

Roadmap for Carbon Free Boston

Introduction

The City of Boston has pledged to be carbon neutral by 2050, with interim goals of a 25 and 50 percent reduction by 2020 and 2030, respectively, relative to a 2005 baseline. As part of its mitigation effort, the City is collaborating with the Green Ribbon Commission (GRC) and Boston University's Institute for Sustainable Energy (ISE) and Department of Earth and Environment (E&E) to produce a *Carbon Free Boston* report in 2018. This report will quantify the most effective combination of technologies and policies to reduce greenhouse gas (GHG) emissions across the energy, buildings, transportation, and waste sectors. *Carbon Free Boston* will also inform the GHG strategies that will be articulated in the City's *Climate Action Plan Update* that will be released in 2018.

Producing the *Carbon Free Boston* Report

The *Carbon Free Boston* report will result from a large, collaborative effort (Figure 1). The lead organizations are the City of Boston, the GRC, and Boston University's ISE and E&E. Their work is guided by a Steering Committee, Technical Advisory Groups, and a Social Equity Advisory Group. The City will also solicit input via public meetings. Technical consultants and staff of the ISE will perform the quantitative work that underlies the *Carbon Free Boston* report.

The work behind the *Carbon Free Boston* report will generate three distinct "outputs" or "products." Parties contributing to the project will play various roles in each product category (Figure 2). The foundation of the technical work is a modeling platform with individual models for the electric power, transportation, buildings, and waste sectors (Figure 3). Sector models will generate scenarios of energy use and GHG emissions based on combinations of policy choices (Exhibit A). An integrating model will pull together sector results to produce a coherent "big picture" for the City as a whole. The model outputs are scenarios of energy use and GHG emissions given inputs of different policy packages. The model results will lead to specific policy options for the City, which will then define the path of implementation.

Steering Committee

The Steering Committee provides strategic operational direction for the *Carbon Free Boston* project. The Steering Committee will include individuals in leadership capacities from City, the Commonwealth, the GRC, the ISE, and from funders of the project. The membership and Scope of Work for the Steering Committee is included as Exhibit B.

The City of Boston

The City has multiple Departments whose responsibilities intersect with GHG mitigation. The Cabinet of Environment, Energy and Open Space (EEOS) manages many of the City's

environmental resources, many of its activities that generate GHG emissions, and communication regarding sustainability. Within the EEOS Cabinet, the Environment Department oversees the protection of the City's air, water, climate, and land resources. The Environment Department also maintains the City's GHG inventory. The Public Works Department constructs and maintains the City's roadways and streetlights, and manages the City's solid waste and recycling programs. The Boston Planning & Development Agency (BPDA) is the planning and economic development agency for the City, and thus connects to GHG mitigation through multiple channels, including land use and the size, density, and composition of the building stock. The Transportation Department oversees traffic management and planning, street lighting, parking, biking and pedestrian infrastructure.

Institute for Sustainable Energy, Boston University

Boston University's Institute for Sustainable Energy is a University-wide institute that assists and promotes faculty research, and enhances BU's curricular offerings and communication products related to sustainable energy. The ISE is the technical coordinating lead in the development of a modeling platform that will identify a set of policies and technologies that effectively and efficiently meet the City's emissions reductions targets. In that role, the ISE will coordinate the work of consultants, staff working with the City and the Commonwealth, academics, and others with expertise in specific sectors.

Department of Earth and Environment, College of Arts and Sciences, Boston University

The mission of the Department of Earth and Environment is to understand a changing Earth, its relationships with humankind, and to develop strategies for a sustainable future. A central, overarching theme in the Department is climate science, which represents the defining and unifying earth and environmental science issue of the 21st century. The Department has three major research areas: Earth System Sciences, Coupled Human and Natural Systems, and Remote Sensing and Geospatial Sciences. Undergraduate students can earn Bachelor's degrees in Earth and Environmental Science, Environmental Analysis and Policy, Geophysics and Planetary Sciences, and Marine Science. The Department emphasizes the integration of teaching and research in the classroom and by including undergraduates in faculty research. The Department's professional Master's programs engage students with the foundational principles, analytical skills, and professional competencies that prepare them for careers in the private, public, and non-profit sector.

Green Ribbon Commission

The Boston Green Ribbon Commission is a group of business, institutional, and civic leaders in Boston working to develop shared strategies for fighting climate change in coordination with the City's *Climate Action Plan*. The GRC established the Carbon Free Boston Working Group to advise and collaborate with the City and the ISE in the development of the *Carbon Free Boston* report that will be completed in 2018. The charter and membership of the Carbon Free Boston Working Group is included as Exhibit C.

Technical Consultants

The ISE will manage technical consultants in the transportation and buildings sectors. The ISE consultants have subject matter expertise and experience with energy systems analysis, GHG avoidance calculations, and various economic valuation methods. Consultants will iteratively analyze specific GHG reduction strategies, separately and in bundles, identified by the ISE and the City for their impact on energy use and GHG emissions in transportation between now and 2050 (Figure 4). Technical analysis in the waste and energy sectors will be done by ISE staff.

Arup USA Inc. (Arup) was chosen to perform the technical analysis of the City's buildings due to its extensive experience and expertise in both policy and strategies in the building sector, and most importantly in creating custom tools and models for their Clients. Arup also has a long-standing relationship with the C40 Cities Climate Leadership Group as a technical advisor. The Arup team has local knowledge and deep expertise in GHG modeling and strategy analysis in the building sectors.

