

# **TOWN OF SHERBORN ENERGY REDUCTION ACTION PLAN**

## **I. PURPOSE AND ACKNOWLEDGEMENTS**

This Energy Reduction Plan (ERP) outlines the energy efficiency measures to be undertaken by the Town of Sherborn in order to reduce the costs and environmental impact of its energy use. This ERP is also the town's first comprehensive examination of its overall energy use and begins a process whereby this energy use will be regularly scrutinized for improvements.

### **A. Letters from Both General Government and School District Verifying Adoption of the ERP**

The Board of Selectmen and the Sherborn School Committee strongly support efforts to reduce energy use in the town. Their approvals of this ERP are presented in Attachment A.

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

The Sherborn Energy Committee would like to acknowledge and thank the many contributors to and supporters of this ERP:

- Board of Selectmen
- The Selectmen's Office
- Community Maintenance and Development (CM&D) Department
- Police Department
- Fire Department
- Sherborn Library
- Sherborn Planning Board
- Sherborn Building Inspector
- Sherborn Recycling Committee
- Sherborn School Committee
- Pine Hill School administration, teachers and maintenance staff
- Pine Hill School Building Committee.

Assistance was also provided by:

- Massachusetts Department of Energy Resources (DOER) Green Communities Division
- ICF International and Horsley Witten Group
- Clark University Green Business Management student project.

### **Sherborn Energy Committee**

The Sherborn Energy Committee was created in 2010 as a joint effort by a grass roots association known as the Sherborn Climate Action Group and the Sherborn Board of Selectmen. The Sherborn Climate Action Group received some initial help from MCAN and Newton Green Decade and was formed with the mission of reducing the town's environmental footprint and increasing sustainability activities by the town and its residents. It also sought to gather information to lobby the town government for greener policies. Simultaneously, the Sherborn

Board of Selectmen (BOS) was looking to become a Commonwealth Green Community under the Green Community Act (GCA). In 2010, both entities agreed to create a town Energy Committee whose main purpose during 2010-2011 would be to do the necessary work, promote town policy changes and make the applications for the Green Community designation. The newly formed Energy Committee received broad authority, and it was encouraged by the BOS to look into all issues of environmental sustainability.

The Sherborn Energy Committee members have extensive energy related experience:

**Daniel Glickman (Chair):** Mr. Glickman is a local contractor and a specialist in green building design. He has held positions in organizations such as the USGBC, Newton Green Decade and the National Association of the Remodeling Industry. Mr. Glickman is also founder of the Sherborn Climate Action Group.

**Michael Lesser:** Mr. Lesser is an energy economist and is an experienced energy planner and analyst with over 30 years of experience. He has worked on numerous energy planning, conservation and renewable energy projects in the U.S. and overseas. Mr. Lesser is charge of the Energy Reduction Plan and led the effort for data collection and analysis, and is the principal author of the plan. (He is also a member of the town's Conservation Commission and Open Space Committee.)

**Gino Carlucci:** Mr. Carlucci is an experienced town planner who has helped other towns receive Green Community designation. As the Sherborn Town Planner, he is responsible for much of the work behind the zoning and general by-law changes proposed by the Sherborn Planning Board and approved at town meeting to comply with the GCA. In addition to working with the Planning Board, he is managing the town's application for Green Community designation.

**Kecia Lifton:** Ms. Lifton is a local architect with extensive experience in residential and commercial architecture. She is responsible for energy modeling various potential projects for the town buildings and reviewing energy audits. She is an important liaison with the School Building Committee, of which she is a member.

**Ed McGuire:** Mr. McGuire is a Registered Professional Mechanical Engineer who managed NStar's Demand Side Management/Energy Conservation Programs for 3 years. He is a member of the Sherborn School Committee, and a member of the Pine Hill School Building Committee.

**Mike Barberio:** Mr. Barberio has owned and operated an electrical engineering firm for 20 years and has conducted research on a new solar energy technology. He was the liaison with Clark University and worked the student study group on its detailed study of Pine Hill School energy use and potential reductions associated with behavioral changes and school policies. He also worked with the Massachusetts School Building Authority to pursue funding for energy efficiency improvements at the Pine Hill School under their Green Repairs program.

Other members of the Energy Committee include:

- John Higley, Sherborn Planning Board
- Leslie Doyle (works on communications)
- Jane Pusch, Sherborn Recycling Committee (works on fuel-efficient vehicles)
- Frank Hoek, Sherborn School Committee (recently resigned)
- Roger Demler, Water Commissioner

- Paul Cutler (works in commercial lighting sales)

In April 2011, the Committee successfully received approval of all proposed by-law amendments and additions related to Green Community designation criteria at Town Meeting, with the majority passing unanimously and all receiving unanimous support from the Board of Selectmen and the Advisory Committee.

## II. EXECUTIVE SUMMARY

### A. Narrative Summary of the Town

Sherborn is a small semi-rural community of about 16 square miles located about 18 miles southwest of Boston. The population is about 4,600 with about 1,500 households. It is located in Middlesex County and borders the Charles River, and its town center is situated along the intersection of Routes 27 and 16.

Settled in 1652 and incorporated in 1674, the town has a rural heritage still evident in active farms and orchards, winding tree-lined roads and preserved in Town Forest and other extensive public lands. Open space comprises more than 50% of the town's area. Minimum house lot sizes are one, two or three acres, depending upon location, partly because all properties have individual wells and septic systems. It has very limited commercial development. Town operations involve a high level of volunteerism. It has an open town meeting form of government with a 3-member Board of Selectmen. Sherborn has one elementary school and shares a middle and high school with Dover.

### B. Summary of Municipal Energy Uses

**Table 1: Summary of Municipal Energy Users**

	<u>Number</u>	<u>Ownership</u>	
<b>Buildings</b>			
Oil Heat	1	Town	Library
Natural Gas Heat	6	Town	town hall, police station, 2 fire stations, public works (CM&D) building/garage, 1 school
Other Heat	0		
<b>Vehicles</b>			
Non-Exempt	2	Town	police (1), public works (1)
Exempt	37	Town	police (8), fire (9), public works (20)
<b>Street Lights</b>	129	Utility	
	6	Town	
<b>Traffic Lights</b>	1	Town	
<b>Water and Sewer</b>	0		all private wells and septic
<b>Other</b>			
Transfer Station	1	Town	
Fire pumping stations	2	Town	
Recreation	2	Town	

Note: Regional (with Dover) middle and high schools are not included.

### C. Summary of Energy Use Baseline and Plans for Reductions

**Table 2: Summary of Town Energy Use Baseline and Savings**

	Baseline FY09		Savings (mmBtu)			Savings as % of	
	(mmBtu)		In-Place	Planned	Total	Line item	Baseline
Buildings	10,171	76%	1,329	1,309	2,638	26%	19.8%
Vehicles	3,021	23%		77	77	3%	0.6%
Streetlights	58	0%		20	20	34%	0.2%
Water/Sewer/Pumping	0	0%			-		
Other	74	1%		2	2	3%	0.0%
<b>Total</b>	<b>13,324</b>	<b>100%</b>	<b>1,329</b>	<b>1,408</b>	<b>2,737</b>		<b>21%</b>

Note: Other includes transfer station, recreation and fire department water pumping stations.

