The Town of Medway
Local Energy Action Plan

Part I – Medway Energy Profile, Goals, & Actions

Approved by the Medway Energy Committee on February 13, 2013.

Approved by the Medway Board of Selectmen on March 4, 2013.

Prepared by the Metropolitan Area Planning Council (MAPC)

for

The Town of Medway

MAPC
METROPOLITAN AREA PLANNING COUNCIL
Smart Growth & Regional Collaboration

LOCAL ENERGY ACTION PROGRAM

Acknowledgments

This plan was produced with input from Medway municipal staff including Town Administrator Suzanne Kennedy and the Medway Energy Committee, as well as Medway residents and businesses. Professional technical assistance was provided by the Metropolitan Area Planning Council: Erin Brandt, Energy Planner; Helen Aki, Energy Services Coordinator; and Po-Yu Yuen, Energy Intern.

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The Town of Medway

Suzanne Kennedy, Town Administrator

Susan Affleck-Childs, Planning and Economic Development Coordinator

Dave D'Amico, DPS Deputy Director

Board of Selectmen

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Sources: Active Rain

Executive Summary

In the wake of a national economic recession and increasing frequency and severity of extreme weather, local governments are paying more attention than ever to the costs and impacts of their energy consumption.

During the last five years, the Town of Medway has made it a priority to advance clean energy efforts in the community. In 2008, Medway Public Schools with support from Town officials entered into an agreement with an Energy Service Company (ESCO) to fund repairs to school buildings through the savings achieved by reducing natural gas and electric energy utilizations. Since then, the Town has made strides towards reducing municipal energy consumption, including becoming a Massachusetts Green Community and installing solar panels on the High School and Middle School. As the Town moves forward with its energy work, it should consider updating its energy reduction goals and setting more ambitious targets for clean energy actions in the community.

The Metropolitan Area Planning Council (MAPC) wrote the Medway Local Energy Action Plan in collaboration with the Town of Medway. As part of MAPC's Local Energy Action Program (LEAP), the Town was selected through a competitive application process to receive MAPC's technical assistance to write this plan and to help with project implementation over a two-year period. This plan is designed to provide clear guidance on how stakeholders, including Town officials, the Medway Energy Committee, residents, and businesses, can advance their clean energy efforts.

The plan is divided into three parts. Part I presents a profile of Medway's energy consumption, highlighting how energy is used in Medway's municipal, residential, and commercial sectors, as well as a list of recommended short and long-term energy goals and actions. Part II of the plan consists of detailed action strategies to help guide energy stakeholders through key energy activities. Lastly, Part III presents supporting materials and information used to develop the plan.

With municipal energy use accounting for just 6% and residential energy use accounting for 70% of Medway's total energy consumption, it is important that a multi-sector approach is taken in order to make significant reductions in Medway's overall energy use. While the Town should continue to pursue municipal energy efficiency and renewable energy projects, it is critical that Medway residents and businesses also initiate such efforts. With the Town on track to meet its existing municipal energy reduction goals, this plan recommends that the Town of Medway establish new and more ambitious energy reduction and renewable energy generation municipal goals. Further, this plan emphasizes the need to set clear MassSave program participation goals and energy reduction goals for the residential and commercial sectors to help drive new clean energy actions.

While many of the recommendations and actions presented in this plan are outlined to take place in the next five years (2013 – 2017), this plan is designed to also position the Town and its constituents to continue to set and to pursue new energy goals beyond the five-year mark.

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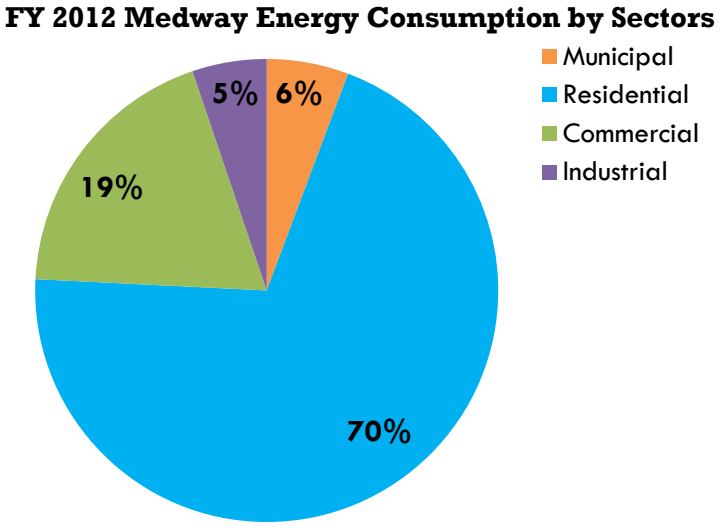
Introduction

The Medway Energy Action Plan outlines how the Town of Medway can achieve community-wide energy reductions. Due to concerns over increasing energy costs, municipal fiscal responsibilities, and environmental consequences due to climate change, communities across the country are pursuing cost-effective and innovative ways to reduce energy consumption and invest in cleaner energy sources.

During the past five years, Medway has pursued projects to reduce municipal energy consumption, to increase adoption of cleaner energy sources, and to encourage and support its residents and businesses in pursuing such actions.

In February 2012, MAPC selected the Town of Medway through a competitive application process, to participate in MAPC's Local Energy Action Program (LEAP). Over a ten-month period, MAPC met with Town officials, including the Town Administrator, municipal staff, Medway Energy Committee, residents, business owners, and other stakeholders such as Columbia Gas, to understand the community's priorities and interests in energy, sustainability, and community and economic development issues. These stakeholders were also represented on a Medway LEAP Working Group, which provided guidance and recommendations to MAPC during the development of the plan. Using feedback from the Town and the LEAP Working Group, MAPC drafted the Energy Action Plan to provide guidance to the Town and its constituents on the steps Medway can take to continue its commitment to clean energy.

With the residential, commercial, and industrial sectors accounting for 94% of the Town's energy consumption, it is critical that any clean energy efforts in Medway address energy use outside of municipal facilities. The Energy Action Plan contains recommendations and actions to promote energy efficiency and renewable energy installations, to increase community awareness of the importance of clean energy efforts, and to help Medway residents and businesses access clean energy opportunities.



How to Use the Plan

The purpose of this plan is to arm Medway with new energy goals and action strategies to advance the community's clean energy efforts. While the plan focuses on specific guidance for the next five years, it is also designed to position the Town and its energy stakeholders to continue to work on energy issues indefinitely. This plan should be treated as a "living document," meaning that the Town and the Energy Committee should review and update the document on an annual basis so that it continues to guide the community beyond 2017.

The plan is divided into three parts:

- **Part I**
    - **Medway Energy Profile:** This section provides an overview of Medway's energy use, including a history of Medway's past energy work and achievements and a profile of municipal, residential and commercial energy use.
    - **Medway Energy Goals and Actions:** This section offers recommended energy goals and actions for the Town of Medway to expand its clean energy work.
- **Part II**
    - **Energy Action Strategies:** The Energy Action Strategies presented in Part II are designed to help stakeholders design and implement recommended energy actions.
- **Part III**
    - **Appendix:** The Appendix includes information that was used to develop the Medway Energy Action Plan.

Source: Medway Open Space Committee

Medway Energy Profile

Since 2004, the Town of Medway has led by example in regards to investments in local clean energy initiatives. The Town, with the support of the Energy Committee, has implemeneted various projects and programs to promote energy efficiency and clean energy development in the municipal sector and in the community.

