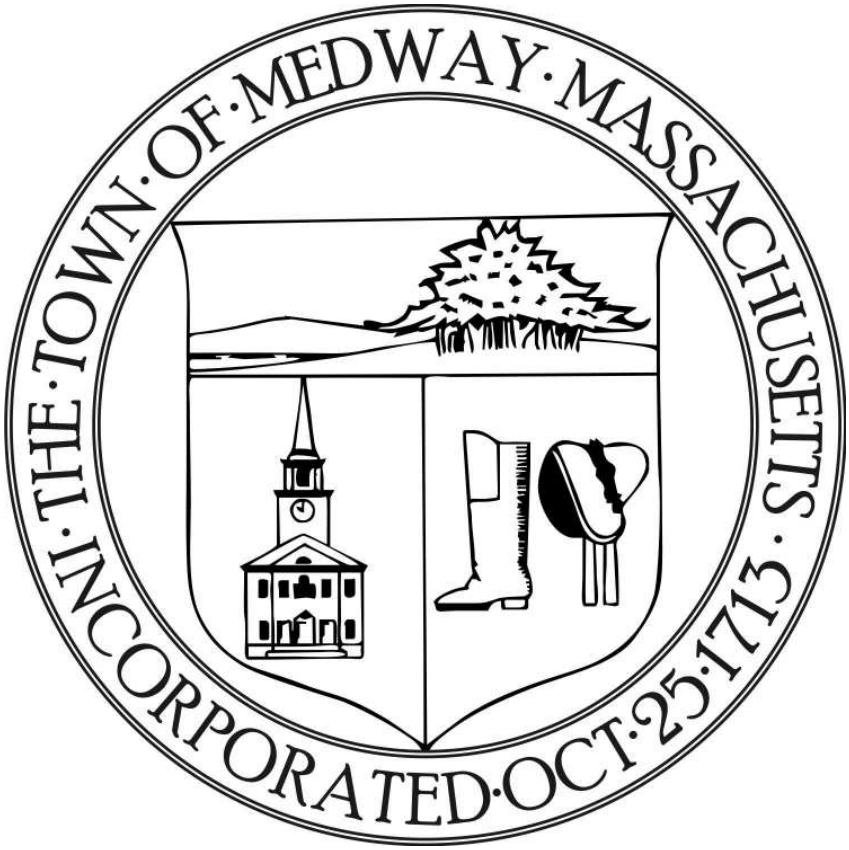

Town of Medway

Medway Town Wide Energy Committee

November 13, 2010

Energy Baseline Inventory
and
Five Year Energy Reduction Action Plan

Prepared by:

Medway Town Wide Energy Committee

I Purpose

In this document, the Town of Medway and the Medway Town Wide Energy Committee will present specific information supporting our request to be accepted as a DOER Green Community within the Commonwealth of Massachusetts.

i. Acknowledgements

The Medway Town Wide Energy Committee has prepared this Energy Baseline and Energy Reduction Plan (ERP). The committee would like to acknowledge the support Kelly Brown, the Regional Coordinator for the DOER for the Green Communities Program.

The committee would also like to acknowledge the direct participation of and support from Suzanne Kennedy, the Medway Town Administrator, Susan Affleck-Childs, the Medway Planning and Economic Development Coordinator and David D'Amico, the Deputy Director Department of Public Services. In addition, the committee would like to acknowledge the Medway Board of Selectmen that initiated the drive for Medway to reduce its energy consumption and continues to support the efforts of this committee towards the intermediate goal of becoming a Green Community, as directed by the Medway Master Plan. Superintendent of Medway Schools Dr. Judith Evans and Assistant Superintendent David Verdolino not only supplied detailed information as requested, but also have lead the town's efforts in energy-reduction planning and implementation in the schools.

Medway Town Wide Energy Committee Members:

Frank Faist	Chair	Beth McDonald	Member
Shelley Wieler	Vice Chair	Charlie Myers	Member
Dave Brownell	Member	Jack Robinson	Member
Peter Cooper	Member	Bob Wilson	Member
Jeff Herman	Member		

ii. Letter from Municipal Officials Verifying Adoption of the Energy Reduction Plan

Attached please find Appendix A that provides a letters from the Medway Board of Selectmen and the Chairperson of the School Committee recognizing that the Town of Medway supports the committee's assessment of the baseline year and that the town supports the five-year energy reduction strategy discussed in this document.

II Executive Summary

Significant energy efficiency measures have been taken in Medway from 2004 to 2006 including: added insulation in the attic of Town Hall along with new windows and boiler, replacing all lighting fixtures in the Police, Fire, Library, Senior Center and Town Hall with high efficiency bulbs and LED's, upgrading traffic signal bulbs with LEDs and replacing all street lighting with high pressure sodium bulbs. Analyzing the DOER web-based energy information tool Mass Energy Insight supplemented with locally collected data capturing the benefits of these early projects through FY2010, the Medway Town Wide Energy Committee (TWEC) was able to establish FY2009 as the baseline energy year and determined that the energy usage for the Town of Medway during that period was approximately 48.7K MMBtu's. Around 72% of this usage total (35,128 MMBtu's) is identified within the School buildings. Energy audits and discussions with energy service companies were conducted for the five school buildings identified as providing the greatest energy savings for the town with significant energy savings to be gained through upgrades to the 1960/1973 built Middle School, 1952 built Francis J. Burke and 1954 vintage John D. McGovern Elementary Schools. The highest priority measures to be implemented at these facilities will include HVAC re-commissioning; lighting improvements (re-lamping/re-ballasting, new fixtures, emergency lighting); occupancy sensors; energy management system, building envelope improvements; and variable frequency drive motor and pump retrofits.

The TWEC has also identified several current and planned projects that will contribute to the ERP 5 year plan to reduce the town energy utilization by 20%. Medway is considering repairs to the Medway Middle School to retrofit a 50-year-old infrastructure including replacement of all the buildings windows, improvements to the building envelope and upgrading ventilation and air condition systems. The repairs to the building, including replacement of the windows, is estimated to save approximately 14,580 Therms (1,458 MMBtu's) of the buildings heating energy. These savings are based on the 2008 TRANE ESCO audit and the contractor estimate for energy savings resulting from the replacement of windows. If the town elects to proceed with the building repairs the cost will be included in the towns financing of the project, if the town does not vote to perform this project the estimated cost of the repair is proposed to be financed through a an energy grant. Implementation of these school related projects would provide 15.6% of the Medway 5 year ERP.

Additional energy savings are planned for the Non-School facilities in the Town of Medway as well. By performing an energy audit of the other 10 Towns buildings: DPW facilities, Police, Fire Stations, Library and Senior Center that utilize 6,836 MMBtu's annually, the TWEC is expecting to save another 3.6 % of the total town energy. It is planned that building envelope improvements; integrated energy management of building utilities, upgrades to building HVAC systems and ductwork sealing for example will contribute to the energy savings expected. An audit of these facilities will be performed during the second and third year of the ERP and implementation of the high value energy savings projects would be implemented in the last two years of the project.

