

# **Town of Brookline**

## **Energy Reduction Plan**

**Submitted by the Board of Selectmen  
Town of Brookline, MA**

**May, 2011**

**(revised June, 2011)**

# TABLE OF CONTENTS

<b>I. PURPOSE AND ACKNOWLEDGEMENTS</b>	<b>1</b>
A. LETTERS FROM MUNICIPAL OFFICIALS VERIFYING ADOPTION OF THE ENERGY REDUCTION PLAN	1
B. LIST OF CONTRIBUTORS THAT PARTICIPATED IN THE BASELINE AND ERP PROCESS	1
<b>II. INTRODUCTION &amp; SUMMARY</b>	<b>1</b>
<b>III. ENERGY USE BASELINE INVENTORY AND DATA TRACKING</b>	<b>5</b>
A. INVENTORY TOOL USED	5
B. BASELINE YEAR	5
C. MUNICIPAL ENERGY CONSUMPTION FOR THE BASELINE YEAR	5
D. AREAS OF LEAST EFFICIENCY/GREATEST WASTE	12
E. AREAS MOST EASILY ADDRESSED	12
F. EFFICIENCY MEASURES ALREADY IMPLEMENTED	12
<b>IV. SUMMARY OF ENERGY AUDITS</b>	<b>16</b>
<b>V. ENERGY USE REDUCTION</b>	<b>16</b>
A. OVERVIEW OF SHORT- AND LONG-TERM GOALS	16
B. PLAN FOR A 20 PERCENT ENERGY USE REDUCTION WITHIN FIVE YEARS (FY2014)	17
1. LIST OF STRATEGIES TO REDUCE ENERGY USAGE	17
2. PROGRAM MANAGEMENT PLAN FOR IMPLEMENTATION, MONITORING AND OVERSIGHT	18
3. ENERGY CONSERVATION MEASURES	18
4. ESTIMATED CAPITAL AND OPERATING COSTS	28
5. SCHEDULE FOR IMPLEMENTATION	29
6. ADDITIONS AND NEW CONSTRUCTION	33
C. MEASUREMENT AND VERIFICATION PLAN FOR PROJECTED REDUCTIONS – ANNUAL REPORTING	33
1. COMMON TECHNOLOGY FEATURES	33
2. PERSONNEL RESPONSIBLE FOR MEASUREMENT AND VERIFICATION AND ANNUAL REPORTING TO GREEN COMMUNITIES DIVISION	33
D. SUMMARY OF LONG-TERM ENERGY REDUCTION GOALS – BEYOND 5 YEARS	33
1. MUNICIPAL BUILDINGS (INCLUDING SCHOOLS)	34
2. VEHICLES (INCLUDING SCHOOLS)	34
3. STREET AND TRAFFIC LIGHTING	34
4. PERPETUATING ENERGY EFFICIENCY	34
<b>VI. ONSITE RENEWABLE ENERGY PROJECTS &amp; RENEWABLE ENERGY</b>	<b>34</b>
<b>VII. LIST OF RESOURCES AND CONTACTS</b>	<b>35</b>

**List of Appendices**

A: Letter Indicating Adoption of the Energy Reduction Plan

**List of Tables**

Table 1: Town of Brookline Climate and Energy Milestones

Table 2: Summary of Municipal Energy Users

Table 3: Summary of Municipal Energy Use Baseline FY2009

Table 4: Municipal Energy Use Baseline

Table 5: Energy Efficiency Measures Already Implemented

Table 6: Planned Energy Conservation Measures

Table 7: Vehicular Energy Conservation Measures

Table 8: Estimated Costs of Energy Conservation Measures

Table 9: Schedule for Implementation

## **I. PURPOSE AND ACKNOWLEDGEMENTS**

### **A. Letters from Municipal Officials Verifying Adoption of the Energy Reduction Plan**

Please find attached *Appendix A: A letter from Brookline Town Administrator Mel Kleckner* verifying the adoption of the energy reduction plan presented in this document.

### **B. List of Contributors that Participated in the Baseline and ERP Process**

The energy baseline and energy reduction plan was created through a collaborative process between town departments and staff, particularly the Selectmen's Office, the Building Department, and the Department of Planning and Community Development. Specific contributors included the following:

Mark Sacco, Town Energy Systems Manager, Building Department  
Charlie Simmons, Director of Public Buildings, Building Department  
Michael Shepard, Building Commissioner, Building Department  
Andy Pappastergion, Commissioner of Public Works  
Mark Parece, Fleet Supervisor, Department of Public Works  
Erin Chute Gallentine, Director of Parks and Open Space, Department of Public Works  
David Geanakakis, Chief Procurement Officer, Purchasing Department  
Melvin Kleckner, Town Administrator  
Melissa Goff, Assistant Town Administrator, Selectmen's Office  
Jeff Levine, Director, Department of Planning and Community Development  
Lara Curtis Hayes, Senior Planner, Department of Planning and Community Development

## **II. INTRODUCTION & SUMMARY**

The Town of Brookline serves a population of approximately 58,732 residents, as measured by the 2010 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.

This commitment to energy efficiency is also evident when the town undertakes major additions and building renovations. When the town renovated the Stephen Glover Train Memorial Health Building in 2006, the town took advantage of energy efficient and green building practices, transforming the building into Brookline’s first municipal “green” building, and received a Smart Growth/Smart Energy award in 2007 from the state for its effort. Additionally, the renovation of the Town Hall begun in 2007 and completed late 2008 reduced the building’s electric consumption by approximately half, and the major addition and renovation to the K-8 Runkle School begun in 2010 and currently underway will meet MA-CHPS high standards for energy efficiency. Significant energy efficiency measures undertaken by the town in the past have been highlighted below.

Table 1: Town of Brookline Climate and Energy Milestones

Year	Milestone
2000	Board of Selectmen adopts Resolution for Participating in the Cities for Climate Protection Campaign through the International Council for Local Environmental Initiatives (ICLEI).
2000	Initial greenhouse gas inventory completed for baseline year 1995.
2002	Local Action Plan on Climate adopted by Board of Selectmen.
2000	Town converts all traffic lights to LED.
2006	Town completes the renovation of the Stephen Glover Train Memorial Health Building, transforming it into the town’s first “green building.”
2007	Town Meeting adopts general bylaw language requiring the analysis of future building projects to include the evaluation of environmental and sustainability goals and objectives, including “green technologies, site selection, waste minimization, energy efficiency, water conservation, indoor environmental quality and other environmental and health factors.”
2008	Town Meeting establishes the Selectmen’s Climate Action Committee.
2008-9	Town completes the renovation of the Town Hall into a much more energy efficient building.
2009	The Selectmen’s Climate Action Committee re-established the town’s membership with ICLEI – Local Governments for Sustainability.
2010	The Selectmen’s Climate Action Committee completed a new greenhouse gas

	inventory for baseline year 2008.
2010	The Selectmen’s Climate Action Committee and the community organization Climate Change Action Brookline launched and managed “Brookline 2010,” a public engagement campaign to encourage community residents and groups to adopt climate-friendly activities.
2010	Town Meeting adopts a new zoning bylaw allowing large-scale solar facilities by right on a municipally-owned property.
2011	The “Brookline 2010” campaign is transitioned into “Brookline Tomorrow: Climate Action Today.”
2011	The Selectmen’s Climate Action Committee begins work on developing a new local climate action plan.