Cambridge Systematics, Inc. (CS) was chosen to perform the technical analysis of the City's transportation system due to its long history of excellence in the transportation field, and its experience developing Massachusetts transportation and environmental data on projects for the Commonwealth. CS employs a robust technical approach that involves development of an easy-to-use tool that will bridge the gap between sketch methods and regional travel demand models, and a strong understanding of the key drivers of GHG emissions and how they can be modeled.

Advisory Groups

Technical Advisory Groups (TAGs)

Individual TAGS will provide strategic advice on the development and application of the quantitative models in the energy, waste, buildings, and transportation sectors. The TAGS will (i) insure that the structure, techniques, and data that underlie the models are state-of-the-art; (ii) identify relevant studies performed or underway in other urban areas, and which results from those studies are relevant; (iii) identify the key policies to be investigated, (iv) identify key connections and feedbacks among sectors; and (v) provide an open and transparent forum to discuss issues related to the reduction of GHG emissions in each sector. Membership and the Scope of Work for the TAGs are included in Exhibit D.

The first meetings of the TAGs for Energy, Transportation, and Buildings were held in November and December of 2017 at Boston University. The goals of the initial meetings were to (i) describe the aims, scope, history, process and timeline of the modeling work for *Carbon Free Boston*; (ii) provide Arup, Cambridge Systematics, and BU personnel the opportunity to describe the proposed modeling frameworks for the buildings, transportation, and energy sectors, respectively; and (iii) receive feedback from the TAG members on the modeling approach and

list of policies to be evaluated. Summary notes from the meetings are available the Carbon Free Boston project web site at Boston University. The TAGs will meet again in March 2018.

Social Equity Advisory Group

The role of the Social Equity Advisory Group is to advise and ensure that the overall technical aspects of the model to reduce GHG emissions in the City of Boston incorporates social equity. Members will review the existing policies in the transportation, buildings, energy, and waste sector models and identify any additional policies having affirmative equity implications, and otherwise determine the extent to which social equity can be explicitly represented in the modeling framework. Membership and the Scope of Work for the Social Equity Advisory Group are included in Exhibit E.

Public Input

Greenovate Boston is organizing the process of public input to the technical work in *Carbon Free Boston*. Input to the Carbon Free Boston process is one piece of *Greenovate's* leadership in communications, events, and relationship building with the broader community to ensure that the City reaches its climate planning goals in partnership with local residents, professionals, and scientists. The first public event—"Let's Talk Carbon Neutrality"—was held at Boston University on February 8, 2018 at Boston University. Additional public events will be held at key touchpoints in the modeling process.

Project Timeline

The final report will be produced by October 15, 2018. A detailed timeline is shown in Figure 5.

