

## **SELECTMEN'S CLIMATE ACTION COMMITTEE REPORT TO TOWN MEETING SPRING 2015**

The Selectmen's Climate Action Committee (CAC) reports annually to Town Meeting on its activities of the past year and its goals and initiatives for the upcoming year. In formulating its plans for future committee activities, the CAC welcomes input from Brookline residents and businesses. Please direct comments and ideas to the CAC's staff support, Lara Curtis Hayes, Senior Planner, Department of Planning & Community Development, at [lcurtishayes@brooklinema.gov](mailto:lcurtishayes@brooklinema.gov) or 617-730-2618.

### **I. INTRODUCTION**

The Selectmen's Climate Action Committee (CAC) was established in 2008 by the Board of Selectmen, in conjunction with a Resolution passed by Town Meeting that May (Appendix 1). The CAC has fifteen members: twelve representatives of various boards and commissions and three citizens appointed by the Selectmen (Appendix 2). The CAC has been reporting to Town Meeting annually since November 2009. This year's report builds upon the content of previous years' reports, presenting a summary of the committee's activities over the past year and identifying new goals and priorities.

The CAC meets monthly, and organizes itself into working subcommittees on an as-needed basis, in response to evolving goals and projects.

In February 2015, the CAC proposed a revised committee charge to the Board of Selectmen to better reflect the committee's efforts to be proactive and encouraging of actions that reduce greenhouse gas emissions and enable to the Town to adapt to the effects of climate change. The Board of Selectmen approved the new charge, which is as follows:

"The responsibilities of the committee shall include:

- To promote a goal of achieving 80% reduction in greenhouse gas (GHG) emissions by 2050 in alignment with the Massachusetts' Global Warming Solutions Act;
- To promote and implement resiliency measures to better prepare the Brookline community to adapt to climate change;
- To develop a comprehensive strategic plan that includes, but is not limited to, reducing greenhouse gas emissions and promoting sustainable practices for home, school and businesses;
- To advance Brookline as a leader in diverse sustainable practices that contribute to environmental health and positive social impact and economic development;
- To promote greater awareness about sustainability and the need to reduce GHG emissions through citizen choices;
- To recommend and, where appropriate, implement programs that reduce the net production of GHG emissions in Brookline;

- To measure, assess and/or monitor the efforts of the Town to reduce net GHG emissions;
- To serve as liaison between the Town and the public with regard to information and programs related to reducing net production of greenhouse gases;
- To report annually to the Annual Town Meeting and to report from time to time to the Board of Selectmen, the Town of Administrator, and the public; and,
- Such other responsibilities as may be determined from time to time by the Board of Selectmen.”

## II. ACCOMPLISHMENTS

**The town’s most recent Climate Action Plan, adopted in 2012, establishes a reduction goal for 2020 of 25 percent below the estimated 1990 greenhouse gas emission levels.** This goal is consistent with the state’s plan, *Massachusetts Clean Energy and Climate Plan for 2020*, which also mandates an 80 percent reduction by 2050.

The most recent greenhouse gas inventory for Brookline indicates that the town’s **total greenhouse gas emissions in 2008 were less than in 2003 and 1995, about 8 percent below 1995 totals.** In comparison, the greenhouse gas emissions for the United States as a whole increased about 10 percent from 1995 through 2007. (See *Appendix #5, Town of Brookline Greenhouse Gas Inventory Overview.*) The CAC sees this as a significant accomplishment, and it provides a solid basis on which to keep building.

### **Reviewing and Updating the Initiatives Listed in the Climate Action Plan**

- The CAC has reviewed each action in the Climate Action Plan (CAP) for continued effectiveness and applicability. During this process, the CAC found several actions that were in the process or had been completed, including LED street light conversions, marketing renewable electricity to Brookline rate payers (Climate Action Brookline’s Mass Energy outreach), and supporting bicycle sharing (Hubway). Additionally, the CAC added a *Climate Change Adaptation* category to the CAP to begin encouraging community members to consider ways to adapt to the likely impacts of climate change.