### D. Summary of Goals and Strategies to be Used in Carrying Out the Action Plan

The goals of Sherborn's Energy Reduction Plan – ERP - are to lower the cost and to reduce the environmental impacts of the town's energy use. Another dimension of the town's overall energy plans is to further reduce the environmental impacts of its energy use by switching to renewable and other cleaner energy sources.

A broader objective of developing this first ERP is a new awareness of and focus on the town's energy use and the potential for cost savings and lessening environmental impacts. This plan is meant to be a working document in that it will be periodically updated as part of an ongoing process of continually seeking to identify attractive energy reduction opportunities. It is also a working document to guide the Energy Committee's ongoing work on priorities and projects to be refined for implementation. Though only the beginning, this overall effort will expand to cover renewable energy as well as efficiency issues in order to more comprehensively address the impacts of energy use in terms of cost, environmental impacts at all levels, and energy security and independence. This work will also involve town discussion of its interests beyond simple financial returns.

The Energy Committee's work on the town's own energy issues is a part of a planned larger effort to increase awareness of and help the town's residents undertake energy efficiency and renewable energy efforts. This work is also part of an even broader vision of fostering practical actions for more sustainable use of water and other resources.

This ERP uses a FY2009 (July 2008 – June 2009) baseline because of some recent projects for which credit is being taken in meeting our energy reduction target. The specific energy reduction measures prior to Green Communities certification for which credit is taken sum to about 10% of the baseline (and overall energy use in FY2010 was about 12% less than baseline FY2009). The overall energy reduction target of at least 20% is met in this ERP by a combination of this initial 10% reduction plus a projected 11% from planned energy conservation measures. Meanwhile, the town is currently pursuing a ground-mounted solar PV project whose electricity generation will be about 25% of the town's baseline energy use.

One general issue is that the relative newness of many buildings (e.g. Town Hall, main fire station and police station) lowers the financial attractiveness of some large energy reduction options such as boiler/furnace replacement; however, the systems installed are not the most energy-efficient options.

The strategies to reach these goals, which partly overlap, are:

#### 1. Lighting Efficiency Improvements

The ERP includes selectively installing higher efficiency fixtures and bulbs in all town buildings. Because, as noted, most of the buildings are relatively new (about 10 years or less) and/or have had some renovations recently, there is a mix of (i) immediate or short-term lighting improvements with clearly attractive payback periods and (ii) expected medium-term improvements. The latter are based on the expectation that readily available LED lighting will, in a number of years, have both higher efficiency and lower cost and lead to expanded opportunities for clearly attractive projects.

#### 2. Building Space Conditioning (Heating and Cooling) Improvements

Audits and other examinations of our buildings have revealed that there are good opportunities for improved insulation and sealing. However, this work has also uncovered many issues related to space conditioning controls even though the basic equipment (e.g. furnaces, boilers, compressors, etc.) are of reasonable efficiency and relatively new. As a result, in some buildings, we will pursue more comprehensive analysis of improvements than possible for the timing of this plan's preparation.

#### 3. Vehicles Efficiency Improvements

The town only has two non-exempt vehicles currently, and one may become exempt. Nevertheless, factoring in fuel efficiency will now become important in the selection of new town vehicles as this plan's development and implementation has increased awareness of overall energy efficiency benefits. This work includes behavioral issues and changing procedures such as idling by police and public works vehicles. In addition, anti-idling devices will also be tested.

#### 4. Behavioral and Management Improvements

Various management approaches will be undertaken to reduce electricity use for lighting and a wide range of equipment (e.g. computers, copiers, printers, etc.). This involves a mix of automatic and manual controls, education, reconfiguring equipment, and replacing equipment.

#### 5. Improved Standards for New Construction and Major Renovations

The town has now elevated the importance of energy efficiency issues for all of its new projects. For example, the town is targeting some level of LEED certification for its next planned town project - a library renovation and expansion. (This standard would be in addition to the recently adopted Stretch Energy Code.)

#### 6. Improved Energy Use in Elementary School

Because Sherborn's one school, the Pine Hill Elementary School, consumes about one-half of the town's energy use, it is a main target of energy reduction efforts. It was initially constructed in 1956, and to improve its operations, projects (i.e. heating, ventilation and lighting) have been undertaken in recent years and more are planned.

## 7. Improved/Cleaner Energy Use in Town Library

As noted above, a renovation and expansion of the town library is planned. Part of this work is to reduce its energy use and cost by switching from fuel oil to natural gas. This switch also has climate change benefits as natural gas has lower unit carbon emissions.

## III. ENERGY USE BASELINE INVENTORY

### A. Inventory Tool Used

Sherborn's baseline energy inventory has been prepared using the Mass Energy Insight (MEI) model. The MEI work was supplemented by Energy Committee spreadsheet work based on MEI model downloads and additional data.

### B. Identification of the Baseline Year

The baseline year is FY2009, which was from July 2008 through June 2009. This baseline allows us to capture some recent energy efficiency improvements undertaken. However, the baseline used for vehicle fuels is CY2010 because vehicle-level fuel use is available for this period (but not for the FY2009 period). The baseline energy use is based on the Energy Committee's supplemental spreadsheet work based on downloads of MEI data.

### C. Town Energy Consumption for the Baseline Year

**Table 3: Town of Sherborn Energy Use Baseline (FY2009)**

	Electricity		Natural Gas		Fuel Oil, Diesel, Gasoline		TOTALS
	kWh	mmBtu	therms	mmBtu	gallons	mmBtu	
Pine Hill Elementary School	396,360	1,352	39,530	3,953			5,305
Police Station	151,904	518	5,524	552			1,071
Town Hall	123,600	422	4,948	495			917
Fire - N. Main Station	53,800	184	6,368	637			820
Fire - Farm Rd. Station	6,759	23	1,194	119			142
CM&D (public works)	24,827	85	7,014	701			786
Library	85,800	293			6,021	837	1,130
SUBTOTAL - Buildings	843,050	2,876	64,578	6,458	6,021	837	10,171
Water Treatment	0		0		0		
Vehicles (aggregate CY10)							
Diesel-fueled					11,241	1,562	1,562
Gasoline-fueled					11,759	1,458	1,458
Street/Traffic Lights (town)	17,006	58					58
Other							
Fire water pumps	5,466	19					19
Transfer Station	9,467	32					32
Recreation	6,690	23					23
TOTAL ENERGY USE	881,679	3,008	64,578	6,458	29,021	3,858	13,324

## D. Identify Areas of Least Efficiency/Greatest Waste

The work in preparing this ERP has identified the following areas with potentially the greatest room for efficiency improvements:

- space conditioning in buildings (e.g. heating in school)
- lighting in general as well as in unoccupied areas and as unnecessary day-time lighting)
- control of heating and cooling in offices
- vehicle fuel use by police and public works (CM&D) department (though possibly limited savings possible due to operational procedures)
- electricity by various office equipment, such as computers, printers, copiers, etc.

For the two building types for which appropriate comparative energy use data was found - elementary schools and town halls, the town's buildings are average or below average as shown in the following table. Furthermore, the town's elementary school FY10 total energy use matches the median in the MEI model for elementary schools. Though many variables are at play, this data indicates that there is potential for energy use reductions in these buildings while also indicating that these buildings are not grossly inefficient.