The town has been tracking its energy use for most buildings for well over a decade using a system of Microsoft Excel spreadsheets. This system has expanded to include all buildings and public facilities. An Energy Task Force made up of department heads and other town staff meets on a quarterly basis to review the town’s rate of energy consumption, analyzing any noticeable changes, as well as discuss energy policies and questions facing the town. This group has recommended temperature settings during the heating and cooling season that are still in place today (68 degrees during winter, 76 during summer). Placards can be found at most thermostats reminding users of the policy. Recently, the town has begun using the MassEnergyInsight tool provided by the state, and this tool, in combination with the town’s Excel system, was used to create the energy use baseline for this report. The town selected fiscal year 2009 as the baseline year for this report. The town aims to reduce its overall energy consumption (192,718 MMBTU in FY 2009) by at least 20 percent by the end of fiscal year 2014. The strategy and measures for accomplishing this reduction are detailed in this Energy Reduction Plan.

The town has performed an inventory of its municipal facilities and resources to determine all energy users under town control. The number of buildings, vehicles, and street, traffic and park lights are listed in the following table.

Table 2: Summary of Municipal Energy Users

	Number	Ownership
<b>Municipal Buildings</b>		
Oil Heat*	11	Municipal
Natural Gas Heat*	35	Municipal
Propane Heat	1	Municipal
Biomass Heat	0	Municipal
Other Heat type	6	Municipal
<b>Vehicles</b>		
Non-Exempt	63	Municipal
Exempt	213	Municipal
<b>Street Lights</b>		
Municipally-Owned	4,085	Municipal
Utility-Owned	0	Utility

<b>Traffic Lights</b>		
Municipally-Owned	354	Municipal
Utility-Owned	0	Utility
<b>Park Lights</b>	182	Municipal

\*The number of buildings heated at least partially with heating oil references FY09. All of these buildings also used natural gas heat in FY09 and are included as “natural gas heat” buildings as well. As of today, several buildings have dual-fuel boilers that allow for either heating oil or natural gas fuel, but are currently only being heated with natural gas.

After analyzing its energy users and consumption rates, the town determined the largest portion of its energy use is due to its buildings. The following table summarizes the total energy usage derived from its buildings, vehicles and street and traffic lights. Approximately 70 percent of the town’s energy use is from building facilities.

After determining that the town’s buildings counted for by far the largest amount of energy use, town staff focused on what building improvements or policy changes would be possible to effect a significant reduction in energy use. Therefore, the energy reduction plan focuses nearly entirely on building energy reductions, although some energy reductions for vehicles and the town’s street lights are also planned.

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/Traffic/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>

\*All building energy use data is from fiscal year 2009 (7/1/2008-6/30/2009) except for Town Hall, whose energy use data is from fiscal year 2007, the last full year in which it was used prior to extensive renovation. Please see “Municipal Energy Consumption for the Baseline Year” below for additional clarification.

The Town expects to continue building on its past commitment to energy efficiency in order to carry out the reduction plan. The town hopes to become a Green Community, opening the door for possible funding to implement some of the energy efficiency measures listed in this plan. In accordance with Green Community requirements, the town will also implement a fuel-efficient vehicle purchasing policy, although the impact from such a policy is expected to be somewhat limited since the town largely already purchases fuel efficient vehicles for its fleet. Other town policies, including more strict enforcement of idling standards for town vehicles and more efficient after-hours use management of the town’s buildings, are expected to help with the reduction of the town’s energy use.

Additionally, some of the energy efficiency measures already completed have been funded with Energy Efficiency and Conservation Block Grant (EECBG) monies. Going

forward, the town will continue to rely on CIP funding to make energy efficiency improvements to its buildings, in accordance with this energy reduction plan. The town will also continue to apply for additional grant funding for energy efficiency measures if and when it becomes available. The town also hopes to replace a significant number of its streetlights with LEDs, although this measure may need to be implemented with the help of an energy service company to defray the high upfront cost.

### **III. Energy Use Baseline Inventory and Data Tracking**

Although the town has been following energy consumption and cost using Excel spreadsheets for at least 10 years, town staff have been transitioning data for use with the new DOER-sponsored energy tracking software MassEnergyInsight (MEI). MEI was used to create the energy use baseline presented in this report, and it is expected to facilitate tracking the town's energy use in the future, including the effectiveness of the energy efficiency measures outlined in the Energy Reduction Plan. The town expects it will need to maintain data both in MEI and in its current Excel spreadsheet system for a limited time until the MEI system can meet all of the needs of the town's Energy Task Force and town staff. Tracking of data will continue to be overseen by the Selectmen's Office, in collaboration with the Public Buildings Division of the Building Department.

#### **A. Inventory Tool Used**

MassEnergyInsight

#### **B. Baseline Year**

The town has selected fiscal year 2009 as the baseline year for this energy reduction plan.

#### **C. Municipal Energy Consumption for the Baseline Year**

Although FY 2009 will be the energy use baseline year, the renovation of the Town Hall was underway during FY 2009, therefore the building was empty for the first half of FY 2009 and retenanted with municipal staff during the second half of that year. The Green Communities Division has enabled the town to take into consideration the improvements to Town Hall as part of Brookline's Energy Reduction Plan. In order to accurately reflect the significant energy reductions for this building as a result of this renovation, the baseline energy numbers for Town Hall in FY 2007, which was the last full year the Town Hall operated prior to renovation, will be used for that building in our baseline analysis. All other energy use numbers for all other town facilities reflects FY 2009 usage and were derived from Mass Energy Insight.

Regarding the town's heating oil consumption, the town has usage data for most of its buildings, but not all of them. When usage data for a building was available, that information was used in the calculation of the energy use baseline. For the Water, Cemetery and Golf Course buildings, the town only has delivery data to reflect heating oil usage. Therefore, in those cases, the energy use baseline reflects the number of gallons of heating oil delivered rather than actually consumed. This method was used in order to ensure the energy use baseline is as



accurate as possible in reflecting overall municipal energy use. Most of the town's buildings have been using natural gas instead of heating oil for heating purposes, and this discrepancy is not expected to be significant.