Medway Energy Use At-A-Glance

Community Overview	
Electric Provider	NSTAR
Natural Gas Provider	Columbia Gas
Population	12,752
Area	11.5 sq.mi
Density	1,108.9 sq.mi

Medway Energy Profile	FY 2012 Energy Consumption (MMBTUs)	Energy Costs (Millions)	% of Total Community Energy Consumption
Municipal Sector	42 thousand	$1 million	6%
Residential Sector	512 thousand	$10 million	70%
Commercial Sector	139 thousand	$2.7 million	19%
Industrial Sector	38 thousand	-	5%
Total Energy Consumption	*731 thousand*	*$14 million*	*100%*

Source: MassEnergyInsight; U.S. Census, 2010; Bureau of Labor Standards Economic Survey, 2010; Energy Information Administration Residential Energy Consumption Survey, 2009; Energy Information Administration Commercial Buildings Energy Consumption Survey, 2005

Comprehensive Energy Efficiency Improvement

In 2009, recognizing the significant opportunity for savings from energy efficiency in capital improvement projects, comprehensive energy efficiency improvement project was implemented in the Medway Public Schools through a performance contract with Trane U.S. Inc., an Energy Services Company (ESCO). The ESCO project marked an important step toward Medway achieving significant energy savings. The project, which was completed in 2010, is expected to reduce the Town's overall baseline energy consumption by 11.5%.[1]

Renewable Energy Projects

In addition to its energy efficiency efforts, the Town is also dedicated to promoting clean energy development in the community. In 2009, a PV system was installed at the Charles River Pollution Control District's regional sewage treatment plant in Medway. The following year, Medway Public Schools entered into a Power Purchase Agreement (PPA) to install a 132 kW solar system on the Medway High School. In 2011, the Schools entered into another PPA contract to install a 296 kW solar system on the Medway Middle School.

In 2010, Governor Patrick attended an event at Medway High School to celebrate the competition of the solar project. (Source: The Milford Daily News)

[1] The estimated energy savings was provided on page 20 in the Town of Medway Energy Baseline Inventory and Five Year Energy Reduction Plan.

In order to consolidate lower pricing and better quality services for solar installation, the Town is currently participating in MAPC's Regional Solar Initiative in 2012.

Energy-Pedia #1: MAPC's Regional Solar Initiative

MAPC's Regional Solar Initiative is a regional procurement service supported by the District Local Technical Assistance (DLTA) Grant. The program aims to assess and facilitate a regional procurement of professional solar installation services for multiple municipalities and sites in the MAPC region. In 2012, 17 municipalities in the MAPC region, including Medway, participated in the Regional Solar Initiative.

The communities participating in this project would gain benefits associated with membership to a peer group working on similar projects throughout the region, which can be asked and answer questions, share success stories and concerns, and generally build confidence and momentum for individual projects. If a regional procurement for solar installation services takes place, the communities that opt to participate in that component would gain the benefit of more competitive bids associated with a group solicitation, as well as save on the administrative costs, which would be borne by MAPC.

For more information, see: http://www.mapc.org/regional-solar

State and Federal Recognition

Medway's clean energy accomplishments are marked by various state and federal recognitions over the years. In 2010, the Town was designated as a Green Community by the Massachusetts Department of Energy and Resources (DOER). As part of its designation, the Town received $158,450 for the installation of variable speed drives, energy efficiency retrofits in municipal buildings and facilities, and energy audits in various municipal buildings. Medway also received a $150,000 federal Energy Efficiency Conservation Block Grant (EECBG) for the 2011 solar installation project at Medway Middle School.

Community Clean Energy Efforts

The Town and the Energy Committee have worked beyond the municipal sector to promote energy efficiency and clean energy efforts. In fulfillment of required criteria for the Town's Green Communities designation, the Town adopted the Massachusetts Stretch Building Code in 2010 to improve energy efficiency standards in residential and commercial buildings. To increase local residents' awareness of energy savings opportunities, the Energy Committee launched a Kill-A-Watt meter lending program at the Public Library to help residents assess the energy efficiency of their home appliances.

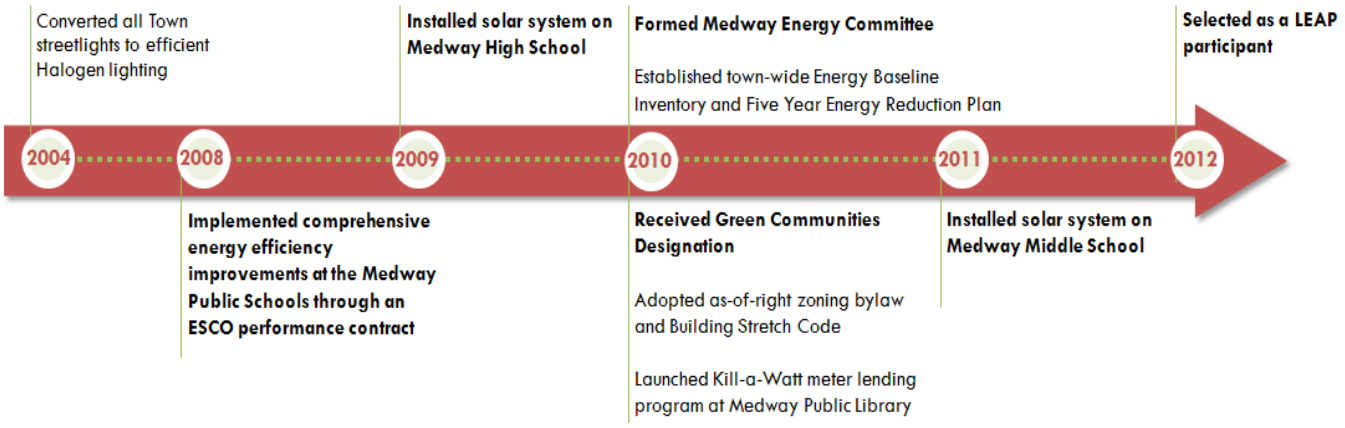
Energy-Pedia #2: Medway Energy Committee

The Medway Energy Committee is a volunteer committee comprised of local volunteers appointed by the Board of Selectmen. The Committee is an advisory group to both the Town and the community that focuses on local energy conservation and renewable energy development issues. Missions of the Committee include:

- Establishing energy inventories for the Town and setting goals for energy reductions;
- Assessing the scope of energy conservation and renewable energy use in Town buildings and vehicles;
- Recommending feasible projects for energy and water conservation and renewable energy use;
- Reviewing Town by-laws to promote energy and water conservation and renewable energy use;
- Educating and providing outreach to Medway citizens;
- Coordinating with various state, federal, and private agencies on energy and renewable issues; and
- Advise and assist the Town and community to identify and apply for energy and conservation related grants and funding opportunities.

For more information, see: http://www.townofmedway.org/Pages/MedwayMA_Bcomm/Energy/index

MEDWAY CLEAN ENERGY TIMELINE



MUNICIPAL ENERGY PROFILE

Medway's municipal energy consumption accounts for approximately 6% of the overall town-wide energy consumption. As part of the requirements for the Green Communities program, the Town created the Energy Baseline Inventory and the Five Year Energy Reduction Plan in 2010. The Reduction Plan documents Medway's municipal energy baseline and identifies energy savings opportunities to achieve short-term and long-term energy reduction goals. The following section builds upon this Energy Reduction Plan, highlighting the implemented municipal energy work and assessing Medway's current progress towards meeting its energy reduction target.

Municipal Energy Profile At-A-Glance

- Designated Green Community in 2010
- 7-member volunteer Energy Committee
- Municipal Energy Use:
  - *49,538 MMBTU in FY 2009*
  - *$1 million in energy expenditures in FY 2009*
  - *~6% of total town-wide usage*

Energy-Pedia #3: Do you know how Medway monitors its municipal energy use?