<b>Unit Building Energy Use and Benchmarks - mBtu/sq.ft.</b>				
	<u>Sherborn</u> (FY10)	<u>Massachusetts benchmarks</u>		
		Average	Maximum	Minimum
<u>Elementary School</u>				
Heating	45	62	119	25
Electricity	19	20	28	13
<u>Town Hall</u>				
Heating	35	63	99	22
Electricity	28	32	45	16

Source: ICF International 2011 email with benchmarks from Massachusetts building audits.

As to buildings to target, the following table summarizes unit energy use by the town's buildings.

<b>Unit Building FY10 Energy Use - mBtu/sq.ft.</b>			
<u>Building</u>	<u>Fuel</u>	<u>Electricity</u>	<u>Total</u>
CM&D Garage (CY10)	16	8	25
Fire: Farm Road Station	51	14	65
Fire: N. Main St. Station	62	27	89
Elementary school	45	19	64
Police station	39	46	85
Town Hall	35	28	64
Library	48	16	64

As noted in our energy reduction measures below, the buildings with relatively higher unit fuel (heating) use either have reduction projects planned or will be studied to identify possible reduction projects. Some of the higher electricity use levels will also be examined as part of addressing space conditioning as well as by implementing the results of lighting audits.

## E. Identify Areas That Can Be Most Easily Addressed

The area of energy inefficiency that can most easily be addressed is a range of improved lighting projects that have been identified by the NSTAR-related audits (after some further review with department heads for each building). Other areas of energy reduction that may be easily addressed are: additional insulation in the N. Main Street Fire Station and some measures at the school directed at turning off or timers on equipment and water conservation.

## F. For Towns Taking Credit for Efficiency Measures Occurring Before Green Communities Designation Application

The town is taking credit for recent energy changes for three buildings:

Energy Use Changes Since Baseline - Credits taken in ERP					
	Electricity		Natural Gas		Total
	kWh	mmBtu	therms	mmBtu	mmBtu
CM&D Building	4,717	16	-5,050	-505	-489
Elementary School			-7,000	-700	-700
Main Street Fire Station			-1,400	-140	-140
Total for Buildings	4,717	16	-13,450	-1,345	-1,329
FY2009 Baseline					13,324
Changes as % of Baseline					-10%

These reduction credits amount to about 10% of total baseline energy use. (Overall, town energy use in FY2010 is about 12% less than baseline FY2009 energy use.)

### CM&D Renovation and Expansion

A new CM&D building was constructed during the latter half of 2009, which replaced and expanded upon an existing building. The change in the building stock is:

CM&D Building Area Changes (gross sqft)		
[Source: Assessors Office]		
	Old Building	New Building
finished space	288	2,240
Garage	7,680	9,760
Total	7,968	12,000
area change:		51%

Energy use in the new building is significantly lower overall. The following table shows that overall energy use on a per square-foot basis has been reduced by 63%. The analysis is based on comparing FY2009 (July 2008 – June 2009) data for the old building and CY2010 (January – December 2010) for the new building as the construction period was July-December 2009. This work does not make any adjustments for the different changes in finished and garage space.)

**CM&D - Comparative Building Energy Use Analysis**

	<u>Old Building</u> (FY2009)	<u>New Building</u> (CY2010)	
Nat. Gas (therms)	7,014	2,911	
Elec. (kWh)	24,827	44,610	
<b>Total (mmBtu)</b>	<b>786</b>	<b>443</b>	
mmBtu gas	701	291	
mmBtu elec	85	152	
<b>per sq.ft.</b>			<b>Energy Use Changes</b>
mBtu - total	99	37	<b>-63%</b>
mBtu - gas	88	24	<b>-72%</b>
kWh - elec	3.1	3.7	<b>19%</b>

This overall reduction is the sum of an even greater reduction in natural gas use and an increase in electricity use. The increase in electricity use is related to the very large increase in finished space for offices and other uses. The large natural gas use reduction is due to the age, condition and equipment of the old building. The energy changes included in this ERP are:

	<u>Natural gas</u>	<u>Electricity</u>
FY2009 baseline use (mmBtu)	701	85
Energy use change (per sqft basis):	-72%	+19%
FY2010 Pro-rated Change (mmBtu)	-505	+16

(The calculation approach produces the same result as adjusting the CY2010 use for only the area of the old building using a factor of 7,968/12,000.)

**Pine Hill Elementary School**

Recent projects at the Pine Hill Elementary School have included the installation of a new boiler and energy management system, changes in ventilation system, and installation of replacement windows in eight classrooms. Though these projects took place one year before the FY09 baseline year, it took several years to tap all of the benefits with regard to the energy management system and improved operation procedures and parameters. Furthermore, there have been ongoing efforts to better seal the building envelope. Actual energy use at the school was significantly less in FY10 as follows:

<b>FY2009 to FY2010 Energy Changes at Pine Hill Elementary School</b>				
	<u>FY09</u>	<u>FY10</u>	<u>Change</u>	<u>mmBtu</u>
Electricity (kWh)	396,360	391,800	-4,560	-16
			-1%	
Nat. Gas (therms)	39,530	31,926	-7,604	-760
			-19%	
Total FY10 Change from FY09 Baseline:				-776

For the purpose of this ERP, a conservative energy reduction credit of 700 mmBtu of natural gas has been used. As discussed below, based on analysis performed for this ERP, significant additional energy reductions at the school are possible. A high priority energy conservation measure is a comprehensive examination of the entire school building envelope and the energy management system to systematically identify projects that improve its energy efficiency.

**Main Fire Station (at North Main Street)**

A larger maintenance/repair project at the main fire station included insulation and other building envelope improvements (including roof repair) for part of the building as well as new programmable thermostat and some repairs to HVAC controls.

**FY2009 to FY2010 Energy Changes at Main Fire Station**

	<u>FY2009</u>	<u>FY2010</u>	<u>Change</u>	<u>mmBtu</u>
Electricity (kWh)	53,800	60,920	7,120	24
Nat. Gas (therms)	6,368	4,730	-1,638	-164
Total Change:				-140

Energy use data for part of FY2011 also show the same pattern as above of reduced natural gas use and increase electricity use. The increased electricity use is being examined and may be due to air conditioning system problems based on preliminary work. Planned future work is aimed at resolving this electricity use increase and is expected to include work on the air conditioning system as in one of this ERP's planned measures that will examine all space conditioning issues. In addition, further work on building insulation is planned with additional heating fuel (natural gas) savings.

For the purpose of this ERP, an energy reduction credit of 140 mmBtu of natural gas is taken as a simplified net change.

**IV. SUMMARY OF ENERGY AUDITS**

Energy audits of several types were used in the development of this ERP. The results of this work are included in the work presented in the next section. NSTAR-related audits by contractors were undertaken for all town buildings (except for the new CM&D building). The Energy Committee members include a contractor and architect who undertook some preliminary analysis of the town's elementary school and main fire station, including limited thermal imaging, blower tests and energy modeling. In addition, a team of Clark University graduate students examined a range of efficiency and sustainability issues at the elementary school as part of a class project.