FIGURE 1 Parties involved in *Carbon Free Boston*

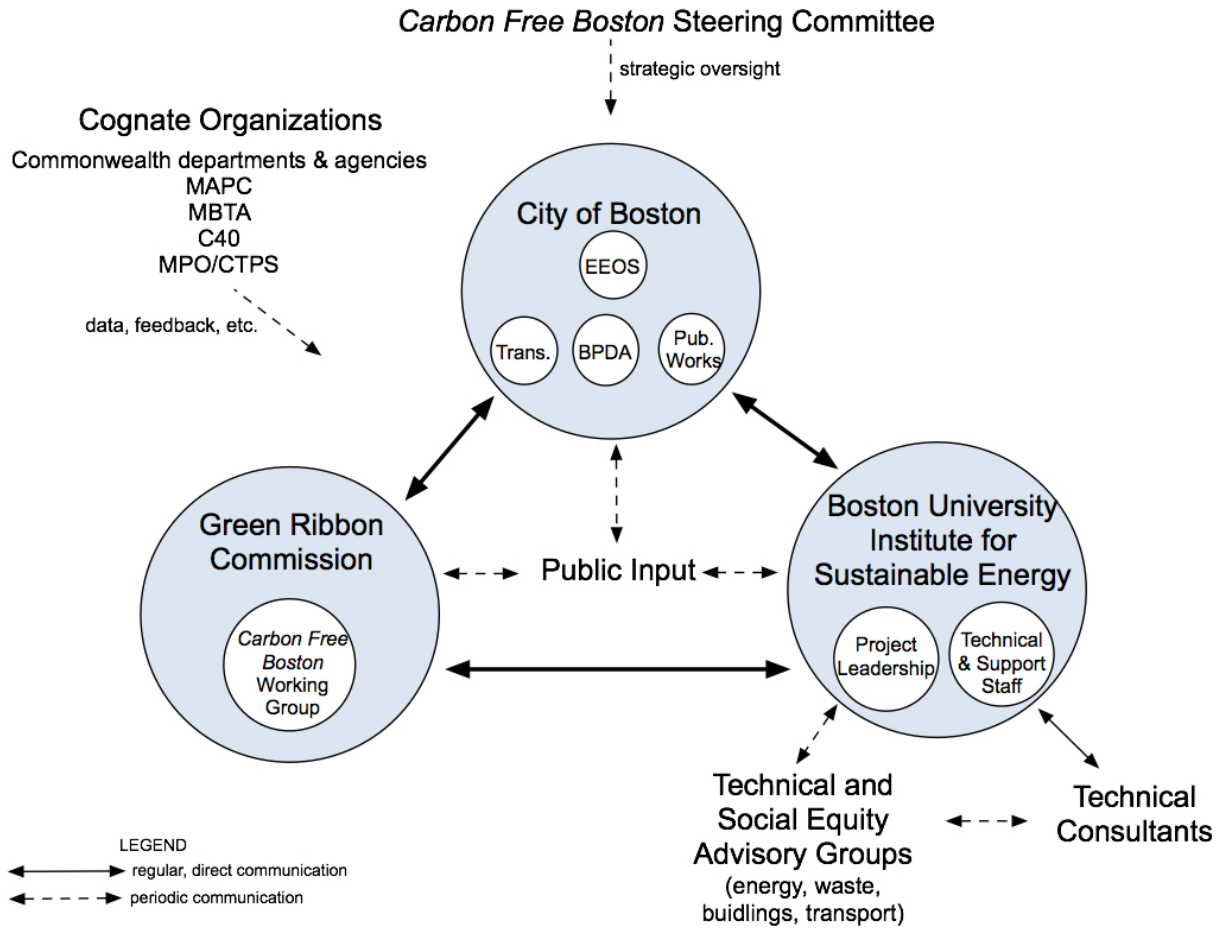


FIGURE 2 Products from the *Carbon Free Boston* report and their contributing parties