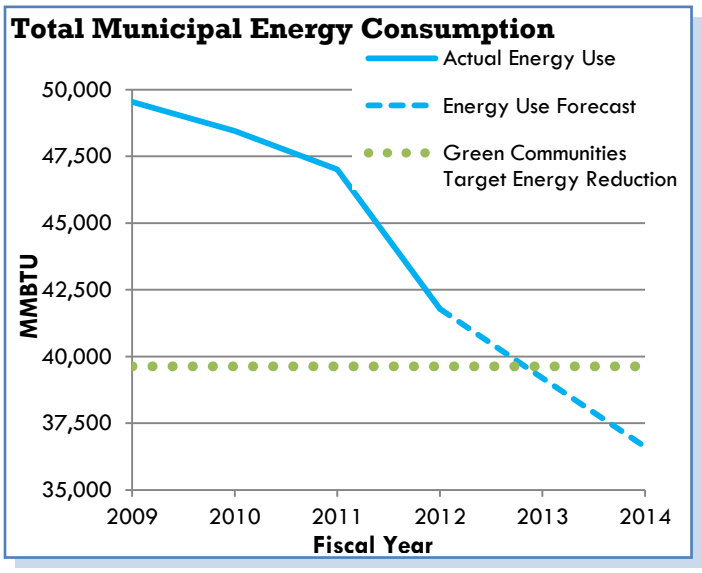
Medway monitors its municipal energy data using the MassEnergyInsight (MEI) tool. MEI is a free, web-based tool developed by Peregrine Energy Group and made available to cities and towns in Massachusetts through the Department of Energy Resources (DOER) as part of the Massachusetts Green Communities Program. Electric and natural gas usage for Medway's municipal accounts is pre-loaded by the utilities into the MEI program. Other fuel use data (such as heating oil and vehicle fuel) must be manually entered and kept up-to-date by Medway Energy Committee members and municipal staff.

For more information, see: http://www.massenergyinsight.net/mei/overview.html

MUNICIPAL ENERGY REDUCTION PROGRESS[2]

Green Communities

In fulfillment of Medway's Green Communities designation requirements, the Town committed to reducing its municipal energy consumption from its FY 2009 baseline by 20% by 2014. As the graph on the right shows, Medway has steadily reduced its municipal energy consumption since 2009. The Town is currently on track with meeting its energy reduction target and is 2,151 MMBTUs away from achieving the goal. Between 2009 and 2012, the Town has realized an average energy reduction rate of



[2] The building energy consumption data in this document is adjusted to account for abnormal fuel consumption due to weather differences each year using Simple-Ratio Based Weather Normalization. For detailed information about the normalization methodology, please refer to Appendix A.

4% annually. If Medway proceeds to implement energy consumption reduction measures at this annual rate, the Town will meet its Green Communities energy reduction goal by 2013, one year before the target date of 2014.

Energy-Pedia #4: The Massachusetts Green Communities Designation and Grant Program

The Massachusetts Green Communities Designation and Grant Program recognizes municipalities' clean energy efforts and provides assistance to help cities and towns reduce energy use and lower their carbon footprints. Medway received the Green Communities Designation in 2010. As of November 2012, the number of designated Green Communities has grown to 103. There are five criteria for Green Communities designation:

- Provide as-of-right siting in designated locations for renewable/alternative energy generation, research and development, or manufacturing facilities;
- Adopt an expedited application and permit process for as-of-right energy facilities;
- Establish an energy use baseline and develop a plan to reduce energy use by 20% within 5 years;
- Purchase only fuel-efficient vehicles; and
- Set requirements to minimize life-cycle energy costs for new construction.

Source: Massachusetts Energy and Environmental Affairs: Green Communities. For more information, see: http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/

Five Year Energy Reduction Plan

To help the Town meet the its Green Communities energy reduction target, the 2010 Five Year Energy Reduction Plan (ERP) detailed a multi-measure energy savings plan to guide Medway's energy reduction progress. The ERP anticipates the Town will reduce its municipal energy consumption by 20.8% (10,117 MMBTUs) through energy efficiency improvement projects in municipal buildings and facilities between 2009 and 2014. The following "Summary of Energy Use and Projected Energy Savings" table summarizes the estimated energy savings from the ERP projects.

Summary of Energy Use and Projected Energy Savings[3]

ERP Projects	FY 2009 Energy Use (MMBTU)	% of Total MMBTU Baseline Energy Usage	ERP Projected Savings (MMBTU)	Overall Municipal Savings (%)
Medway Public Schools	35,128	72%	7,581	15.6%
a. TRANE Energy Services Contract at all schools	-	-	*5,580*	*11.4%*
b. Middle School Repair Project	-	-	*1,468*	*3.0%*
c. New window units and insulation at Burke ES	-	-	*333*	*0.7%*
d. Insulation at McGovern ES	-	-	*200*	*0.4%*
Energy upgrades at non-school buildings	6,836	14%	1,767	3.6%
Fuel efficiency upgrades for vehicles	4,208	9%	421	0.9%
Variable frequency drives installation at water well	2,572	5%	348	0.7%
5 YEAR ENERGY REDUCTION PLAN	**48,744**	**100%**	**10,117**	**20.8%**

[3] The "Summary of Energy Use and Projected Energy Savings" table is from Medway's Energy Baseline Inventory and Five Year Energy Reduction Plan (ERP) prepared for the Massachusetts Green Communities Program. The energy data presented in the ERP was extracted from multiple sources including the Town's MassEnergyInsight database, energy use spreadsheets provided by the Medway School Department for FY 2005 through part of FY 2010, and gas and electric bills for the Medway Public Library for November 2007 through January 2010. In Summer 2012, the Energy Committee and the Town standardized the Town's benchmarking method by only using energy data from the MassEnergyInsight database. Due to the change in the data used for benchmarking, the baseline energy data in this table is slightly different from the baseline presented in this plan. *This table should therefore only be used as a reference for identifying Medway's energy reduction potential and should not be used for benchmarking energy consumption and tracking energy reduction progress.*

The ERP includes four school and three non-school energy efficiency improvement projects. The following "Energy Reduction Plan Action Implementation Progress" table summarizes the status of the seven proposed ERP projects. As of December 2012, the Medway Public Schools completed the TRANE ESCO project. Additionally, the Middle School Repair Project is currently being implemented and is in the final construction phase.[4] Two non-school energy efficiency projects are also currently in progress.

Energy Reduction Plan Action Implementation Progress

Facility	Action Item	Status as of December 2012
Medway Public Schools	TRANE Energy Services Contract at all schools	Completed
Medway Public Schools	Middle School Repair Project	In-Progress
Non-School buildings	Energy upgrades[5]	*Expected to be completed in FY 2013*
Fire Station 1	*Roof Replacement*	*Expected to be completed in FY 2013*
Highway Bar; Fire Station 2; Police Station	*Hot water boiler controls*	*Expected to be completed in FY 2013*
Town Hall; Highway Barn; Fire Station 1; Fire Station 2; Library; Senior Center	*Building envelope improvements*	*Expected to be completed in FY 2013*
Water well	Variable frequency drives installation	In-Progress
Vehicles	Fuel efficiency upgrades	Expected to be completed in FY 2014

Clean Energy Target

In addition to the Green Communities energy reduction target, Medway has established a renewable energy goal that is estimated to reduce municipal fossil fuel energy consumption by 4.2%. It is estimated that solar energy production at the Middle School and the High School will result in an additional 2,075 MMBTUs savings on top of the energy savings resulted from the anticipated ERP actions.

Municipal Building Energy Use Overview

Municipal buildings account for approximately 79% of the Town of Medway's municipal energy use. The Medway Public School System is the biggest municipal energy user. Among the six school buildings, Medway High School and Medway Middle School have the highest energy building consumption, followed by the Memorial School.