### **Improving Residential Energy Efficiency through Green Homes Brookline**

- *New Initiatives:* Green Homes Brookline is a partnership between the Town of Brookline, CAC, Climate Action Brookline and energy services company Next Step Living, marketing no-cost energy assessments, insulation and air-sealing rebates, and other energy efficiency incentives available under the Mass Save program. When Green Homes Brookline was first established in 2010, it was supported by approximately \$150,000 in grant funding from the federal Energy Efficiency and Conservation Block Grant (EECBG) program. Even after federal resources have been spent, Green Homes Brookline continues to market the Mass Save opportunities, and has begun encouraging residents to consider other efficient alternatives for

heating and cooling, such as air source heat pumps. Green Homes Brookline regularly holds information workshops in the Brookline area to educate and encourage residents to consider weatherizing their homes, and partners with Climate Action Brookline on other outreach initiatives to reach as many residents as possible. The CAC is beginning to consider how best to encourage the residents in multi-family buildings to take advantage of the energy efficiency incentives that are also available under the Mass Save program, such as generous lighting incentives (including LEDs), free programmable thermostats, and a selection of water conservation devices.

- **Outreach Success:** As of 3/11/2015, **1,441 energy assessments and 417 weatherizations of Brookline homes** have been completed, surpassing the program's original goal of reaching at least 1,000 homes. This accomplishment can be attributed to the significant commitment to the program by the town, Climate Action Brookline and Next Step Living. Using estimated energy and money savings for an average energy assessment and weatherization (.3638 metric tons of CO<sub>2</sub>e and \$94 annually from an energy assessment, and 1.03 metric tons of CO<sub>2</sub>e and \$271.50 annually from an average weatherization), the Green Homes Brookline program has reduced greenhouse gas emissions by 953.75 metric tons of CO<sub>2</sub>e, and **saved Brookline residents \$248,670 in energy costs** this year alone. This is **equivalent to taking 201 passenger vehicles off the road** for a year (Source: [www.epa.gov/cleanenergy/energy-resources/calculator.html](http://www.epa.gov/cleanenergy/energy-resources/calculator.html)).

#### **Exploring Municipal Opportunities for Renewable Energy**

- Supported the town's participation in the Metropolitan Area Planning Council's (MAPC) regional procurement for renewable energy management services, and its partnership with Blue Wave Capital and others. The town hopes to have solar PV systems installed on several municipal roofs and properties in 2015.

#### **Engaging Residents through Fifth Annual Climate Week**

- The fifth annual Climate Week was held in February 2015. Organized and led by CAB, a number of events were held jointly with different organizations, including the CAC, Brookline Economic Development Division, and Brookline Department of Public Health, among others. Numerous businesses, town departments and local organizations collaborated in creating special events. All events helped to inform and encourage climate-friendly behavior. Mothers Out Front, in collaboration with CAB, launched its campaign *Green Up Your House With a Click of a Mouse*, an effort to have 1,000 Brookline residents and businesses switch to Boston-based renewable energy. A campaign launch party during Climate Week was well attended, despite the snow, and they are actively moving ahead with the campaign.

#### **Completing Green Community Designation Grant**

- When the Town attained “Green Community” status in 2011, not only did it affirm the Town’s commitment to sustainability, but Brookline was also awarded \$215,050 in initial grant funding. At the end of December 2014, a representative from the Green Communities division visited Brookline to view the various energy efficiency projects completed under this grant, including condensing boilers in the Main and Coolidge Corner libraries, and several interior and exterior LED lighting projects. Town staff submitted a final grant report to the Green Communities Division, which was approved, and an application for competitive grant funding was submitted in March. Green Community designation must be maintained by continuing to satisfy the Green Community requirements (Appendix 4), including ensuring the town’s fuel efficient vehicle purchasing policy is followed and that progress is made on the adopted Municipal Energy Reduction Plan. Annual reporting on the town’s Green Community status to the state is also required.