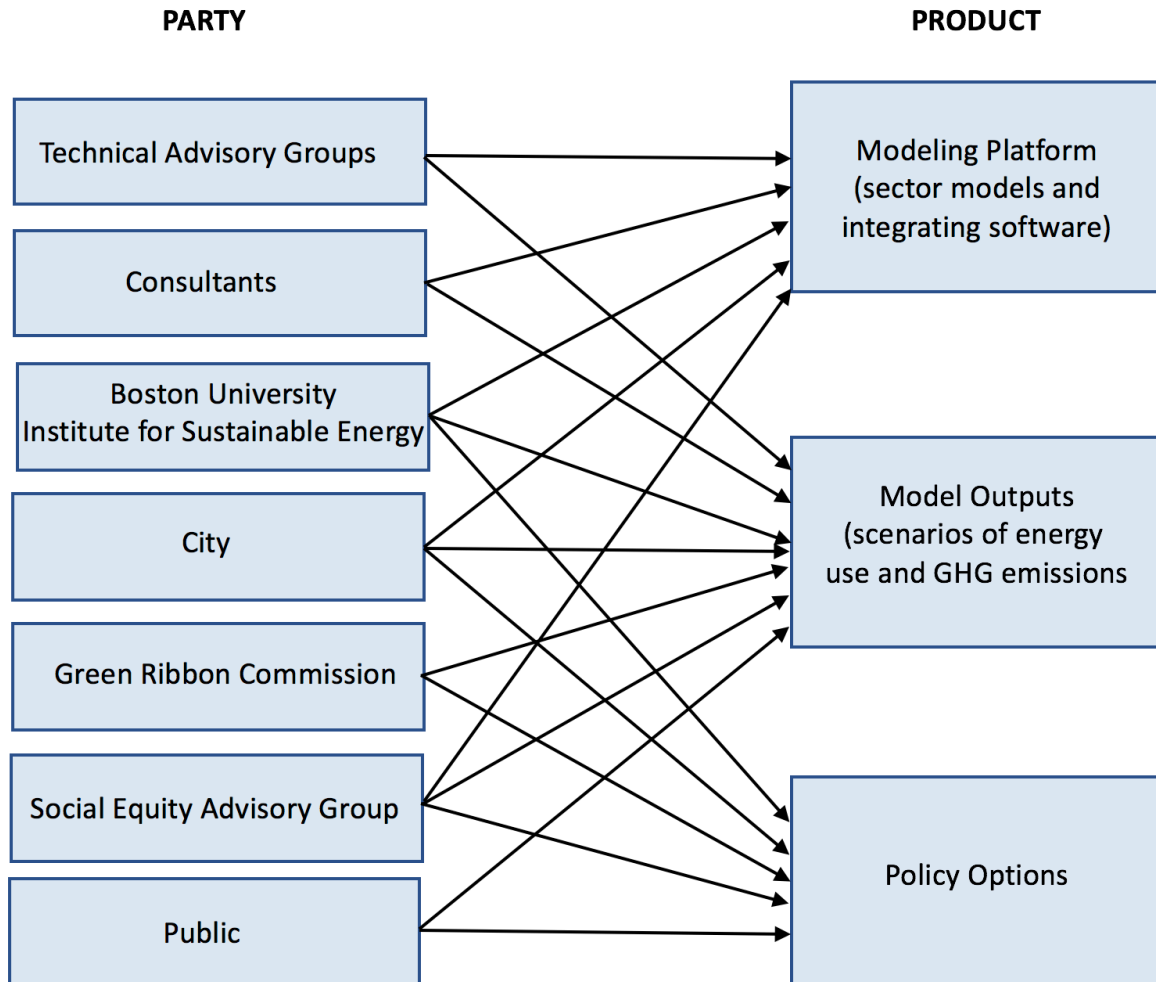


FIGURE 3 Structure of Modeling Platform Underlying *Carbon Free Boston*

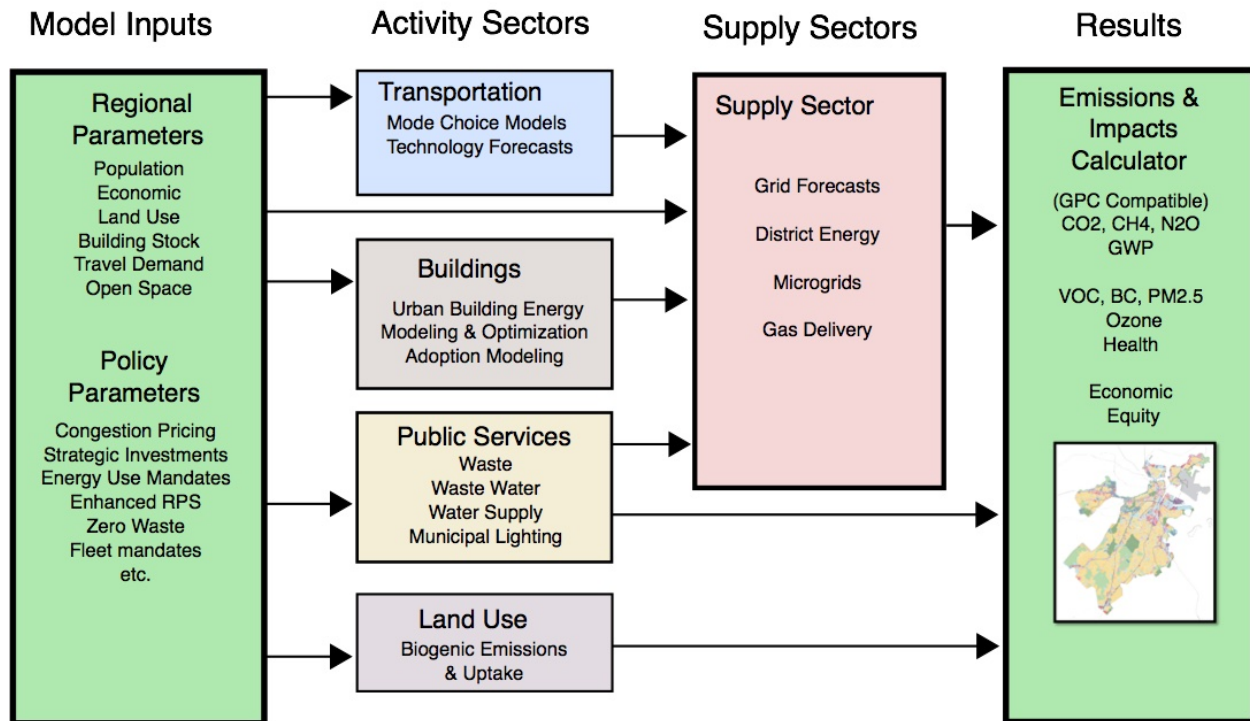


FIGURE 4 Timeline for consultant work

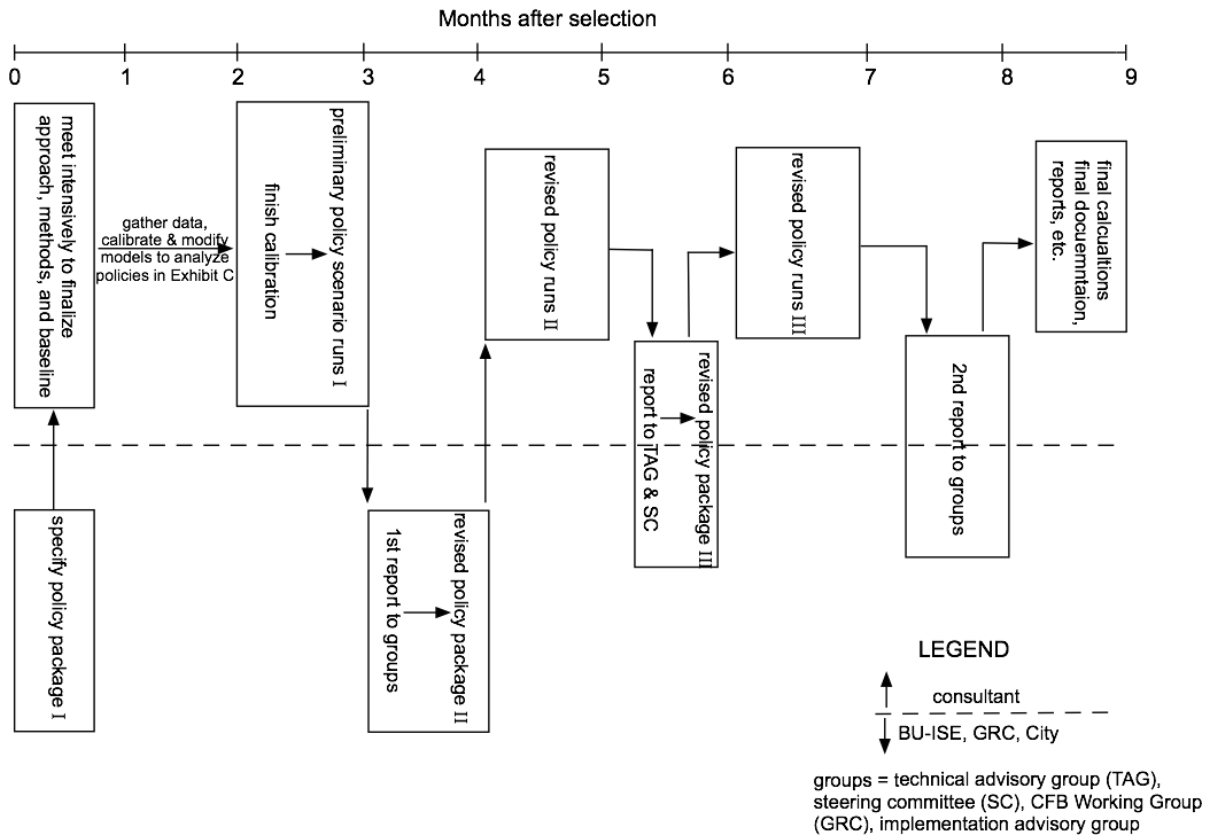


FIGURE 5: Timeline for *Carbon Free Boston*

Fall 2017

- Consultants selected; SOWs revised; foundational work commences
- Identification and coordination of data collection
- First meetings of Energy, Transportation, Buildings TAGs; meet with NGOs
- Meetings with Brattle, Synapse, MJ Bradley re: grid model
- Planning for preparation of final report
- Discussions with *Greenovate* re: engagement and outreach
- C40 engagement

January/February 2018

- Modeling approaches finalized for buildings and grid model
- Initial specification and “base case” complete for transportation model
- Community Meeting held at BU
- Student projects launched at MIT, BU, Northeastern
- Personnel changes/additions to BU Team

March 2018

- Social Equity Advisory Group established
- TAGs and Steering Committees meet; sector models adjusted
- Grid model finalized
- Writing commences on Final Report

April 2018

- Initial results from Buildings and Transportation models
- Draft of initial sections of Final Report

May 2018

- TAGS meet; models revised
- Steering Committee meets
- Results from student projects

June 2018

- Results from 2nd run of Buildings and Transportation models
- Preparation of technical portions of Final Report begins

Late July 2018

- TAGS meet; final (small) changes to models
- Continued work on technical sections and appendices of Final Report

August 2018

- Consultants finalize models
- First draft of Final Report (late August)

September

- Final reports from consultants (September 15)
- Iterative review/revision of Final Report

October 15: Final Report delivered to Green

EXHIBIT A

STRATEGIES TO REDUCE GHG EMISSIONS IN BUILDINGS

- Implement zoning, building and energy conservation codes based on carbon neutral, zero net energy, and other cost-effective approaches that improve energy efficiency and increase the use of renewable energy
- Require deep retrofitting of buildings at designated intervention points: time of sale/purchase, financing, major renovation of building or space, and rebuilding
- Require energy storage and electric vehicle charging requirements for new and retrofitted buildings
- Require energy audits, rating, and disclosure
- Require higher standards for energy efficiency of appliances
- Establish minimum energy efficiency standards for rental housing
- Reduce urban heat island effect via cool roofs and cool pavements (adopt cool roof mitigation policy, cool roof codes, etc.).
- Develop and expand low- to no-carbon district heating and cooling systems

STRATEGIES TO REDUCE GHG EMISSIONS IN ENERGY SECTOR

- Force the retirement or conversion of fossil-fuel plants
- Increase renewable portfolio standards (RPS) for utilities
- Provide clean power purchasing option (e.g., allow consumers to participate in wholesale market, Community Choice Aggregation)