Energy Use Intensity (EUI), the ratio between total building energy use and floor area, can be a helpful indicator for comparing energy savings opportunities among buildings since it demonstrates how much energy is being used per unit floor area in a building. According to the "Municipal Building Inventory" table on page 9, the Senior Center has the highest EUI among all Town buildings in FY 2012, followed by the Town Hall. While the Town Hall EUI dropped by 40% from FY2009 to FY2012, the Senior Center EUI increased by 81%. The EUIs for the school buildings have dropped significantly since FY 2009, indicating a reduction in the total building energy use with respect to building floor areas.

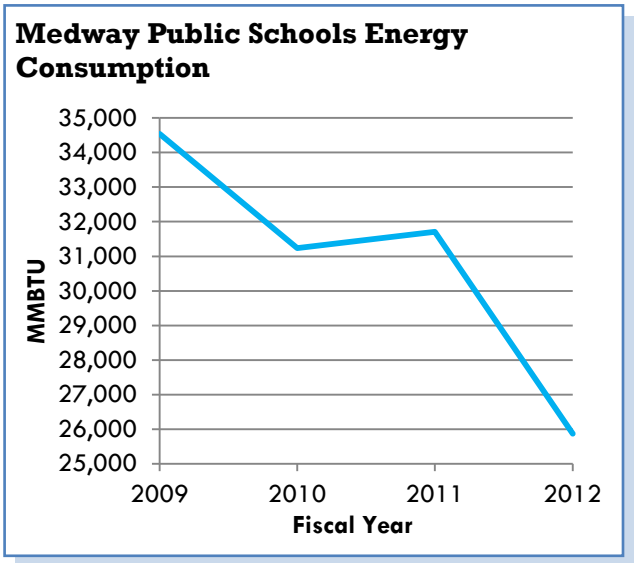
[4] For more information on the Medway Middle School Repair Project, please refer to the "Municipal Building Projects" section on page 9.
[5] For a detailed list of the energy efficiency improvement projects at non-school buildings and facilities, please refer to Appendix D.

However, it is important to note that when making energy project decisions, EUI should only be used as one type of indicator for determining building energy efficiency. EUI only measures the ratio between building energy use and floor area; a building's EUI rating may be affected by other factors, such as a building's operation hours and usage. Therefore, a comparison of EUI ratings may not truly reflect the efficiency of Medway's municipal buildings. Therefore, it is critical that the Town refer to the energy audit information provided by TNT Energy to identify eclectic and gas savings opportunities for each municipal building.

Municipal Building Inventory

Building	Building Floor Area (Sq. Ft)	2009 Baseline Energy Use (MMBTU)	2009 Baseline EUI (kBTU/ Sq.Ft)	2012 Energy Use (MMBTU)	2012 Baseline EUI (kBTU/ Sq.Ft)
42 Broad Street	2,400	0	0	26	11
50 Winthrop Street	1,362	119	87	0	0
Thayer House	1,544	2	1	4	2
Town Hall	8,830	1,255	142	890	101
Highway Barn	6,501	584	90	503	77
Highway Washbay	1,800	141	78	131	73
Senior Center	6,520	143	22	738	113
Fire Station 1	8,742	662	76	564	65
Fire Station 2	11,795	388	33	346	29
Library	16,437	977	59	748	46
Police Station	11,075	899	81	874	79
Burke School	39,640	2,397	60	1,729	44
High School	210,704	10,912	52	9,330	44
McGovern School	53,865	2,536	47	1,239	23
Memorial School	72,669	6,992	96	5,865	81
Middle School	129,360	11,705	90	7,700	60

Municipal Building Projects



Medway's existing municipal energy reduction strategies center on the sector's biggest energy user: the Medway Public Schools. As noted in the "Summary of Energy Use and Projected Energy Savings" table on page 7, the ERP estimated that increasing energy efficiency in the Schools would reduce the Town's energy consumption by 75% (7,581 MMBTUs). As noted in the "Medway Public Schools Energy Consumption" chart, as of FY 2012, energy efficiency improvements in the school buildings have reduced Medway Public Schools energy consumption by 8,679 MMBTUs.

TRANE ESCO Project

In FY 2009, Medway and the Medway Public Schools bundled multiple facility retrofit projects and contracted with TRANE, a professional Energy Services Company (ESCO), to provide energy management services through a performance contract. An ESCO performance contract is a creative financing mechanism that allows communities to use guaranteed energy cost savings over a 15-20 year period to pay for a bundle of energy saving and infrastructure renewing projects across a portfolio of buildings. The Medway ESCO projects were completed in FY 2010. The ESCO work is expected to reduce the schools' energy use by 24% beginning in FY 2011. As of March 2012, the Medway Public Schools saved $248,000 in energy expenditures as a result of the ESCO project, which is $24,000 more than the guaranteed energy savings projected at the beginning of the project.[6] For more information about the Medway Public Schools ESCO project, please refer to Appendix E.

Medway Middle School Repair Project

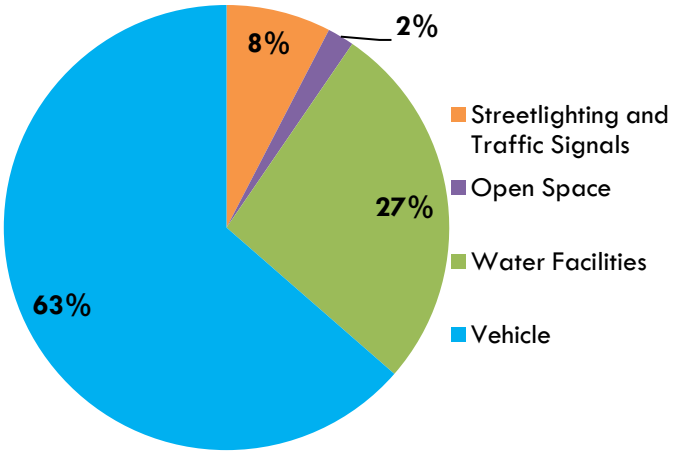
In addition to the TRANE ESCO project, in November 2011, Medway Public Schools began Phase 1 of the Middle School Repair Project. Although the Repair Project is not focused specifically on energy savings, many of the repairs to the Middle School's building infrastructure have energy saving components. The project's energy efficiency measures include building envelopment improvement, window unit replacement, and HVAC installation. The Middle School started the fourth and final Construction Phase of the project in Fall 2012.

Source: Consigli/Medway Middle School Repair Project Website

Non-Building Energy Use Overview

Medway's non-building energy consumption is from: street lighting and traffic signals, water facilities, open space lighting, and vehicles. In FY 2012, non-building energy use accounted for 21% of the Town's overall municipal energy consumption. The largest non-building energy use in the Town is from vehicles, followed by water and sewer, and street lighting and traffic signals.

Non-Building Energy Consumption (FY2012)

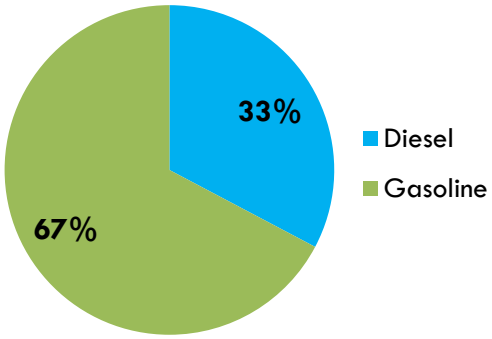


[6] Data on energy cost savings from the ESCO project is extracted from the 2012 Year 2 Measurement and Verification Reconciliation for Medway Public Schools report provide by Trane U.S., Inc.