Table 4: Municipal Energy Use Baseline FY2009

	Building	Electricity		Natural Gas		Fuel Oil		Propane		Gasoline		Diesel Fuel		Total MMBtu
		kWh	MMBtu	Therms	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	
ADMIN	Town Hall	1,267,500	4,325	741	74	19,918	2,769	0	0	0	0	0	0	7,167
	Health Building	152,757	521	7,140	714	0	0	0	0	0	0	0	0	1,235
	Old Lincoln School	135,080	461	37,670	3,767	2,903	404	0	0	0	0	0	0	4,631
	Senior Center	202,500	691	11,106	1,111	0	0	0	0	0	0	0	0	1,802
	Carpenter Shop	14,216	49	0	0	0	0	0	0	0	0	0	0	49
	Electric Shop	4,743	16	409	41	0	0	0	0	0	0	0	0	57
	7 Warren Street/ Gatehouse Building	45	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total Admin. Bldg. Use:</b>	1,555,337	5,307	57,066	5,707	22,821	3,172	0	0	0	0	0	0	13,034
LIBRARY	Main Library	983,280	3,355	23,298	2,330	0	0	0	0	0	0	0	0	5,685
	Coolidge Corner Branch	197,920	675	10,047	1,005	0	0	0	0	0	0	0	0	1,680
	Putterham Branch	76,200	260	7,367	737	0	0	0	0	0	0	0	0	997

	Building	Electricity		Natural Gas		Fuel Oil		Propane		Gasoline		Diesel Fuel		Total MMBtu
		kWh	MMBtu	Therms	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	
	<b>Total Library Bldg Use:</b>	1,257,400	4,290	40,712	4,071	0	0	0	0	0	0	0	0	8,361
PUBLIC SAFETY	Public Safety Building	771,096	2,631	19,216	1,922	0	0	0	0	0	0	0	0	4,553
	Fire Station 1	85,410	291	14,979	1,498	0	0	0	0	0	0	0	0	1,789
	Fire Station 4	65,102	222	10,611	1,061	0	0	0	0	0	0	0	0	1,283
	Fire Station 5	107,369	366	16,634	1,663	0	0	0	0	0	0	0	0	2,030
	Fire Station 6	59,389	203	13,312	1,331	0	0	0	0	0	0	0	0	1,534
	Fire Station 7	62,053	212	6,714	671	0	0	0	0	0	0	0	0	883
	Summit	1,143	4	0	0	0	0	0	0	0	0	0	0	4
	<b>Total Public Safety Use:</b>	<b>1,150,419</b>	<b>3,925</b>	<b>81,466</b>	<b>8,147</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12,072</b>
PUBLIC WORKS	Municipal Service Center	597,304	2,038	40,930	4,093	0	0	0	0	0	0	0	0	6,131
	Sanitation	50,440	172	0	0	0	0	0	0	0	0	0	0	172
	Water Building	127,120	434	22,592	2,259	0	0	0	0	0	0	0	0	2,693
	Singletree Hill Reservoir	8,040	27	0	0	0	0	0	0	0	0	0	0	27

	Building	Electricity		Natural Gas		Fuel Oil		Propane		Gasoline		Diesel Fuel		Total MMBtu
		kWh	MMBtu	Therms	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	
	Fisher Avenue Building	3,120	11	0	0	0	0	0	0	0	0	0	0	11
	Park & Forestry	15,181	52	2,667	267	0	0	0	0	0	0	0	0	318
	Larz Anderson Comfort Station	0	0	5,496	550	0	0	0	0	0	0	0	0	550
	Cemetery	10,265	35	0	0	0	0	0	0	0	0	0	0	35
	<b>Total Public Works Bldg Use:</b>	811,470	2,769	71,685	7,169	0	0	0	0	0	0	0	0	9,937
RECREATION	Eliot Recreation Center	35,393	121	3,792	379	0	0	0	0	0	0	0	0	500
	Golf Course	75,746	258	8,577	858	0	0	0	0	0	0	0	0	1,116
	Skating Rink	271,344	926	4,055	406	0	0	0	0	0	0	0	0	1,331
	Lynch Recreation Center	36,380	124	6,388	639	0	0	0	0	0	0	0	0	763
	Soule Recreation Center	83,840	286	11,284	1,128	0	0	0	0	0	0	0	0	1,414
	BECC (Soule Shed)	7,288	25	0	0	0	0	0	0	0	0	0	0	25

	Building	Electricity		Natural Gas		Fuel Oil		Propane		Gasoline		Diesel Fuel		Total MMBtu
		kWh	MMBtu	Therms	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	
	<b>Total Recreation Bldg Use:</b>	509,991	1,740	34,096	3,410	0	0	0	0	0	0	0	0	5,150
SCHOOLS	Baldwin School	25,048	85	10,504	1,050	1,204	167	0	0	0	0	0	0	1,303
	Brookline High School*	1,966,120	6,708	14,910	1,491	22,647	3,148	0	0	0	0	0	0	11,347
	Phys Ed/UAB Building	1,288,524	4,396	127,104	12,710	0	0	0	0	0	0	0	0	17,107
	Edith C. Baker K-8	606,000	2,068	64,194	6,419	5,691	791	0	0	0	0	0	0	9,278
	Edward Devotion K-8	608,600	2,077	64,943	6,494	16,267	2,261	0	0	0	0	0	0	10,832
	Heath K-8	286,608	978	30,972	3,097	0	0	0	0	0	0	0	0	4,075
	Lawrence K-8	580,820	1,982	35,766	3,577	1,956	272	0	0	0	0	0	0	5,830
	Michael Driscoll K-8	321,132	1,096	43,602	4,360	251	35	0	0	0	0	0	0	5,491
	Pierce School K-8	745,031	2,542	73,866	7,387	3,744	520	0	0	0	0	0	0	10,449
	Runkle K-8	291,996	996	26,321	2,632	2,394	333	0	0	0	0	0	0	3,961
	William H. Lincoln K-8 (New Lincoln)	765,450	2,612	31,175	3,118	1,574	219	0	0	0	0	0	0	5,948

	Building	Electricity		Natural Gas		Fuel Oil		Propane		Gasoline		Diesel Fuel		Total MMBtu
		kWh	MMBtu	Therms	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	Gals.	MMBtu	
	<b>Total School Bldg Use:</b>	7,485,329	25,540	523,357	52,336	55,728	7,746	0	0	0	0	0	0	85,622
	<b>TOTAL for BUILDINGS</b>	12,769,946	43,571	808,382	79,687	78,549	10,918	0	0	0	0	0	0	134,176
	<b>Vehicles in Aggregate</b>	0	0	0	0	0	0	0	0	303,744	37,664	62,861	8,738	46,402
	<b>Street &amp; Traffic Lights in Aggregate</b>	3,220,578	10,989	0	0	0	0	0	0	0	0	0	0	10,989
	<b>TOTAL ENERGY CONSUMPTION</b>	15,990,524	54,560	808,382	80,838	78,549	10,918	0	0	303,744	37,664	62,861	8,738	192,718

\*Natural gas numbers for Brookline High School only includes hot water usage. The High School and the Phys Ed/UAB building share natural gas accounts for general heating, and those meters are associated with the Phys Ed/UAB building.