### **Strengthening Community Partnerships**

- Sustained a close working relationship with nonprofit Climate Action Brookline (CAB). Joint initiatives include Green Homes Brookline and Climate Week.
- Advised the Department of Planning and Community Development and the Board of Selectmen regarding the management of Green Community funds, the Green Homes Brookline program, municipal solar initiatives, bicycle sharing and other related projects.

### **III. WORK PLAN**

The CAC has identified the following tasks for the coming year:

1. Continue to provide support to groups and residents working on activities listed in the Climate Action Plan, including community shared solar (CSS), bicycle sharing and complete streets, and adaptation. As implementation of the plan proceeds, refine greenhouse gas reduction estimates. The actions listed in the plan provide a road map and policy framework for the committee as it moves forward.
2. Assist as needed in the town’s efforts to install solar PV facilities on municipal buildings and properties.
3. Lead and assist in developing community shared solar (CSS) opportunities in Brookline.
4. Work with community and municipal partners to identify and implement climate change adaptation strategies. Pool resources with neighboring municipalities to build support for adaptation initiatives and develop best practices.
5. Collaborate with CAB on community education and engagement activities to promote lifestyle changes that lead to greenhouse gas reduction.

6. Monitor and support the Green Homes Brookline Program, as well as work to expand its focus to include large condominium and apartment buildings.
7. Provide support for the town's efforts to implement the Green Communities Act criteria and objectives, including the execution of the municipal energy reduction plan, and encouraging the pursuit of renewable energy generation alternatives.
8. Collect and refine data on town energy use and GHG emissions, by sector and source.

#### IV. APPENDICES

##### 1. **Town Meeting Resolution** (Article 29, May 27, 2008, Annual Town Meeting)

VOTED: That the Selectmen establish a committee, the purpose of which is to reduce the total emission of greenhouse gases by the Brookline community, including Town government. The name of the committee shall be the Selectmen's Climate Action Committee. The responsibilities of the committee shall include:

1. To recommend programs that reduce the net production of greenhouse gases in Brookline, such as energy efficiency measures, green energy sources, and additional greenspace;
2. To monitor, measure, and assess efforts of the Town to reduce net greenhouse gas emissions;
3. To monitor promising relevant programs in other municipalities;
4. To monitor relevant technological developments;
5. To serve as liaison between the Town and the public with regard to information and programs related to reducing net production of greenhouse gases;
6. To report annually to the Annual Town Meeting and to report from time to time to the Board of Selectmen, the Town Administrator, and the public; and
7. Such other responsibilities as may be determined from time to time by the Board of Selectmen.

The committee shall consist of the following members appointed by the Board of Selectmen:

1. A member of the Board of Selectmen
2. The Chair of the Advisory Committee or her/his nominee
3. The Chair of the School Committee or her/his nominee
4. The Chair of the Transportation Board or her/his nominee
5. The Chair of the Conservation Commission, or her/his nominee
6. The Chair of the Planning Board, or her/his nominee
7. The Chair of the Building Commission, or her/his nominee
8. The Chair of the Advisory Council on Public Health, or her/his nominee
9. A Co-Chair of Climate Action Brookline, or their nominee
10. The President of the Brookline GreenSpace Alliance, or her/his nominee
11. A Co-Chair of the Brookline Neighborhood Alliance, or their nominee
12. The President of the Brookline Chamber of Commerce, or her/his nominee
13. Three members at large with special consideration given to people with the following skills:
  - Relevant scientific and/or academic expertise
  - Relevant engineering expertise

- Knowledge of and/or experience with green businesses
- Relevant public health expertise.

All members shall serve three-year terms, which may be renewed. Initial appointments shall be for terms of one, two, and three years so that terms will expire at staggered intervals. No member shall be disqualified because she or he is not a resident of the Town. The committee shall have two co-chairpersons, one of whom shall be the selectman member and one of whom shall be elected annually by the committee. The staffing of the committee shall be determined by the Selectmen and the Town Administrator. The committee shall be established by November 30, 2008, and shall be evaluated by the Board of Selectmen before December 31, 2011 to determine whether it should be made permanent or dissolved.

