the residences of Boston get their heat from fuel oil, which produces more GHG emissions per unit of energy than natural gas. Although some of the utility efficiency programs—particularly those run by electricity utilities—may provide efficiency measures for low-income heating oil customers, there is no specific program targeted at heating oil customers, and many of them will be unaware of what is available.

- Develop an aggressive oil-related energy efficiency program that is comparable to efficiency programs for gas and electric (utility programs).
- Promote fuel switching to less carbon-intensive fuels (for example, bio-diesel, biomass pellets, natural gas, solar), potentially in conjunction with a state/regional low-carbon fuel standard (see below).
- Work with the Commonwealth to develop a surcharge on oil sales comparable to the current electric and gas system benefit charge, or other funding sources, for the oil efficiency program.

Green Lease

NEW MEASURE

One common obstacle in building efficiency programs is the “split incentive.” For example, the owner of a multi-unit residential building has little financial incentive to insulate the entire building, if the building units are separately metered and the tenants pay their own heating bills. A “green lease”—of which there already exist examples—is a lease agreement that allows tenants and owners to share, in some way, both the cost of efficiency improvements and their benefits.

- Develop or adapt model green leases, and promote their use in both the residential and commercial rental markets

Building Codes and Standards

2020 GHG reduction: 0.7%

EXISTING AND PROPOSED MEASURE

In 2009, in accordance with the Green Communities Act, the Commonwealth of Massachusetts adopted, as part of its building code, the most recent International Energy Conservation Code (IECC), which raised the requirements for energy efficiency in all new buildings and major renovations. The IECC undergoes regular three-year updates, and these, too, will be adopted by the Commonwealth within one year of their promulgation.

This state-level measure by itself will produce significant energy and GHG reductions.

The Green Communities Act also established a “green communities program” that provides financial assistance to qualifying communities. One qualification is that a municipality must “require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.” One way—but not the only way—a municipality can meet this standard is to adopt the Commonwealth’s more rigorous building “stretch code.” (Under Massachusetts law, individual cities and towns cannot make their own changes to the building code.) The stretch code could lead to buildings about 10 percent more efficient than those built to the base code and contribute about 0.2 percent to Boston’s reaching its 2020 greenhouse gas reduction goal.

Analysis of the costs and benefits of the stretch code for residences and smaller commercial projects shows net benefits. However, because analysis of projects above 100,000 square feet has not been completed, some developers are concerned about the cost-effectiveness of the stretch code. They are also concerned that the stretch code may create marketplace disparities by disproportionately impacting new construction and neglecting opportunities for energy efficiency in renovations of existing buildings (for example, relative to lighting codes).

- Ensure adequate training of inspectors and strict enforcement of energy code provisions.
- Identify and resolve potential conflicts between the energy code and Boston’s historic preservation requirements and other requirements for aesthetic, historical, and cultural purposes.
- Work with the Commonwealth to eliminate disparities in energy standards and the stretch code that may disproportionately impact new construction and neglect opportunities for energy efficiency in renovations of existing buildings.
- Adopt the stretch code in Boston, or find another mechanism to meet Green Communities requirements.

LEED Standards

EXPANDED MEASURE

Boston City Government requires that several categories of buildings achieve standards based on the U.S. Green Building Council’s LEED rating systems. These include the Green Affordable Housing Program, under which projects funded by the Department of Neighborhood Development must meet the LEED Silver standard, and Zoning Article 37, which requires large private projects (over 50,000 square feet) to be “LEED Certifiable under the most appropriate LEED building rating system.” The LEED standards include energy requirements as well as many other desirable green building measures. Because developers have many options for obtaining the necessary number of credits under that system, energy efficiency has sometimes been slighted in favor of other areas. The most recent version of LEED puts a greater emphasis on energy, requiring better-than-code performance for LEED certification.

Building codes, LEED, and other standards, however high, establish only minimum standards of performance. Whatever requirements are in place, Boston City Government has other tools—including, perhaps, property tax abatements, tax credits, grants, and height and density criteria—that might be useful in creating stepped incentives (and disincentives) that could lead developers and builders to higher energy and LEED performance.

- Lower the size threshold at which the Boston Zoning Code (Article 37) requires projects to meet green building LEED requirements.
- Design an incentive program to encourage developers to achieve building energy performance significantly higher than required by state and municipal standards.

Cool Roofs

2020 GHG reduction: 0.1%

NEW MEASURE

Cool roofs are light-colored roofs that reduce summer cooling requirements by reflecting more of the sun’s energy than dark roofs. Vegetated roofs increase insulation and on-site water retention, and can have benefits in both cold and hot weather; however, because of the greater cost and greater weight of a vegetated roof, it is less often a feasible alternative. With a requirement for cool roofs as roof replacements and on new construction, this beneficial measure can slowly spread

over the city. Landmarks and historical preservation districts might require exemptions. Currently, the benefits for residential properties are not as clear as for commercial properties.

- Develop requirements for cool roofs for all new commercial construction and for roof replacements, and encourage green roofs where feasible.
- Evaluate further when similar requirements should apply for residential buildings.

Appliance Standards

2020 GHG reduction: 1.3%

EXPANDED MEASURE

The federal government issues minimum efficiency standards for many appliances. It also established the Energy Star program to promote the most efficient appliances. Although states can issue standards for appliances not covered or otherwise preempted by federal standards, most major appliances are already covered by the federal standards or will be in the next few years.

- Provide outreach and education to residents and businesses through Renew Boston to encourage the purchase of high-efficiency appliances and the use of utility rebates and other financial incentives.

Rating and Labeling

2020 GHG reduction: 0.5%

NEW MEASURE

Across the country, many organizations are developing evaluation tools that can provide a summary of a building's absolute and relative energy performance and, often, offer detailed recommendations for improvements (for example, HERS, ASHRAE, Energy Star Portfolio Manager; also see recent benchmarking/reporting programs adopted by Washington, DC, New York City, and Seattle.) Such tools provide information to owners, residents, and prospective buyers and tenants, and, through education and the operations of the market, create incentives to participate in energy efficiency programs.

- For Residential Housing: By 2012, develop an energy rating and labeling requirement for Boston residential properties that makes this information available for prospective owners or tenants, and link this, through Renew Boston, to utility efficiency programs.
- For Commercial Properties: By 2012, implement an energy rating and labeling program for all commercial

buildings over 100,000 square feet that makes this information available for prospective owners or tenants. Phase in this program for all commercial buildings over 5,000 square feet by 2015.

- Base labeling requirements on Energy Star Portfolio Manager or another nationally used standard, require bi-annual updating of ratings, require that tenants make utility data available to building owners, and work with utilities to enable automatic transfer of energy data to the rating tool.

Energy Efficiency Retrofit Ordinances

2020 GHG reduction: 1.6%

NEW MEASURE

The rating and labeling program is designed to provide a strong motivation for building owners and tenants to participate voluntarily in energy efficiency programs. However, the exigency of greenhouse gas reduction will likely require, at some point, that participation be mandatory. A program that some other municipalities (for example, San Francisco) have adopted, which requires efficiency improvements—if not previously implemented—at the time of sale, looks promising. The required measures should be tied to the same energy evaluations used for the labeling program, and be used to require energy improvements in buildings with low performance scores. Required improvements can be capped by an absolute dollar amount or tied to a percentage of the sale price. As with all other building efficiency measures, this program should also be linked to Renew Boston.

- Adopt a Boston Residential Energy Conservation Ordinance that includes all owner-occupied housing, rental housing, and condominiums by 2015.
- Adopt a Boston Commercial Energy Conservation Ordinance by 2016 that includes all commercial property over 5,000 square feet.

Building Use Behavior Change

2020 GHG reduction: 0.8%

NEW MEASURE

Although many of the recommendations in the report ask people to change their behavior in some way, behavior change, in this context, refers to changing actions that occur over and over again, that cannot be managed with a one-time purchase or investment, and that involve more personal choices. They include, for example: regularly changing HVAC air filters; regularly tuning up air conditioners; adjusting temperatures for

living spaces (lower in winter, higher in summer), water heating (lower), and laundry (lower water temperature selection); and, where possible, using clotheslines for drying clothes.

- Develop, as part of community engagement and in partnership with other entities (for example, utilities, community organizations), a public campaign that motivates individuals to make climate action part of their daily lives.

Renewable Portfolio Standard

2020 GHG reduction: 2.9%

EXISTING MEASURE

The Renewable Portfolio Standard (RPS) requires that electricity suppliers provide a certain percentage of energy from new renewable sources. The RPS, revised as part of the Commonwealth's Green Communities Act, now increases the required percentage of renewable energy by one percent per year through 2020, by which time 15 percent of electricity sales must come from renewables. In addition, the state adopted an Alternative Energy Portfolio Standard, which will result in an additional five percent of electricity sales coming from combined heat and power and other alternative energy sources. This will result in a total of 20 percent of electricity sales coming from renewable and alternative energy sources by 2020.

Boston City Government has already developed a strong program to support renewable energy development. In 2008, Mayor Menino, through the Solar Boston program (now part of Renew Boston), set a goal of increasing Boston solar capacity to 25 MW by 2017. In 2009, the new Article 88 of the Boston Zoning Code established standards for siting wind energy facilities.

- Continue to support state efforts to fully implement and enhance the Renewable Portfolio Standard.
- Continue to develop renewable energy resources inside the city.
- Require that all new buildings and all major renovations that include roof construction or replacement be "solar ready" for future installation of photovoltaics or solar hot water, if they have adequate solar potential.
- Work with the Commonwealth and utilities to address the current obstacles to placing renewable energy systems on the downtown area distribution network.