**D. Areas of Least Efficiency/Greatest Waste**

Those buildings that appear to have the least efficiency based on building square footage include the Skating Rink, the Municipal Service Center, and Soule Recreation Center. However, overall energy consumption for the Skating Rink and Soule Recreation is relatively minimal in comparison to other town buildings. The Municipal Service Center has large vehicle bay doors that open and close frequently, largely inhibiting its energy efficiency. Other measures have been installed to improve the efficiency of these buildings; for example, high efficiency electric chillers were installed in 2006 to support the Skating Rink.

**E. Areas Most Easily Addressed**

Since the town has been very proactive in the past identifying “low hanging fruit” in the energy efficiency realm for its buildings, determining what projects would be the easiest for the Town to proceed with next is very challenging unless significant capital investment beyond what is feasible under the current funding provided in the CIP is made. Improvements in those buildings that use the most energy, such as the Town Hall and most school buildings, may be the easiest way to achieve significant reductions in building energy use. Additionally, the town may need to partner with an energy service company to implement some higher-priced energy conservation measures, such as a larger LED street light replacement project, despite a relatively short payback period.

**F. Efficiency Measures Already Implemented**

The Town selected FY 2009 as its baseline year to allow inclusion of certain energy efficiency measures in its buildings that have already been completed. These measures are outlined in the following table.

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	Calculated based upon equipment specs
<b>Driscoll School</b>	Replace bulbs and ballasts (installed FY10)	61,911			211	AECOM (vendor for project)



	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>Heath School</b>	HVAC occupancy sensors (installed FY11)		1,200		120	Calculated based upon equipment specs
<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	
<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	Calculated based upon equipment specs (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	Calculated based upon equipment specs
<b>UAB/Physical Ed Building</b>	Occupancy sensors for lights (installed FY11)	10,532			36	AECOM (vendor for project)

	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>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	Calculated based upon equipment specs
<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)
	<b>TOTAL SAVINGS</b>	1,603,048	48,374	5,448	10,983	

#### **IV. Summary of Energy Audits**

Recently, the town applied for and received energy audit assistance from the state. In 2010, an energy audit was completed. Brookline's Public Buildings Division submitted to state energy auditors information for 17 municipal buildings it thought likely to have the most opportunities for energy improvements. The auditors' initial analysis revealed that most of these buildings were operating at relatively high energy efficiencies. Each building was given a potential EPA ranking. While the Baldwin School, Water Building and Baker School had the lowest rankings at 15, 35 and 40 respectively, the rest of the buildings analyzed in the audit performed much higher, with six buildings having potential rankings of 75 or higher.

The lowest ranking buildings, particularly the Baldwin School, use minimal amounts of energy in comparison to other municipal buildings. The one exception to this is the Baker Elementary School, for which the auditors created a benchmark report to identify energy efficiency opportunities. The auditors also created a benchmark report for the New Lincoln K-8 School.

Along with these reports, the Town of Brookline depends on utility programs to bring energy efficiency opportunities to staff attention, taking into consideration financial resources and payback periods. Energy software also assists with determining which buildings may benefit the most from additional improvements.

Town staff has also met with an energy company to determine whether Brookline is a good candidate for participating in an energy demand management program. Such a program would pay the town for reducing its reliance on utility-provided energy on days when requested by the management company. The town considered this program as a possible opportunity to provide additional funding for energy efficiency measures, as well as to determine new energy efficiency opportunities. However, after analysis by the company's energy professionals, it was determined that in order to participate, the town would likely need to rely on large generators, and the town's overall capacity to reduce demand upon request is very limited. Given that the buildings recommended by the company for generator reliance house critical IT and public safety infrastructure, town staff did not recommend implementing this plan.

#### **V. Energy Use Reduction**

##### **A. Overview of Short- and Long-Term Goals**

The Town of Brookline adopted a Local Climate Action Plan in 2002, which established a goal for reducing greenhouse gas emissions from Brookline (both municipal and community sources) by 20 percent below 1995 levels by 2010. A new greenhouse gas inventory for 2008 was completed by the Selectmen's Climate Action Committee in 2010, and indicated that although greenhouse gas emissions had likely been reduced, the initial goal had not been reached. Despite this, the town will continue to implement policies, programs and improvements to reduce not only municipal energy usage, but energy use from community sources as well. The Selectmen's Climate Action Committee has begun the process to

develop a new climate action plan, which will include both municipal and community measures. The committee expects the new plan will be completed before the end of calendar year 2011.

**B. Plan for a 20.9 Percent Energy Use Reduction Within Five Years (FY2014)**

The town of Brookline expects to reach a reduction in overall energy use of 20.9 percent by the end of fiscal year 2014, primarily by installing energy efficiency measures in municipal buildings, retrofitting streetlights with LED bulbs, and implementing policy changes in the way the buildings are used by staff and the public. The town also expects to see additional improvements from the adoption of a fuel efficient vehicle purchasing policy.

**1. List of Strategies to Reduce Energy Usage**

a. *Building Improvements*

Financial incentives for building efficiency improvements will be of key importance in order to supplement the funds currently dedicated in the town's CIP for energy conservation measures. Since most of the relatively inexpensive and obvious energy efficiency measures for the town's public buildings have already been implemented, the town must implement more expensive measures with longer payback periods in order to reach the 20 percent goal. The town is also continually updating the previously-implemented energy conservation measures in its buildings with increasingly more efficient technology. The town expects to take advantage of utility incentive programs and grant funding to finance building improvements. For many of the planned energy conservation measures, town staff still needs to discuss and finalize possible incentives with utility program managers.

b. *Vehicles*

Grant funding, such as from the Clean Cities program, would help supplement the additional cost of replacing town vehicles with more fuel efficient alternatives, however, it is not required in order to put the the fuel-efficient vehicle purchasing policy into practice. The expected savings in fuel costs will help fund the policy's implementation.

c. *Street lights*

The town plans to use a portion of its EECEBG funding to install LED street lights as part of two pilot projects, one project being located in a commercial center and another in a residential neighborhood. These pilots will be used to confirm expected energy savings as well as hear citizen reactions to the lights' appearance. The town expects to continue with LED replacements of street lights as funding allows if the initial projects are successful. A larger streetlight retrofit project would avoid replacing those fixtures in national and local historic districts until town staff and residents are convinced that LED lights

are appropriate in these areas. The town will seek out neighborhood reactions to the new street lights prior to moving forward with other LED projects. Funding for a larger replacement project may require partnering with an energy services company to defray significant upfront costs.

d. *Policy Changes*

While reviewing possible energy savings opportunities, town staff noted that some policy changes modifying the way the town's building stock is used by residents and town staff could be a significant source of energy savings. These policy changes include limiting the use of buildings after the close of normal business hours, modifying the winter and summer temperature settings and limiting the staff's use of inefficient space heaters.