## 2. CAC Membership

|                          |  |
|--------------------------|--|
| Dan Bennett              | Building Commission                              |
| Michael Berger           | at-large   |
| Ben Chang                | School Committee                                 |
| Robert Cook              | Planning Board                                   |
| David Lescohier          | at-large   |
| Alan Leviton             | Climate Action Brookline                         |
| Werner Lohe              | Conservation Commission                          |
| Patricia Maher           | Department of Public Health                      |
| Linda Pehlke             | Brookline Neighborhood Alliance                  |
| Deborah Rivers, Co-chair | Brookline GreenSpace Alliance                    |
| Kathleen Scanlon         | at-large   |
| Celinda Shannon          | Brookline Chamber of Commerce                    |
| Ali Tali                 | Transportation Board                             |
| Don Weitzman             | Advisory Board                                   |
| Neil Wishinsky, Co-chair | Board of Selectmen                               |
| Lara Curtis Hayes, Staff | Department of Planning and Community Development |

## 3. Municipal Energy Reduction Plan

*In June 2011, the Board of Selectmen adopted a Municipal Energy Reduction Plan with the goal of reducing municipal energy use by 20 percent over a 5-year period. Below is an excerpt from the plan's Introduction and Summary, as well as tables showing the town's energy use baseline and the energy efficiency measures that had already been implemented at the time of the plan's adoption. The Municipal Energy Reduction Plan is available on the Climate Action Committee's website.*

The Town of Brookline serves a population of approximately 57,107 residents, as measured by the 2000 U.S. Census. It is primarily a well developed suburban residential community, with commercial hubs located along major transportation routes, such as Coolidge Corner, Brookline Village and Washington Square. The town manages 42

municipal buildings, 11 of which are school buildings. The town's municipal fleet includes approximately 276 vehicles. The town's public infrastructure includes approximately 4,085 streetlights (312 of which are ornamental), 354 traffic lights, and 182 park lights. The town's buildings are supplied electricity by NSTAR and heated with natural gas, although a majority of the buildings are powered by dual-fuel boilers, allowing them to be powered by heating oil if ever needed.

Energy efficiency and conservation is a priority of the town, and funding has been dedicated to improving the energy efficiency of the town's buildings and facilities for several years, reflecting this commitment. The town's Capital Improvements Program (CIP) has regularly included funding for energy efficiency measures on an annual basis, spending more than \$750,000 on energy conservation measures alone since 2004, with another \$1 million proposed as part of the Town's FY12-FY17 CIP. The town regularly partners with and participates in utility programs that subsidize energy efficiency improvements in order to leverage these funds. Therefore, several of the town's buildings and facilities are already extremely energy efficient.

A state audit in 2010 indicated that of the 17 town buildings selected by the Building Department for independent review because of their likelihood to benefit from energy efficiency measures, only three had estimated EPA rankings of 40 or below, and two of those buildings are small and contribute only a fraction to the town's total energy costs. Six buildings had estimated EPA rankings of 75 or higher, qualifying them for EPA Energy Star certification should the Town wish to pursue official recognition. Such results can be credited towards the Building Department's efficient and diligent building management as well as the town's continued financial commitment to improving the energy efficiency of its facilities.