As noted below, this work identified the need for some more detailed systematic building assessments to address space-conditioning issues that not only affect efficiency but also even/balanced performance and better controls. Such assessments will be part of continuing efficiency work.

A list of the audits performed on municipal buildings is provided in Section VII below and included in Tables 4, 5 and 6.

## **V. ENERGY USE REDUCTION**

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

The short-term goal of this current plan is to identify and implement currently attractive energy efficiency projects in order to both reduce energy costs and environmental impacts and establish an approach for and track record of successfully implementing such projects. The longer-term goals include setting a process by which energy use is regularly analyzed for cost-effective efficiency measures and mechanisms for designing, funding and implementing such measures are established.

### **B. Getting to a 20% Energy Use Reduction Within the 5 Year Period Following the Baseline Year**

As noted above, this ERP projects at least a 20% energy reduction based on in-place measures saving about 10% and on planned measures saving about 11%.

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

The Energy Committee, together with town departments, has committed to the implementation of energy reduction projects. This effort will be strongly driven by the town's ongoing need to lower costs due to budgetary constraints. Both external and internal financial resources will be utilized. Most of the initial measures may be funded by external sources, such as the Green Communities Grant Program. NSTAR incentives for improved lighting efficiency are also a significant source of funding. As part of ongoing work, other external sources will be investigated. Some of such funding may arise when energy efficiency projects are integrated with other town projects that obtain some external funding. Furthermore, for projects of sufficient scale and useful life (more than \$10,000 and greater than 5 years), internal funding will be tapped by working with the town's Capital Budget Committee. As noted below, we are also investigating the use of an energy management services company (ESCO) that could potentially facilitate financing as well as management of improvements.

The main tools the town will deploy to reduce energy use are:

- a. Detailed energy studies of town major buildings (specifically Pine Hill School) to prioritize specific energy investments by their financial return.
- b. Investments in town buildings improvements and vehicle upgrades (such as anti-idling devices)
- c. Policy changes and behavioral modifications (i.e. equipment purchasing policies)
- d. Education and training of town employees, school staff and students and the Sherborn community (along with monitoring and publicizing progress)
- e. Potentially hiring a town energy conservation and building maintenance professional.

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

The Energy Committee is responsible for the oversight of the ERP and the implementation of the energy conservation measures. In general, it will work with the directors (or their designee) of each department on relevant measures. The first round of implementation will test how to best manage implementation, which will also vary based on the type and scale of the projects. Importantly, the Board of Selectmen is currently examining the overall issue of and various

options for buildings management. Options include a buildings management position (staff or consultant) as well as an interdepartmental committee, which would include working on energy related matters. We are also participating in a Metropolitan Area Planning Council program to solicit proposals from an ESCO on a regional basis in order to provide a more attractive option for the ESCO. The solicitation and evaluation process will produce sufficient information to determine whether use of an ESCO would be appropriate for our town.

Importantly, the expertise and time of Energy Committee members will be used to ensure the proper implementation of these measures (with outside assistance when needed) and then to monitor and evaluate their impacts. Members of the committee have expertise in contracting, architecture, planning and energy analysis, and it includes town staff. The Committee clearly recognizes the importance of initial and continued evaluation of measures for any needed corrections and for any feedback on future project design and implementation.

The development of this ERP has begun the process of developing department linkages for measure implementation. Because of the town's small size, all town departments have small staff, which has the advantage of easy direct communications and the disadvantage of limited resources. Town management has a long established setup of extensive reliance on resident volunteers; therefore, working relationships between the Energy Committee and town departments has been and is expected to be workable. For the Pine Hill School, the town's largest energy user, the Energy Committee includes the chair of the School Committee and a member of the School Building Committee. The Energy Committee has already been working with school principal and will work school district maintenance department.

The Energy Committee will be responsible for monitoring the implementation of measures and the progress against this ERP. Actual energy use will be reviewed by the Committee on a regular (at least annual basis) to monitor progress, effectiveness of implemented measures and potential changes. The infrastructure for data collection and analysis has already been established by the Committee.

### 3. Energy Conservation Measures

Table 4 presents the planned energy conservation measures to be implemented in FY2012 and FY2013 (and some additional measures will be developed for FY2014, the last year of the five-year period). The table also notes some potential projects that will be examined beyond this period. As presented the estimated energy reductions from these measures are:

	Energy Savings from Planned Energy Conservation Measures		
	Electricity	Fuel	Totals
mmBtu:	383	1,025	1,408
% of Baseline	13%	10%	11%
Buildings	361	948	1,309
Vehicles		77	77
Street/Traffic Lights	20		20
Other	2		2

**TABLE 4: SHERBORN PLANNED ENERGY CONSERVATION MEASURES**  
**[See last page with TABLES 4, 5 and 6.]**

### Electricity Savings

As to electricity use reductions, about 60 percent of the estimated savings are based on NSTAR-related audits. These audits, on average, are estimated to save about 10 percent of each building's baseline electricity use. Some additional work on the audits will be undertaken with all departments to review whether sufficient lighting controls should be included. Lighting changes at the Pine Hill School will also include some work on the level of required lighting in the classrooms.

As noted below under Subsection 6, a library renovation is projected to provide about 14% of the estimated total town electricity reductions. (The amount of library electricity savings is based on a 20% savings calculated using an average of electricity use for FY's 2008-2010. This 20% estimated savings is based on preliminary architectural work.)

The remaining 26% of electricity reductions are a number of smaller measures that have been identified by the Energy Committee during ERP preparation. Some comments on specific measures are:

- Elementary School equipment electricity use: lowering electricity use by printers, computers and refrigerators was recommended by a Clark University report and involves a combination of timer controls, behavior modification and possibly new equipment.
- Traffic signal: significant and cost effective electricity savings are clearly possible from Energy Star certified LED traffic lights; potential savings can greatly exceed 50% of current use and are estimated at approximately 50%.
- Street lights (town owned): significant and cost effective electricity savings are possible from changing the lighting at the six town-owned streetlights; this will be examined and are estimated at approximately 30%.

Though not included in Table 4, the new CM&D building will be examined for lighting improvements and other electricity savings.

### Heating Fuel Savings

As to fuel savings, the largest planned measure pertains to improvement projects at the Pine Hill Elementary School, and this is a high priority. Already significant reductions have been achieved by replacing the boiler and some windows. Preliminary analysis by the Energy Committee estimate that significant further energy savings of about 20% can be cost-effectively achieved from the building's FY10 natural gas use. (This reduction is in addition to the FY10 reduction from FY09 baseline level.) This estimate is based on work by the Energy Committee that included thermal imaging, blower door tests, energy modeling and review of past work and reports. This work has identified the need for projects related to insulation, envelope sealing, continued window replacement, ventilation system changes, heating system control changes, and behavioral modifications.

Due to the scope and complexity of this needed work for the school, a detailed comprehensive energy audit will be undertaken to specify a set of coordinated cost-effective projects for an overall Heating Energy Use Reduction Measure. The age of the building and the history of additions and renovations reinforce the need for this audit. The building was built in 1956, and there have been two major additions: (i) a gym and kindergarten wing with 4 classrooms in 1998 of about 13,000 sq.ft. and (ii) a library/media center and 9 classrooms in 1971 of about 17,600

sq.ft. The building is now about 70,000 sq.ft. with about 28 classrooms as well as offices, gymnasium, auditorium, cafeteria and library/media center.