Town staff consistently work with ICLEI, the Massachusetts Municipal Association and others, to determine and examine the policies adopted by other municipalities to reduce their overall energy consumption. For example, town staff met informally with staff from the City of Cambridge in December 2010 to discuss Cambridge's use of Mass Energy Insight and other software, as well as the city's internal management of energy policies, to learn from that municipality's experience managing its energy consumption. Those policies that appear effective and can translate to Brookline will be brought before the Board of Selectmen and the Selectmen's Climate Action Committee for discussion and possible adoption.

**2. *Program Management Plan for Implementation, Monitoring and Oversight***

All energy efficiency improvements for municipal buildings will be implemented or overseen by town staff in the Public Buildings Division of the town's Building Department. This arrangement has been successful in the past, as they are very familiar with the use and management of all these buildings. Additionally, they are familiar with utility incentive programs and opportunities.

Vehicle purchasing policies will be overseen jointly by the Chief Procurement Officer and the Fleet Manager of the Department of Public Works.

Monitoring of the energy savings from these measures will be a joint effort of the Selectmen's Office, who currently oversees the town's overall energy use, the Energy Task Force, which is comprised of department heads and are kept abreast of energy use trends, and the Planning and Community Development Department, who manages the town's EECBG funds as well as provides staff support to the Selectmen's Climate Action Committee.

**3. *Energy Conservation Measures***

- a. *Buildings*: For a specific listing of planned energy conservation measures for buildings, please see *Table 6*. Following is a summary of the general measures expected to be implemented, often across multiple buildings. Implementation of all of these measures is expected to reduce the town's energy use by 8,024 MMBtus, or 4.2 percent.
- i. Deep night setback of heating systems and update the programming of heating hot water pumps.
  - ii. Install demand control ventilation units for HVAC systems.
  - iii. Install new or upgrade energy management systems for some buildings.
  - iv. Install additional lighting occupancy sensors.
  - v. Install new jockey boilers in several buildings to enable low-level heating of buildings during low or no occupancy.
  - vi. Install CO2 controls in several buildings.
  - vii. Convert some heating systems to forced hot air.
  - viii. Remove space heaters from school and town buildings.
  - ix. Some of the town's buildings lack sufficient or well-performing insulation, typically at the roof level. The town will incorporate into its roof replacement plan an analysis of the insulation opportunities available when a building's roof is being replaced.
- b. *Vehicles*
- i. The adoption of a fuel-efficient vehicle purchasing policy will ensure all vehicles purchased for the municipal fleet, apart from police cruisers, heavy-duty trucks and passenger and cargo vans, meet high fuel economy standards. Although the town largely purchases such vehicles already, a new policy will solidify this commitment and ensure all vehicles purchased, including those for department heads, meet fuel economy goals. This is expected to reduce the town's energy use by 408 MMBtus, or 0.2 percent.
  - ii. The town's Police Department expects to begin replacing Ford Crown Victoria cruiser vehicles with Ford Taurus vehicles. Although the new Ford Taurus does not meet the high fuel efficiency standards of the Green Communities Act, the Taurus is expected to meet the needs of the Police Department and offer a reduction in fuel usage due to a higher fuel efficiency. The Department expects to begin replacing 11 cruisers each year, beginning with FY2012. This is expected to reduce the town's energy use by 8,667 MMBtus, or 4.5 percent.
  - iii. The town's Police Department also expects to begin implementing more bicycle patrols instead of vehicles, starting in FY 2012. Town staff is not clear at this point how many patrols will be replaced and how large a reduction in vehicle miles traveled should be expected, therefore the town has not

estimated how this measure will affect the town's total energy use. The reduction will likely be documented as the policy is implemented.

c. *Street Lights*

Should the two LED street light pilot projects be successful, the town will proceed with a replacement program for additional streetlights as funding becomes available. The town will first look to replace those streetlights that are not located in local or national historic districts, as these lights may require greater aesthetic scrutiny prior to replacement. The town expects the LED street light pilot project will reduce the town's energy use by 234 MMBtus, or 0.1 percent. If approximately 2,700 of the town's street lights were replaced with LED bulbs, the town's energy use would be reduced by 7,701 MMBtus, or 4 percent.

d. *Policy Changes:* The town expects that implementing the following policies would reduce the town's annual energy use by 11,556 MMBtus, or 6 percent of the town's total energy use.

- i. The town is currently conducting a feasibility study to consider whether and how the buildings used by the Park & Recreation Division may be consolidated. Depending on the results of this study, the town may be able to reprogram the space needs of the Park & Recreation Division and reap energy savings.
- ii. The Building Department, in conjunction with the Selectmen's Office, will begin reviewing methods to better manage the use of the town's buildings after hours. This effort aims to ensure the buildings are used more efficiently, and that large buildings, such as the Town Hall, are not fully heated when they are not needed. Although there is a significant demand for meeting space by both town staff and the public, this space can be scheduled and used more efficiently.
- iii. An employee behavior and awareness program, aimed at educating employees on how personal behavior affects energy use, including the operating of space heaters, avoiding idling vehicles, etc., will encourage the voluntary reduction of town energy consumption.

Table 6: Planned Energy Conservation Measures

Building/Site	Energy Conservation Measure	Projected Annual Savings (kWh)	Projected Annual Savings (therms)	Projected Annual Savings (gallons oil)	Projected Annual Savings (MMBtus)	Source for Projected Savings
<b>Baker School</b>	Deep Night Setback of Heat & turning off heating hot water pumps	20,600	10,600		1,130	Energy Star Benchmark Report
	Demand Control Ventilation Units	1,500	3,600		365	Energy Star Benchmark Report
	High Performance Refrigerated Box Controls	15,000			51	Energy Star Benchmark Report
	Condensing Natural Gas Boiler Plan		12,000		1,200	Energy Star Benchmark Report
<b>New Lincoln</b>	Update unoccupied Programming of Heating Hot Water Pumps	13,377			46	Energy Star Benchmark Report
	High Performance Refrigerated Box Controls	15,000			51	Energy Star Benchmark Report
	New Energy Management System	24,825	8,000		885	Energy Star Benchmark Report
	Gym Lighting Occupancy Sensors	960			3	Energy Star Benchmark Report
<b>Heath School</b>	Install jockey boiler in conjunction with additional HVAC renovation		3,822		382	Calculated based upon equipment specs (15% reduction in gas usage)
<b>Runkle School</b>	High efficiency boilers, new HVAC controls and equipment and new windows		4,516		452	Calculated based upon equipment specs (20% reduction in gas usage)