Low-Carbon Fuel Standard for Heating Fuels

2020 GHG reduction: 0.5%

NEW MEASURE

The Commonwealth is working with ten other northeastern states to develop and implement a regional fuel standard that may reduce the carbon intensity of transportation fuels ten percent by 2020. The states are considering including a similar standard for heating fuels.

- Encourage the Commonwealth to develop a regional low-carbon fuel standard for heating fuels as well as transportation fuels.

The Regional Greenhouse Gas Initiative (RGGI)

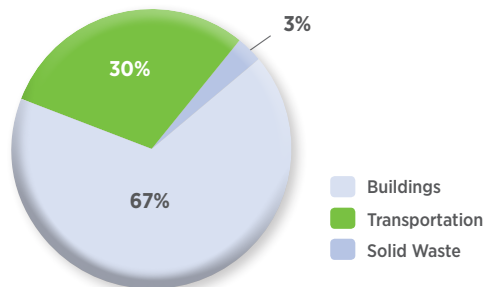
RGGI is a mandatory GHG cap-and-trade program for the electric power sector in ten northeastern states, including Massachusetts. The cap will gradually decrease to provide a 10-percent emissions reduction in the electric power sector by 2018. In Massachusetts, all RGGI allowances are auctioned off, and the proceeds go primarily into energy efficiency programs.

(Boston GHG reductions are not calculated separately for RGGI, because GHG savings from all other electricity-focused programs included here are implicitly part of RGGI. Adding RGGI savings would result in double-counting.)



Transportation

GHG Reductions by Program Area



Vehicle Efficiency

Federal and State Vehicle Mileage and GHG Standards

2020 GHG reduction: 3.4%

EXISTING MEASURE

Massachusetts adopted California's GHG emission standards for vehicles in 2006. These standards would lead to a 30-percent reduction on average in new vehicle greenhouse gas emissions from 2002 levels by 2016. The standards were initially rejected by the U.S. Environmental Protection Agency (EPA), but following a federal lawsuit and EPA reconsideration under the new federal administration, they can now be implemented. However, new federal CAFE standards, which require 5-percent efficiency improvements per year until fleet averages for new cars increase to 35.5 mpg by 2016, will effectively preempt the state standards from 2012 to 2016. Implementation of the California GHG standards after 2016 will bring additional GHG reductions.

Electric Vehicle Pilot Program

EXISTING MEASURE

Electric vehicles have the potential to significantly reduce GHG emissions, especially if the electricity comes from renewable sources. As more automobile companies develop all-electric and plug-in hybrid vehicles, a major impediment is the lack of charging stations in convenient—or any—locations. Boston City Government has already exhibited leadership by starting a process to install a pilot on-street charging station near City Hall.

- Expedite the plan to install a pilot electric-vehicle charging station near City Hall.

- Develop a comprehensive strategy for the installation of refueling/charging stations throughout Boston.
- Use TAPAs and parking freeze permits to expand the number of refueling/charging stations.

Efficient Taxis

EXPANDED MEASURE

In 2007, Boston City Government, working with Massport, developed an incentive program to encourage taxicab owners to switch to hybrid and alternative-fuel vehicles. However, a 2009 requirement for hybrid cabs was invalidated by a federal court. Although the number of taxicabs in Boston (about 1,800) is small relative to the total number of vehicles, their constant use throughout the day makes it important to reduce their emissions. The growing visibility of green cabs—now numbering over 340—makes them an excellent symbol of the city's progress.

- Encourage the growth of low-GHG taxis (for example, hybrids, electric vehicles).
- Explore ways to re-institute the requirement for low-GHG taxis.

Carbon Intensity of Fuels

Low-Carbon Fuel Standard/Renewable Fuel Standard

2020 GHG reduction: 1.2%

NEW MEASURE

The Commonwealth is working with 10 other northeastern states to develop and implement a regional low-carbon fuel standard to reduce the carbon intensity of transportation 10 percent by 2020. This regional measure would go beyond the federal Renewable Fuel Standard, which would reduce carbon intensity by only three percent.

Vehicle Operation and Maintenance Practices

Vehicle Use Behavior Change

2020 GHG reduction: 1.1%

As discussed above, behavior change refers to changing actions that occur over and over again, that cannot be managed with a one-time purchase or investment, and that involve more personal choices. For people and businesses that own vehicles, this could include, for

example: conducting routine maintenance on vehicles (tire pressure, oil and filter changes); purchasing low rolling resistance tires; improving driving technique (for example, smooth acceleration), and lowering driving speeds.

- Develop, as part of community engagement and in partnership with other entities (for example, state, community organizations), a public campaign that motivates individuals to make climate action part of their daily lives, particularly as it relates to operating and maintaining vehicles.

Anti-Idling

2020 GHG reduction: <0.1%

EXISTING MEASURE

Massachusetts state law and the state's air pollution regulations prohibit excessive vehicle idling. Although non-traffic-related idling is a relatively small contributor to the city's GHG inventory, excessive idling is a prominent offense to many members of the public as well as a source of local air pollution.

- Increase enforcement of the anti-idling law and regulation.
- Expand existing anti-idling educational efforts to reach more members of the community with information about the health and economic benefits of idling reduction and the myths about the "need" for idling.

Vehicle Miles Traveled Reduction

Overall Goal

Even with more fuel-efficient vehicles and use of lower-carbon fuels, greenhouse gas emissions from transportation will continue to grow unless travel behavior changes. One key to achieving such changes in travel behavior is to focus on a coordinated set of efforts designed to provide meaningful alternatives to automobile use and otherwise reduce vehicle miles traveled (VMTs). VMT reduction requires multiple approaches, including facilitating and incentivizing the use of walking, bicycles, and public transit, encouraging car sharing, and discouraging the use of private vehicles.

According to transportation data and models overseen by the Commonwealth, total VMTs in Boston have been growing—and are projected to continue to grow—at a rate of about 0.25 percent a year. A shift of one percent—leading to a net VMT decrease of 0.75 percent a year—would produce about a 7.5 percent reduction in VMT

in Boston by 2020, which is equivalent to a two-percent reduction in Boston's total annual GHG emissions. Specific recommendations to achieve this goal are listed below, along with the component GHG reductions.

- Reduce total vehicle miles traveled in Boston 7.5 percent below 2010 levels by 2020.

Bike Programs

2020 GHG reduction: 0.2%

The Mayor's 2008 appointment of a "bike czar" symbolized the energetic expansion of the Boston City Government's bicycle program, which now includes the installation of about 10 miles of new bicycle lanes per year, the installation of new bike racks around Boston, the development of a public bike-sharing program, and requirements for bicycle facilities in new developments.

Bicycle Infrastructure Improvements

EXPANDED MEASURE

- Accelerate and expand the installation of bike lanes and bicycle infrastructure improvements.
- Require that all commercial buildings provide dedicated, secure storage area for bicycles or provide cyclists access to elevators or other convenient means to bring their bicycles into the building.
- Evaluate opportunities to develop a network of shower and storage facilities for bicycle commuters by using YMCAs and other existing athletic facilities.
- Evaluate the potential to increase bicycle parking and storage in existing private parking lots.
- Increase the number of available bike cab permits.

Bicycle Sharing Program

NEW MEASURE

- Ensure—and, if possible, accelerate—the full installation of 3,000 shared bikes in Boston by 2020, and a total of 5,000 shared bikes regionally (that is, including Cambridge, Somerville, and Brookline).
- Work with the MBTA to locate bike share stations near as many major MBTA stops as possible.

Car Sharing

2020 GHG reduction: 0.5%

EXPANDED MEASURE

Car sharing is a program that distributes cars around a city or region and allows members to reserve vehicles for hourly or longer use. The Boston-based company Zipcar already has more than 18,000 members and 450 cars in Boston, and other car rental companies are developing similar services. According to Zipcar, members of its car-sharing program, on average, drive 2,500 miles per year less than they did before joining.

Ensuring citywide access to shared cars is, therefore, a potentially powerful way of reducing vehicle miles traveled while ensuring that Boston residents have access to cars when needed.

- Work with car sharing companies to ensure that every Boston resident lives within 1/4 mile of a shared car by 2020. This may require:
 - If necessary, revising zoning laws to allow for shared car placement throughout the city
 - Creating opportunities for shared car placement on municipal property
 - Actively promoting shared cars through a partnership with one or more shared-car companies
 - Working with community-based organizations to promote car sharing

Planning, Mass Transit, and Parking

2020 GHG reduction: 1.2%

Smart Growth and Transit-Oriented Development

EXISTING MEASURE

Smart Growth and transit-oriented development are two similar policies directed at encouraging relatively high-density mixed-use development, including affordable housing, around transit stations. This encourages the development of vibrant neighborhoods, improves walkability, and promotes transit use, thereby reducing the need for cars. The Boston Redevelopment Authority has had a transit-oriented development initiative for many years, and Zoning Code Article 87 establishes the bases for Smart Growth overlay districts in the city, as required by state law.

Complete Streets Design Initiative

EXISTING MEASURE

In summer 2009, Mayor Menino appointed the Complete Streets Advisory Committee to discuss design guidelines for street reconstruction. Topics that the guidelines will address include: bicycle lanes; storm water drainage techniques; bus priority measures; scooter, electric car, and vanpool parking; and pedestrian-friendly sidewalks.

- Ensure that the design guidelines, once completed, are implemented expeditiously.
- Implement—or continue to implement—measures already recognized as important for a safer, more efficient transportation system.

Multi-modal Social Marketing

NEW MEASURE

Transportation is an area where Boston residents, workers, and visitors make daily choices. For this reason, social marketing campaigns can have significant effects when tied to multi-modal options programs that encourage the use of car sharing and ride sharing as well as biking, walking, and transit.