Vehicles

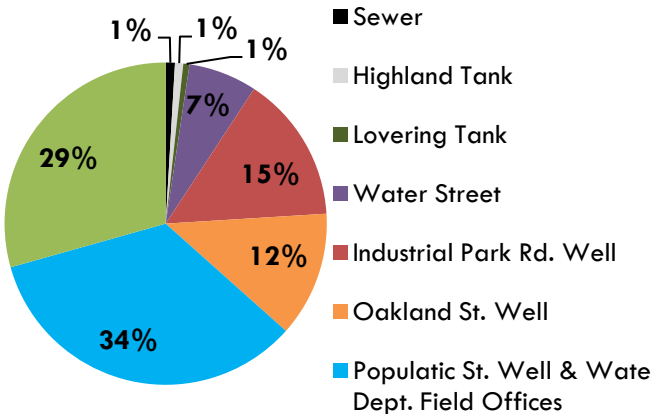
Vehicle energy usage accounted for 63% of the Town's non-building energy consumption in FY 2012. 68% of the Town's vehicle energy usage is attributable to gasoline fuel consumption. The remaining 32% is attributable to diesel fuel consumption. Proportionally, gasoline usage and diesel usage accounted for approximately 67% and 33% respectively of municipal vehicle greenhouse gas emissions in FY 2012.

FY 2012 Vehicle Greenhouse Gas Emissions by Fuel Types



Water Facilities

FY 2012 Water Consumption by Facilities



In aggregate, water facilities are the second largest users (27%) of Medway's non-building energy. Among the Town's water facilities, the Populatic St. Well & Water Department Field Offices had the highest energy use in FY 2012, followed by the Village St. Well, then the Industrial Park Rd. Well. The sewer facility, the Highland Tank, and the Lovering Tank have the lowest energy use, with each accounting for just 1% of the Town's water and sewer energy consumption.

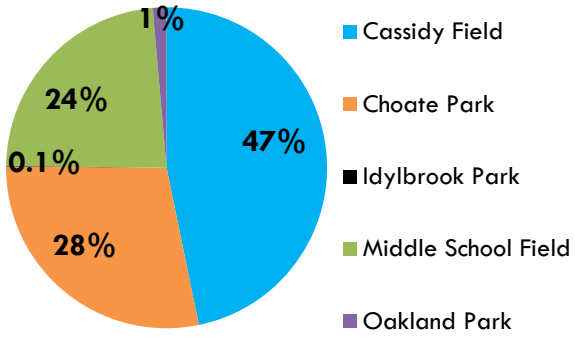
Street Lighting and Traffic Signals

Street lighting and traffic signal energy usage comprises 8% of the municipal sector's non-building energy use. In 2004, the Town capitalized on utility incentives to convert all 619 Town streetlights to more efficient halogen fixtures. In order to further advance the energy savings potential in street lighting, the Town is currently considering implementing a LED streetlight retrofit demonstration project. The "Retrofit Streetlights" section on page 19 details resources and incentives available for LED streetlight retrofit.

Open Space Lighting

Medway's open space energy usage includes outdoor lighting at Cassidy Field, Choate Park, Idylbrook Park, Oakland Park, and the Middle School Field. In aggregate, the Town's open space accounted for 2% of municipal non-building energy consumption in FY 2012. Cassidy Field comprises the largest share (47%) of Medway's open space energy consumption, followed by Choate Park and Middle School Field.

FY 2012 Open Space Energy Consumption by Facilities



Residential, Commercial, & Industrial Energy Profile

Medway's residential, commercial, and industrial sectors account for approximately 94% of Medway's energy consumption. The best way to assess residential, commercial, and industrial consumption is to look at aggregate utility data for each sector. Currently, there are no standard systems for municipalities to collect aggregate residential and commercial data from investor-owned utilities. Given the difficulty with accessing such data for developing this plan, the plan uses publicly available data such as census data, labor statistics, and building energy survey analyses to estimate aggregate energy use by sector. The information in this section is meant to serve as a baseline for the purposes of local energy planning efforts and to provide insight into the types and scale of energy use within Medway. However, since consumption use is estimated based on static data sources, the energy consumption baselines presented in this plan cannot be used to benchmark and monitor subsequent changes in use. In other words, real aggregate data must be used to accurately measure the success of any future energy project.[7] For a detailed explanation of how the estimated energy consumption was derived, please refer to Appendix B.

Residential Sector

Medway's population by race and ethnicity is fairly proportional to the state average, with slightly larger Asian and Black populations and a slightly smaller Latino population. Medway's population is younger than the state average, with a higher percentage of young adults in their 20s and 30s. Medway's median household income ($106,058) is higher than the state median ($62,859). 18% of Medway's households earn below the state's annual median income, with 5% earning between 60% and 80% of the state median household income.

Residential Sector At-A-Glance

Medway Residential Profile	
Median Household Income	$106,058
Total # Housing Units	4,433
Owner-Occupied Units	89%
Renter-Occupied Units	11%
Units that Heat with Natural Gas	46%
Units that Heat with Heating Oil	45%

Housing Type	Overall	Owner-Occupied	Renter-Occupied
Single-Family, Detached	81%	80%	1%
Single-Family, Attached	3%	3%	0%
Multi-Family, 2-4 Units	7%	4%	3%
Multi-Family, 5+ Units	9%	2%	7%
Total	**100%**	**89%**	**11%**

Source: US Census 2010

Medway has a large single-family, detached, owner-occupied housing stock (80% of total occupied housing stock). 89% of the housing units in the Town are owner-occupied and the remaining 11% are renter-occupied units. Almost half of the homes in Medway heat with natural gas (46%), with an additional 45% of homes heating with fuel oil. The remaining 9% have electric heat or use another heating fuel such as cordwood.

[7] MAPC and the Town of Medway are currently working with NSTAR and Columbia Gas to get aggregate residential and commercial data to create a more accurate residential and commercial energy profile and baseline and to establish energy reduction and program participation goals directly linked to such baselines.

Residential Energy Consumption[8]

The residential sector makes up approximately 70% of energy consumption in Medway. By fuel type, fuel oil makes up the largest part of the residential sector's greenhouse gas emissions followed by electricity, and then natural gas. Medway residents spend approximately $10 million each year on home energy expenditures.

Residential Energy Overview

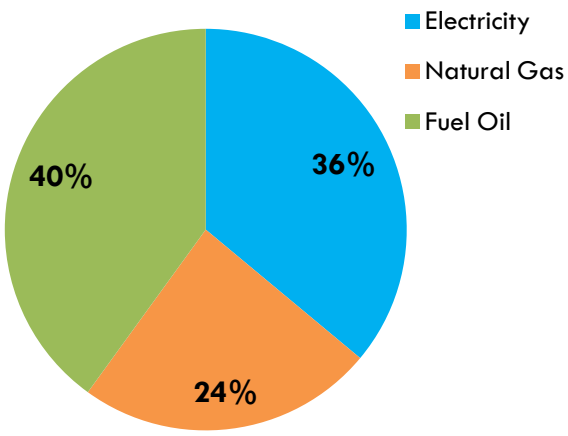
Annual Residential Energy Consumption in Medway		
Fuel Type	**Energy Consumption**	**Greenhouse Gas Emission**
Electricity	37 million kWh	31 million lbs CO2
Natural Gas	1.7 million therms	20 million lbs CO2
Fuel Oil	1.5 million gallons	34 million lbs CO2
Total	512 thousand MMBTUs	85 million lbs CO2

GHG emissions were derived using the energy consumption by fuel type and the following conversion factors:

Creenhouse Gas Emission Conversion Factors		
Fuel Type	**Factor (lbs CO_2 per Fuel Unit)**	**Fuel Unit**
Electricity	0.828	kWh
Natural Gas	11.71	Therms
Fuel Oil	22.38	gallons

Source: MassEnergyInsight

Residential Greenhouse Gas Emissions by Fuel Types



C&I Sectors At-A-Glance

Medway Commercial Profile		
Median Weekly Wage	$877	
Total Employment	3,869	
Total Establishments	361	
Industry	**# Est.**	**# Emp.**
Food Sales	9	178
Food Service	25	373
Outpatient Care	18	98
Retail (non-mall)	19	81
Enclosed and Strip Malls	4	28
Office	91	602
Public Assembly	8	51
Service	25	135
Warehouse & Storage	8	31
Medway Industrial Profile		
Industry	**# Est.**	**# Emp.**
Construction of Buildings	18	29
Specialty Trade Contractors	31	62
Miscellaneous	4	245

Source: Bureau of Labor Standards Economic Survey, 2010

Commercial and Industrial (C&I) Sectors

The commercial and industrial sectors in Medway consist of 361 business establishments. The office and food service sectors are the largest employers in Medway. Medway also has a relatively large food sales and service sector. The community has a small industrial sector that is comprised of building construction, specialty trade, and miscellaneous industries.