When Green Community certification is achieved, an immediate priority is to pursue detailed audit efforts to develop specific projects at the school. This work may include the Whole Building Assessment Program if the school qualifies. However, in addition, a contractor specializing in the diagnostics (including balancing) of space conditioning systems will be hired. Overall, this work is expected to identify the appropriate mix, timing and specification of projects for the school. This work is planned to start in FY2012.

The Pine Hill Building Committee (which includes two Sherborn School Committee members and town residents, one of which is an Energy Committee member) has identified over \$1,000,000 in expected capital projects, which include significant energy reduction efforts. This budget level is also part of the town's Capital Budget Committee menu of possible expenditures.

The planned comprehensive audit is expected to produce detailed project specification. Some preliminary project definition work is:

- Windows: A recent project replaced single-glazed windows in 8 classrooms. One planned project is the continued replacement of windows in additional older classrooms and other rooms. Based on previous work, this project will cost in excess of \$500,000 and have significant energy savings as well as building maintenance and comfort benefits.
- Building envelope: An expected project of building sealing and selected insulation is preliminarily estimated at about \$50-100,000.

However, detailed specification of such work will be based on a comprehensive audit given overlapping issues and the synergies of addressing all space conditioning matters together. A systematic audit is expected to better identify the mix of projects that is cost effective.

More specifically, some of the work supporting the estimated energy reduction is as follows.

- Windows: Existing conditions in many rooms include single-glaze windows, which are a large percentage of the exterior area. Replacement/renovation options for these windows range from storm windows to double-glazed low-E options. Energy modeling (using REScheck software v.4.4.1) of a typical older classroom indicated that window improvements could reduce the room's heat loss by 35-55 percent.
- Air leakage: The blower door tests found that air leakage was significantly above building standards. This work also identified specific locations for envelope improvement by sealing, caulking and insulation. For example, significant leakage was found at the junction of different types of building materials, such as between the cinder-block walls and the ceiling steel beams.
- Ventilation system: A 2005 study of the ventilation system found that it was not performing to specification and improvements were needed, including operational changes. The design of needed modifications will now examine heat recovery and energy efficiency options. Such modifications may cost between \$50-150,000.
- Heating system controls: A survey of the teachers and on-site work indicate the need for work on improved controls of the heating system, including related to balancing, timing and levels. Energy savings are expected from this work.

The primary electricity savings at the school pertain to lighting: more efficient equipment, better controls and behavior modifications. A lighting audit analysis by Northern Energy Services (December 7, 2010) identified annual electricity savings of about 44,000 kWh (which is about a 40 percent savings) and about 11 percent of baseline school electricity use. The project cost is about \$51,000, which after utility incentives is estimated at about \$38,000 with about a 4-year simple payback.

As to other large fuel reduction measures:

- The library renovation (with estimated 20% savings) is projected to provide about 15% of the estimated fuel reductions based on preliminary design work by the architect (Beacon Architectural Associates 2011 memorandum).
- The Main Street Fire Station: The Committee will prepare a scope for the insulations and controls work and go out to bid for this project.

Though not included in this plan, Table 4 notes that work on the space conditioning systems at the Town Hall and the Police Station is needed. The schedule for this work will depend on how well the work on other measures proceeds.

#### Vehicle Fuel Savings

As noted above, the town has the following vehicles:

	<u>non-exempt</u>	<u>exempt</u>
CM&D	1	20
Fire Dept.	1	9
Police Dept.		8
Totals:	2	37

Falling under Criterion 4 for Fuel-Efficient Vehicles are two non-exempt vehicles owned by the town:

- a vehicle used by the head of the CM&D department
- a vehicle used by the Fire Department Chief.

The CM&D vehicle has a current odometer reading of about 190,000 miles with annual use now projected to about 10-15,000 at about 14 miles per gallon. It is planned for replacement in FY13 with a fuel-efficient vehicle as per the Criterion 4 efficient vehicle policy. The projected energy savings is conservatively projected at 5 percent of current fuel use as it is too early to specify the specific fuel-efficient model. (It is possible that the vehicle replacement will be equipped for work such that it becomes exempt; nevertheless, fuel efficiency will be part of what vehicle is chosen.) The Fire Department vehicle currently has about 40,000 miles with annual use about 4,000 miles and about 15 miles per gallon, and it is not planned for replacement within the period of this plan. In any case, any replacement of non-exempt vehicles will be in line with the Vehicle Efficiency Policy recently approved by the Board of Selectmen.

Attachment B presents the inventory of all town vehicles and their replacement schedule. In addition to the one non-exempt CM&D vehicle noted above, 11 other exempt vehicles are planned for replacement during this plan period. To the extent possible, fuel efficiency and appropriate vehicle size will be part of the replacement decision.

Many of the vehicles being replaced are 15 to over 20 years old. Potential fuel savings are expected because of the age of the vehicles and availability of more fuel-efficient models;

however, in some cases, more stringent air pollution controls in new vehicles may lessen such savings. Fuel efficiency information for heavy-duty vehicles and fire engines is not readily available; however, surveying some anecdotal information on the internet indicates that some savings can be expected. For this ERP, an estimated savings of 5 percent is projected for all vehicle replacements in the table below.

<b>Vehicles - Projected Fuel Savings</b>		<u>Replacement</u>	<u>CY10</u>	<u>Est.</u>	<u>Projected</u>
	<u>Year</u>	<u>Fuel</u>	<u>Use</u>	<u>Savings</u>	<u>Savings (mmBtu)</u>
<u><b>CM&amp;D Department</b></u>					
#20 non-exempt	FY13	gasoline	917	5%	6
#10 dump/sander	FY13	Diesel	327	5%	2
#25 loader	FY13	Diesel	582	5%	4
#28 pick-up	FY13	Diesel	284	5%	2
#30 dump/sander	FY12	Diesel	305	5%	2
#38 tractor	FY13	Diesel	145	5%	1
anti-idling device (1)	FY13	Diesel		1%	1
<u><b>Fire Department</b></u>					
Engine 4 replacement	FY12	Diesel	197	5%	1
Engine 5 replacement	FY13	Diesel	86	5%	1
<u><b>Police Department</b></u>					
4 police cruisers	FY12&13	gasoline	8,944	5%	55
anti-idling device (1)	FY13	gasoline		1%	2
<b>Total Projected Savings:</b>					<b>77</b>

Note: 0.139 mmBtu/gallon diesel  
0.124 mmBtu/gallon gasoline

The largest savings from replacement of police cruisers is approximate because the vehicle choice has not yet been decided. For the current model, the EPA fuel economy data for Ford Crown Victoria Police vehicles show no change between 2005, 2007 and 2011. Nevertheless, some fuel use improvements could be expected because a replacement will be new. In addition, Ford Taurus or Explorer models are also being considered – both of which could have slightly higher EPA fuel economy.