- Expand social marketing and information programs to encourage Boston residents, workers, and visitors to get out of their cars.
- Develop, as part of community engagement, an on-the-ground, face-to-face outreach program to educate residents about all available transportation options and how to effectively and safely use the options, and pilot it in one neighborhood.

Mass Transit

EXPANDED MEASURE

Boston is fortunate to have an extensive public transit system, which, despite its well publicized difficulties, has relatively high ridership compared to other similarly sized cities. Bostonians need to remain forceful advocates for the upkeep, expansion, and sound financial standing of all MBTA transportation options, including buses, rapid transit, and commuter rail, and the continued development of passenger rail, especially high-speed rail, to other major cities.

- Forcefully advocate at the MBTA for more reliable, affordable, safe, accessible, extensive, and frequent mass transit service.
- Forcefully advocate for the MBTA at the state and federal level to address its long-term financial problems (for example, by providing debt relief).

- Use the city's planning and development authority to facilitate the expansion of rail lines and tracks at South Station to expand commuter access to Boston and other destinations.

Transportation Access Plan Agreements

EXPANDED MEASURE

The Boston Zoning Code (Article 80) requires developers of large projects (greater than 50,000 square feet) to sign with the Boston Transportation Department a Transportation Access Plan Agreement (TAPA). Boston City Government has used this tool effectively for many years to develop the streetscape, keep down parking capacity, expand traffic management tools, expand bicycle infrastructure, and expand the use of transportation demand management (TDM) by businesses and institutions.

- With the 10-percent VMT reduction goal in mind, use the TAPA process more aggressively to promote public transit, walking, and biking, and discourage vehicle use in the city (including through enforcement of existing TAPA agreements).

TMAs, Rideshare, Ridesharing, and Commute-mode Reporting

NEW MEASURE

A major source of vehicle travel not only within Boston city limits but throughout the metropolitan region is commuters who drive (almost always by themselves) to jobs in the city. Measures that encourage alternative transportation and ridesharing and discourage solo driving by commuters will reduce GHG emissions not only in Boston but throughout Massachusetts.

Currently, Massachusetts Rideshare regulations require large businesses (with greater than 250 or 1,000 commuters, depending on several factors) to collect data on commuting patterns, take various measures to reduce employee driving, and report to the Commonwealth. The first target of most business TDM programs is single-occupancy commuter vehicles. The Commonwealth established MassRides, a program for matching drivers and riders, to assist that effort.

Boston City Government may be able to more effectively administer both the Rideshare and commute-mode reporting requirements and incentives currently overseen by the Commonwealth because of its closer relationship with local building owners, businesses, and institutions. Boston City Government has been using Transportation Access Plan Agreements (TAPAs) and parking freeze permits to expand the number of parking

spaces reserved for ride-sharing vehicles; and new Web-based technology and other networking tools are making it easier to link up ride seekers with ride providers and supplement traditional carpools, vanpools, and park-and-ride lots.

Boston City Government has developed good relationships with its several transportation management associations (TMAs). TMAs serve more than 150,000 commuters at major employment centers in the Financial District, Back Bay, Seaport, South End, and the Longwood Medical Area. The TMAs leverage the resources and investments of businesses, institutions, and public agencies to invest in coordinated transportation demand management (TDM) initiatives and programs.

- Pursue an agreement with the Commonwealth to share responsibilities for the enforcement of Rideshare regulations and incentives.
- Develop a tiered program that, based on the number of employees, requires businesses to collect data on commuting and take various TDMs.
- Work with Boston's TMAs to develop programs that would encourage businesses to join TMAs and to fulfill some or all of their TDM requirements through TMA membership.

TDM Coordinator

NEW MEASURE

Although transportation demand management (TDM) measures are incorporated into TAPAs and parking freeze permits—and have often been effective at reducing VMTs—there is rarely follow-up by the responsible departments to ensure that commitments from building owners are met and that requirements from different departments are coordinated. Also, as new programs become available, it will be necessary to actively provide information and encouragement to existing buildings, businesses, and institutions to expand their TDM programs.

- Create a position of TDM Coordinator to oversee mode reporting requirements and ridesharing and other programs; to enforce TDM requirements incorporated into TAPAs and parking freeze permits; and to provide education and assistance to building owners and tenants, businesses, and institutions seeking to expand their TDM programs.

Multi-space Parking Meters, Expansion of Meter Hours

EXPANDED MEASURE

Higher parking meter rates in downtown and neighborhood commercial districts can discourage driving, promote turnover that supports retailers, and potentially provide a revenue source for other VMT reduction efforts. Multi-space meters, which have already been installed in many areas of Boston, give customers more ways to pay. The meters are also capable of handling complex rate structures that vary by time of day, day of week, and amount of demand, and allow transportation officials to manage demand and congestion.

- Expand the installation of multi-space meters in commercial and retail districts around Boston, with the goal of moving all meters to this system by 2020.
- Investigate the potential costs and benefits of lengthening meter hours, and extend meter hours in locations where there will be net benefits.
- Raise parking meter rates to optimize turnover and discourage cruising for parking meter spaces and driving to transit-served locations.
- Use the revenues from increased parking fees and hours to support other VMT reduction measures, such as pedestrian and bicycle improvements.

Residential Parking Permit Fees

NEW MEASURE

There is currently no fee to obtain a residential parking sticker in Boston, and there is no limit on the number of permits per household. Partially as a result of this, the number of parking stickers held by Boston residents far exceeds the number of parking spaces designated for them, with over 100,000 valid residential parking permits issued during the past two years. A parking permit fee, with a rapidly increasing cost for each additional vehicle registered at the same address, can induce residents to reconsider car ownership and reduce VMT by better balancing the supply of and demand for on-street residential parking spaces. It would also provide a revenue source for other VMT reduction efforts. Potential impacts on lower-income residents can be addressed both by using the proceeds to fund alternative transportation and, potentially, by allowing fee reductions or waivers for low-income residents.

- Introduce a graduated fee structure for on-street residential parking permits charging a modest amount for the initial vehicle at a given address and increasing for multiple vehicles registered to the same address.

- Actively encourage residents who own cars to consider giving them up by, for example, distributing educational material on alternative transportation whenever someone applies for or renews a residential parking permit.

Parking Freeze

EXPANDED MEASURE

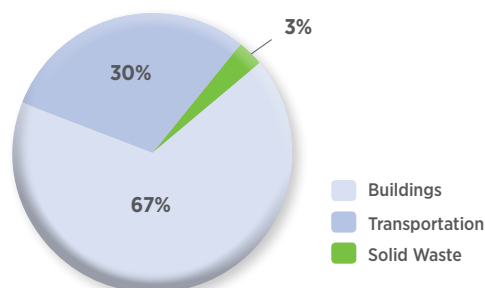
Boston currently has parking freezes in three parts of the city: Downtown, South Boston, and East Boston. The regulations vary by district. The overall intent of the South Boston and Downtown freezes is to cap the number of off-street commercial parking spaces and thereby discourage commuters from driving into Boston. Currently, South Boston and East Boston permits require annual renewal and payment of a fee. Downtown permits require no fee and are, in principle, valid forever.

- For the Downtown parking freeze, require annual renewal of permits for all non-residential off-street parking and the payment of an annual fee.
- Use the additional revenue to increase oversight of compliance with parking freeze requirements, and to support a new transportation demand management (TDM) coordinator position.
- Use the permitting process, including public hearings, to increase the adoption of TDM measures.
- Evaluate the potential to expand the freezes to other areas of the city.



Waste Reduction

GHG Reductions by Program Area



Zero Waste Goal

Diverting waste from landfills saves money and reduces GHG emissions associated with landfills and other disposal methods. Boston City Government currently supplies curbside pickup for residents in buildings with up to six units and supports the implementation of recycling at larger multi-unit buildings (which can also participate in curbside recycling collection). These efforts have produced significant increases in recycling, but there is much room for improvement. According to the Boston City recycling office, Boston residents currently recycle only about 14 percent of the trash that they produce, but more than 50 percent of trash is recyclable. For commercial buildings, trash haulers are required to offer recycling services, but Boston businesses that contract with them are not required to purchase these services.

Waste reduction and recycling are high-visibility activities that provide clear messages to the community and encourage personal involvement in and awareness of environmental and climate issues.

- Set a long-term goal for the city of zero waste.

Residential Solid Waste Reduction

2020 GHG reduction: 0.2%

Single-Stream and Mandatory Recycling for Curbside Pickup

EXPANDED MEASURE

Boston began its first single-stream recycling pilot in 2007, and is now in the process of delivering single-stream recycling bins to all residential neighborhoods.

- Complete the full rollout of single-stream recycling city-wide.



- Ensure that all residents have the equipment, information, and motivation that they need for increased recycling.
- Establish a mandatory recycling policy.

Trash Fee

NEW MEASURE

Many cities, in the Commonwealth and elsewhere in the U.S., have discovered that voluntary recycling has been insufficient to meet high recycling and zero-waste goals. To provide a disincentive for trash (and an incentive for recycling), the imposition of a fee for the pickup of non-recyclable trash has often been necessary. One common system is “Pay-As-You-Throw,” which requires residents, for example, to purchase specific garbage bags or stickers for regular trash, but imposes no fee on recycling.

A serious concern that must be addressed before Boston adopts any type of trash fee is the risk of increased dumping. Some parts of Boston already suffer from illegal trash dumping, and it will be important to develop enforcement or other mechanisms that ensure that no neighborhood suffers from trash dumpers attempting to evade fees.

- After the full rollout of single-stream recycling is complete and a mandatory recycling policy is established, beginning in 2015, implement a trash fee for all Boston residents that receive curbside pickup.