**Table 3. Summary of Municipal Energy Use Baseline FY2009**

| Category                           | Fiscal Year 2009 MMBtu | % of Total MMBtu Baseline Energy Consumption | MMBtu Savings Already Implemented | Projected Planned MMBtu Savings | Total MMBtu Savings | Savings as % of Total MMBtu Baseline Energy Consumption |
|------------------------------------|------------------------|--|-----------------------------------|---------------------------------|---------------------|---|
| Buildings*                         | 135,328                | 70.2%  | 10,307                            | 19,580                          | 29,887              | 15.5%   |
| Vehicles                           | 46,402                 | 24.1%  | 782                               | 1,377                           | 2,159               | 1.1%  |
| Street/<br>Traffic/<br>Park Lights | 10,989                 | 5.7%   | 0                                 | 7,936                           | 7,936               | 4.1%  |
|                                    |                        |  |                                   |                                 |                     |   |
| <b>TOTAL</b>                       | <b>192,718</b>         | <b>100%</b>                                  | <b>11,089</b>                     | <b>28,893</b>                   | <b>39,981</b>       | <b>20.7%</b>  |

Table 5. Energy Efficiency Measures Already Implemented

|                                | Energy Conservation Measure   | Estimated Annual Savings (kWh) | Estimated Annual Savings (therms) | Estimated Annual Savings (unleaded gallons) | Estimated Annual Savings (MMBtu) | Source for Estimated Savings   |
|--------------------------------|---|--------------------------------|-----------------------------------|---|----------------------------------|--------------------------------|
| <b>Town Hall</b>               | Complete renovation, incl. replacement windows, new HVAC systems, lighting, switch from heating oil to natural gas, etc. (completed FY09) | 589,109                        | 12,510                            | 0   | 3,261                            | Actual bill savings            |
|                                | Occupancy sensors for lighting (installed FY10)   | 6,552                          |                                   |   | 22                               | AECOM (vendor for project)     |
| <b>Brookline High School</b>   | HVAC occupancy sensors (installed FY10)   | 17,690                         | 10,200                            |   | 1,080                            | Building Commissioner Estimate |
|                                | Demand management ventilation system for gym (installed FY10)   | 23,551                         |                                   |   | 80                               | AECOM (vendor for project)     |
|                                | Occupancy sensors for lighting (installed FY10)   | 18,275                         |                                   |   | 62                               | AECOM (vendor for project)     |
| <b>Baker School</b>            | Replace bulbs and ballasts (installed FY10)   | 34,114                         |                                   |   | 116                              | AECOM (vendor for project)     |
|                                | Lighting (installed FY10)   | 57,268                         |                                   |   | 195                              |                                |
|                                | HVAC occupancy sensors (installed FY10-11)  |                                | 5780                              |   | 578                              | Building Commissioner Estimate |
| <b>Driscoll School</b>         | Replace bulbs and ballasts (installed FY10)   | 61,911                         |                                   |   | 211                              | AECOM (vendor for project)     |
| <b>Heath School</b>            | HVAC occupancy sensors (installed FY11)   |                                | 1,200                             |   | 120                              | Building Commissioner Estimate |
| <b>Lynch Recreation Center</b> | Occupancy sensors for lights (installed FY10)   | 6,271                          |                                   |   | 21                               | AECOM (vendor for project)     |
| <b>New Lincoln School</b>      | lighting upgrade (installed FY10)   | 47,806                         |                                   |   | 163                              | AECOM (vendor for project)     |
|                                | CO2 sensors/demand ventilation equipment (installed FY10)   |                                |                                   |   | 0                                |                                |