Building/Site	Energy Conservation Measure	Projected Annual Savings (kWh)	Projected Annual Savings (therms)	Projected Annual Savings (gallons oil)	Projected Annual Savings (MMBtus)	Source for Projected Savings
<b>Pierce School</b>	Install additional CO2 controls, night setback work and optimum start		6,319		632	Calculated based upon equipment specs (10% reduction in gas usage)
<b>Lawrence School</b>	Install additional CO2 controls, night setback work and optimum start		3,574		357	Calculated based upon equipment specs (10% reduction in gas usage)
<b>Driscoll School</b>	Install additional CO2 controls, night setback work and optimum start		5,199		520	Calculated based upon equipment specs (10% reduction in gas usage)
<b>High School</b>	Install CO2 controls; new hallway lighting	63,599	6,385		855	Calculated based upon equipment specs (2% reduction in electricity usage; 10% reduction in gas usage)
<b>Golf course</b>	Convert to forced hot water; install jockey boiler		1,215		122	Calculated based upon equipment specs (15% reduction in gas usage)
<b>Old Lincoln</b>	Convert to forced hot water; install jockey boiler		3,674		367	Calculated based upon equipment specs (10% reduction in gas usage)
<b>Health Building</b>	Install jockey boiler		322		32	Calculated based upon equipment specs (5% reduction in gas usage)
<b>Public Safety Building</b>	Install jockey boiler		938		94	Calculated based upon equipment specs (5% reduction in gas usage)

Building/Site	Energy Conservation Measure	Projected Annual Savings (kWh)	Projected Annual Savings (therms)	Projected Annual Savings (gallons oil)	Projected Annual Savings (MMBtus)	Source for Projected Savings
Town Hall	Install jockey boiler		317		32	Calculated based upon equipment specs (2% reduction in gas usage)
Coolidge Corner Library	Replace Energy Management System, install CO2 controls, install jockey boiler		430		43	Calculated based upon equipment specs (5% reduction in gas usage)
Main Library	Upgrade Energy Management System, install jockey boiler		1,048		105	Calculated based upon equipment specs (5% reduction in gas usage)
Senior Center	New HVAC controls; upgrade Energy Management System		365		36	Calculated based upon equipment specs (3% reduction in gas usage)
Municipal Service Center	Modify HVAC system; install new floor heat system with floor replacement; add zone for top floor garages		2,568		257	Calculated based upon equipment specs (7% reduction in gas usage)
Town Hall and School Buildings	Remove all personal space heaters	1,950			7	Assumptions made: 1.5 kWh/space heater/hour; 5 hours/day, 5 days week for 5 months
<b>TOTAL BUILDING MEASURES</b>		156,811	74,890	0	8,024	

Building/Site	Energy Conservation Measure	Projected Annual Savings (kWh)	Projected Annual Savings (therms)	Projected Annual Savings (gallons oil)	Projected Annual Savings (MMBtus)	Source for Projected Savings
<b>LED Street Light retrofit pilot project</b>	60 streetlights in a residential neighborhood, and 25 streetlights in a commercial district are being replaced with LEDs in a pilot project (installed FY10-FY11)	68,595			234	Calculated based upon equipment specs
<b>Extensive LED Street Light Retrofit Project</b>	Replace 2,797 additional streetlights, avoiding those lights located in national and local historic districts and along Harvard and Boylston Streets	2,257,179			7,701	Calculated based upon equipment specs
<b>Building Management Policy Analysis and Employee Awareness Program</b>	Evaluate and implement a policy to consolidate and reduce the overall after-hours use of town buildings, as well as implement an employee awareness program to encourage the voluntary reduction of energy use by employees	1,175,287	75,455		11,556	Assumes an annual reduction of 10 hours of energy use in administration and school buildings per week
<b>TOTAL OTHER MEASURES</b>	60 streetlights in a residential neighborhood, and 25 streetlights in a commercial district are being replaced with LEDs in a pilot project (installed FY10-FY11)	3,501,061	75,455	0	19,491	

Table 7: Vehicular Energy Conservation Measures

Dept	Vehicle*	Type	Replacement	Already Implemented?	Vehicle Miles Traveled (VMT)**	Projected Annual Savings (gallons gasoline)	Projected Annual Savings (MMBtus)	Source for Projected Savings
<b>Police</b>	Police Cruisers	N/A	Add more bicycle patrols to reduce VMT	Proposed FY 2012	Reduction is not known	unknown	unknown	
	11 Police Cruisers (Ford Crown Victoria)	4 Door Sedan	Ford Taurus	Proposed FY 2012	26,000 mi/vehicle/year	2,889	358	www.fueleconomy.gov; www.mpgillusion.com
	11 Police Cruisers (Ford Crown Victoria)	4 Door Sedan	Ford Taurus	Proposed FY 2013	26,000 mi/vehicle/year	2,889	358	www.fueleconomy.gov; www.mpgillusion.com
	11 Police Cruisers (Ford Crown Victoria)	4 Door Sedan	Ford Taurus	Proposed FY 2014	26,000 mi/vehicle/year	2,889	358	www.fueleconomy.gov; www.mpgillusion.com
<b>Engineering</b>	2000 Ford Taurus	4 Door Sedan	Toyota Prius	Yes FY 2011	6,500 miles/year	184	23	www.fueleconomy.gov; www.mpgillusion.com
	2001 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		3,500 miles/year	76	9	www.fueleconomy.gov; www.mpgillusion.com
<b>Building</b>	2003 Ford Crown Victoria	4 Door Sedan	Ford Fusion Hybrid	Yes FY 2011	17,000 miles/year	509	63	www.fueleconomy.gov; www.mpgillusion.com
	2001 Ford Crown Victoria	4 Door Sedan	Ford Fusion Hybrid	Proposed FY 2012	3,000 miles/year	78	10	www.fueleconomy.gov; www.mpgillusion.com
	1999 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		1,400 miles/year	30	4	www.fueleconomy.gov; www.mpgillusion.com
<b>Fire</b>	2010 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	39	5	www.fueleconomy.gov; www.mpgillusion.com

Dept	Vehicle*	Type	Replacement	Already Implemented?	Vehicle Miles Traveled (VMT)**	Projected Annual Savings (gallons gasoline)	Projected Annual Savings (MMBtus)	Source for Projected Savings
	2009 Chevrolet Tahoe	4X4	Ford Explorer 4WD		6,500 miles/year	102	13	www.fueleconomy.gov; www.mpgillusion.com
	2004 Chevrolet Tahoe	4X4	Ford Explorer 4WD		2,000 miles/year	46	6	www.fueleconomy.gov; www.mpgillusion.com
	2008 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		5,000 miles/year	108	13	www.fueleconomy.gov; www.mpgillusion.com
	2007 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		3,500 miles/year	76	9	www.fueleconomy.gov; www.mpgillusion.com
	1998 Ford Taurus Wagon	4 Door Sedan	Ford Escape Hybrid		2,500 miles/year	40	5	www.fueleconomy.gov; www.mpgillusion.com
	1998 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
	2003 Ford Crown Victoria	4 Door Sedan	Toyota Prius	Yes FY 2011	4,500 miles/year	160	20	www.fueleconomy.gov; www.mpgillusion.com
<b>Finance</b>	1997 Chevrolet Blazer	Sport Utility	Ford Escape Hybrid		2,500 miles/year	57	7	www.fueleconomy.gov; www.mpgillusion.com
	2001 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,400 miles/year	52	6	www.fueleconomy.gov; www.mpgillusion.com
	2001 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		1,400 miles/year	30	4	www.fueleconomy.gov; www.mpgillusion.com
	1995 Ford Escort	Wagon	Toyota Prius		1,000 miles/year	17	2	www.fueleconomy.gov; www.mpgillusion.com
<b>Health</b>	2001 Ford Taurus	4 Door Sedan	Toyota Prius	Proposed FY 2012	2,000 miles/year	54	7	www.fueleconomy.gov; www.mpgillusion.com
	1997 Ford Ranger	2WD Pickup Truck	Chevrolet Colorado		1,500 miles/year	11	1	www.fueleconomy.gov; www.mpgillusion.com
<b>Highway &amp; Sanitation</b>	2010 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		15,000 miles/year	324	40	www.fueleconomy.gov; www.mpgillusion.com