- Carbon tax
- Provide financial incentives for on-site and off-site renewable generation
- Reduce regulatory barriers and increase incentives for combined heat and power (CHP), microgrids, district energy, tri-generation, and energy storage
- Invest in large- and medium-scale distributed generation (district energy for heating and cooling, micro-grids, CHP, tri-generation districts),
- Continued lowering of the cap on greenhouse gas emissions through RGGI
- Electric grid modernization
- Increased locally produced and community-owned renewable power
- Install solar panels on all municipal properties
- Implement measures to ensure that PV owners can interconnect to the grid with standardized rules, minimized fees, and reasonable feed-in tariffs;
- Install distributed renewable energy generation on city facilities

- Impact of plausible and specific decisions that impact ISO New England grid (more hydro from Canada, more offshore wind, new natural gas pipelines, major generator retirements, increase in storage, etc.)

STRATEGIES TO REDUCE GHG EMISSIONS IN TRANSPORTATION

- Incentivize adoption of alternative fuel vehicles (use of public transit lanes, free parking, exemption from taxation, feebates)
- Establish taxes/fees on fossil-fuel vehicles (at purchase and/or registration)
- Establish congestion/climate taxes on fossil-fuel vehicles in designated areas
- Set taxes on gasoline/petroleum purchase
- Convert public transit, government fleets, and taxi fleets to no- to low-carbon energy (electric, hybrid, natural gas, hydrogen)
- Invest in infrastructure for low- to no-carbon mobility: electric vehicle charging, hydrogen, fuel cell infrastructure (including incentives for real estate owners to install charging stations)
- Improve bicycle infrastructure
- Improve bus infrastructure
- Improve pedestrian infrastructure
- Expand Travel Demand Management in public and private sectors
- Invest in new public transit capacity (modernization, expansion), choices (e.g., streetcars, light rail lines), reliability, speed, quality, accessibility, convenience, way-finding, and reduced waiting times)
- Establish regional congestion pricing (variably priced lanes, variable tolls on entire roadways, cordon charges, area-wide charges, vehicle-miles-traveled fee, variably priced ramps)
- Institute new parking pricing models (performance-based parking, off-street parking tax, dynamic pricing, variable market rate on-street pricing, unbundle parking costs from the rent or sale price)
- Promote carpooling, ride-sharing, car-sharing, and High Occupancy Vehicle lanes
- Various strategies to improve efficiency in freight transport

STRATEGIES TO REDUCE GHG EMISSIONS IN WASTE

- The City is in the early stages of developing a Zero Waste plan. The strategies identified for analysis in the waste planning process will also be assessed in terms of their impact on GHG emissions. The waste planning process and the GHG mitigation analysis will use a common set of assumptions, data, definitions, etc.