Organic waste diversion

NEW MEASURE

Boston already has a program to separately collect spring and autumn yard wastes and Christmas trees in early January, all of which is mulched or composted. In 2008, Boston City Government issued a Request for Expression of Interest (RFI) as part of its effort to expand its capacity to compost this type of organic material year-round, and received several responses; it continues to explore possible sites and technologies.

The next expansion step in organic waste diversion would be to include food waste. As with the garden waste already collected, the new organic material could be used as feedstock for composting or anaerobic digestion. It would not be put in a landfill and allowed to decompose and release methane, a potent greenhouse gas, into the atmosphere.

- Begin planning a comprehensive residential curbside organics pickup program that provides material to a local/regional composting operation either prior to or concurrent with implementing a trash fee.
- Continue to investigate the potential to construct a Boston-based anaerobic digester to process organic material.
- Develop a program to include commercial organic waste in this program.
- Investigate whether the promotion of in-sink garbage disposals coupled with anaerobic treatment at Deer Island would be an effective complimentary organic waste diversion program.

Other Waste Measures

NEW MEASURE

- Investigate the possibility implementation of other waste measures, including restrictions on plastic bags, expansion of can and bottle deposit requirements, placement of recycling bins in all public places, and take-back requirements for manufacturers.

Commercial Solid Waste Reduction

2020 GHG reduction: 0.5%

EXPANDED MEASURE

- Create requirements and incentives to increase commercial recycling rates.

Other

Grow Boston Greener

EXISTING MEASURE

Established in 2007, Grow Boston Greener is a collaboration between the Boston City Government and its partners in Boston's Urban Forest Coalition (BUFC) to plant 100,000 trees by 2020. As the new trees mature, Boston's tree canopy cover will increase from 29 percent to 35 percent by 2030, thereby helping to keep the city cooler in summer and providing many other benefits.

Water Conservation and Retention

EXPANDED MEASURE

Measures to encourage residential water conservation will provide additional GHG reduction by reducing the amount of energy used to transport, heat, and clean water.

- Develop more effective campaigns to increase residential water conservation.
- Continue to develop and require more on-site storm water retention measures, both mechanical and vegetative.

Local Food and Farming, and Reducing High GHG Content Foods

EXPANDED MEASURE

Boston was recently rated as the best large city in the U.S. for local food availability and farmers markets. Local food and farming results in fewer transportation miles and supports beneficial land use (for example, agriculture, which can assist with carbon sequestration). Meat production is highly carbon-intensive; eating less meat reduces carbon emissions.

- Continue to promote and expand local farmers markets and provide education to residents on the potential benefits of local food and farming.
- Encourage healthy, lower-carbon diets through education and outreach, especially to children.

Municipal Measures

Municipal GHG Reduction Goal

Mayor Menino's previous adoption of the Kyoto Protocol's GHG reduction goal of seven percent for municipal operations by 2012 and the concrete measures that he put in place through the 2007 executive order on climate action gave Boston a leading position in climate protection efforts. Boston's municipal government operations must continue to set an example for the entire Boston community.

- Reduce GHG emissions associated with municipal operations by at least 25 percent by 2020.

Leading by Example

Existing Municipal Buildings

NEW MEASURE

- By 2011, track and report energy use in all municipal buildings and facilities individually.
- Use EPA's Portfolio Manager or a comparable rating system to benchmark all municipal buildings and facilities.
- By 2012, develop a comprehensive plan to retrofit all municipal buildings and facilities with cost-effective energy efficiency measures and take advantage of all utility incentive programs and other financial resources.
- By 2012, complete an evaluation of the feasibility of using on-site renewable resources and combined heat and power (CHP) for all municipal buildings and facilities.
- Expedite the establishment of an Energy Manager position, as outlined in Boston's Energy Efficiency Conservation Strategy.
- Link the installation and implementation of energy efficiency and renewable energy measures at schools with the school curriculum; provide educational opportunities for students to learn first hand about energy efficiency measures.

Renewable Energy Purchasing and Renewable Energy Installations

EXISTING MEASURE

In 2007, Mayor Menino directed in his executive order on climate action that by 2012 at least 15 percent of the electricity purchased by municipal departments must come from renewable sources. The expansion of renewable energy sources and the projected increased efficiency of municipal facilities should mean that it is possible to increase that goal.

- By 2020, obtain at least 20 percent of electricity used by Boston City Government from renewable energy sources.

Green Building

EXPANDED MEASURE

All new municipal buildings and major renovations currently must meet LEED Silver requirements. In 2009, Boston City Government celebrated its first LEED Gold building, the new annex of the Franklin D. Roosevelt K-8 School in Hyde Park.

- Increase the minimum requirement for new municipal building from LEED Silver to LEED Gold.
- Require installation of all cost-effective energy efficiency measures.

Municipal Transportation

EXISTING MEASURE

In 2005, the Boston Public Works Department started using a biodiesel blend to fuel its diesel vehicles. Boston City Government's vehicle procurement policy requires all new vehicles to be alternative fuel vehicles or among the most fuel efficient vehicles available. In 2009, the employees at City Hall and 1010 Massachusetts Avenue gained access to a pool of bikes that can be used for travel around town.

Green Municipal Operations Policies

EXISTING MEASURE

The green municipal operations program includes guidelines for procurement of all goods and services, a "green" information technology roadmap, including printing and electronics, expanded recycling, and "green" (that is, less toxic) cleaning products. The procurement guidelines direct that government purchases should be Energy Star, wherever applicable.

- Expand the procurement guidelines to cover and encourage the purchase, where appropriate, of food and other products from local sources, for example, for school cafeterias.



CHAPTER 3

Climate adaptation: preparing for change

Adaptation—the city’s preparation for the different local environmental conditions that are the consequences of global climate change—is an essential part of climate action.

Among scientists, there is little uncertainty that local environmental conditions—including sea level, summer and winter temperatures, and rainfall patterns—have already begun to change and will change more in the future. There is some uncertainty about how much and how rapidly change will occur, mostly because we don’t know how successful the world will be in reducing emissions of the greenhouse gases that cause climate change. Some changes, such as sea-level rise, heat waves, and increases in storm intensity or frequency, pose major risks to Boston, its infrastructure, its tax base, and, of course, its residents. For these reasons, Boston has a responsibility to prepare for change, including making detailed, practical plans based on reasonably foreseeable events, while remaining alert to changes in environmental data and scientific understanding and retaining flexibility in plans and thinking.

Climate mitigation—the reduction of greenhouse gas emissions—has, to date, been the primary focus of climate policy, in part because of the clear economic, health, and security benefits from reducing energy use and the burning of fossil fuels. Investments in adaptation, however, are often harder to see. Their value may not become evident, for example, until the aftermath of a major storm shows that adaptation measures have reduced the amount of damage or economic losses from what otherwise might have occurred. The benefits of adaptation are no less real, however.

Many, though not all, adaptation measures are also mitigation measures. Cool and vegetated roofs on buildings help to reduce the neighborhood risks from heat waves, which are likely to become more prevalent, as well as reduce the summer cooling costs of the buildings on which they are placed. Reductions in driving in Boston reduce emissions of carbon dioxide and the precursors of ozone, which is more likely to rise to unhealthy levels during heat waves. Furthermore, mitigation reduces the

need to adapt more later. The changes in the environment that are starting to appear now are the result of 100 years of greenhouse gas emissions.

Boston is fortunate in having been the focus of pioneering work on climate adaptation. The 2004 report *Climate’s Long-term Impacts on Metro Boston* (CLIMB), led by researchers at Tufts University and Boston University, started to put numbers to the economic impact of climate change and the economic benefits of different approaches to adaptation. In 2007, the Union of Concerned Scientists published *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* (and one member of that team is also a member of the Leadership Committee). More recently, the Commonwealth of Massachusetts, in accordance with the 2008 Global Warming Solutions Act, formed a Climate Change Adaptation Advisory Committee, and Boston City staff participated on the committee and on its working groups; the final report of this committee (the draft report contained over 200 recommendations for state and regional action) will appear soon.

Boston City Government has also been directly active. Mayor Menino’s 2007 Executive Order Relative to Climate Action in Boston states:

The City shall prepare an integrated plan that outlines actions to reduce the risks from the likely effects of climate change, and coordinates those actions with the City’s plans for emergency response, homeland security, natural hazard mitigation, neighborhood planning and economic development.

Planning for all new municipal construction and major renovation of City-owned facilities and other major municipal projects...shall also include an evaluation of the risks posed by the likely effects of climate change through 2050 to the project itself and related infrastructure and a description of potential steps to avoid, minimize or mitigate those risks.

In 2008, Boston City Government was a partner of ICLEI—Local Governments for Sustainability in convening an all-day workshop on municipal climate adaptation at Northeastern University. In 2009, the MA Office of Coastal Zone Management (CZM) selected Boston as a pilot community for its StormSmart Coasts Implementation Initiative, and work with CZM has focused on sea-level rise issues. Last winter, the Boston City Government, taking advantage of the Solar Boston grant from the U.S. Department of Energy, initiated a new LIDAR scan of all of Boston, which has provided planners with a much more precise elevation model of the entire city. This model will serve many purposes, including more detailed understanding of the possible effects of sea-level rise and storm flooding.