With the adoption of the Fuel-Efficient Vehicle policies for the Municipal and School Departments, the ERP is expecting a gain town energy savings. In conjunction with the increased use of fuel efficient vehicles the TWEC will be pursuing a viable vehicle-idling

strategy for additional energy saving from town owned vehicles. These two initiatives are expected to save Medway about 0.9% total town energy used.

Another project currently under way is the upgrading of the town owned well motors and pumps with VFD controllers and efficient motors. There are four town water wells using approximately 5.3% of the town's energy. 348 MMBtu (0.7 % of the ERP energy saved) is expected from this project and will be financed through energy grants over a four-year plan.

In addition to the Green Community Energy Reduction Plan projects cited in this document, Medway is concurrently adding Photovoltaic Solar Panels to the Medway High and Middle Schools. These additions are planned to generate approximately 608K KWH (2,075 MMBTU) to compliment the 20.8% planned energy savings described above with another 4.3% of town energy savings. The plans outlined in the following pages describe the potential for the Town of Medway to save about 25% (12,192 MMBtu's) of its FY2009 baseline year over the next 5 years and beyond.

A summary of the Energy Use Baseline and plans for Reductions are shown in Table 1 below.

Table 1 - Summary of Baseline and ERP Savings

Energy Component	MMBtu Used in Baseline Year	% of Total MMBtu Baseline Energy Consumption	ERP Savings as % of Total MMBtu Baseline Energy Consumption
Buildings	43,848	90.0%	19.9%
Vehicles	4,208	8.6%	0.9%
Street Lights	688	1.4%	0.0%
Total	48,744	100%	20.8%

i. Summary of Town

The town of Medway, founded in 1713, is located 25 miles southwest of Boston and had a total population of 12,448 citizens recorded in the US 2000 Census. It lies in Norfolk County largely along the northern shore of the Charles River near its headwater source. Medway has 10 Municipal buildings, 4 Town owned wells, five School building including the High School, Middle School and the Memorial, Burke and McGovern Elementary Schools and 70 Town owned vehicles. Table 2 provides a summary of Medway's Municipal Energy Uses

Table 2 – Summary of Municipal Energy Uses

Municipal Inventory	Number
Buildings	
Oil Heat	5
Natural Gas Heat	10
Propane Heat, etc.	4
Biomass Heat	0
Other Heat Type	0
Vehicles	
Non-Exempt	10
Exempt	60
Street Lights	
Municipally-Owned	618
Utility-Owned	0
Traffic Lights	
Municipally-Owned	4
Utility-Owned	0

ii. Energy Reduction Goals

The Town of Medway is committed to reducing our Town energy consumption in the near term and in the long term. The Town has already made major improvements to its five school buildings, which accounts for over 70% of the Town's baseline energy consumption. Additional school repairs are in the construction and planning phases. One of our goals is to continue this significant energy reduction into our remaining Municipal Buildings and to improve the vehicle fleet fuel economy.

In the next five years, Medway has set an energy savings goal of reducing our FY2009 energy consumption by 20.8%. This goal is achievable and this Energy Reduction Action Plan sets out the steps we will take to accomplish this goal. This energy savings does not include our two major solar PV installations.

iii. Municipality's Role

a) Energy Use Baseline Inventory

The inventory of Medway Energy use has been determined using the data sources that will be discussed in Section III-i. The results of this inventory for FY2009, our selected baseline fiscal year, are shown in Table 3.

Table 3 – Baseline Fiscal Year Energy Use Distribution

Municipal Inventory	Electricity		Natural Gas		Fuel Oil		Propane		Fuel		Total
	KWH	MMBTU	Therms	MMBTU	Gallons	MMBTU	Gallons	MMBTU	Fuel	MMBTU	MMBTU
Department of Public Works & Misc	189,413	646	5,021	502	7,318	1,017	2421	220	0		2,385
Fire Station	51,245	175	9,520	952	0	0	0	0	0		1127
Library	80,800	276	7,628	763	0	0	0	0	0		1,039
Police Station	121,560	415	5,273	527	0	0	0	0	0		942
School	3,392,262	11,574	235,357	23,536	0	0	200	18	0		35,128
Senior Center	42,040	143	0		3,530	491	231	21	0		655
Water Department	622,464	2,124	0		0	0	4,922	448	0		2,572
Total for Buildings	4,499,784	15,353	262,799	26,280	10,848	1,508	7,774	707	0	0	43,848
Vehicles Gasoline in Aggregate	0	0	0	0	0	0	0	0	28,995	3,595	3,595
Vehicles Diesel in Aggregate	0	0	0	0	0	0	0	0	4,407	613	613
Street & Traffic Lights in Aggregate	201,579	688	0	0	0	0	0	0	0	0	688
Total Energy Consumption	4,701,363	16,041	262,799	26,280	10,848	1,508	7,774	707	33,402	4,208	48,744

b) Energy Use Forecast

The current energy forecast for the Town of Medway over the next 5 years is relatively stable. As the town has adopted the stretch energy code, and the town is committed to life-cycle cost analysis for the purchase of new equipment and repair/new building projects, we expect that that this will continue to limit energy use growth.

c) 20% Reduction

The Town of Medway has developed an Energy Reduction Plan that will achieve a 20.8% reduction in energy use over 5 years, compared to a baseline of FY2009. This is achieved by a reduction of 10,117 MMBtu's of the 48,744 MMBtu's used by facilities, please see Table 4.

Table 4 – Summary of Energy Use and Projected Energy Savings

Projects	FY 2009 Building Usage MMBtu	% of Total MMBtu Baseline Energy Usage	ERP Projected Savings MMBtu	Town-Wide Savings %
Medway Schools:	35,128	72%	7,581	15.6%
TRANE ESCO (Electric)			3,627	7.4%
TRANE ESCO (Gas)			1,953	4.0%
MMS Envelope Repair (Gas)			998	2.0%
MMS Windows (Gas)			470	1.0%
Burke ES Windows (Gas)			107	0.2%
Burke ES Insulation (Gas)			226	0.5%
McGovern ES Insulation (Gas)			200	0.4%
Non-School Municipal Savings*:	6,836	14%	1,767	3.6%
Vehicle Energy Savings (Fuel):	4,208	9%	421	0.9%
Water Well VFD Upgrades (Elec.):	2,572	5%	348	0.7%
5 year ERP Savings Totals	**48,744***	100%	**10,117**	**20.8%**
Added ERP Projects not part of 20% 5 yr. savings:				
MMS Solar (Electric Generation)			461	0.9%
MHS Solar (Electric Generation			1,614	3.3%
Medway Energy Savings over 5 yrs.			**12,192**	**25.0%**

* Total Energy Use for FY2009

d) Statement of goals and strategies to be used in carrying out action plan

Since facilities accounted for 90% of all energy used by the Town of Medway, reducing facility energy use was the primary focus of the energy reduction action plan. The Town of Medway engaged RISE Engineering and TRANE U.S, to conduct energy audits at selected town school buildings and based on their recommended energy conservation measures (discussed in detail in Section V-i-a), developed a detailed action plan to mitigate the energy consumption in the targeted buildings. The savings resulting from the ESCO contract from TRANE is reflected in Table 4.