EXHIBIT B

Scope of Work (SOW)

Steering Committee for Carbon Free Boston

Background

Boston is a recognized leader in the global response of cities to climate change. The City has played foundational roles in the Carbon Neutral Cities Alliance, the Global Covenant of Mayors for Climate & Energy, and the C40 Cities Climate Leadership Group. By executive order in 2007, the City of Boston set GHG reduction goals of 25% below 2005 levels by 2020, and 80% by 2050 for municipal operations. In 2011, the City released a *Climate of Progress* in which the same 80x50 GHG reduction goals were extended to the entire City.

Boston strengthened its commitment to reduce emissions when Mayor Walsh signed the Metro Boston Climate Mitigation Commitment in 2016 along with the 13 partner cities and towns in Greater Boston that belong to the Metropolitan Mayors Coalition. Signatories to the Climate Mitigation Commitment pledged to be carbon free by 2050.

The City is collaborating with the Green Ribbon Commission and Boston University's Institute for Sustainable Energy (ISE) to produce a *Carbon Free Boston* report in 2018. This report will quantify the most effective combination of technologies and policies to reduce greenhouse gas (GHG) emissions across the energy, buildings, transportation, and waste sectors. *Carbon Free Boston* will also inform the GHG strategies that will be articulated in the City's *Climate Action Plan Update* that will be released in 2018.

The ISE is the technical coordinating lead in the development of a modeling platform that will identify a set of policies and technologies that effectively and efficiently meet the City's emissions reductions targets. In that role, the ISE will coordinate the work of consultants, staff working for the City and the Commonwealth, academics, and others with expertise in specific sectors.

Steering Committee Role and Responsibilities

The Steering Committee provides strategic operational direction for the *Carbon Free Boston* project. Specific responsibilities include:

- Ensure that the project's scope aligns with the City's mitigation goals.
- Provide guidance to the ISE project team in its capacity as the technical coordinating lead.

- Ensure the appropriate level of City staff engagement from both technical and implementation perspectives.
- Prioritize the work of the project.
- Foster communication among government, academia, business, academia, and NGOs such that the expertise, data, and collaboration essential to the project goals is realized.
- Ensure that stakeholder and other communications strategies are incorporated into the project and effectively managed.
- Support additional project fundraising if needed.
- Monitor the timeline of the project.
- Provide advice about changes to the project as it develops.
- Address any issue that has significant implications for the project.

Steering Committee Meeting Frequency and Logistics

The Steering Committee will meet at least four times from August, 2017 to August 2018. Committee members may be asked to comment on material circulated electronically, and to participate in conference calls. Meetings and communication will be supported by a Project Management Team within the ISE. Meetings will be held on the campus of Boston University, or at another location designated by the Committee.

Steering Committee Membership

The Steering Committee is chaired by EEOS and includes individuals in leadership capacities from City, the Commonwealth, the GRC, the ISE, and from funders of the project. The Steering Committee is comprised of these members:

Janet Atkins	Leventhal Foundation
Austin Blackmon	City of Boston-EEOS
Alison Brizius	City of Boston-EEOS
John Cleveland	Green Ribbon Commission
Vineet Gupta	City of Boston-Transportation
Meredith Hatfield	Barr Foundation
Amy Longworth	Green Ribbon Commission
Richard McGuinness	City of Boston-BPDA
Bud Ris	Green Ribbon Commission
Carl Spector	City of Boston-EEOS
Katie Theoharides	Commonwealth of Massachusetts

Consultants: Cutler Cleveland, Peter Fox-Penner, Michael Walsh, Boston University

EXHIBIT C

Green Ribbon Commission: Carbon Free Boston Working Group Charter – May, 2017

Purpose: Create Deep Decarbonization Policy and Technology Model for Boston

At the GRC's June, 2016 meeting, Mayor Walsh announced the launch of Carbon Free Boston, a partnership between the City and the GRC to analyze the challenges and the choices for the Boston community to meet the goal of carbon neutrality by 2050. Over the next year, the Carbon Free Boston initiative will begin to analyze the likely effectiveness, cost, and benefits of the technology and policy options for deep decarbonization. Based on that work, the City, through its next update of the Boston Climate Action Plan, will make difficult but informed choices about implementation strategies. In some cases, these choices may represent a significant departure from business as usual and will require proactive, long-term leadership from multiple stakeholders, including those represented by the CFB Working Group and the GRC as a whole.