Dept	Vehicle*	Type	Replacement	Already Implemented?	Vehicle Miles Traveled (VMT)**	Projected Annual Savings (gallons gasoline)	Projected Annual Savings (MMBtus)	Source for Projected Savings
<b>Parks &amp; Open Space</b>	2004 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		13,000 miles/year	280	35	www.fueleconomy.gov; www.mpgillusion.com
<b>Police</b>	2010 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		3,200 miles/year	69	9	www.fueleconomy.gov; www.mpgillusion.com
	2009 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
	2009 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
	2009 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
	2000 Ford Expedition	Sport Utility	Ford Explorer 4WD		2,000 miles/year	52	6	www.fueleconomy.gov; www.mpgillusion.com
	2009 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
	2010 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		2,000 miles/year	43	5	www.fueleconomy.gov; www.mpgillusion.com
<b>Recreation</b>	2001 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		3,500 miles/year	76	9	www.fueleconomy.gov; www.mpgillusion.com
<b>Water &amp; Sewer</b>	2010 Ford Taurus	4 Door Sedan	Ford Fusion Hybrid		10,000 miles/year	225	28	www.fueleconomy.gov; www.mpgillusion.com
	2006 Chevrolet Impala	4 Door Sedan	Chevrolet Malibu Hybrid		12,000 miles/year	337	42	www.fueleconomy.gov; www.mpgillusion.com
<b>TOTAL</b>						11,956	1,483	

\*Individual vehicles listed as being replaced include those that are not exempt from the fuel-efficient vehicle policy and whose combined MPG is not compliant with the policy's required MPG minimums. Non-exempt vehicles to be replaced beyond FY2014 are not listed.

\*\*If the average annual miles travelled is not known for the vehicle, the vehicle is assumed to average approximately 2,000 miles a year.

#### 4. *Estimated Capital and Operating Costs*

The total cost to the town of all of the planned energy conservation measures to be installed or implemented from the date this energy reduction plan is adopted and the end of FY 2014 is approximately \$4.6 million, although a significant portion of this cost is due to the Runkle School renovation currently underway and the expanded streetlight replacement project. This total assumes the town will receive at least \$350,000 from utility incentives; the town hopes additional outside grant funding, likely from state or federal government sources, or utility incentives could also be obtained to reduce the overall cost of implementing this plan. Without additional grant funding or partnering with an energy service company, the payback period for these measures is expected to be 7.8 years.

Table 8: Estimated Costs of Energy Conservation Measures

<b>Building/Site</b>	<b>Projected Total Cost of all measures</b>	<b>Potential Utility/Other Incentives</b>	<b>Net Cost</b>	<b>Annual Dollars Saved</b>	<b>Years to Payback</b>
Baker School*	\$274,600	\$10,000	\$264,600	\$53,729	4.9
New Lincoln School	\$111,460	\$25,000	\$86,460	\$23,688	3.7
Heath School	\$20,000	\$15,000	\$5,000	\$6,918	0.7
Runkle School	\$2,000,000	\$10,000	\$1,990,000	\$8,174	243.5
Pierce School*	\$30,000	\$0	\$30,000	\$11,437	2.6
Lawrence School*	\$10,000	\$0	\$10,000	\$6,469	1.5
Driscoll School*	\$10,000	\$0	\$10,000	\$9,410	1.1
High School	\$19,017	\$10,000	\$9,017	\$22,369	0.4
Golf Course	\$20,000	\$15,000	\$5,000	\$2,199	2.3
Old Lincoln	\$150,000	\$20,000	\$130,000	\$6,650	19.5
Health Building	\$25,000	\$20,000	\$5,000	\$582	8.6
Public Safety Building	\$25,000	\$20,000	\$5,000	\$1,698	2.9
Town Hall	\$25,000	\$20,000	\$5,000	\$573	8.7
Coolidge Corner Library	\$25,000	\$20,000	\$5,000	\$779	6.4
Main Library	\$50,000	\$20,000	\$30,000	\$1,896	15.8
Senior Center	\$50,000	\$0	\$50,000	\$660	75.8
Municipal Service Center	\$250,000	\$0	\$250,000	\$4,647	53.8
Space Heaters in Buildings	\$0	\$0	\$0	\$332	0.0
LED Street Lights Pilot	\$180,000	\$145,000	\$35,000	\$11,661	3.0

Extensive LED Street Light Replacement Project	\$1,538,350	\$0	\$1,538,350	\$383,720	4.0
Vehicle Replacements**	\$153,447	\$0	\$153,447	\$31,850	4.8
<b>TOTAL</b>	\$4,966,874	\$350,000	\$4,616,874	\$589,441	7.8

\* Utility incentives are still to be determined and finalized.

\*\*Cost reflects difference between typical replacement cost and fuel-efficient replacement cost. Also reflects the cost difference for replacing Crown Victoria police cruisers with Ford Taurus vehicles over three years (est. \$132,000).

**5. Schedule for Implementation**

The timeline for implementation of energy conservation measures largely depends on the timing and availability of grant funding to supplement the town's funding from the CIP. Nevertheless, an approximate time table has been created to allow for the necessary planning for implementation of the energy conservation measures.