Energy conserving building repairs are planned for the Medway Middle School (MMS). These repairs include replacing windows and reducing losses from the building envelope. The projected envelope energy savings for the Middle School are based on the prior TRANE Audit

from 2008, for which the envelope repairs had not yet been performed. The window replacement energy benefit is projected based on the MMS repair consultants estimate. High-efficiency boilers will also be installed to replace obsolete boilers, which will provide additional energy savings not calculated herein.

The projected savings from window replacements on the Burke ES are based on the contractor estimate of 5% of the fuel energy for the school. Planned improvements to the insulation for the Burke ES are based on the TRANE energy audit for the Middle School extrapolated to the building heat load for the Burke ES. A similar method is used to project the energy savings for improving insulation at the McGovern ES.

Municipal buildings, excluding the schools, have not received the substantial energy saving measures that the TRANE ESCO provided to the school system. We plan to initiate energy audits for these buildings and the projected 5-year energy savings is based on the energy-prorated savings that the TRANE ESCO was able to achieve with the school system.

Vehicle fuel use accounts for 8.6% of all energy used by the Town of Medway. Vehicle energy reduction will be achieved by implementing two policies; the "fuel-efficient vehicle policy" and the "vehicle-idling strategy." The fuel-efficient vehicle policy (as required by criteria 4 of the Massachusetts DOER Green Community application) has been developed and approved by Medway's Board of Selectman and School Committee. A vehicle-idling strategy will be developed and implemented over the next few years. The combination of these energy conservation policies has been conservatively estimated to achieve a 10% vehicle energy reduction with a 0.9% impact to the Medway's total energy use.

An assessment has been made regarding the potential savings for replacing the existing municipal well pump motors with VFD technology. This energy saving measure is projected based on engineering estimates of energy reduction in kWh use for the Oakland Street and Populatic Street wells and extrapolating these savings to our other Town wells.

III Energy Use Baseline Inventory

This report presents the Town of Medway Energy Baseline and Five Year Energy Reduction Action Plan. Part of this plan is the establishment of a Town-Wide Energy Use Baseline Inventory. The Energy Baseline Inventory will become the benchmark that the Town will use to assess future energy use and savings. A central aspect of this effort has been the acquisition of the energy cost and use data for the Town including comparisons between different data sets to validate the accuracy of the supplied values.

Establishing an accurate accounting of the energy use for each year from FY2007 forward allows this data set to become a valuable tool for multiple purposes. These include providing the basis for selecting the energy baseline fiscal year and identifying areas needing improvement through our energy reduction plan.

i. Sources for Town Energy Data

The Town of Medway has been tracking the Town's energy usage and costs for a number of years. DPS staff has accessed data provided through the Mass Energy Insight database service offered by the DOER. In addition, data has been collected and reviewed by the Medway Energy Committee from the school system and several of the Town departments, including extensive data provided by the Department of Public Service (DPS) and utility invoices for the Library.

The specific types of energy data available to the Medway Energy Committee and the scope of these data are as follows:

a) Mass Energy Insight Database

The Mass Energy Insight resource is expected to be the primary source of energy use and cost for the Medway Energy Committee going forward. Most of the data in this resource are populated directly through a data link with the utilities and the State. DPS staff and the Town administration have identified the utility accounts present in this data and have connected them with the proper departments and buildings. Some data has been manually entered into this database, such as oil and propane use and vehicle fuel use.

The Mass Energy Insight system provides both the data and sophisticated data visualization tools that will be helpful for interpreting the large amounts of data it contains. As a note: the demand charges for electricity are not included in this data set. The TRANE energy audit and improvements, discussed in Section V, did consider demand charges and action steps were taken to reduce demand electric loads.

b) Town-Wide Utility Cost Data by Fuel Type and Department

This data set was created and provided by the Department of Public Services (DPS) and it covers the period from January 2007 through June 2009. This data set includes cost for each available utility invoice including Gas Distribution, Gas Supply, Heating Oil, Propane, Electricity Distribution and Electricity Supply. Separate data sets have been generated by DPS for energy cost and use for the Town street lights and the fuel used in Town vehicles, including Diesel and Gasoline.

c) Medway School System Spreadsheets

The Medway School Department has provided two spreadsheets with substantial data for the energy use and costs for the entire school system. One sheet is available with details for the full school system without individual school details for FY2005 through part of FY2010. A second set of sheets provides a similar details sheet for each school (Burke and Memorial are Combined) for FY2005 through the complete FY2007. The individual school data sheets include gas and electric consumption and costs including supply costs, distribution costs, and certain energy fees. The summary sheets contain the usage and total costs for electricity and Natural Gas.

d) Gas and Electric Bills for the Medway Public Library

The Medway Town Wide Energy Committee has obtained copies of the utility bills for the Medway Public Library. These detailed bills include gas and electricity from November 2007 through January of 2010. This independent set of data has allowed the committee to validate that both the Mass Energy Insight data and the Town Wide Utility Cost data are consistent with this third data set.

ii. Existing Municipal Energy Use

a) Medway Municipal Building Inventory and Description

The Town of Medway has nineteen Municipal buildings including our five school facilities and four Town owned wells. The total square footage of all energy consuming Municipal building is 578,551 square feet. Buildings that do not consume electricity or fuel are not included in this inventory.

The water supply for Medway includes both Town operated wells and private wells. The four Town operated wells are described as part of the ERP inventory.

A brief characterization of each Town building that uses energy is provided in Table 5 below.

Table 5 - Town of Medway Building Inventory

Department	Building	Sq. Ft.	Year Built	Last Renovation
DPW	50 Winthrop Street (Community Farm)	1,362	1900	None
DPW	Thayer House (2B Oak Street)	1,544	1830	2009
DPW	Town Hall	4,582	1955	2008
COA	Senior Center	6,520	1997	2008
DPW	Highway Barn	6,501	1969	None
DPW	Highway WashBay	1,800	2007	None
Water	Industrial Park Rd. Well	320	2009	None
Water	Oakland St. Well	252	1964	None
Water	Populatic St. Well & Water Dept. Field Offices	1,059	1943	2008
Water	Village St. Well	324	1976	None
FIRE	Fire Station 1	8,742	1990	2008
FIRE	Fire Station 2	11,795	1920	2009
LIBRARY	Library	16,437	1940	2001
POLICE	Police Station	11,075	1991	2008
SCHOOL	Burke School	39,640	1952	2008
SCHOOL	High School	210,704	2004	None
SCHOOL	McGovern School	53,865	1954	2006
SCHOOL	Memorial School	72,669	1997	None
SCHOOL	Middle School	129,360	1961	On-going
	Total Town Building Sq. Ft.	578,551		

Both the energy baseline inventory and the energy reduction plan address the energy utilization for these buildings.

b) Vehicle Energy Use and Inventory

The fuel use by all 70 town Diesel and Gasoline vehicles has been tabulated for the Fiscal Years of 2007 through 2010. The FY2009 data is contained in the baseline data for the Town.