|                                     | Energy Conservation Measure  | Estimated Annual Savings (kWh) | Estimated Annual Savings (therms) | Estimated Annual Savings (unleaded gallons) | Estimated Annual Savings (MMBtu) | Source for Estimated Savings   |
|-------------------------------------|--|--------------------------------|-----------------------------------|---|----------------------------------|--|
| <b>Old Lincoln</b>                  | CO2 sensors/demand ventilation equipment (installed FY10)  |                                |                                   |   | 0                                | AECOM (vendor for project)   |
|                                     | Pipe Insulation (installed FY10)   |                                | 6,335                             |   | 634                              |  |
|                                     | Install new high efficiency boiler   |                                | 3,674                             |   | 367                              | Building Commissioner Estimate (10% reduction in gas usage)            |
| <b>Devotion School</b>              | Occupancy sensors for lights (installed FY10)  | 97,416                         |                                   |   | 332                              | AECOM (vendor for project)   |
| <b>Lawrence School</b>              | new lighting, fixtures, controls (installed FY10)  | 52,696.60                      |                                   |   | 180                              | AECOM (vendor for project)   |
|                                     | Occupancy sensors for HVAC (installed FY11)  |                                | 7,460                             |   | 746                              | Building Commissioner Estimate   |
| <b>UAB/Physical Ed Building</b>     | Occupancy sensors for lights (installed FY11)  | 10,532                         |                                   |   | 36                               | AECOM (vendor for project)   |
| <b>Soule Gym</b>                    | new lighting/fixtures (installed FY10)   | 9,239                          |                                   |   | 32                               | AECOM (vendor for project)   |
| <b>Senior Center</b>                | Install new high efficiency boiler   |                                | 1,215                             |   | 122                              | Building Commissioner Estimate   |
| <b>11 Newton Street DPW</b>         | new lighting/fixtures (installed FY10)   | 26,719                         |                                   |   | 91                               | AECOM (vendor for project)   |
|                                     |  |                                |                                   |   |                                  |  |
| <b>Take Home Vehicle Reductions</b> | The number of vehicles driven home by town staff has been sharply reduced. (implemented FY10)  |                                |                                   | 5,448                                       | 676                              | Fuel savings from mileage estimates                                    |
| <b>Town PCs PowerSave Policy</b>    | All town computers have been equipped with a Powersave feature that automatically shuts off computers after a period of idleness. (implemented FY10) | 543,899                        |                                   |   | 1,856                            | 7.5% savings assumed (first 3 mos of project have yielded 10% savings) |

|  | Energy Conservation Measure | Estimated Annual Savings (kWh) | Estimated Annual Savings (therms) | Estimated Annual Savings (unleaded gallons) | Estimated Annual Savings (MMBtu) | Source for Estimated Savings |
|--|-----------------------------|--------------------------------|-----------------------------------|---|----------------------------------|------------------------------|
|  | <b>TOTAL SAVINGS</b>        | 1,603,048                      | 48,374                            | 5,448                                       | 10,983                           |                              |

#### 4. **EECBG Program**

The Department of Energy approved the Town's proposal to use Energy Efficiency and Conservation Block Grant (EECBG) monies on the following projects:

- Install energy efficiency improvements in several municipal buildings (\$143,000);
- Three LED street light pilot projects, two in residential neighborhoods and one in Brookline Village along Harvard Street (\$170,800);
- Establish Green Homes Brookline, a residential energy efficiency program to provide energy assessments and improvements for Brookline homes (\$160,600);
- Provide supporting funds to CAB for a public education campaign (\$20,000).

This grant ended September 27, 2012, at which point all monies, except for \$5,407 leftover as the last LED streetlight project came in under budget, were expended.

#### 5. **Green Communities Act**

To qualify as a Green Community, a municipality must meet all five of the following criteria:

- Provide for the as-of-right siting of renewable or alternative energy generating facilities, renewable or alternative energy research and development (R&D) facilities, or renewable or alternative energy manufacturing facilities in designated locations.
- Adopt an expedited application and permitting process under which these energy facilities may be sited within the municipality and which shall not exceed 1 year from the date of initial application to the date of final approval.
- Establish an energy use baseline inventory for municipal buildings, vehicles, street and traffic lighting, and put in place a comprehensive program designed to reduce this baseline by 20 percent within 5 years of initial participation in the program.
- Purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.

- 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.

## **6. Town of Brookline Greenhouse Gas Inventory Overview**

### ***History and Purpose***

In May 2000, the Town of Brookline elected to participate in the Cities for Climate Protection Campaign, a program of the International Council of Local Environmental Initiatives (ICLEI). The Cities for Climate Protection Campaign follows a 'Five Milestone' process:

- Milestone One: Conduct a Greenhouse Gas Emissions Inventory and Report
- Milestone Two: Set a Greenhouse Gas Emissions Reduction Target
- Milestone Three: Develop a Local Climate Action Plan
- Milestone Four: Implement the Local Climate Action Plan
- Milestone Five: Monitor Emissions Reductions

The Town completed the first three milestones in the ICLEI program, publishing a greenhouse gas inventory in August 2000 and a Greenhouse Gas Emissions Reduction Target and Climate Action Plan in February 2002.