[8] Annual residential energy consumption and expenditures was approximated based on the average heating energy consumptions for Massachusetts households provided by the 2009 Energy Information Administration Residential Energy Consumption Survey. The Town of Medway is currently working with NSTAR and Columbia Gas to establish a standard system for collecting aggregate residential energy data on a regular basis. According to aggregate energy data provided by NSTAR, Medway's residential sector accounts for 43 million kWh in electricity consumption in 2012, 14% higher than the estimated value in this Plan. For detailed information on the survey data used in this plan, please refer to Appendix C.

Commercial and Industrial Energy Consumption[9]

Energy use in the commercial and industrial sectors accounts for approximately 19% and 5% of the community's energy consumption, respectively. The largest source of greenhouse gas emissions in both sectors is electricity, followed by natural gas. Fuel oil accounts for the smallest source of commercial greenhouse gas emissions. Medway's commercial establishments spend approximately $2.7 million annually on energy. Due to the limitations of the data sets used to approximate this baseline, industrial sector energy expenditures cannot be determined.

Commercial & Industrial Energy Overview

Annual Commercial Energy Consumption in Medway		
Fuel Type	**Energy Consumption**	**Greenhouse Gas Emission**
Electricity	28 million kWh	23 million lbs CO2
Natural Gas	288 thousand therms	3.4 million lbs CO2
Fuel Oil	106 thousand gallons	2.3 million lbs CO2
Total	139 thousand MMBTUs	29 million lbs CO2

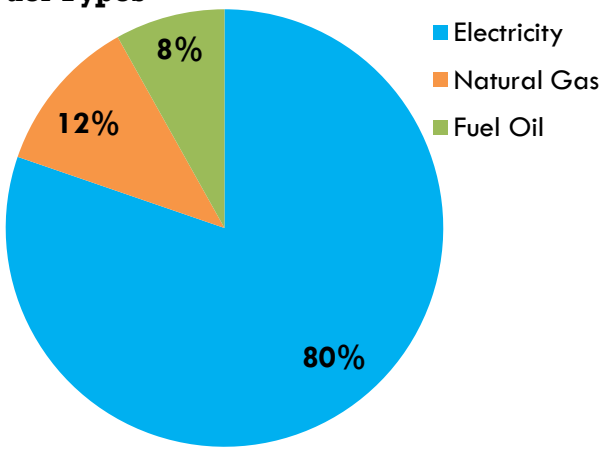
Annual Industrial Energy Consumption in Medway		
Fuel Type	**Energy Consumption**	**Greenhouse Gas Emission**
Electricity	5.6 million kWh	4.6 million lbs CO2
Natural Gas	144 thousand therms	1.7 million lbs CO2
Fuel Oil	-	-
Total	38 thousand MMBTUs	6.3 million lbs CO2

GHG emissions are derived using the energy consumption by fuel type and the following conversion factors:

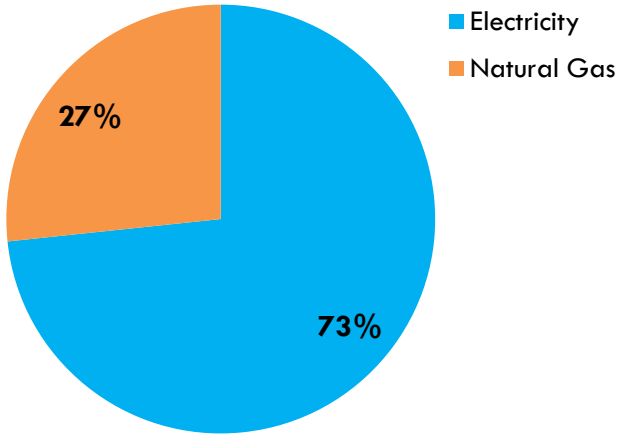
Greenhouse Gas Emission Conversion Factors		
Fuel Type	**Factor (lbs CO_2 per Fuel Unit)**	**Fuel Unit**
Electricity	0.828	kWh
Natural Gas	11.71	Therms
Fuel Oil	22.38	gallons

Source: MassEnergyInsight

Commercial Greenhouse Gas Emissions by Fuel Types



Industrial Greenhouse Gas Emissions by Fuel Types

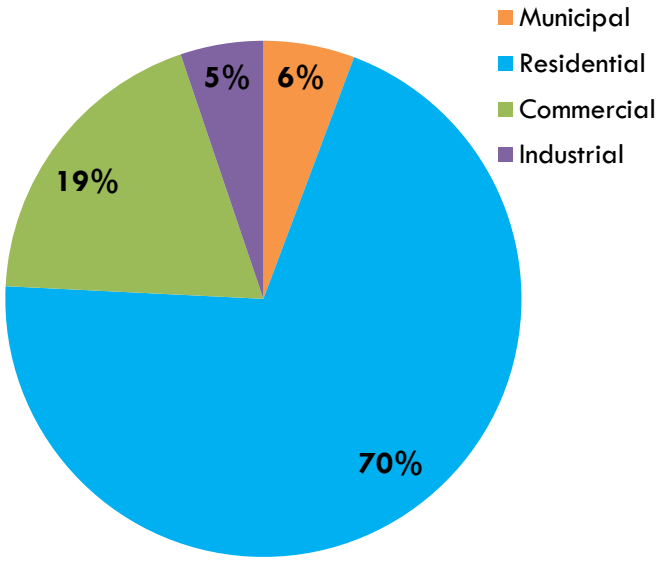


[9]Annual commercial and industrial energy consumption and expenditures was approximated based on the average energy consumptions for Massachusetts commercial buildings provided by the 2005 Energy Information Commercial Buildings Energy Consumption Survey. The Town of Medway is currently working with NSTAR and Columbia Gas to establish a standard system for collecting aggregate commercial and industrial energy data on a regular basis. According to aggregate energy data provided by NSTAR, Medway's commercial & industrial sectors account for 28 million kWh in electricity consumption in 2012, 21% lower than the estimated value in this Plan.

Medway Energy Goals & Actions

The recommendations for energy goals and actions presented in this section were established based on the Medway Energy Profile and the feedback generated from the community visioning process held with Medway municipal staff, the Medway Energy Committee, and other energy stakeholders in the area, including local residents and businesses. With municipal energy consumption accounting for just 6% of Medway's overall energy use, it is critical that Medway develop a multi-sector clean energy action plan in order to achieve significant energy savings throughout the community.