Table 6 - Vehicle Fuel Use and Cost by Fiscal Year

	Use MMBtu			Cost $		
	Diesel	Gasoline	Both Fuels	Diesel	Gasoline	Both Fuels
FY2007	694.	3,327.	4,022.	$14,197.	$70,102.	$84,300.
FY2008	956.	3,660.	4,617.	$25,828.	$92,128.	$117,956.
FY2009	612.	3,595.	4,208.	$14,724.	$72,665.	$87,390.
FY2010	644.	3,614.	4,259.	$13,737.	$78,292.	$92,030.

c) Street and Traffic Lighting

The calculated energy usage and the electric charges for street lighting are based on the calculated energy consumption assuming the total lighting load is 1,404 kW and that the lights are on for a specified hours using a month by month profile. Using this aggregated approach, the total electric lighting usage is 688 MMBtu per year with an associated cost of $25,592 per year. The amount of electricity consumed by Street lights in Town is not a significant load as the town converted the streetlights from Mercury Vapor lights to more energy conservative High Pressure Sodium Lighting several years ago. In addition, the Town converted all Traffic lights to LED bulbs further reducing energy consumption.

iii. Selection of Energy Baseline Fiscal Year

The Medway Energy Committee has decided that FY2009 is the best choice for the Medway Energy Baseline Fiscal Year.

The Medway Energy Committee used the data sources described earlier in this Section to determine the total electric and fuel energy usage for FY2007 through FY2010. A summary of the results of this evaluation are shown in Table 7. In this Table, the annual energy consumption, using Million Btu's (MMBtu) as the unit of energy, is provided for electricity as well as the total for all heating fuel types (gas, oil and propane). Note that the electric energy data in this table is based on the local energy use and does not reflect the fuel consumed to generate the delivered electricity (primary energy).

The energy data available from the Mass Energy Insight database begins from January in CY2007 and thus some energy fuel data for the first half of FY2007 is missing. The Vehicle energy consumption includes both Diesel and gasoline and was provided by DPS using invoice data. The street lighting energy consumption and cost is based on an aggregate for the street lighting system and is not separately metered. The lighting is assumed to have not changed during this range of fiscal years.

Table 7 - Summary of Town of Medway Energy Use by Fiscal Year

Fiscal Year	Energy Category	Town of Medway Energy Use by Fiscal Year MMBtu	Town of Medway Energy Cost by Fiscal Year Dollars
FY 2007	Total	43,698	$1,275,365
	Fuel*	22,435*	$381,843
	Electricity	16,553	$783,629
	Vehicle	4,022	$84,300
	Street Lights	688	$25,592
FY 2008	Total	48,269	$1,447,824
	Fuel	27,264	$467,011
	Electricity	15,700	$837,265
	Vehicle	4,617	$117,956
	Street Lights	688	$25,592
FY 2009 SELECTED BASELINE YEAR	Total	48,744	$1,410,929
	Fuel	28,495	$451,159
	Electricity	15,353	$846,787
	Vehicle	4,208	$87,391
	Street Lights	688	$25,592
FY 2010	Total	41,611	$1,179,639
	Fuel	22,917	$349,543
	Electricity	13,747	$712,474
	Vehicle	4,259	$92,031
	Street Lights	688	$25,592

* Partial Year Fuel Data

Several issues were considered with regards to the Baseline Fiscal Year selection. First, the TRANE ESCO work that was undertaken in late FY 2009 to improve the energy efficiency of the schools was completed in FY2010. Given that this project is expected to result in a significant energy savings to the town it was decided to select a Fiscal Year prior to the FY2010 ESCO work completion.

FY2008 and FY2009 were both considered representative of the town baseline energy consumption prior to the ESCO work. The Medway Town Wide Energy Committee decided that FY2009 is the best choice for the Medway Energy Baseline Fiscal Year as it is the most recent Fiscal Year that is representative of our energy use. Therefore, the baseline energy usage for Medway is 48,744 MMBtu, including 28,495 MMBtu of electricity, 15,353 MMBtu of heating fuel, 4,208 MMBtu of vehicle fuel usage and 688 MMBtu of electricity for street lighting.

iv. Summary of Fuel Type Used in Baseline Year

The distribution of energy usage by source and the relative amount of each type of energy used are shown in the Pie chart in Figure 1. This chart represents the energy associated with electricity as simply the local use kWh reading converted to MMBtu's. With this representation, the electricity component is only 32% of the total energy use in the Town.

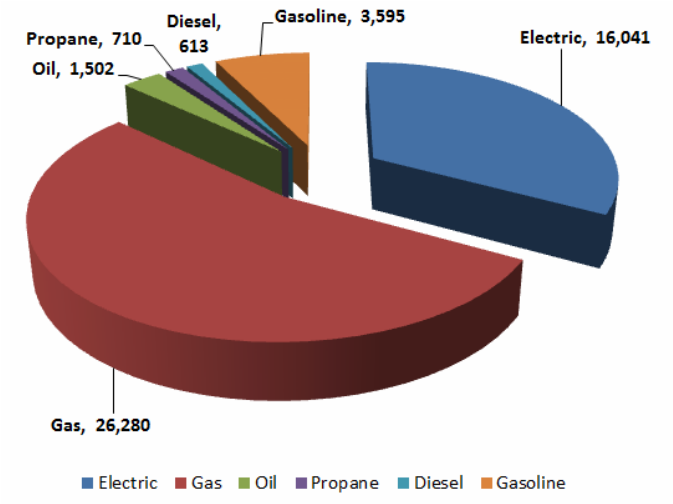

Figure 1- Distribution of Energy Use in FY2009, MMBtu

If the energy used at the generating stations were included in this figure, assuming an average grid fuel to delivered electricity conversion of 40%, the total energy used to deliver our electricity would be 55% of the total. This is an important difference when using this data to form a figure of merit for future energy conserving measures.

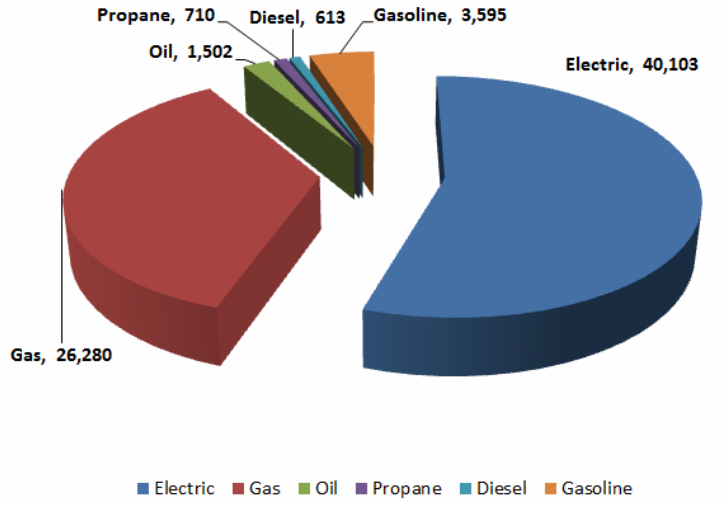

Figure 2 - FY2009 Energy Use Including Fuel to Produce Electricity, MMBtu

v. Existing Efficiency Measures Implemented in Last 2 Years

The Town of Medway has implemented significant energy saving improvements in the last 2 years. In particular, Medway contracted with TRANE Inc. to provide energy savings improvements to a number of our school buildings. The energy saving results of this effort did not occur until after the baseline year so the savings that are anticipated will form a part our energy reduction plan. This program will be discussed in detail in Section V.