Boston planners have already started to incorporate climate adaptation concerns into their work. In 2008, Boston City Government began a review and update of Boston's Comprehensive Emergency Management Plan. Although this process is still underway, the Mayor's Office of Emergency Preparedness has indicated that climate change concerns will be integrated. Similarly, the Boston Water and Sewer Commission is beginning long-range capital planning for the city's sewer and storm water system, and potential climate changes, particularly sea-level rise and changing storm patterns, will be incorporated there. Private developers are similarly responding. In 2009, Spaulding Rehabilitation Hospital, which is moving to a new site in the Charlestown Navy Yard, submitted plans that indicated it was raising the base level of its new facility to account for increased flooding risks due to sea-level rise. Also in 2009, Mayor Menino appointed a Complete Streets Advisory Committee to develop street design guidelines that will include measures addressing some of the effects of climate change.

Notwithstanding these signs of progress, climate adaptation—in Boston and around the world—is a less-developed area of policy and implementation than climate mitigation. Although there are many vexing details, the basic message for climate mitigation now is: use less fossil fuel. There is no one overarching message for climate adaptation, unless it is “Be prepared!” For these reasons, strong leadership will be particularly important for the implementation of adaptation recommendations.

Principles and Priorities

- 1 Residents, businesses, and institutions of Boston must accept that global climate change will alter the city's physical environment and that these alterations could have significant effects on the geography, security, economy, and society of Boston. Climate change must be the concern of all members of Boston community.
- 2 Boston should have a sustained and comprehensive climate adaptation program.
 - Boston City Government should develop and publish a climate adaptation plan that ensures the safety of all people living or working in Boston and, to the extent practical, protects existing buildings, businesses, institutions, and neighborhoods.
 - The adaptation plan should be informed by a detailed vulnerability assessment (see below) and complement Boston's climate mitigation (greenhouse gas reduction) plan, integrating with it, where possible, and receiving equal attention.
 - The plan should spur public action through a mixture of education, incentives, resources, and requirements that may change over time.
- 3 Boston should start its adaptation efforts by focusing first on preparing for the greatest near-term risks: sea-level rise, increased frequency and intensity of heat waves, and increased intensity of storms.
 - The effects of climate change are multi-faceted, wide-ranging, and, in some cases, inevitable, due to greenhouse gas emissions that have already occurred.
 - As the adaptation program develops or new data emerge, it should widen its attention or change areas of focus.
 - Adaptation planning should address the health, economic, and social consequences of climate change impacts.
- 4 Consideration of climate change for the purposes of adaptation planning should always include a range of reputable projections, including the worst-case scenarios.
- 5 In all adaptation planning, the Boston community should give special attention to those of its members who are more vulnerable because of lack of resources, poor health, age, or other reasons.

- 6 Wherever possible, city government should work with other levels of government to address climate adaptation on a state-wide, regional, and national level.
- Boston's planning and assessments should identify adaptation measures that are beyond the capability or authority of city government, and Boston City Government should pursue those measures at the appropriate level of authority.
- Boston City Government and the broader Boston community should be a strong advocate, at both the state and federal level, with both the executive and legislative branches, for any financial, technical, administrative, and legal resources that exceed municipal capabilities.
- Boston should support efforts to ensure that laws, codes, and regulations of the Commonwealth, particularly those affecting coastal and flood-prone areas, incorporate forward-looking climate change concerns.

Information, Measurement, and Analysis

- 7 Boston City Government should conduct as soon as possible an assessment of Boston's vulnerability to climate change, focusing on sea-level rise, heat waves, and storms.
- The assessment should include the probability of an event occurring; the consequences of the event; the vulnerability of people and the natural, built, and social environments to that event; and opportunities to build adaptive capacity.
- The assessment (or series of assessments) should separately evaluate near-term, mid-term, and long-term scenarios over the coming century.
- This assessment should build on the Metropolitan Area Planning Council's 2007 Metro-Boston Multi-Hazard Mitigation Plan and Boston Annex, and may be done, if warranted, as part of a regional assessment.



- 8 As part of its three-year climate action plan revision cycle, Boston City Government should regularly review climate change projections and environmental, socio-economic, and demographic data, and adjust its adaptation and mitigation plans in response to important trends.
- Boston City Government should ensure that environmental monitoring and data analysis are sufficient to provide the information needed to conduct regular climate assessments. In particular, Boston needs a way to monitor whether the effects of climate change are likely to exceed projections previously used for planning purposes.
- Boston should partner with the Commonwealth of Massachusetts, the federal government, and local academic and scientific institutions, as appropriate, and should establish a scientific advisory group to help evaluate new information on climate change projections
- 9 Boston should establish a task force to examine the potential effects from and potential responses to likely long-term threats (50 years and beyond) from sea-level rise and other consequences of climate change, as well as low-probability, but catastrophic shorter-term events.
- The task force should build on the results of the vulnerability assessment to focus on the very long-term and potentially most disruptive physical, social, and economic consequences of climate change.

- The possible responses should explicitly include technological and infrastructure changes (for example, street redesign, green infrastructure, and ocean barriers) and social and economic changes (for example, retreat from low-lying areas, relocation of residents and industry).
- The task force should identify specific trigger points that indicate if and when the implementation of major responses needs to begin.
- If possible, this task force should be a joint effort with other municipalities around Boston Harbor and with agencies of the Commonwealth.

Planning and Implementation

- 10 Boston should immediately and explicitly incorporate climate adaptation into all planning and review processes for both public and private activities.
- The vulnerability assessment should form the basis for this consideration. Until that assessment is completed, Boston can rely on recent, more general reports of the Commonwealth, the federal government, and scientific bodies.
 - Boston planners should identify various types of strategies, including “no-regrets” strategies (those that make sense however much the climate changes), “low-cost” strategies (those with some possible net costs, but many benefits), and “wait-and-see” strategies (that depend on how much and how fast the environment changes).
 - Boston City Government should quickly begin in-depth adaptation planning case studies in several different areas of Boston, with different mixes of residential, commercial, industrial, and undeveloped sites, and different types of vulnerabilities.
- 11 All capital, infrastructure, and neighborhood planning in Boston should explicitly consider the effects of climate change over the next 100 years.
- Boston should work with FEMA and the relevant state agencies to ensure that the 100-year flood maps, traditionally based on historic flood levels, incorporate projected changes in sea level and storm intensity and frequency. Current flood maps are likely to be inadequate for planning purposes.
- 12 Every city government department and agency should undertake a formal review of the possible implications of climate change for its on-going programs and infrastructure in the next ten years,

and implement changes or establish programs and policies based on that review. Some examples of areas of concern, which need not all be addressed simultaneously, are:

- **Comprehensive Emergency Management Plan:** Boston's ongoing revision of the Comprehensive Emergency Management Plan should examine the short-term risks from climate change (particularly heat waves and flooding). All critical facilities should have both adequate plans and resources to respond to more frequent and more expansive emergency events.
- **Revenue and Budget:** Boston should assess the potential effect of sea-level rise and other consequences of climate change on Boston City Government's revenues and budgetary health.
- **Regional Transportation System:** Boston should work with the MBTA and MassDOT to assess the vulnerability of the regional transportation system to climate change and to develop strategies to reduce short-term and long-term risks.
- **Urban Heat Island:** Over the next five years, Boston should develop a comprehensive plan to mitigate the urban heat island effect in the most vulnerable areas of the city, building on the Grow Boston Greener and cool roof programs.
- **Emergency Cooling Centers:** Boston should ensure that a sufficient number of its emergency cooling centers are designed for “passive survivability” and have emergency sources of power to cope with electrical grid blackouts.
- **Public Health:** The Boston Public Health Commission and other municipal offices should develop a comprehensive assessment of the long-term risks to public health from climate change, especially related to heat waves and their effect on vulnerable populations.
- **Storm Water Management:** Boston should continue to strengthen its existing programs for green storm water management and infiltration, in particular by protecting and, wherever possible, expanding green infrastructure, including parks, urban wilds, wetlands, and green roofs, that can aid storm water management.

- **Boston Harbor and Logan Airport:** Boston should work with the Office of Coastal Zone Management, Massport, and other municipalities contiguous to Boston Harbor to ensure the safety and operability of Boston Harbor and Logan Airport with continued sea-level rise. This work should include an assessment of the economic vulnerabilities to Boston Harbor from climate change.
 - **Deer Island Sewage Treatment Plant:** Boston should work with the Commonwealth, the Boston Water and Sewer Commission, and the Massachusetts Water Resources Authority to assess the long-term viability of the Deer Island Sewage Treatment Plant.
 - **Boston Harbor Islands National Recreation Area:** Boston should work with the National Park Service and other partners to evaluate the long-term viability of the Boston Harbor Islands National Recreation Area.
 - Areas of longer-term concern that need to be addressed eventually include food security, the local effects of changes in national and international migration patterns, and climate-related economic trends.
- 13 All new private development and institutional master plans, through existing planning and environmental review processes, should evaluate the vulnerability of projects and institutions to climate change over the life of the project or institution and specify how it will address both short-term and long-term vulnerabilities.
- Boston City Government should establish planning lifetimes for different types of projects. These lifetimes should reflect the actual time such structures are likely to be in use, which may exceed the lifetimes assumed in business or financial models for the project.





CHAPTER 4

The economic benefits of climate action

Climate action to reduce greenhouse gas emissions and to prepare the city for climate changes will bring many benefits to Boston:

- Investments in efficiency and decreases in the use of cars will reduce energy and fuel expenditures.
- Reductions in air pollution from burning fuels will improve public health and reduce medical costs.
- The demand for energy efficiency and renewable energy services will create jobs.
- The long-range planning for climate adaptation will create a safer, cleaner, more prosperous city.
- Education, outreach, and engagement on climate action will produce a more active, productive, supportive community.

These benefits will come in addition to the primary purpose of climate action: to do Boston's part in averting global climate change, to protect the health and well-being of Boston residents and visitors, and to secure the physical, social, and economic viability of Boston into the next century. Nonetheless, as Boston implements its climate action program, care must be taken to ensure that it does not exacerbate existing social and economic inequalities and, whenever possible, contributes to reducing them.