FY 2012 Medway Energy Consumption by Sectors



Recommendations for Municipal Energy Goals and Actions

As the Municipal Energy Profile in this plan reveals, Medway is on track to meet its energy reduction targets set as part of the Green Communities program. Given Medway's achievements in energy reduction and its interest in further advancing the Town's clean energy profile, it is recommended that the Town:

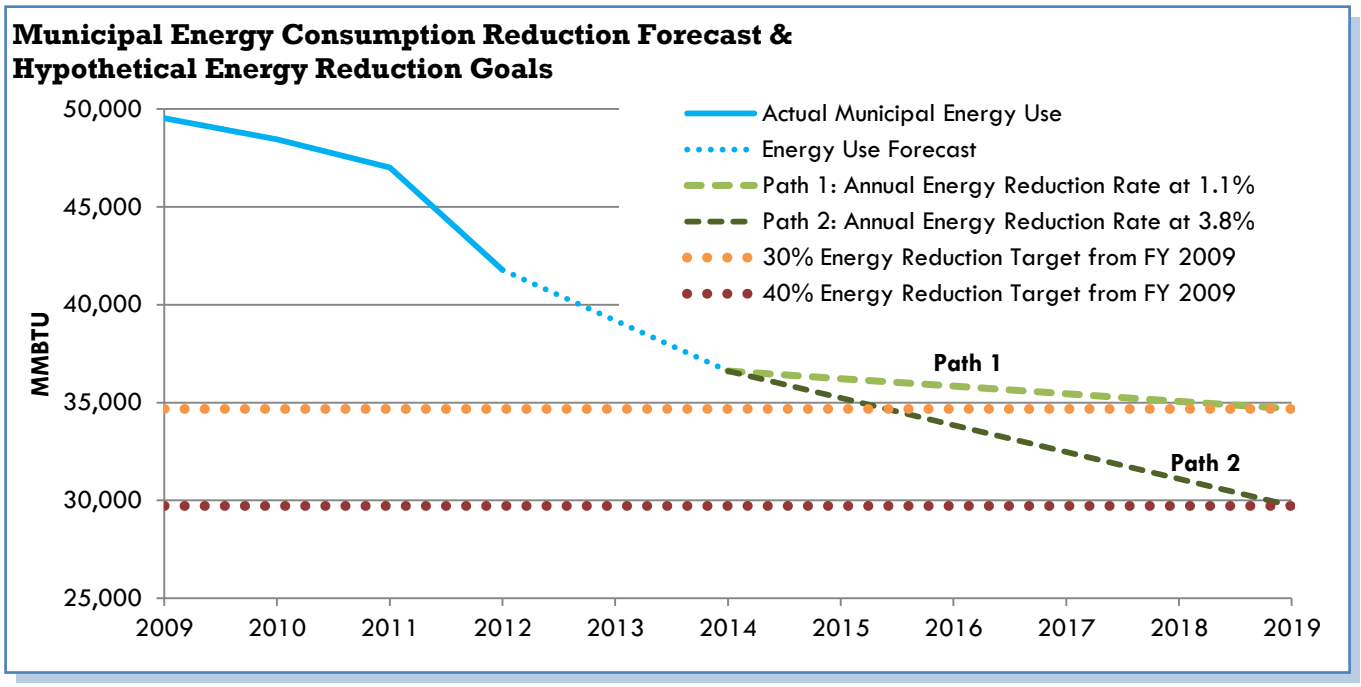
- Establish additional municipal energy reduction goals,
- Prioritize municipal energy efficiency projects,
- Establish renewable energy goals,
- Pursue renewable energy projects,
- Increase energy management and planning capacity, and
- Promote clean energy policies.

The following recommendations should guide municipal decision-making concerning energy and capital improvement projects.

1. Establish Additional Energy Reduction Goals.

As of FY 2012, the Town of Medway is on track to meet its Green Communities energy reduction target by 2014. (For more information, refer to the "Municipal Energy Reduction Progress" section on page 6). Since 2009, the Town has reduced its municipal energy consumption on average by 4% annually (12,279 MMBTU reduction per year).[10] If the Town's energy reduction continues at this annual rate, it is anticipated that Medway will meet its current energy reduction target at the end of FY 2013. At this rate, the Town will reduce its overall municipal energy consumption by 26% from the FY 2009 baseline by 2014.

In addition to monitoring and maintaining existing energy reduction progress, the Town should establish additional energy reduction goals to advance Medway's overall energy efficiency efforts. The "Municipal Energy Consumption Reduction Forecast & Hypothetical Energy Reduction Goals" chart below can be used as a reference when establishing new energy reduction goals for the Town. The chart depicts two potential energy reduction paths starting at the projected FY 2014 energy consumption level (36,611 MMBTUs). The two paths demonstrate how the Town can reach a 30% and a 40% energy reduction target from the FY 2009 baseline between FY 2014 and FY 2019.



1. Path 1 (Annual Energy Reduction Rate at 1.1%) shows that in order for the Town of Medway to reduce its municipal energy consumption by 30% from the FY2009 baseline, Medway would need to realize an annual energy reduction rate of 1.1% between FY 2014

[10] Municipal energy consumption includes energy consumption by buildings, street lighting and traffic signals, open spaces, water and sewer facilities, vehicles and auto maintenance facilities.

and FY 2019. At this rate, by FY 2019, the Town will have reduced overall municipal energy consumption by 14,861 MMBTUs from FY 2009.

2. Path 2 (Annual Energy Reduction Rate at 3.8%) shows that if Medway achieves an annual energy reduction rate to 3.8% starting in FY 2014, the Town will reduce its energy consumption by 40% from the FY2009 baseline by FY 2019. At this rate, by 2019, the Town will reduce overall municipal energy consumption by 19,815 MMBTUs from FY 2009.

Given that the Town will have captured a large portion of potential energy reductions from the energy efficiency improvements in the Medway Public Schools by FY2013, the potential for energy reductions, and therefore the annual energy reduction rate from FY2014 onward, will likely be significantly lower than the current rate of 4%. Therefore, when considering new energy reduction goals, the Town should identify the potential energy savings for the energy projects that have to be completed, as noted in the chart below.

Recommended Municipal Energy Efficiency Improvement Opportunities

Energy Efficiency Improvement	Target Building	Recommendation Source
Hot water heating system upgrade	Town Hall	TNT Energy Audit; Town Wide Facility Management Study
Energy management system installation	Library; Police Station	TNT Energy Audit
Computer room air conditioning upgrade	Police Station	TNT Energy Audit
New window units	Burke Elementary School; McGovern Elementary School	Town Wide Facility Management Study
Ceiling replacement	Burke Elementary School; McGovern Elementary School	Town Wide Facility Management Study
Exterior lighting upgrade	High School	Town Wide Facility Management Study
Retrofit Streetlights with LEDs	Municipal Streetlights	MAPC

Source: TNT Energy Assessment report; Town Wide Facility Management Study

2. Prioritize Municipal Energy Efficiency Projects.

Once the Town identifies new energy reduction goals, it is important for the Town to prioritize projects based on a project's energy savings and greenhouse gas reduction potential and its ability to help the Town achieve both energy goals and other goals, such as those related to cost savings and capital improvements. The Action Strategy "Planning for Municipal Retrofit Projects" in Part II of the plan provides guidance to municipal staff on how to prioritize municipal energy projects and how to establish an implementation process.

Balancing "Low-Hanging Fruit" Projects with Extensive Projects

As the Town considers which energy projects to pursue and when, it should also consider how certain projects and financing mechanisms can help the Town simultaneously reduce energy consumption, increase cost savings, and lead to capital improvements. Given that the Town has already pursued significant energy saving opportunities in municipal buildings, many of the energy projects that remain are ones with long payback time. In instances where Medway is considering the implementation of more challenging building projects that may be higher in cost and/or require long implementation time, the Town should also rationalize the benefits of balancing such energy work with facility improvement projects that have lower payback period,

since doing both types of projects together will help the Town maximize the level of energy efficiency achieved.