Near the end of FY2009 a 140 kW solar array was installed on the roof of the High School. This effort was undertaken with a Power Purchase Agreement between the Medway Public Schools and Broadway Electric. The solar panels are guaranteed by Broadway to generate 135,147 kWh (461 MMBtu). This renewable energy project was commissioned in mid-April 2010 and the impact of this energy reducing measure was limited to one month. Although this project will result in significant savings to the town, it has not been included in our 5 year ERP.

In addition, Medway Public Schools have an in place contract to install a 445 kW (1,614 MMBtu) solar array on the Medway Middle School. The contract for this installation is also a Power Purchase Agreement with Broadway Electric to provide and maintain the equipment for a reduced price of the energy used by the school. This renewable energy project was awarded in late summer 2010 and the impact of this energy reducing measure will not be part of Medway's energy savings until 4 Quarter 2011. Although this project will result in significant savings to the town, it has not been included in our 5 year ERP

vi. Areas of Least Efficiency / Greatest Gain

The Energy Baseline study provided a detailed picture of the energy utilization in the Town with building level resolution. The bulk of our energy use is applied to our five school buildings as shown in the chart in Figure 3. These five buildings use 72% of all Town energy resources. This is why Medway has undertaken significant energy saving measures for these buildings.

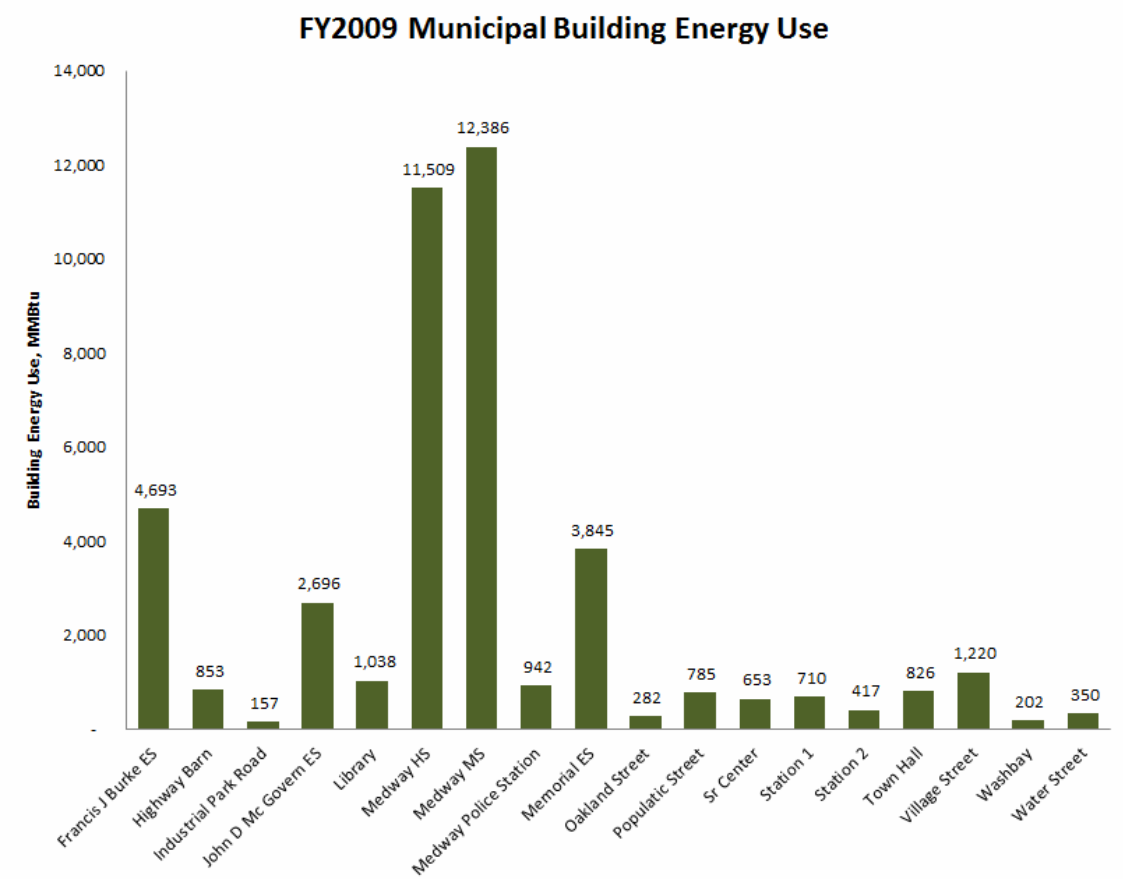

Figure 3 - Baseline Year Building Energy Use

After considering the Medway Public School buildings, there are a number of other buildings and non-building loads within the Town, as shown in Figure 4. It turns out that the next largest energy load in town is the fuel used in our vehicles. There are both Diesel and gasoline vehicles in the fleet but 85% of the fuel used is gasoline. This includes police cruisers, DPS vehicles and other emergency vehicles.

The next largest load is the power needed to operate our Town wells. This load is being addressed with a phase in of more energy efficient water pumps. The Water Department is considering the use of variable speed pumps and other energy efficient motors.