The plan includes installing anti-idling devices in FY13 in one police cruiser and one CM&D vehicle as tests for their practicality and effectiveness. This measure is only approximate and will be specified after reviewing the experience elsewhere as they are planned for nearby towns (e.g. Medway). This review may lead to a greater or no adoption of these devices depending on the findings. As a conservative estimate, a 1 percent fuel savings for each vehicle is projected.

Though not explicitly included as a project, the Energy Committee will work with the Police and CM&D Departments on vehicle idling issues to see if operational changes can be made to save fuel.

#### 4. Estimated Capital and Operating Costs

Table 5 presents the estimated costs, incentives, savings and simple payback for many of the energy reduction measures in Table 4. (The savings are based on approximate unit energy costs of \$0.20/kWh, \$12/mmBtu for natural gas, and \$3/gallon of vehicle fuel.)

**Table 5: Estimated Costs of Energy Conservation Measures**  
[See last page with TABLES 4, 5 and 6]

The town's total energy costs were about \$300,000 in FY10 (not including the municipal owned streetlights). The estimated cost savings from the measures is about 10 percent (paralleling the energy reduction levels in energy units). The payback periods for the defined projects are generally under five years. The payback periods for some larger projects related to improvements in space conditioning are expected to be longer, which is acceptable because of the longer life of these projects and the related maintenance benefits.

The energy savings at this time will become operating cost savings for the town and help the town prepare non-override operating budgets given current fiscal conditions. In addition, see the discussion below under Subsection D. point 4. "Perpetuating Energy Efficiency Both During and Beyond this Plan" noting some financing options to be pursued.

## **5. Schedule for Implementation**

Table 6 presents the schedule for implementation of the energy reduction measures through FY13. The highest priority for implementation are the lighting projects based on audits and detailed building audits particularly for specifying projects at the elementary school.

**Table 6: Schedule for Implementation**  
[See last page with TABLES 4, 5 and 6.]

## **6. Additions and New Construction**

The only planned building additions and new construction during the remaining plan period is a renovation and expansion of the town's library. This project would renovate the entire existing library space and include an addition that will increase the building area by about 50 percent. The energy use by expansion is not included in this ERP and will be reported on separately as in the plan instructions. (The conservatively estimated 20% reduction in electricity and fuel use in the renovated existing space is included in this ERP and will be monitored as part of the annual reporting on this plan.) Furthermore, analysis of future energy use against the baseline will be adjusted for the addition to the CM&D building within the plan period.

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

The Town will now use the Mass Energy Insight Model for tracking its ongoing energy use. The Energy Committee will oversee the entry of energy use information that is not regularly updated by the electricity and gas utility. Developing the baseline energy has forged the town relationships needed for this ongoing energy tracking.

The Energy Committee will be responsible for and prepare annual reports of the town's energy use to the Green Communities Division. This report will also include a section on monitoring the energy use reductions expected from the renovation and expansion of the CM&D building that took place during and after the baseline year. Regular energy use reporting will also be made to the town's departments: Selectmen, Police, Fire, School, Library and CM&D.

## D. Summary of Long-Term Energy Reduction Goals – Beyond 5 years

The town is strongly motivated to generate operating cost savings due to its fiscal situation. A goal is that energy reduction work becomes a routine part of the budgeting process.

Furthermore, the environmental benefits of energy efficiency match the interests of many town residents. Longer-term reduction goals include:

### 1. Buildings:

#### a. Building envelope and space conditioning improvements:

All building maintenance and repair projects will consider any synergies with including building envelope improvements in their scope in order to continually improve efficiency of space conditioning energy use. The space conditioning systems at Town Hall and the Police Station will be examined as these buildings are not part of this ERP.

#### b. Regional middle and high school buildings:

This work will be expanded to include the analysis for and implementation of attractive energy reduction projects.

#### c. Pine Hill Elementary School

There are discussions that, in the medium to longer term, some major renovations will be needed at the elementary school. It is the Energy Committee's goal that such work will incorporate high levels of energy efficiency and practical renewable energy options, including broader sustainability issues such as some LEED certification. This goal will be supported by the increasing efficiency required by the evolving energy code.

### 2. Vehicles:

An ongoing goal is to purchase, whenever possible, efficient vehicles even when exempt from the efficiency vehicle policy. In addition, though school busing is contracted out, there is interest to see if such contracting can be used to leverage increased efficiency (as well as alternative fuel use such as biodiesel) from the provider.

### 3. Lighting efficiency improvements:

Though significant lighting improvements will be implemented during this ERP, expected technical and cost improvements in lighting options (such as LEDs) are expected to lead to additional attractive projects in town buildings in the future.

### 4. Perpetuating Energy Efficiency Both During and Beyond this Plan:

The Board of Selectmen recognizes the usefulness of directing energy cost savings towards funding an ongoing energy efficiency program. However, a formal earmarking of such savings may be difficult due to the town's tight financial position. Sherborn in the past has followed traditional paths for municipal project, usually considering projects on an individual basis rather via earmarked funding. The Capital Budgeting Committee will support attractive projects, which can be approved as part of exempt debt borrowing.

Importantly, town leadership has expressed its interest in innovative and new financing approaches to accomplish energy reductions, ones that might be simpler, lower cost and procedurally more effective. One option may be performance contracting, as allowed by state law, that would enable the town to borrow money without debt exclusions and to repay the debt using energy savings accomplished by the projects funded by the debt. Other ideas include town resident funding via loans/bonds. In addition, there are current discussions of formalizing building operations/maintenance support that would include energy efficiency work and this might be justified and funded by energy cost savings.

## VI. ONSITE RENEWABLE ENERGY PROJECTS & RENEWABLE ENERGY

The town plans to pursue, at a minimum, the following renewable energy projects:

- PV: ground-mounted solar PV at the town's former landfill
- Electricity: future commodity electricity purchases will include examining renewable energy-based sources
- PV: roof-mounted solar PV at the elementary school and possibly other town buildings
- Biomass: biodiesel (e.g. waste vegetable cooking oils) for vehicles.

In FY2012, the town plans to go out to bid for a ground-mounted solar PV installation at the town's former landfill. A recent Town Meeting approved the Board of Selectmen proceeding with this project, including ability to lease the land. This meeting also approved other zoning by-law changes needed for permitting this type of project. The estimated scale of this project is about 600-800 kW (from ICF International action plan Appendix C data) with an estimated annual generation of about 1 million kWh (about 3,400 mmBtu), a similar result from a NREL solar electricity estimator. This generation is equal to about 25% of the town's baseline energy use.

While going out to bid for the ground-mounted PV project, the town will also explore roof-mounted systems at town buildings with prospective project developers. In the past, there was interest expressed in a project at the Pine Hill Elementary School.

The town's current contract for electricity is expiring this year and options for renewable based electricity generation will be examined as part of selecting a new supplier.

Though not energy focused at this time, the town is currently promoting composting of food wastes and is exploring a central composting facility at the transfer station. The goal is lower solid waste generation and producing fertilizer; however, there is interest in any energy-related possibilities even though unlikely to be attractive in this climate.