Reducing Economic Risks through Climate Adaptation

In addition to risks to human health and safety, climate change poses risks to property. For example, sea-level rise of about 20 inches—which will increase frequency and extent of flooding from coastal storms—will raise the amount of “exposed assets” in metropolitan Boston from less than \$100 billion today to about \$500 billion.

As described in chapter 3, climate adaptation is preparation for the different local environmental conditions that are the consequences of global climate change. The 2004 report *Climate's Long-Term Impact on Metro Boston* estimated that relatively low-cost measures—primarily, requirements for more extensive

floodproofing of new buildings and structures, and floodproofing of existing building and structures over a 15-year period—would reduce damage from flooding by \$17 billion over the next 90 years. Adaptation measures could also reduce the health care costs due to hospitalizations during heat waves and reduce the costs of work and transportation disruptions from flooding and storms.

Saving Money through Climate Mitigation

The timing of the economic benefits from climate adaptation is uncertain, because the biggest savings will start to “happen” when extreme circumstances arise. On the other hand, the returns from climate mitigation will be immediate and continuous. Greenhouse gas reductions will come primarily from reducing energy use and increasing efficiency, and the savings will appear in the form of lower electricity, natural gas, oil, gasoline, and diesel bills every month.

Implementation of all the climate mitigation recommendations and continuation of all existing federal, state, and city programs contributing to greenhouse gas reductions will save Boston residents and businesses a total of about \$2 billion through 2020. These are estimated net savings, taking into account direct costs (capital, operations, and maintenance). About four-fifths of the savings are from building-related programs, and one-fifth from transportation programs. The savings will be widespread. Renew Boston alone has a 2020 goal of gaining the participation of over 150,000 households (about 60 percent of Boston).

| | Cumulative GHG Reductions through 2020 (thousand tons) | Total Net Savings (\$ million) |
|----------------|--|--------------------------------|
| Buildings | 6,750 | \$ 1,670 |
| Transportation | 3,130 | \$ 410 |
| Solid Waste | 140 | \$ 0 |
| TOTAL | 10,020 | \$ 2,070 |

| | Cumulative GHG Reduced through 2020 (thousand tons) | Benefit (cost) (\$/ton) | Total Benefit (\$ million) |
|---|---|-------------------------|----------------------------|
| Buildings | 6,747 | | 1,666 |
| Renew Boston/ Electric Utility Efficiency Programs | 2,610 | 379 | 989 |
| Appliance Standards | 547 | 430 | 235 |
| Energy Efficiency Retrofit Ordinances | 350 | 286 | 100 |
| Renew Boston/ Natural Gas Utility Efficiency Programs | 757 | 132 | 100 |
| Behavior Change— Buildings | 336 | 286 | 96 |
| Building Codes | 200 | 430 | 86 |
| Oil Heat Efficiency Program | 244 | 256 | 62 |
| Benchmarking and Labeling | 175 | 286 | 50 |
| Stretch Building Code or alternative | 100 | 322 | 32 |
| Cool Roofs | 41 | 81 | 3 |
| Low-Carbon Fuel Standard— Heating Fuels | 155 | -64 | -10 |
| Renewable Portfolio Standard | 1,231 | -64 | -79 |

| | Cumulative GHG Reduced through 2020 (thousand tons) | Benefit (cost) (\$/ton) | Total Benefit (\$ million) |
|--|---|-------------------------|----------------------------|
| Transportation | 3130 | | 406 |
| Vehicle Mileage and GHG Standards | 1470 | 137 | 201 |
| Mass Transit/ Parking | 515 | 198 | 102 |
| Behavior Change— Transportation | 460 | 137 | 63 |
| Car Sharing | 213 | 198 | 42 |
| Bike Programs | 83 | 198 | 17 |
| Anti-Idling | 18 | 274 | 5 |
| Low-Carbon/ Renewable Fuel Standard—Diesel | 65 | -64 | -4 |
| Low-Carbon/ Renewable Fuel Standard—Gasoline | 305 | -64 | -20 |

| | Cumulative GHG Reduced through 2020 (thousand tons) | Benefit (cost) (\$/ton) | Total Benefit (\$ million) |
|--------------------------------------|---|-------------------------|----------------------------|
| Solid Waste | 145 | | 0 |
| Residential Solid Waste Reduction | 39 | 0 | 0 |
| Commercial Solid Waste Reduction | 106 | 0 | 0 |

Most of the recommended policies and programs save more money through lower utility bills or reduced gasoline payments than they cost to implement, though there is a large range in benefits per ton of GHG. The most cost-effective programs—per ton and in total benefits—are related to improving the energy efficiency of buildings. A few programs—federal, regional, and state programs to increase renewable energy and low-carbon fuels, for instance—will tend to increase energy costs. However, they represent less than five percent of the total benefits, reduce GHG emissions, and are likely to have other benefits to which monetary values have not yet been given (for example, greater fuel diversity, reduced imports, and less air pollution).

Details of calculations, assumptions, and data sources used to estimate the benefits from climate mitigation are in a spreadsheet on the Boston Climate Action website.

Creating Jobs through Climate Action

In addition to the substantial direct financial benefits, climate action will be an important source of job growth for the green economy. As can be seen from the catalogue of mitigation recommendations in chapter 2, there will be growing demand for positions including:

- Energy Efficiency Technician and Weatherization Installation
- Energy Auditor / Building Performance Institute (BPI) Certification
- Green Heating, Ventilation and Air-Conditioning (HVAC)
- Green Construction / LEED Certification
- Remediation Technician
- Green Landscaping
- Renewable Energy (Design and Installation)
- Bicycle Maintenance and Repair
- Automotive Technician (developing hybrid modules)

In the next three years, Massachusetts will gain over 4,000 new jobs from energy efficiency investments by federal, state, and utility programs. These include a three-year federal grant of \$6.5 million to Renew Boston, which will create about 100 jobs. The utility efficiency programs in Boston are likely to reach expenditures of over \$60 million per year, requiring the employment of engineers, auditors, and installers. And the efficiency programs—and, therefore, the number of jobs—are likely to continue to grow through the decade. There will also be substantial indirect and induced job growth related to the ability of residents and businesses to spend their \$2 billion of energy savings through 2020 on other investments, goods, and services.

There is no guarantee that even jobs located in Boston will go to Boston residents or that contracts will go only to Boston businesses. Boston City Government has taken significant steps to establish training programs for individuals seeking employment and for small contractors seeking to ensure that they have the necessary skills to successfully take on this work. Boston City Government has also reached out to local non-profits and civic associations to maximize local opportunities. These programs include:

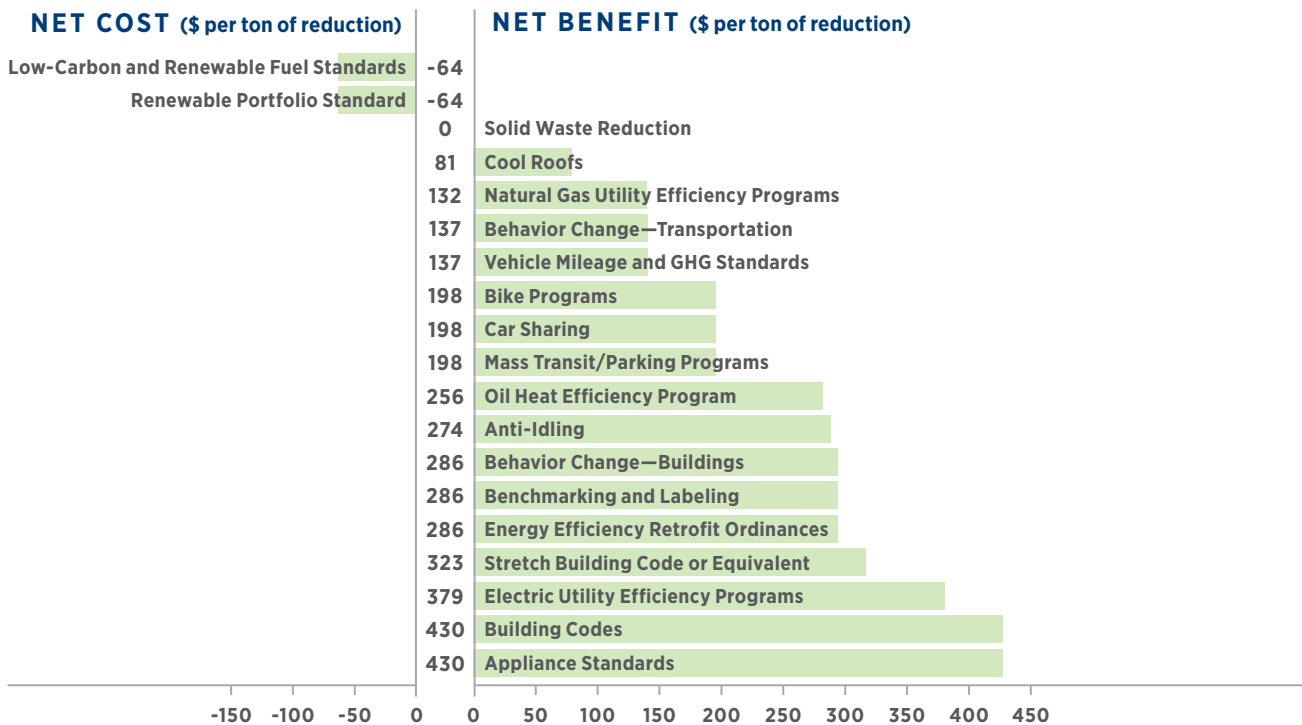
- Green Jobs Boston, a partnership with the Boston Workforce Investment Board
- Boston Green Worker Database, to match Boston workers with newly created green job opportunities
- Boston Green Contractor Training Institute

- Use of grants from the federal Department of Housing and Urban Development to fund neighborhood-based training programs

To maximize economic opportunities for all Boston residents and businesses, Boston City Government should:

- Ensure that all climate action work done through municipal programs at a minimum fulfills the goals of the Boston Resident Jobs Policy and the Boston CORI ordinance, pays prevailing wages, and is done in safe and healthy conditions; and encourage others working in Boston to adopt similar standards.
- Ensure that Boston residents and contractors are prepared to meet the growing demand for climate action services and can be easily connected to economic opportunities flowing from climate action by, for example, expanding worker and contractor databases and training programs.
- Coordinate municipal, state, federal, and private resources to ensure that all Boston residents—especially underserved populations and those facing possible barriers of economic status, language, or other factors—have maximum access to green job training and placement opportunities.
- Track the effect of climate action and energy efficiency programs on Boston employment, wages, and workplace standards.