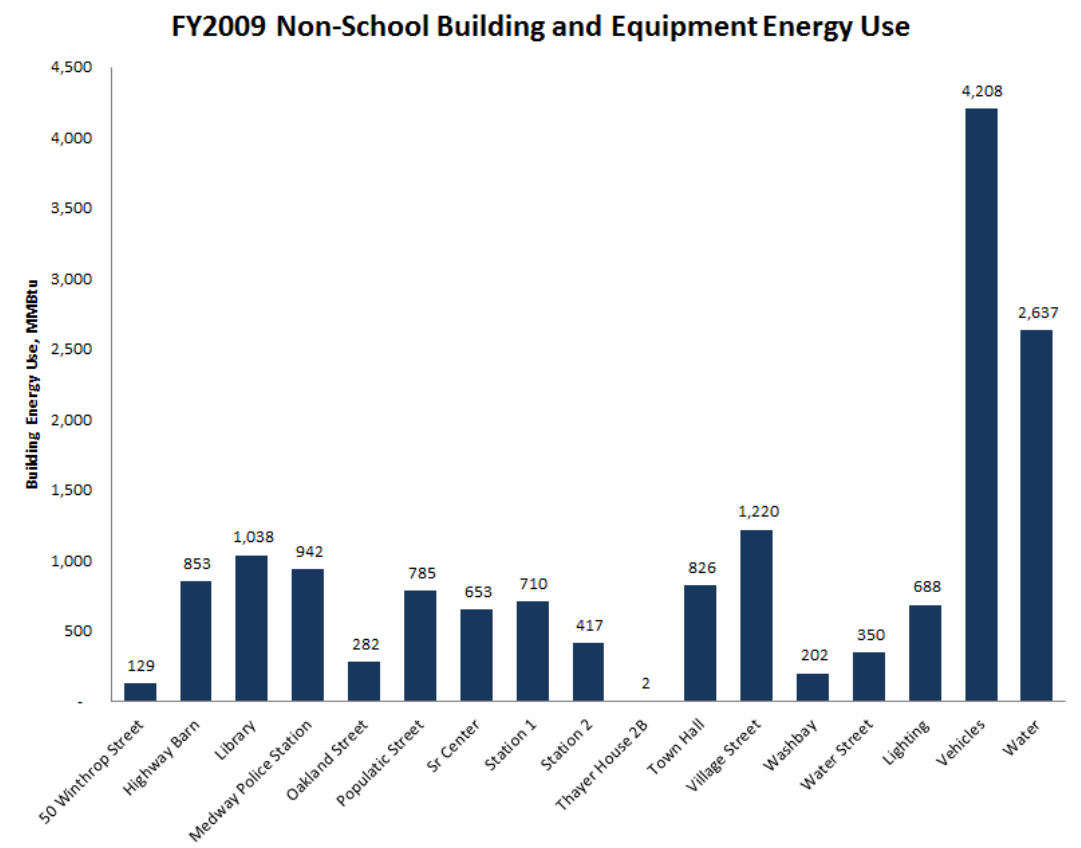

Figure 4 - Non School Building and Equipment Energy Usage

vii. Areas that can be Most Easily Addressed

The charts in Figure 3 and Figure 4 are helpful for determining what the largest building loads are but it is not particularly useful for assessing if a building is built and operated efficiently relative to the other buildings. This information is important if proper decisions are to be made in alleviating excessive building energy consumption because it is better to refurbish inefficient buildings before working on the more efficient buildings.

A better indicator for the energy efficiency of a building is to compare the energy use per square foot. This benchmark is plotted versus the actual FY2009 building energy use in Figure 5. This chart clearly shows that for the high energy consuming buildings the Middle School and the Burke School, both built before 1962, are underperforming relative to the Memorial and High Schools, both built after 1997. Although a smaller energy consumer, the Town Hall building has the highest energy consumption of the major Town buildings. This may be attributable to significant utilization of this building and a high density of computers and similar energy intensive equipment. The planned energy audit will clarify the loads for the Town Hall.

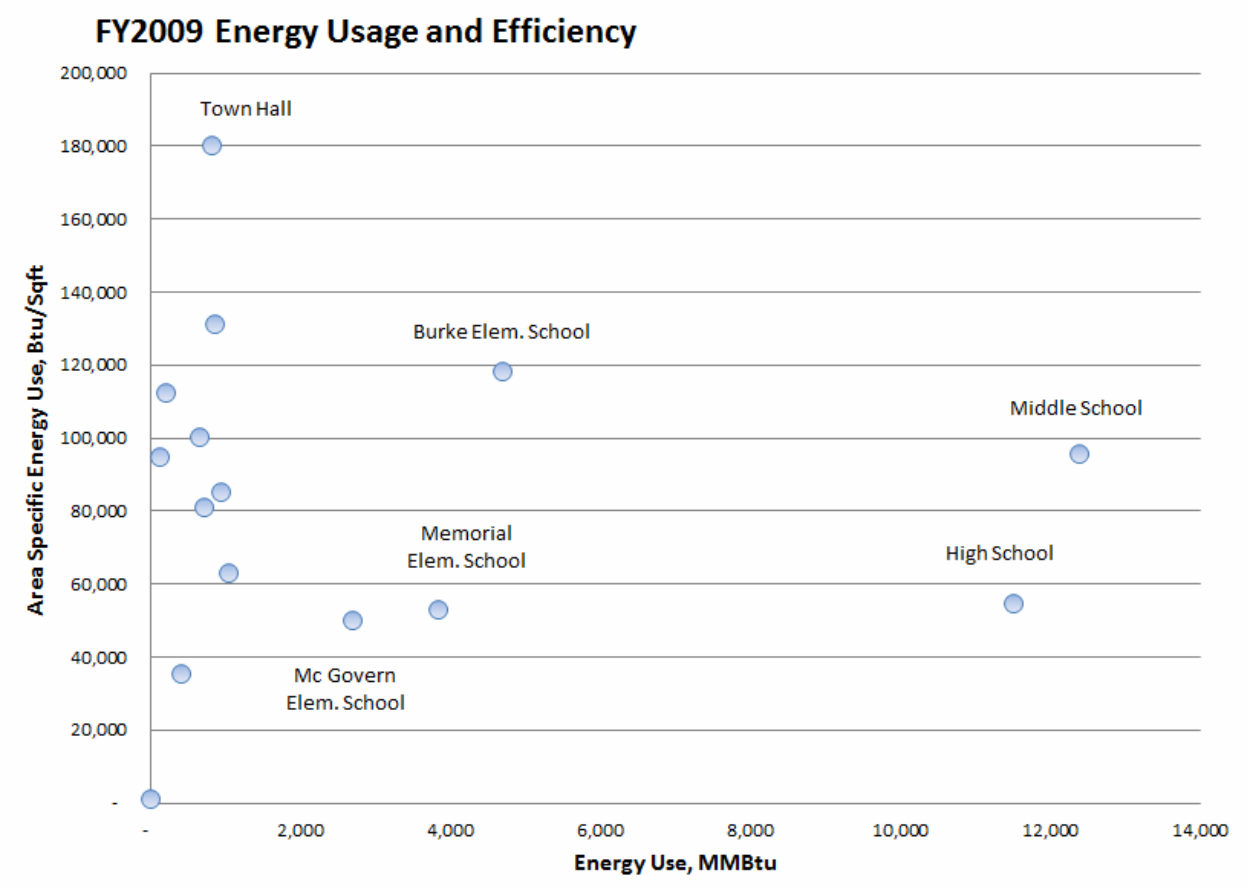

Figure 5 - Chart Indicating High and Low Energy Consumption per Square Foot

IV Summary of Plan to Undertake Town Wide Energy Audits

The town of Medway has been proactive in undertaking School building energy audits. Energy audits were performed on the Medway Public School buildings in January 2003 by RISE Engineering and in September 2008 by Trane U.S. Inc. These audits identified needed repairs and recommended energy efficiency improvements. Based on the recommendations of these audits Medway contracted with TRANE under an Energy Services Contract (ESCO) that will be discussed in detail in Section V.

In the next year, Medway plans to contract to perform energy audits for selected Town Municipal building outside of the School system.

V Energy Use Reduction

The baseline study shows that the Town of Medway is consuming 48,744 MMBtu of energy every year with a cost to the town exceeding $1.4 million dollars. The Town of Medway is aiming to minimize our energy consumption for all municipal buildings and equipment to limit the financial burden that such consumption incurs and to minimize the impact that the Town has on the environment.

i. Short-Term Energy Reduction Goals – Getting to 20% Reduction in 5 Years

a) TRANE Energy Services Contract (ESCO)

The Medway Public Schools (MPS) and the Town of Medway have implemented energy efficiency improvements to the school buildings over the last two years. Through an Energy Services Contract (ESCO) issued to Trane U.S. Inc. in FY 2009 and completed in FY 2010, the MPS are expected to realize an overall 24% energy savings in Electric, Gas and Water utilities resulting in a projected 11.5% energy savings over the FY 2009 Town Wide Energy baseline. The energy savings from this project will begin to occur within the first year of our Energy Reduction Plan during the installation process in FY 2010. The full ESCO savings will be realized in FY 2011 and beyond. Funding for the project is provided through the energy savings, guaranteed by the ESCO program, to finance the town-sponsored loan.