The August 2000 Greenhouse Gas Inventory reported emissions for calendar years 1995 and 1998. The following summary updates those initial findings to include information for calendar years 2003 and 2008. The goal of the Greenhouse Gas Inventory is to guide Brookline's process of writing and implementing a plan to reduce the emissions contributing to climate change. The CAC is currently working on updating the Greenhouse Gas Inventory again, but up-to-date findings were not available in time for this report.

### ***Brookline's Community Greenhouse Gas Emissions Totaled 520,000 Tons CO<sub>2</sub> for CY2008***

Brookline's community greenhouse gas emissions (Table 1 and Figure 1) have been steady at roughly 520,000 tons of CO<sub>2</sub> per year for, at least, the five year period from 2003 through 2008. Community emissions comprise the residential, commercial, and government sectors.

Brookline's 2008 community greenhouse gas emissions were about eight percent below the annual emissions rate of 560,000 tons previously reported for 1995 (August 2000 Greenhouse Gas Inventory Report). Adjusting for possible inconsistencies in electricity and natural gas usage and vehicle emissions described below, Brookline's 1995 greenhouse gas emissions may have been as low as 515,000 tons per year. In either

case, Brookline has done better than the United States, as a whole. Greenhouse gas emissions increased about ten percent nationally from 1995 through 2007.

Greenhouse gas emissions from Brookline's government operations (Figure 2) for 2008 are relatively unchanged from those previously reported for 1995 (August 2000 Greenhouse Gas Inventory Report). Government operations are responsible for about three percent of Brookline's total community emissions.

Emissions from MBTA trolleys and buses were not included in this analysis. Emissions from these sources are likely about one percent of the reported total community emissions, based on the August 2000 Greenhouse Gas Inventory Report.

***Brookline's Climate Action Plan Base Year Should be Changed from 1995 to 2003***

The ICLEI Local Government Protocol (September 2008) states: "It is good practice to compile an emissions inventory for the earliest year for which complete and accurate data can be gathered. The base year for the UNFCCC and subsequent Kyoto Protocol is calendar year 1990. However, required data from 1990 is often prohibitively difficult or impossible to collect. Given that the priority for a greenhouse gas management program should be on practical results, it is more important that the base year be documented with enough detail to provide a good basis for local action planning than it is that all local governments produce an inventory with the same, stipulated base year."

Graphs of electricity usage (Figure 3) and natural gas usage (Figure 4) from 1995 through 2008 indicate anomalies in trends for both utilities. Values for 1995 and 1998 were reported in the August 2000 Greenhouse Gas Inventory report based on information provided by Boston Edison and Boston Gas. Usage information for 2002 through 2008 was obtained from NSTAR and National Grid. The significant drop in usage of gas and electricity from 1998 to 2002 is inconsistent with both population growth in Brookline and national trends in residential energy consumption during that period.

CO<sub>2</sub> emissions from vehicles traveling in Brookline may also have been overstated, based on a November 2009 report from the United States Environmental Protection Agency. Vehicle emission factors generated for 1995 by the ICLEI software (CACP 2009) were based on projections that predated the recent EPA report.

Due to the above inconsistencies, it is recommended that 2003 be used as the base year for Brookline's Greenhouse Gas Reduction Target and Climate Action Plan.

***Brookline's Residential Carbon Footprint is Much Lower than the U.S. Average***

In 2008, Brookline's average residential carbon footprint was about 31,000 pounds of CO<sub>2</sub> per year. The average US household had a carbon footprint of 46,000 pounds of CO<sub>2</sub> per year, according to data from the US Energy Information Agency's (EIA) 2005 Residential Energy Consumption Survey and a household vehicle use survey for 2009

published by the National Highway Transportation Survey (NHTS). In both cases, CO<sub>2</sub> emissions from personal air travel were not included.