## VII. LIST OF RESOURCES

Many of the resources used in the development of this ERP are:

- NSTAR audits:
  - Northern Energy Services audit of Pine Hill Elementary School (December 7, 2010)
  - AECOM audit of Fire Station at North Main Street (February 14, 2011)
  - AECOM audit of Fire Station at 4 Farm Road (January 31, 2011)
  - AECOM audit of Town Hall (March 30, 2011)
  - AECOM audit of Police Station (April 22, 2011)
- Beacon Architectural Associates, "Sherborn Library Expansion Study – Proposed Operating Costs" March 17, 2011 memorandum
- Clark University Green Business Management class project, "Pine Hill Elementary School: Sustainability Plan" by Andrew Lizotte, Chris Adams and Dat Nguyen, 2010.
- work by The Sherborn Energy Committee (Glickman and Lifton) on town's buildings: blower door tests, infrared diagnostics and energy simulation modeling using ResCheck software.
- Green Communities Action Plan, Town of Sherborn (March 2011). ICF International, on behalf of DOER. 33 pp.

- Pine Hill Elementary School – “Draft Existing Conditions Report” and “Feasibility Study”, prepared by Flansburgh Associates, Inc. no date. (Architect’s work for 2007-08 renovations.)
- EPA information on fuel efficiency at [www.fueleconomy.gov](http://www.fueleconomy.gov)
- online info on traffic signals and street lights
- IMBY NREL solar electricity estimator

## ATTACHMENT A

## TOWN APPROVAL OF ENERGY REDUCTION PLAN

## A.1 Board of Selectmen Approval



## Town of Sherborn

SHERBORN, MASSACHUSETTS 01770

TOWN OFFICES: 19 Washington Street • Phone (508) 651-7850 • Fax (508) 651-7854

Tom Twining, Chairman  
Paul R. DeRensis, Vice Chairman  
George X. Pucci, Clerk

June 9, 2011

TO: Sherborn Energy Committee:

We are pleased to inform you that on June 9, 2011 the Board of Selectmen of the Town of Sherborn voted unanimously to support and adopt the Sherborn Energy Reduction Plan. We look forward to working with the Energy Committee on achieving the goals of the Plan to significantly reduce the town's energy use thereby lowering related environmental impacts and financial costs.

Sincerely,

Tom Twining  
Chair

Paul R. DeRensis  
Selectman

  
George X. Pucci  
Selectman

**A.2 Sherborn School Committee Approval**

## Sherborn School Committee



June 9, 2011

Daniel Glickman, Chairman  
Sherborn Energy Committee  
19 Washington Street  
Sherborn, MA 01770

Dear Mr. Glickman:

At its meeting of May 12, 2011, the Sherborn School Committee voted to approve the Energy Reduction Plan for Sherborn. The minutes of that meeting are attached.

We are very interested in reducing energy costs at Pine Hill School, and we appreciate the work your committee has done to begin to identify measures to accomplish that goal.

Sincerely,

A handwritten signature in black ink that reads "Edward McGuire".

Edward McGuire  
Chairman, Sherborn School Committee

**Sherborn School Committee**

Meeting of May 12, 2011

Members Present: Ed McGuire  
Susan Hanlon  
Frank Hess  
Frank Hoek  
Anne Hovey  
Also Present: Valerie Spriggs, Superintendent of Schools  
Stephen Bliss, Assistant Superintendent of Schools  
Veronica Kenney, Principal Pine Hill School

**3) Community Comments** – Mr. Lesser of the Sherborn Energy Committee presented and discussed a draft Energy Plan for proposed energy savings at Pine Hill.

Mr. Hess made a motion to approve the Sherborn Energy Reduction Plan. Ms. Hanlon seconded.

11-22 VOTE: 5 – 0

Respectfully submitted,  
Amy Davis

**ATTACHMENT B:**  
**SHERBORN VEHICLE INVENTORY, FUEL USE AND REPLACEMENT SCHEDULE**

<u>Unit #</u>	<u>Model</u>	<u>Make</u>	<u>Year</u>	<u>Fuel</u>	<u>MPG</u>	<u>Fuel Use CY10</u>			<u>Replacement</u>
						<u>Diesel</u>	<u>Gasoline</u>	<u> </u>	
<b><u>EXEMPT VEHICLES</u></b>									
20	CM&D – Silverado	Chevy	2002	gasoline	~ 14				917
301	FIRE – Explorer	Ford	2002	gasoline	~ 15				266
<b><u>NON-EXEMPT VEHICLES</u></b>									
<b><u>CM&amp;D DEPARTMENT</u></b>			<u>(maintenance/public works)</u>						
1	F250 4WD (9,600)	Ford	2007	diesel	.	511			
10	8000 dump/sander	GMC	1979	diesel		327			FY13
21	7500 dump/sander	Internat'l	2002	diesel	.	450			
22	RD690P dump/sander	Mack	2000	diesel		656			
23	700SER dump/sander	Internat'l	2007	diesel		953			
24	4900 dump/sander	Internat'l	2001	diesel		389			
25	522G loader	John Deere	1993	diesel		582			FY13
26	F450 dump-15,000	Ford 4WD	2004	diesel		948			
27	F450 dump-15,000	Ford 4WD	2004	diesel		296			FY14
28	F350 pick-up	Ford	1997	diesel		284			FY13
29	Pelican (sweeper)	Elgin	2007	diesel		659			
30	4900 dump/sander	Internat'l	1993	diesel		305			FY12
31	410G back-hoe	John Deere	2004	diesel		589			
33	F350 pick-up	Ford (9,900)	2001	diesel		402			
34	F450 dump (16,000)	Ford	2005	diesel		666			
35	4700 dump	Internat'l	1999	diesel		287			
38	MTV tractor	Trackless	1997	diesel		145			FY13
39	Tractor	John Deere	1994	diesel		65			FY14
40	320 Skidsteer	John Deere	2007	diesel		45			
41/52/101	Misc. vehicle (discontinued)					386	340		
<b><u>Equipment</u></b>									
2	Equipmt (LM-G-D)			gasoline/diesel		421	441		
3	Equipment (G-D)			gasoline/diesel		58	24		
19	Chipper	Morbark	1988	gasoline		67			
37	1070 tractor mower	John Deere	1994	gasoline					
90	Compressor	Unknown	1965	diesel					
91	Chipper	Vermeer	1998	gasoline					
99	Lawn mower			gasoline			52		
92	Msg. Board 4X3H	Addco	2010	n.a.					
Subtotal:							9,493	1,774	

[continued]