Responsibilities: Provide Guidance, Communication, and Leadership

- Provide periodic strategic and/or technical guidance to the City of Boston, GRC staff, and BU Technical Team as the modeling work progresses.
- Represent, support, and endorse the CFB Working Group's findings to the full GRC and potentially to other key leaders and funders in the City, region, and State.
- Assist with the critical outreach and stakeholder engagement process that will undergird the City's policy planning and implementation.
- As opportunities arise, lead by example and through public statements of support to help move the City toward its targets.

Time Requirements: Three One-Two Hour Meetings per Year (estimated)

Meetings will be held on an as-needed basis over the course of 2017 and 2018, depending on the need of project staff, technical advisors, and the City for guidance and assistance. Three meetings in each of the two years is likely. Key stakeholders (such as the utilities) may also be asked to provide data and/or staff expertise.

Members

Mindy Lubber, Ceres (Chair)
Bob Brown, Boston University
Bill Fahey, Veolia
Joe Grimaldi, Mullen Advertising
Amos Hostetter, Barr Foundation
Katie Lapp, Harvard University
Alex Liftman, Bank of America
Penni McLean-Conner, Eversource
Israel Ruiz, MIT
Austin Blackmon, City of Boston (*ex officio*)
Carl Spector, City of Boston
Brad Swing, City of Boston

EXHIBIT D

Scope of Work (SOW)

Technical Advisory Groups (TAGs) for Energy, Waste, Buildings, Transportation

Background

Boston is a recognized leader in the global response of cities to climate change. The City has played foundational roles in the Carbon Neutral Cities Alliance, the Global Covenant of Mayors for Climate & Energy, and the C40 Cities Climate Leadership Group. By executive order in 2007, the City of Boston set greenhouse gas (GHG) reduction goals of 25% below 2005 levels by 2020, and 80% by 2050 for municipal operations. In 2011, the City released a *Climate of Progress* in which the same 80x50 GHG reduction goals were extended to the entire City.

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The City is collaborating with the Green Ribbon Commission and Boston University's Institute for Sustainable Energy (ISE) to produce a *Carbon Free Boston* report in 2018. This report will quantify the most effective combination of technologies and policies to reduce GHG emissions across the energy, buildings, transportation, and waste sectors. *Carbon Free Boston* will also inform the GHG strategies that will be articulated in the City's *Climate Action Plan Update* that will be released in 2018.

The ISE is the technical coordinating lead in the development of a modeling platform that will identify a set of policies and technologies that effectively and efficiently meet the City's emissions reductions targets. In that role, the ISE will coordinate the work of consultants, staff working with the City and the Commonwealth, academics, and others with expertise in specific sectors.

Role and Responsibilities

Individual TAGS will provide strategic advice on the development and application of the quantitative models in the energy, waste, buildings, and transportation sectors. The role of the TAGs is to advise and ensure the overall technical quality of the model to reduce GHG emissions in each sector in the City of Boston.

Specific responsibilities include:

- Insure that the structure, techniques, and data that underlie each sector model are state-of-the-art
- Identify relevant studies performed or underway in other urban areas, and which results from those studies are relevant.
- Identify the key policies to be investigated.
- Identify key connections and feedbacks across sectors.
- Provide an open and transparent forum to discuss issues related to the reduction of GHG emissions in each sector.

TAG Meeting Frequency and Logistics

Each TAG will meet at least three times. Each TAG will also be asked to comment on material circulated electronically, and to participate in conference calls. Some members may be contacted outside of the scheduled meetings to answer specific questions from the ISE and its transportation consultants. Meetings and communication will be supported by a Project Management Team within the ISE. Meetings will be held on the campus of Boston University.

TAG Membership

Each TAG includes representatives from various agencies in the City, energy utilities that serve the City, energy agencies from the Commonwealth, energy consulting firms, relevant non-governmental organizations, and academia. The membership of each TAG is listed below:

Membership of Buildings TAG:

Benjamin Silverman	City of Boston-EEOS
John Dalzell	City of Boston-BPDA
Alex Pollard	Commonwealth-DOER
Jim Newman	Linnean Solutions, LLC
Dennis Carlberg	Boston University
Ben Myers	Boston Properties
Chris Schaffner	Green Engineer
Maura Zlody	City of Boston-EEOS
Hong-Hanh Chu	Commonwealth-EEA
Galen Nelson	MA Clean Energy Center
Matt Foran	National Grid
James Cater	Eversource
Karthik Rao	Enernoc
Stephanie Horowitz	Zero Energy Design
Rebecca Hatchadorian	ARUP
Brian Swett	ARUP
Manuel Esquivel	City of Boston-BPDA
John Cleveland	Green Ribbon Commission
Amy Longsworth	Green Ribbon Commission
Alison Brizius	City of Boston-EEOS
Atyia Martin (invited)	Northeastern University
Karilyn Crockett (invited)	City of Boston, MIT

Membership of Transportation TAG:

Peter Furth	Northeastern University
Josh Weiland	City of Boston-Transportation
Haidee Janak	City of Boston-EEOS
Jonathan Lee	City of Boston-BPDA
Hong-Hanh Chu	Commonwealth-EEA
Jennie Hatch	Boston University
Jieping Li	MPO/CTPS
Jules Williams	MassDOT
Steve Gehrke	Metropolitan Area Planning Commission
Eric Sundquist	State Smart Transportation Initiative
Marc Ebuña	Transit Matters
Henry Kelly	Boston University/University of Michigan
Kathryn Carlson	A Better City
Brian Morris	Eversource
Sandeep Dudhwewala	National Grid
Chris Porter	Cambridge Systematics
John Cleveland	Green Ribbon Commission
Amy Longsworth	Green Ribbon Commission
Alison Brizius	City of Boston-EEOS
Penn Loh (invited)	Tufts University
Elizabeth Weyant (invited)	Metropolitan Area Planning Commission