Brookline's average commercial carbon footprint was 162,000 pounds of CO<sub>2</sub> per year in 2008, excluding air travel.

**Table 1** **Greenhouse Gas Emissions**  
CO<sub>2</sub>e, Tons/Year

|                 | <b>1995</b>    | <b>2003</b>    | <b>2008</b>    |
|-----------------|----------------|----------------|----------------|
| Electricity     | 140,920        | 130,384        | 137,125        |
| Natural Gas     | 120,369        | 104,223        | 126,643        |
| Heating Oil     | 126,267        | 112,366        | 103,678        |
| Cars and Trucks | 151,315        | 152,194        | 128,992        |
| Solid Waste     | 21,129         | 21,129         | 21,264         |
| <b>Total</b>    | <b>559,999</b> | <b>520,295</b> | <b>517,702</b> |

**Table 2** **2008 GHG Emissions By Sector**  
CO<sub>2</sub>e, Tons/Year

|                 | Residential | Commercial | Municipal | Total          |
|-----------------|-------------|------------|-----------|----------------|
| Electricity     | 75,688      | 54,106     | 7,331     | 137,125        |
| Natural Gas     | 89,812      | 34,474     | 2,357     | 126,643        |
| Heating Oil     | 81,070      | 19,980     | 2,629     | 103,679        |
| Cars and Trucks |             |            |           | 128,992        |
| Solid Waste     | 14,176      | 6,998      | 90        | 21,264         |
| <b>Total</b>    |             |            |           | <b>517,702</b> |

**Table 3** **Greenhouse Gas Sources**

|                 |         | <b>1995</b> | <b>2003</b> | <b>2008</b> |
|-----------------|---------|-------------|-------------|-------------|
| Electricity     | kwh     | 311,702,637 | 288,397,640 | 293,386,860 |
| Natural Gas     | Therms  | 20,445,394  | 17,702,807  | 21,511,045  |
| Heating Oil     | Gallons | 11,283,499  | 10,041,279  | 9,264,891   |
| Cars and Trucks | Miles   | 232,094,937 | 242,992,126 | 210,333,390 |
| Solid Waste     | Tons    | 21,000      | 21,000      | 21,135      |

**Table 4** **Brookline's Residential Carbon Footprint - 2008**

|                 | CO <sub>2</sub> e, Tons/Year |
|-----------------|------------------------------|
| Electricity     | 75,688                       |
| Natural Gas     | 89,812                       |
| Heating Oil     | 81,071                       |
| Gasoline/Diesel | 139,156                      |
| Solid Waste     | 14,176                       |

|  |         |
|--|---------|
| Total                                  | 399,901 |
| Number of Households                   | 25,573  |
| Pounds CO <sub>2</sub> /Household/Year | 31,275  |

**Table 5 Brookline's Commercial Carbon Footprint - 2008**

|                                       | CO <sub>2</sub> e, Tons/Year |
|---------------------------------------|------------------------------|
| Electricity                           | 52,536                       |
| Natural Gas                           | 34,474                       |
| Heating Oil                           | 19,980                       |
| Gasoline/Diesel                       | 7,576                        |
| Solid Waste                           | 6,998                        |
|                                       | 121,564                      |
| Number of Businesses                  | 1,500                        |
| Pounds CO <sub>2</sub> /Business/Year | 162,086                      |

**Table 6 Brookline's Municipal Carbon Footprint - 2008**

|                 | CO <sub>2</sub> e, Tons/Year |
|-----------------|------------------------------|
| Electricity     | 8,901                        |
| Natural Gas     | 2,357                        |
| Heating Oil     | 2,629                        |
| Gasoline/Diesel | 2,305                        |
| Solid Waste     | 90                           |
|                 | 16,282                       |