Table 9: Schedule for Implementation

Energy Conservation Measure	Q4 FY 2011	Q1 FY 2012	Q2 FY 2012	Q3 FY 2012	Q4 FY 2012	Q1 FY 2013	Q2 FY 2013	Q3 FY 2013	Q4 FY 2013	Q1 FY 2014	Q2 FY 2014	Q3 FY 2014	Q4 FY 2014
LED Streetlight Retrofit Pilot	X												
LED Streetlight Extensive Replacement Project							X	X			X	X	
BAKER: Deep Night Setback, Demand Control Ventilation Units, High Performance Refrigerated Box Controls, Condensing Natural Gas Boiler Plan						X	X						
NEW LINCOLN: Heating Hot Water Pumps; Refrigerated Box Controls, Energy Management System, Gym Lighting Occupancy Sensors			X			X							
HEATH: Jockey boiler & HVAC renovation						X	X	X					
RUNKLE: High efficiency boilers, new HVAC controls and equipment and new windows	X	X											

Energy Conservation Measure	Q4 FY 2011	Q1 FY 2012	Q2 FY 2012	Q3 FY 2012	Q4 FY 2012	Q1 FY 2013	Q2 FY 2013	Q3 FY 2013	Q4 FY 2013	Q1 FY 2014	Q2 FY 2014	Q3 FY 2014	Q4 FY 2014
PIERCE: CO2 controls, night setback work and optimum start		X	X										
LAWRENCE: CO2 controls, night setback work and optimum start		X	X										
DRISCOLL: CO2 controls, night setback work and optimum start		X	X										
HIGH SCHOOL: CO2 controls; new hallway lighting	X	X											
GOLF COURSE: Convert to forced hot water; install jockey boiler													X
OLD LINCOLN: Convert to forced hot water; install jockey boiler													X
HEALTH BUILDING: Install jockey boiler										X			
PUBLIC SAFETY BUILDING: Install jockey boiler										X			
TOWN HALL: Install jockey boiler									X				

Energy Conservation Measure	Q4 FY 2011	Q1 FY 2012	Q2 FY 2012	Q3 FY 2012	Q4 FY 2012	Q1 FY 2013	Q2 FY 2013	Q3 FY 2013	Q4 FY 2013	Q1 FY 2014	Q2 FY 2014	Q3 FY 2014	Q4 FY 2014
COOLIDGE CORNER LIBRARY: Energy Management System, install CO2 controls, install jockey boiler										X			
MAIN LIBRARY: Energy Management System, install jockey boiler										X			
SENIOR CENTER: HVAC controls; upgrade Energy Management System		X	X										
MUNICIPAL SERVICE CENTER: Modify HVAC system; install new floor heat system with floor replacement; add zone for top floor garages										X			
TOWN HALL & SCHOOL BUILDINGS: Remove all personal space heaters			X										
BUILDING MANAGEMENT POLICY & EMPLOYEE AWARENESS PROGRAM		X	X										
VEHICLE REPLACEMENTS		X				X				X			

**6. Additions and New Construction**

The town is in the midst of what will be a series of construction projects in an effort to renovate and expand its public schools to adequately serve a growing school population.

The town is currently renovating and constructing an addition to the Runkle K-8 School. Pre-renovation square footage for Runkle 67,114 after renovation Runkle will be 105,222 square feet. Temporarily, the school children and teachers of the Runkle have relocated to the Old Lincoln School. Construction at the Runkle is expected to be completed July 2012. When completed, the school will meet MA-CHPS high energy efficiency standards.

Also expected to be completed by July 2012 is an approximately 12,000 s.f. addition to the Heath School, construction of which is expected to begin November 2011. This will primarily be an addition project and will not involve an extensive renovation of the existing school building. Prior to the addition Health School was 66,544 SQ, after the addition it will be 80,952 SF. Following the construction on the Runkle and Heath Schools, the town plans to begin renovations and additions to the Devotion School, followed by renovations to the Pierce School.

All of these additions and renovations, while expected to increase the buildings' energy efficiency per square foot, are also expected to increase total energy consumption due to the increase in overall building size and the number of students. As the town progresses with an analysis of the effectiveness of its energy conservation measures, the additional square footage resulting from these construction projects will be excluded from its analysis.

**C. Measurement and Verification Plan for Projected Reductions – Annual Reporting**

**1. Common Technology Features**

Town staff will continue to use MassEnergyInsight, as well as its existing Microsoft Excel-based system, to monitor the town's energy use. The town's Energy Task Force will continue to meet at least quarterly to discuss changes in energy use and possible opportunities for further reducing overall energy consumption.

**2. Personnel Responsible for Measurement and Verification and Annual Reporting to Green Communities Division**

Town staff from the Selectmen's Office and the Department of Planning and Community Development will work collaboratively to monitor the town's energy consumption and report annually to the Green Communities Division on the implementation of this Energy Reduction Plan.

**D. Summary of Long-Term Energy Reduction Goals – Beyond 5 Years**

**1. *Municipal Buildings (including schools)***

The town will continue to invest in energy efficiency measures for its buildings as technology improves and payback periods decrease. The town will continue its commitment to funding such measures through its CIP to ensure its municipal buildings maintain a high level of energy efficiency. Additionally, the town will continue to seek out and apply for grant funding and utility incentives to reduce the overall cost of implementing such measures.

**2. *Vehicles (including schools)***

Currently the town is exploring the possibility of replacing some of its hybrid vehicles with more energy efficient electric vehicles. Since this technology is still extremely new, the town expects options for electric vehicles to become clearer and more numerous within a few years, at which point the town expects to begin taking advantage of electric vehicle technology. In the meantime, the town will continue to explore more fuel-efficient options for its entire vehicle fleet, including for heavy-duty vehicles and police cruisers, particularly as options become more numerous.

**3. *Street and Traffic Lighting***

If the two LED pilot projects put into place in FY10 to FY11 are successful, and if the town can successfully finance the replacement of a significant portion of its street lights, the town will look to replace more street lights with LEDs as funding becomes available. Those street lights not identified in this plan for replacement are primarily located in local or national historic districts, along major thoroughfares such as Harvard, Beacon and Boylston Streets, or in parks. These lights will require particular attention to ensure the replacements are appropriate and adequately serve the town's needs.

**4. *Perpetuating Energy Efficiency***

The town continues to dedicate funding for energy conservation measures in its CIP. This procedure is expected to continue well into the future. Additionally, the town's Energy Task Force will continue to meet quarterly to discuss energy consumption patterns and possible policy changes in a continuous effort to improve the efficiency of its facilities.

**VI. Onsite Renewable Energy Projects & Renewable Energy**

The town plans to work with solar contractors to discuss the likelihood of installing photovoltaic facilities on the roofs of existing town buildings. The town has a roof replacement plan for all town buildings, and would like to coordinate the installation of PV with this plan as much as possible. Some buildings are not likely candidates for PV installations, particularly those that are small or are finished with slate roof tiles.

Additionally, the town recently adopted a zoning amendment allowing for a ground-mounted large-scale solar facility on a municipally-owned site that currently houses an underground water tank. As funding becomes available, the town would like to proceed

with a further feasibility and engineering analysis for developing a solar facility on this site.

## **VII. List of Resources and Contacts**

The town made use of the following resources and tools to create this plan:

### **State**

Massachusetts Green Communities Division  
Massachusetts Department of Energy Resources

### **Federal**

Department of Energy

### **Non-Profit**

ICLEI – Local Governments for Sustainability

### **Documents and Tools**

[www.massenergyinsight.net](http://www.massenergyinsight.net)  
[www.fueleconomy.gov](http://www.fueleconomy.gov)  
[www.mpgillusion.com](http://www.mpgillusion.com)  
ICLEI's CAPP (v1.5) software