Net Savings from Greenhouse Gas Reduction Measures





CHAPTER 5

Community engagement strategy

Boston is ready to adopt bold goals for climate action that will reduce the city's greenhouse gas emissions and prepare the city for sea-level rise and other effects of climate change. No one component of the Boston community—individuals, businesses, institutions, government—can achieve these goals for the city by acting alone. Everyone must participate.

Climate change is not part of the daily lives of most people, nor of the regular activities of most businesses or organizations. At the same time, we all stand to benefit from the results of effective climate action: a safer, healthier, more sustainable city, increased civic engagement, more jobs, and increased business opportunities. Boston City Government has a crucial role to play in enabling the Boston community to become aware of those benefits, understand actions they can take, and commit to sharing responsibility for achieving Boston's climate action goals.

Effective climate action will require new behaviors and ways of thinking, which can only be sustained in the long term by community-wide shifts in the norms that guide how we live and use resources. To guide the Boston community toward achieving these shifts, Boston City Government must reach out to all segments of the Boston community, using a sophisticated and strategic campaign that conveys a powerful message and converts awareness into action. It also must create incentives for participation, establish and clearly communicate goals, and identify ways to measure progress for the city as a whole and for neighborhoods and communities.

The recommendations for community engagement described in this report bring specificity to these general principles. The recommendations are directed to Boston City Government as the central—but by no means only—catalyst for community-wide change. They call for an active, ongoing partnership among city government, community-based organizations, businesses and institutions of all sizes, and individual residents.

A Five-Element Engagement Strategy

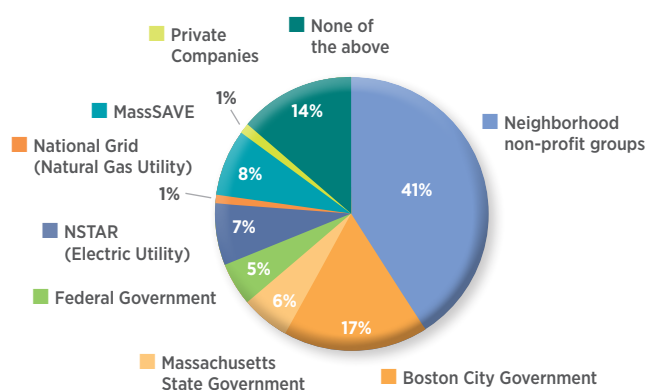
Boston City Government should facilitate the engagement of the Boston community in climate action by adopting a strategy with five interlocking elements:

- 1 Partner with and share responsibility for Boston's climate goals with community organizations to promote climate action at the neighborhood level.
- 2 Encourage community involvement in policy development, program planning, and assessment.
- 3 Support a long-term, ongoing, city-wide awareness campaign that frames climate action in the context of broad community concerns, informs people about climate action, and motivates them to act.
- 4 Equip individuals to take action and influence their peers.
- 5 Continue to lead by example.

1 Partner with and share responsibility for Boston's climate goals with community organizations to promote climate action at the neighborhood level.

Boston is a city of neighborhoods, each with its own traditions, vulnerabilities to climate change, and particular opportunities and challenges for climate action. Community organizations and networks—for example, civic associations, nonprofit organizations, sports leagues, and social clubs—typically have detailed knowledge of their communities and ongoing working relationships. Many work on a range of issues that already are, or easily could be, linked to climate action. Neighborhood-based organizations are considered by many residents to be the most trustworthy sources of information. (Polling at the community workshops placed Boston City Government in second place). They can be valuable partners in making climate action a unifying movement across the city with policies and programs that are implemented effectively street by street.

Whom do you trust most about getting information on energy efficiency program?



Boston City Government can take several steps to build strong climate-action partnerships with local organizations. Boston City Government must work closely with community and neighborhood networks to develop local priorities and design local activities, including outreach and implementation of climate action programs and policies. When local priorities include greening public institutions (for example, schools or libraries), staff of the relevant municipal departments must partner actively with community groups, using such activities as a way to increase the visibility of climate action and the opportunities for participation. In all cases, the neighborhood liaisons have an important part to play in ensuring this level of ongoing cooperation and coordination.

Boston City Government should also work with community groups and neighborhood networks to identify sustainable funding sources to support community-based climate action—including, for example, creating neighborhood climate teams and hosting block parties, workshops, and house tours. It should facilitate communication among residents, businesses of all sizes, government, institutions, and community organizations across the city. In this way, action can be coordinated, and information, strategies, lessons learned, and best practices can be shared. Finally, Boston City Government should cultivate a deeper commitment to climate action by creating incentives for collective participation—for example, a “Gold Star Neighborhood” designation when a certain percentage of the neighborhood has acted with, perhaps, some structure for good-natured competition among neighborhoods—and by acknowledging the work of local residents, businesses, organizations, and networks.

2 Encourage community involvement in ongoing policy development, program planning, and assessment at the city, state, and federal levels.

All segments of the community need to participate in the development, implementation, and assessment of Boston’s climate action policies and programs to ensure that everyone can participate and benefit.

As the public expression of this vision of involvement, a commission that brings together leaders from all segments of the community should be established to provide a regular forum for discussing progress, obstacles, and new ideas, evaluating and coordinating public and private efforts, and continually energizing and engaging the entire Boston community in climate action. Members should include business, institutional, youth, and community leaders as well as technical experts, who are willing to serve as active ambassadors for climate action amongst their constituencies. The commission should hold public meetings at least semi-annually.

To allow both this commission and the entire community to understand clearly what is being done, Boston City Government should develop specific, concrete city-wide and community-based indicators and targets to gauge the progress of all climate action policies and programs and their impact on Boston’s residents, businesses, and neighborhoods.

As the mitigation and adaptation chapters of this report make clear, the Boston community and its government can take major steps in reducing its greenhouse gas emissions and in preparing for the consequences of climate change. Those chapters also make clear that many of the policies and programs essential for successful climate action in Boston are under the jurisdiction of state, regional, and federal authorities—for example, control of the public transit system. It is the responsibility of all segments of the Boston community to be forceful advocates with their representatives and other officials at those levels of government for policies and programs that support the climate action goals of the Boston community.

3 Support a long-term, ongoing, city-wide awareness campaign that frames climate action in the context of broad community concerns, informs people about climate action, and motivates them to act.

Clear, compelling, and frequently repeated messages are key to producing long-term shifts in thought and behavior. Boston City Government, local communications media, organizations that control major advertising venues, and local media professionals must work together to



develop and sustain a city-wide awareness campaign that communicates, through messages and images, the risks and benefits of climate change and informs people how to take action, where to find resources, and how to track progress.

The core message of the campaign must clearly link climate action to a broad range of community concerns, such as health, quality of life, community well-being, cost of living, jobs, and business opportunities. In addition, it must be conveyed positively, drawing people in, whenever possible, rather than imposing requirements on them. The campaign needs to address a few critical questions that are essential for motivating change. Why is climate action important now? What should I do and how hard is it? Where should I start? How will I benefit? Can I really make a difference? Because the answers to some of these questions differ for specific groups, the overarching message must be supplemented by messages informed by and customized for specific constituencies, such as youth, ethnic groups, faith communities, and small businesses. (See appendix for workshop participants' reactions to several possible tag lines for the campaign.)

The climate action messages must be delivered through a long-term, multi-lingual, multi-cultural, multi-media campaign. In addition to employing traditional media such as news coverage and advertising on MBTA, posters, television, radio, and billboards, the campaign must employ new media and highlight stories of ordinary residents, businesses, and organizations taking actions that matter. At the same time, the campaign should enlist local sports teams, performers, and other well-known Bostonians to carry the message of climate action. As with many of the mitigation and adaptation measures, the success of this campaign will depend on City Government staff engaging and partnering closely with professionals who have relevant technical expertise—in this case, in social marketing using traditional and new media, social networking and web-based applications, behavior change, and multi-cultural community mobilization.

ELEMENTS OF A POWERFUL PUBLIC AWARENESS CAMPAIGN

- Advertising in city-wide, neighborhood, ethnic media: MBTA posters, television, radio, billboards, newspapers, shop windows
- Cable programming and scroll bars
- Social media (for example, Facebook, Twitter), iPhone and Blackberry “apps”
- Professional sports team and local celebrity endorsements and projects (for example, recycling at sports venues)
- Coordinated tag lines, song, mascot, and logos for ads, stickers, buttons, posters, mugs, t-shirts, etc.
- Digital stories
- Customizable templates and campaign materials for use by community groups
- Multi-lingual, multi-cultural images and messages
- Ongoing input from different target groups

4 Equip individuals to take action and influence their peers.

As community engagement motivates individuals, they must have the tools and information needed to take action and to influence their family and peers to act as well. Otherwise, motivation will turn to frustration, a feeling that can be as contagious in a neighborhood as commitment. On the other hand, successful action creates momentum and new norms—a new sense of what’s “normal” in how we use energy and resources, how we dispose of waste, and how we move around the city.