**ATTACHMENT B:**  
**SHERBORN VEHICLE INVENTORY, FUEL USE AND REPLACEMENT SCHEDULE**  
[continued]

<u>Unit #</u>	<u>Model</u>	<u>Make</u>	<u>Year</u>	<u>Fuel</u>	<u>MPG</u>	<u>Fuel Use CY10</u>		
						<u>Diesel</u>	<u>Gasoline</u>	<u>Replacement</u>
<b>FIRE DEPARTMENT</b>								
401 A-1	Ambulance	Ford	2007	diesel	682			
303 E-1G	600	Mack	1993	gasoline			2	
304 E-1D	600	Mack	1993	diesel	234			
305 E-2D	600	Mack	1990	diesel	98			
306 E-2G	600	Mack	1990	gasoline			3	
307 E-3D	Dash	Pierce	2004	diesel	382			
308 E-3G	Dash	Pierce	2004	gasoline				
309 E-4D	600	Mack	1993	diesel	197			retire FY12
310 E-4G	600	Mack	1993	gasoline			2	retire FY12
New	Contender (450)	Pierce	2011	diesel				new FY12
311 E-6D	S1800	International	1986	diesel	39			
312 E-6G	S1800	International	1986	gasoline			1	
313 1-G	Brush (pump)	AM General	~1986	gasoline				
314 1-D	Brush AWD	AM General	~1986	diesel	30			
315 E-5D	F350	Ford	1989	diesel	86			FY13
316 E-5G	F350	Ford	1989	gasoline			14	FY13
Subtotal:						1,748	289	
<b>SCHOOL DEPARTMENT</b>								
501	Equipment	n/a	n/a	gasoline		0	10	
<b>POLICE DEPARTMENT</b>								
1511	Crown Victoria	Ford	2007	gasoline	~10	2,514	FY12	
1512	Crown Victoria	Ford	2007	gasoline	~13	2,042	FY12	
1513	Crown Victoria	Ford	2005	gasoline	~12	2,629	FY13	
1515	Unmarked			gasoline		57		
1516	Unmarked			gasoline		451		
1517	Unmarked			gasoline		229		
1518	Explorer	Ford	2007	gasoline	~8	1,759	FY13	
1519/4102	Unmarked			gasoline		5		
Subtotal:						0	9,686	
<b>TOTALS</b>						<b>11,241</b>	<b>11,759</b>	

## TOWN OF SHERBORN ENERGY EFFICIENCY PROJECTS

TABLE 4: SHERBORN PLANNED ENERGY CONSERVATION MEASURES (ECMs)

TABLE 5: ESTIMATED COSTS AND SAVINGS OF ECMs

TABLE 6: SCHEDULE FOR ECM IMPLEMENTATION

		ENERGY SAVINGS			SOURCE	Cost	Incentives	Net Cost	SAVINGS (\$)		IMPLEMENTATION	
		Electricity		Natural Gas/Fuel					FY 12	FY 13		
		kWh	mmBtu	mmBtu					Q1 & 2	Q3 & 4	Q1 & 2	Q3 & 4
<b>FIRE DEPARTMENT</b>												
<b>N. Main Fire Station</b>												
F-1. <b>Lighting Efficiency Improvement (NSTAR)</b>	6,914	24			- NSTAR-related audit; savings ~10% of baseline elec. Use	\$ 5,100	\$ 1632	\$ 3,468	\$ 1,383	2.5	X	
F-2. <b>Insulation &amp; improved controls for heat-A/C efficiency</b>					- energy-related payback not used as project will also reduce building maintenance costs							
a. for heating (natural gas savings)			140		- preliminary contractor estimate of ~30% savings	22,000		22,000	1,680		X	
b. for A/C	6,000	20			- preliminary contractor estimate of ~10% savings	5,000		5,000	1,200	4.2	X	
<b>Farm Road Fire Station</b>												
F-3. <b>Lighting Efficiency Improvement (NSTAR)</b>	700	2			- NSTAR-related audit; savings ~10% of baseline elec.	819	398	421	140	3.0	X	
F-4. <b>Heating Reduction</b>			8		- preliminary contractor estimate of ~5% savings	200		200	100	2.0	X	
- new thermostats and reduced settings												
F-5. <b>Compressed Air System Efficiency</b>	3,000	10			- preliminary work with Fire Department			TBD	600		X	
- project for new or adjust compressed air system & fix truck leak (to be refined)												
F-6. <b>Town Hall "F Pump" Efficiency</b>	500	2			- preliminary contractor estimate of ~10% savings			TBD	100		X	
- adjust dehumidifying level &/or better seal tank area												
<b>POLICE STATION</b>												
P-1. <b>Lighting Efficiency Improvement (NSTAR)</b>	11,748	40			- NSTAR-related audit; savings 8% of baseline elec.	6,543	2,776	3,767	2,350	16	X	
P-2. <b>Heat-A/C Efficiency &amp; Controls</b>					- controls/thermostat work needed; analysis to be done, some controls issues						X	
<b>TOWN HALL</b>												
TH-1. <b>Lighting Efficiency Improvement (NSTAR)</b>	9,665	33			- NSTAR-related audit; savings ~8% of baseline elec.	11,122	2,416	8,706	1,933	4.5	X	
TH-2. <b>Heat-A/C</b>					- no detailed analysis, but some controls issues; many house-keeping issues for doors & windows - to be studied						X	
<b>TRANSFER STATION</b>					- electricity use for equipment increasing; efficiency possibilities to be explored						X	
<b>LIBRARY</b>												
L-1. <b>Renovation/Expansion</b>												
Electricity use	17,000	58			- architect preliminary design estimate of ~20% savings						X	
Heating energy use (fuel oil, switch to gas)			170		- architect preliminary design estimate of ~20% savings						X	
- additional savings expected from switch to natural gas from fuel oil												
<b>CM &amp; D BUILDING</b>												
CMD-1. <b>Lighting Efficiency Improvement</b>					- for this new building, check in future for improvements with emerging new technology (likely beyond 5-yr period)						X	
<b>PINE HILL ELEMENTARY SCHOOL</b>												
PH-1. <b>Detailed Building Audit</b>											X	
PH-2. <b>Heating Energy Use Reduction</b>			600		- preliminary estimate	5,000		5,000				
					- preliminary contractor estimate of ~20% savings - high priority for specification	50-100,000	TBD	TBD		7,200		
					- insulation, sealing, window replacement, ventilation controls; to be done in stages							
PH-3. <b>Lighting Efficiency Improvement (NSTAR)</b>	43,913	150			- NSTAR-related audit; savings 11% of baseline elec.	51,065	13,000	38,065	8,780	4.3	X	
PH-4. <b>Hot water use reduction - aerators</b>			30		- Clark University study & Energy Committee	200		200	360	0.6	X	
PH-5. <b>Printer/computer energy use reduction</b>					- Clark University study & Energy Committee	625		625	1,120	0.6	X	
A. time controls	5,600	19			- Clark University study & Energy Committee	0		0	240	0.0		
B. new efficient printers	1,200	4										
<b>VEHICLES</b>												
V-1. <b>Police Vehicles</b>												
Replacement of 4 exempt vehicles			55								X	
Anti-Idling Devices and Practices			2								X	
V-2. <b>Fire Vehicle Replacement (exempt)</b>			2								X	
V-3. <b>CM &amp; D Vehicle Replacement (exempt &amp; 1 non-exempt)</b>			18								X	
<b>TRAFFIC LIGHT (at Routes 16/27)</b>												
TL-1. <b>Lighting Efficiency Improvement (LED)</b>	3,000	10			- preliminary estimate of ~50% savings based on literature						X	
<b>STREET LIGHTS - MUNICIPAL (6)</b>												
SL-1. <b>Lighting Efficiency Improvement</b>	3,000	10			- preliminary estimate of ~30% savings based on literature						X	
<b>TOTALS</b>					Savings: 112,240 383 1,025							
					% of baseline: 13% 10%							
					Baseline FY09 (mmBtu): 3,008 10,315							