The ESCO project was undertaken after several energy audits performed on the MPS buildings in January 2003 by RISE Engineering and September 2008 by Trane U.S. Inc., identified needed repairs and energy efficiency improvements. A MPS Energy Committee and town sponsored ESCO Review Committee reviewed the audits and selected high priority repairs critical to the Medway Middle School, Francis J. Burke, Memorial and John D McGovern Elementary schools along with several energy efficiency improvements to the 6 year old High School. Table 8 is a summary for the MPS building characteristics and year built.

Table 8 - MPS Building Characteristics

MPS Building	Year Built/ Major Modification	Building Size (Sq. Ft.)
High School	2004	210,704
Middle School	1961/1970	129,360
Francis J. Burke Elementary School	1952	39,640
Memorial Elementary School	1997	72,669
John D McGovern Elementary School	1954	53,865

Most of the repairs were targeted for the 49-year-old Middle School, the 58-year-old Burke and 56-year-old McGovern Elementary schools heating systems with new Unit Ventilators and an associated Energy Management System (EMS) to control the buildings' environments. The lighting systems in all the buildings were replaced with modern efficient lighting fixtures and bulbs coupled with occupancy sensors to improve surface lighting for the students and assure the lights are off when not in use. Additional improvements and energy saving modification were

identified to replace aging pumps and motors with modern energy efficient Variable Frequency Drive (VFD) motors and modern energy efficient pumps in all of the MPS buildings. Additional savings were found though the upgrading of all MPS computers and related system with the addition of computer based power management software to turn off computers and monitors when not in use. Selected miscellaneous equipment, freezers, coolers, vending machines, etc., throughout the MPS buildings were modified with energy "misers" to reduce the energy drain when the buildings were not in use. Lastly, selected buildings were identified for improvements to doors and roof penetrations that required better weather stripping and sealing to improve energy savings.

As part of the ESCO project, but not part of the ERP, additional utilities savings were identified for the upgrades of Middle, Burke and McGovern water infrastructure. In each of the schools "water misers" and "flow restrictors" were added to gain ~17% of MPSs total water use.

A summary of the energy improvements made across all of the Medway Public School buildings is shown in Table 9.

Table 9 - Trane ESCO Project Summary

Medway Buildings	Unit Ventilator Replacement & EMS Integration	Lighting Upgrade	Pump & Motor Replacement w/VFD	Computer Energy Management	Building Envelope Upgrades	Miscellaneous Energy Savings	Water Conservation
High School	Upgrade EMS	all	19	316	35 Doors	X	
Middle School	110 w/EMS Upgrades	all	4	138	56 Doors	X	18 Water Restrictors
Burke Elementary School	29 w/EMS added	all	8	19	9 Doors	X	53 Water Restrictors
Memorial Elementary School		all	10	83	12 Doors	X	
McGovern Elementary School	31	all	8	24		X	58 Water Restrictors
Project ESCO Energy Savings	Predicted Annual Electric Savings: 3,633 MMBtu (1,063,241 kWh) = 7.5% of Town Wide Energy Savings (TWES)						
	Predicted Annual Gas Savings: 1,953 MMBtu (19,531 Therms) = 4.0% of Town Wide Energy Savings (TWES)						

From the analysis of the data collected from Mass Energy Insight tool and other available Medway data (Table 10 below) the contributions of the ESCO projects implementations has already contributed ~13% of the ERP's objectives in FY 2010.

Table 10 - ESCO Savings for FY 2010

Medway Buildings	FY 2009 Energy Baseline (MMBtu)	FY 2010 Energy Consumption (MMBtu)	% of Town Wide Energy Savings in FY 2010
High School	11,508	10,291	2.5%
Middle School	12,385	9,675	5.6%
Burke Elementary School	4,694	3,765	1.9%
Memorial Elementary School	3,845	2,638	2.5%
(Estimated) McGovern Elementary School	2,697	2,370	0.7%
Total MPS FY Energy	35,129	28,739	13.1%

b) Medway Middle School Repair and Energy Improvement Project

A major repair proposal for the Medway Middle School is scheduled to be voted on at Town Meeting on November 15, 2010. This project would help reduce the relatively high energy consumption per square foot, which was noted in Figure 5, through building envelope improvements including the replacement of exterior doorways, weather-stripping and caulking, and window replacements that are all part of the proposed repairs. Altogether, the project should reduce the building's energy use by 12%.

c) Anticipated Energy Reduction Action Items Now Through FY2014

A number of energy conserving measures are anticipated over the Energy Reduction Action Plan period, which ends in June 2014, five years following the FY2009 Baseline. A more concrete assessment of the action items will result from the proposed energy audit of non-school buildings.

1. identify the energy consumption for all Town buildings and facilities,
2. determine which buildings and equipment are using more energy than is necessary,
3. assess which energy saving actions provide the best trade-off between cost and energy savings,
4. identify funding methods that can allow recommended energy saving actions to be performed,
5. Contract for work to be done,
6. Check that contracted work is performed and monitor energy savings.

A summary of the currently envisioned schedule for implementation and action items for each building are indicated in the following Tables.

Table 11 – Schedule for Implementation

	FY 2010				FY 2011				FY 2012				FY 2013				FY 2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Schools																				
High School			x																	
Middle School			x																	
Burke ES			x																	
Memorial ES			x																	
McGovern ES			x																	
MS Repairs																x				
Burke ES Windows														x						
McGovern ES Windows																		x		
Municipal (Non-School Building) Energy Upgrades									x											x
Water Dept VFDs					x						x				x				x	
Vehicle Fuel efficiencies increased																		x		
HS Solar			x	x																
MS Solar								x												

Table 12- Medway Public School (MPS) Building Inventory

1) Name: Medway High School
Address: 88 Summer Street
Baseline: 11,509 MMBtu
Actions Taken: ESCO, Solar Array
ERP Options: None

2) Name: Medway Middle School
Address: 45 Holliston Street
Baseline: 12,386 MMBtu
Actions Taken: ESCO, Repairs, Solar Array
ERP Options: None

3) Name: Memorial Elementary School
Address: 16 Cassidy Lane
Baseline: 3,845 MMBtu
Actions Taken: ESCO
ERP Options: None

4) Name: Burke Elementary School
Address: 16 Cassidy Lane
Baseline: 4,693 MMBtu
Actions Taken: ESCO
ERP Options: Energy Audit Actions

5) Name: McGovern Elementary School
Address: 9 Lovering Street
Baseline: 2,696 MMBtu
Actions Taken: ESCO
ERP Options: Energy Audit Actions

Table 13 - Medway Municipal Building Inventory (Page 1 of 2)