The opportunities and resources presented by the many climate action policies and programs of Boston City Government alone – not to mention other resources – will create a bewildering array of information for residents and businesses unfamiliar with climate action. Therefore, the primary tools that Boston City Government must supply are well organized information, ways to access that information easily, and people who can help. Today, that means, above all, an easily accessible, multi-lingual website. The website should be organized by type of actor (for example, resident, business, and so on) and provide specific recommendations for action and links to sources of assistance. The website should also include interactive features that allow users to ask questions, share ideas, seek encouragement, and discuss problems, and tools to track individual and communitywide progress.

Web-based resources are not sufficient by themselves. As more information is organized on websites, it becomes even more important that libraries and schools are able to provide computers and Internet access to those who do not have them at home. Beyond that, digital media cannot fully replace print materials and physical places where people can gather face-to-face to learn and talk. Libraries, schools, community health centers, and other neighborhood institutions must remain vibrant sources of information in Boston's neighborhoods. They should become climate information centers and, where appropriate, action centers, for example, for weatherization, bike maintenance, and other programs. For those who need to talk, Boston City Government must open a climate telephone hotline or provide information through existing constituent service mechanisms.

Education, in its many forms, is a central way to equip individuals with the tools they need. Boston City Government should partner with community organizations, community colleges, adult basic education programs, and others to sponsor workshops and other face-to-face events to build the skills and nurture the network of climate actors across the city.

Because climate action will extend to the next generation and beyond, special attention must be paid to educating Boston's young people. Many nonprofit and community-based organizations already engage young people in environmental protection, community gardening, and more. The large, enthusiastic turnout at the recent community climate workshop for teens showed that Boston's young people are ready to engage with this topic. Our schools are vital to this task, and can respond in many and varied ways. Enthusiastic, knowledgeable faculty and staff can educate and inspire students in many ways. Sustainability and climate action themes should be integrated across the curriculum. Students should also be engaged through after-school clubs and activities, community gardening, and neighborhood greening projects. And, as energy efficiency and other climate measures (for example, greenhouses, gardens, solar collectors, recycling) continue to take concrete form in Boston's schools, the buildings themselves will teach as well.

5 Continue to lead by example

Successful public engagement will foster climate leaders at all levels of the community, and Boston City Government has a unique and important role to play. Therefore, Boston City Government must not only establish good policies and programs that will help the community as a whole take effective climate action. It must set a strong example through its internal operations and through the visible behavior of City workers.

Mayor Menino's 2007 executive order on climate action and his 2008 executive order on greening municipal operations have already set a high standard for municipal operations—standards of which all Bostonians can be proud. The mitigation section of this report makes recommendations for additional steps specific to municipal buildings, transportation, energy sources, and other areas. From the perspective of the public engagement strategy, it is important that, to the greatest possible extent, municipal climate action projects be visible in prominent locations to inform, inspire, and engage people in every neighborhood of the city.

It is also important that municipal workers be models of climate action. All municipal staff, particularly those in most regular contact with the neighborhoods and the city's young people — for example, staff in the Office of Neighborhood Services, the Office of New Bostonians, Main Streets, the Department of Neighborhood Development, and the Boston Redevelopment Authority, and faculty and staff of the Boston Public Schools—should be able to link residents and businesses with the programs and resources related to climate action, as many of them already do. Boston City Government workers also need to pay particular attention to the individual actions over which they have direct control. This has significant symbolic value. For example, a needlessly idling municipal vehicle, however infrequently encountered, will send the dispiriting message that different rules apply to different people, despite what we know about the Mayor's commitment to climate action.

Sparking the Climate Revolution

In the past ten years, cities and towns across the United States have been leading the country into vigorous climate action, and Boston has been recognized as a leader among cities. This report presents recommendations for reducing greenhouse gas emission, adapting to climate change, and engaging the community that will keep Boston moving vigorously forward on the path of climate action.

There is much to do. Successful implementation of the recommendations will require hard work and broad cooperation. The Boston community and its government will need to prioritize actions, establish benchmarks of progress and methods of measurement, prepare as well as possible, re-evaluate costs and benefits, and adjust programs and policies, while keeping long-term goals firmly in mind.

With eagerness to learn, flexibility to respond, concern for this generation and those to come, and willingness to share the burdens and benefits of climate action, Boston can—and should—grow, lead, and prosper. In the urgency of this moment—as in other tumultuous and historic moments—Boston stands ready to act.

Appendix

- I. Working group participants
- II. Workshop partners
- III. Community workshop results
(separate document)

I. Working group participants

Transportation

Rick Dimino
Vineet Gupta
Nicole Freedman
Stephanie Pollack
James Fitzgerald
David Straus

Buildings

Jim Coyle
Tim Healy
Olav Hegland
Bryan Koop
Ted Landsmark
Elaine Strunk
Tedd Saunders
Galen Nelson
Galia Escarfullery
Fran Cummings
John Dalzell
Frank Gundal
David Straus
Brian Swett

Adaptation

Bud Ris
Chris Busch
Chuck McDermott
Donald Mc Gough
Erika Siegfried
Hermann Karl
John Dalzell
John P. Sullivan
Judith Nitsch
Kim Lundgren Barrows
Leon Bethune
Mark Buckley
Matthew Kiefer
Paul Kirshen
Paul Shoemaker
Rick McCullough
Todd Schenk
Walter Salvi
Victoria Wolff

Community Engagement

Community Advisory Committee Members

Loie Hayes
Brenda CottoEscalera
Gloria Herrera
James H. McQueen
Jess Lerner (*Pitch the City winner*)
Brian Rawson
Muriel Finegold
Susan Labandibar
Ann Carbone
Nebulla Stephen

Leadership Committee Members

Councilor John Connolly
David Queeley
Galia Escarfullery
Kalila Barnett
Rebecca Park
Viki Bok

II. Workshop partners

Community Workshops on Climate Action

Community Partners – Outreach for Workshops, Facilitators, and Volunteers

We recognize the tremendous efforts of all those partners who recruited nearly 500 Boston residents to the community workshops that were part of this planning process. We also thank everyone in their networks who contributed to recruitment.

Alliance for Climate Education
Allston Brighton Community Development Corporation
Alternatives for Community and Environment
Arborway Coalition
Barr Foundation
Bikes Not Bombs
BOLD Teens
Boston Climate Action Network
Boston Facilitators Roundtable
Boston Green Justice Coalition
Boston Latin Youth CAN
Boston Natural Areas Network

Boston Public Health Commission
Boston Youth Environmental Network
Chinese Progressive Association
Codman Square Neighborhood Council
Dudley Street Neighborhood Initiative
Emerald Necklace Conservancy
Environmental Protection Agency
Environetwork
Farm Aid
Foundation for a Green Future, Inc.
Franklin Park Coalition
Greater Four Corners Action Coalition
Green Streets Initiative
Hyde Square Task Force
International Council for Local Environmental Initiatives
Interaction Associates
Interaction Institute for Social Change
Inquilinos Boricuas en Accion
Mass Audubon's Boston Nature Center
Massachusetts Water Resource Authority
Mayor's Youth Council
Neighbors for Neighbors
New England Grassroots Environment Fund
New England United for Justice

Neighborhood of Affordable Housing, Inc.
Community Development Corporation
Sociedad Latina
Southwest Boston CDC
Tech Networks of Boston
Urban Edge
West Roxbury Saves Energy
Youth Worker's Alliance

Facilitators

The small-group discussions were rated the most valuable part of the workshop experience. Special thanks to our facilitators:

Alexandra Chery, BOLD Teens
Allexe Law-Flood, Environmental Protection Agency (EPA)
Andrea Lukens, Boston Nature Center
Andrea Simpson, EPA
Anne Zinter Hackett, Interaction Associates
Arielle Tonkin, Student-Boston University
Barbara Simonetti
Brenda Cotto-Escalera, Neighborhood of Affordable Housing, Inc. (NOAH CDC) and Community Advisory Committee

Candice Cook, Boston Natural Areas Network
 Cindy Lewis, EPA
 Cynthia Greene, EPA
 Cynthia Loesch, Codman Square Neighborhood Council
 Dawn M. Tesorero
 Denny Dart, EPA
 Ellie Tonkin, EPA
 Erin Ennis, Noah CDC
 Ernie Waterman, EPA
 Eshe Sherley, Boston Latin School YouthCAN
 Fiona Yu, Chinese Progressive Association (CPA)
 Fred Arnstein, Boston Facilitators Roundtable
 Geralda Sylvain, BOLD Teens
 Gina Snyder, EPA
 Gloria Herrera, Community Advisory Committee
 Gregory Caplan, Boston Nature Center/ Mass Audubon
 Gustavo Quiroga, Allston Brighton CDC
 Hugh Martinez, EPA
 Jeri Weiss, EPA
 Jessica Flaherty, BAGLY
 Jim Murphy, EPA
 Julie Brandlen (clean up), Mass Audubon
 Kathy Sferra, Mass Audubon
 Loie Hayes, Boston Climate Action Network and Community Advisory Committee
 Maggie Theroux, EPA
 Marianne Tyrrell, EPA
 Marilyn St Fleur, EPA
 Matt Thompson, Boston Facilitators Roundtable
 Maya Copeland, BOLD Teens
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