Membership of Energy TAG:

Amlan Saha	M.J. Bradley & Associates
Bruce Biewald	Synapse Energy Economics
Patty DiOrio	National Grid
Bill Fahey	Veolia
Sharon Weber	Commonwealth-DEP
Cammy Peterson	Metropolitan Area Planning Commission
Brad Swing	City of Boston-EEOS
Tony Janetos	Boston University
James Shuckerow	Eversource
Matthias Ruth	Northeastern University
David Cash	UMass/Boston
Kate McKeever	Enel
David Luke Oates	Brattle Group
Seth Federspiel	City of Cambridge
David Ismay	Conservation Law Foundation
John Cleveland	Green Ribbon Commission
Amy Longsworth	Green Ribbon Commission
Alison Brizius	City of Boston-EEOS
Lisa Frantzis	Advanced Energy Economy
Miriama White-Hammond (invited)	Green Justice Coalition and Bethel ACE Church
Neenah Estrella-Luna (invited)	Northeastern University

Membership of Waste TAG:

The *Carbon Free Boston* analysis of GHG mitigation potential in the waste sector will be driven by the waste management strategies identified in the City's Zero Waste initiative. A TAG for the waste sector will be formed in Spring 2018 when the Zero Waste planning is further developed.

EXHIBIT E

Scope of Work (SOW)

Social Equity Advisory Group

Background

Boston is a recognized leader in the global response of cities to climate change. The City has played foundational roles in the Carbon Neutral Cities Alliance, the Global Covenant of Mayors for Climate & Energy, and the C40 Cities Climate Leadership Group. By executive order in 2007, the City of Boston set GHG reduction goals of 25% below 2005 levels by 2020, and 80% by 2050 for municipal operations. In 2011, the City released a *Climate of Progress* in which the same 80x50 GHG reduction goals were extended to the entire City.

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The City is collaborating with the Green Ribbon Commission and Boston University's Institute for Sustainable Energy (ISE) and Department of Earth and Environment to produce a *Carbon Free Boston* report in 2018. This report will quantify the most effective combination of technologies and policies to reduce greenhouse gas emissions across the energy, buildings, transportation, and waste sectors. *Carbon Free Boston* will also inform the GHG strategies that will be articulated in the City's *Climate Action Plan Update* that will be released in 2018.

The ISE and Department of Earth and Environment are the technical coordinating leads in the development of a modeling platform that will identify a set of policies and technologies that effectively and efficiently meet the City's emissions reductions targets. In that role the ISE will coordinate the work of consultants, staff with the City and the Commonwealth, academics, and others with expertise in specific sectors.

Social Equity Advisory Group Role and Responsibilities

The role of the Social Equity Advisory Group is to advise and ensure that the overall technical aspects of the model to reduce GHG emissions in the City of Boston incorporates social equity. Group members are expected to:

- Review the existing policies in the transportation, buildings, energy, and waste sector models and identify any additional policies having affirmative equity implications.

- Identify the social equity costs and benefits associated with policies that will be evaluated in the transportation, buildings, energy, and waste sector models. Determine the extent to which social equity can be explicitly represented in the modeling framework.
- Identify relevant experience in other cities in regards to the social equity implications of GHG mitigation.
- Identify key social equity connections and feedbacks among policies in the transportation, buildings, energy, and waste sectors.
- Provide an open and transparent forum to discuss issues related to addressing social equity in conjunction with reducing GHG emissions.

Social Equity Advisory Group Membership

The Social Equity Advisory Group will include representatives from various agencies in the City, academia, the private sector, relevant non-governmental organizations, and appropriate individuals from other areas of Boston’s civil society. Membership will reflect the full spectrum of expertise and perspectives on the issue of social equity and GHG mitigation.

Members of the Social Equity Advisory Group are drawn from members of the TAGS for buildings, energy, waste, and transportation. This structure produces a cross-cutting working group that focuses on the social equity implications of the modeling and policies.

Invitees:

Penn Loh	Tufts University	Transportation TAG (invited)
Elizabeth Weyant	MAPC	Transportation TAG (invited)
Alex Papali	Clean Water Action	Waste TAG (invited)
Kirstie Pecci	Conservation Law Foundation	Waste TAG (invited)
Dr. Miriama White-Hammond	Bethel AME Church	Energy TAG (Invited)
Dr. Neenah Estrella-Luna	Northeastern University	Energy TAG (Invited)
Dr. Atyia Martin	Northeastern University	Buildings TAG (invited)
Dr. Karilyn Crockett	City of Boston	Buildings TAG (invited)

Social Equity Advisory Group Meeting Frequency and Logistics

The Social Equity Advisory Group will meet approximately two times in 2018, in addition TAG meetings that members will also attend. Members may be asked to comment on material circulated electronically, and to participate in conference calls. Some members may be contacted outside of the scheduled meetings to answer specific questions from the ISE and/or the City. Meetings and communication will be supported by a Project Management Team within the ISE in collaboration with the City’s Department of Environment.