6) Name: Medway Police Station
Department: Police
Address: 315 Village Street
Baseline: 942 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

7) Name: Fire Station 1
Department: Fire
Address: 44 Milford Street
Baseline: 710 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

8) Name: Fire Station 2
Department: Fire
Address: 155R Village Street
Baseline: 417 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

9) Name: Medway Town Hall
Department: Board of Selectmen
Address: 155 Village Street
Baseline: 826 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

10) Name: Medway Senior Center
Department: Council on Aging
Address: 76 Oakland Street
Baseline: 653 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

Table 14 - Medway Municipal Building Inventory (Page 2 of 2)

11) Name: Medway Public Library
Department: Library
Address: 26 High Street
Baseline: 1,038 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

12) Name: Community Farm
Department: Public Services
Address: 50 Winthrop Street
Baseline: 129 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

13) Name: Highway Barn
Department: Public Services
Address: 46 Broad Street
Baseline: 853 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

No Image

14) Name: Highway WashBay
Department: Public Services
Address: 46 Broad Street
Baseline: 202 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

No Image

15) Name: Thayer House
Department: Public Services
Address: 2B Oak Street
Baseline: 2 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

Table 15 - Medway Municipal Well Inventory

16) Name: Village Street Well — Well Pump
Department: Public Services - Water
Address: 41R Village Street
Baseline: 1,220 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

17) Name: Oakland Street Well — Well Pump
Department: Public Services - Water
Address: 48 Oakland Street
Baseline: 282 MMBtu
Actions Taken: None
ERP Options: None, well shut down during FY2009

18) Name: Populatic Street Well & Field Office
Department: Public Services - Water
Address: 19 Populatic Street
Baseline: 785 MMBtu
Actions Taken: None
ERP Options: Energy Audit Actions

19) Name: Industrial Park Well — Well Pump
Department: Public Services - Water
Address: Industrial Park Road
Baseline: 157 MMBtu
Actions Taken: None
Status: Construction in FY 2009, brought on line in FY 2010

ii. Measurement and Verification Plan for Projected Reductions

Every energy related use in the Town will be included as part of the DOER Mass Energy Insight database. Most of this work has already been completed. Manual entries of certain fuel delivery quantities will be performed on a regular basis. This database will be the primary source of information regarding the actual building-by-building electric and fuel usage.

The performance verification process begins with the inspection of new work to determine if it meets the requirement of the contracted effort. In the case of the TRANE ESCO, the town received guarantees that the buildings would meet specific energy reduction benchmarks. The Medway Energy Committee and the Medway Public Schools are tracking the current energy use and in this early period of operation the anticipated reductions are consistent with the guaranteed amounts.

Similarly, the two Solar PV installations that have been initiated in the last 24 months have guaranteed electric energy savings as well as a reduced electric cost to the Town through the Power Purchase Agreements.

As future work is performed on Town facilities aimed at energy reduction every effort will be made to obtain projected electricity and fuel savings from the contractor. These savings will be tracked in the same manner as was done for the previously discussed projects.

iii. Long-Term Energy Reduction Goals – Beyond 5 Years

The Town of Medway will continue to identify opportunities to reduce energy use beyond those measures identified in this document. While the primary focus has been on the 5-year plan, the Town of Medway will continue to identify opportunities to achieve long-term energy reduction including, but not limited to:

- Identify additional facilities where PV solar panels can be installed to supplement the 608,091 KWH systems installed in 2010-2011. These PV solar panels may be town owned or privately owned depending on incentives available at the time.

- Evaluate locations within the Town of Medway that can host a ground based Solar Farm.

- The town has adopted the stretch energy code, and the town is committed to life cycle cost analysis for the purchase of new equipment and repair/new building projects. We expect that that this will continue to limit residential and commercial energy-use growth beyond five years.

- The Town is investigating the implementation of a "Renewable Energy Revolving Fund and Betterment Program." This would allow the town to offer loan programs to property

owners for renewable energy improvements, and provide a legal mechanism to set up a revolving fund for this purpose.

    - As the town realizes savings from the current energy savings measures outlined in this document, it is expected that we will be able to set aside some portion of these savings to fund future energy conservation measures, making energy savings "self-funding" and self-perpetuating.

- Develop educational programs for homeowners in town to reduce their residential energy use.

- Consolidate the use of buildings for off-hours meetings to encourage the use of fewer buildings and the use of the more energy efficient buildings.

- Encourage contracted service providers, such as school bus, transportation (GATRA), trash and sewage (CRPCD), to implement alternative energy technology and efficient energy technologies.

VI Onsite Renewable Energy Projects & Renewable Energy

a) Medway High School Solar Panel Project

Photovoltaic energy production is an important component of Medway's energy reduction strategy, although not included in the five year ERP. A 132 kW Photovoltaic array was installed on the high school in the late FY2010 with a guaranteed annual production of 135,147 kWh (461 MMBtu) under a Power Purchase Agreement between Medway and Broadway Electric Co. PV production alone amounts to a 1.0% reduction from the FY2009 base year energy use (@3413 Btu / kWh).

b) Medway Middle School Solar Panel Project

A 445 kW array for the Medway Middle School and is guaranteed by Broadway to produce 472,944 kWh (1,614 MMBtu) annually, will be installed during the third & fourth quarter of FY2011 by Broadway Electric under a similar power purchase agreement as was done on the MHS. The MMS PV is projected to save ~3.3% of the FY2009 base year energy savings use (@3413 Btu / kWh).

VII Conclusion

Over the past two years, The Town of Medway has invested significant time and resources understanding how we use energy and identifying ways to reduce our energy use. These efforts have put us in a good position to apply for Massachusetts DOER Green Community status in November 2010. In particular, the detailed energy audits of our facilities provided us with a strong base for our energy reduction plan. The Town of Medway has also invested significant efforts in 608-kilowatt PV solar systems that will significantly reduce our carbon fuel use, consistent with the goals of the Green Community initiative.

The Town of Medway understands how it uses energy and has completed a thorough baseline of its energy use. In addition, the Town of Medway has developed a comprehensive and detailed plan to reduce its energy use 20.8% over the next 5 years. 96% of the overall savings will be achieved by implementing energy savings measures at the municipal and school facilities. The energy conservation measures were focused on facilities, as there are proven and measurable strategies for reducing the energy use and verifying the energy savings at these facilities. 4% percent of the energy savings come from common-sense energy saving measures in vehicle energy use, including a fuel-efficient and vehicle-idling strategy. We believe that this baseline and energy reduction plan meets the requirements of DOERs Green Communities criteria number 3.

The Town of Medway is committed to energy conservation, and strives to be a leader in municipal energy conservation.

i. List of Resources

Massachusetts DOER Green Communities Site at www.mass.gov

www.townofmedway.org

www.massenergyinsight.net

ii. Contacts

Town Administrator: Suzanne Kennedy - skennedy@townofmedway.org

Medway Town Wide Energy Committee,
Chair: Frank Faist - frank.faist@comcast.net
Vice Chair: Shelley Wieler - shelleywieler@gmail.com

Appendix A

Letter from Medway Board of Selectmen

Letter from Chair of School Committee