The "Recommended Municipal Energy Efficiency Improvement Opportunities" table above summarizes energy efficiency improvement projects previously recommended to the Town of Medway that have yet to be completed. Municipalities often use ESCO performance contracts to fund municipal energy projects, however given the fact that Medway was already completed much of its energy work, an ESCO for non-school municipal buildings might not be feasible or practical. Nevertheless, as the Town considers how it will fund and manage the remaining energy projects, it might be worthwhile investigating whether an ESCO project could in fact be used for Medway to pursue the remaining energy savings opportunities.

Medway should also conduct further research to identify additional financing mechanisms and funding opportunities, such as utility incentives, municipal lease financing, revolving loan funds, and state grants. For example, the Town can explore establishing an Enterprise Fund to allocate revenue generated from energy cost savings to finance clean energy projects and/or energy staff time. Such information will help the Town plan strategically for which projects it should pursue to achieve its energy goals and for how the Town will coordinate such work with other related efforts.

The following table provides an overview of the utility incentive programs available for funding municipal retrofit projects.

Incentive Program	Descriptions	Available Projects
New Construction and Equipment Incentives	Provides technical assistance and incentives to improve energy efficiency in a new facility or for replacing aging equipment.	Lighting & Controls; HVAC Systems' Motors; Compressed Air; Variable Speed Drives
Existing Facility Incentives	Provides technical assistance and incentives to improve energy efficiency and promote energy savings for energy efficiency retrofits at an existing facility or for replacing inefficient equipment.	Lighting & Controls; HVAC Systems' Motors; Compressed Air; Variable Speed Drives; Energy Management System

Source: National Grid and MassSave

For more information, see:

- MassSave New Construction: http://www.masssave.com/business/new-construction-and-equipment/find-incentives
- MassSave Retrofit: http://www.masssave.com/business/building-or-equipment-upgrades/find-incentives
- Columbia Gas: http://www.columbiagasma.com/en/save-energy-money/Energy-Efficiency-Business.aspx
- NSTAR: http://www.nstaronline.com/business/energy_efficiency/electric_programs/business_solutions.asp

Beyond utility incentives, there are a range of borrowing services and financing tools available for funding larger and more comprehensive municipal energy projects. The following "Summary of Financing Options for Municipal Energy Projects" table provides an overview of common energy-related financing options available for funding municipal energy projects.

Summary of Financing Options for Municipal Energy Projects

Financing Option	Description
Qualified Energy Conservation Bonds (QECBs)	▪ Very low-interest financing tool (1% - 2% is common) ▪ Must be used for "qualified conservation purposes," such as: • Energy efficiency upgrades (need to have plan for 20% reduction) • Renewable energy production • Implementing Green Community programs (e.g. street lighting projects that are not tied to a building but affecting overall municipal energy use)
Qualified Zone Academy Bonds (QZABs)	▪ Can be used for school systems ▪ Low-interest financing tool ▪ Implemented through the MA School Building Authority
General Obligation (GO) Bond	▪ Not secured by a specific source of revenue ▪ High administrative costs
Tax-Exempt Municipal Lease	▪ Secured by equipment (i.e. lights, insulation, boilers, chillers, pipes) ▪ Subject to annual appropriation ▪ Has a slightly shorter term than GO bonds ▪ Tends to be limited to 15 years
Permanent State House Serial Notes	▪ Shorter-term loan ▪ Available for projects that may be below typical thresholds for bonds or leases

Pursue Energy Efficient and Alternative Fuel Vehicle Projects

Vehicle fuel usage accounts for 14% of Medway's overall municipal energy consumption. Given that vehicles constitute a significant portion of Medway's municipal energy consumption and expenditures, the Town should identify technologies and policies to reduce vehicle energy expenditures and to promote the use of more efficient municipal fleets. Potential actions that could result in energy reduction and cost savings in municipal fleets include purchasing electric vehicles, alternative fuel vehicles, and/or high-efficiency vehicles; installing electric vehicle infrastructures on municipal properties; and researching parking and zoning policies that support efficient and alternative fuel vehicles adoption.

Retrofit Streetlights

Although the Town retrofitted its streetlights in 2004, it should consider the additional energy savings that would result from LED streetlight retrofits. Unlike most communities in Massachusetts, the Town of Medway owns all of its streetlights. Streetlight ownership creates an opportunity for Medway to immediately pursue energy reduction measures. In order to showcase the savings potential of LED street lighting retrofits, the Town is currently considering a demonstration project at two locations as a way to gauge the efficiency and public

acceptance of LED lights. Medway plans to use approximately $15,000 in Green Communities to retrofit up to 60 streetlights in Medway in Spring 2013. If the demonstration project is well received, Medway should work with MAPC to purchase additional LED lights as part of MAPC's 2012 Bulk Purchasing of LED Street and Outdoor Lighting project in order to see immediate savings.

Energy-Pedia #5: MAPC's LED Street and Outdoor Lighting Program

MAPC's LED Street and Outdoor Lighting Program helps communities come together to collectively purchase LED streetlights and other outdoor lights (parking lots, flood lights, wall packs, etc.). The benefit of this program is twofold: (1) converting streetlights to LEDs reduces municipal energy consumption and expenditures and (2) joint procurement of the fixtures helps municipalities secure more competitive pricing for these projects, leading to a lower overall payback time. As part of the LED program, MAPC provides professional support and technical assistance to municipalities throughout the planning and procurement process.

Utility Incentives

Streetlights (e.g. cobraheads) are not individually metered for energy consumption. Instead, they are billed based on a predetermined formula for energy consumption called a tariff. Utility incentives for replacements of these types of fixtures are calculated based on kWh savings and are currently determined on a case by case basis. Incentives for streetlights replacement currently varies between utilities.
NSTAR is able to calculate a change in power consumption by comparing your existing fixture with the proposed replacement. Since Medway is served by NSTAR, the Town will be able to recoup energy savings from street lighting retrofits. NSTAR currently provides an incentive of up to $0.25 per kWh saved.

For more information, see: http://mapc.org/led-street-lighting

Pursue Remaining Energy Reduction Plan Recommendations

As Medway moves closer to meeting its Five Year Green Community energy reduction target in FY 2014, it should monitor the progress made in implementing the ERP's proposed energy conservation measures. The following chart summarizes the envisioned implementation schedule for the ERP recommended measures.[11]

Energy Reduction Action Schedule for Implementation

Energy Reduction Action	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
Medway Public Schools ESCO			X																	
Middle School Repairs																X				
Burke ES Windows														X						
McGovern ES Windows																		X		
Municipal (Non-School Building) Energy Upgrades									X											
Water Department VFDs					X						X				X				X	
Vehicle Fuel Efficiency Improvement																		X		
High School Solar			X	X																
Middle School Solar								X												

Medway should also consider pursuing the recommended ERP measures that have yet to be realized. These measures include:

[11] The "Energy Reduction Action Schedule for Implementation" table is created based on "Table 11-Schedule for Implementation" on page 23 in the Energy Baseline and Five Year Energy Reduction Plan.

- Researching funding opportunities for performing the recommended energy saving actions and contract for work to be implemented;

- Developing community education programs to increase awareness of energy reduction in the residential sector;

- Consolidating the use of municipal buildings for off-hours meetings to encourage the use of fewer buildings and the use of the more energy efficient buildings; and

- Encouraging contracted service providers, such as school bus, transportation services, trash and sewage haulers, to implement alternative energy technology and efficient energy technologies.

3. Establish Renewable Energy Goals.

As noted in the ERP, renewable energy production is an important energy reduction strategy to Medway. The Town is already supportive of renewable energy development, as demonstrated by the solar panel installations at the sewage treatment plant, the High School, and the Middle School. As of FY 2012, solar energy production at the schools has resulted in 1,660 MMBTUs savings. *Given the time and capacity restraints of municipal staff and the Energy Committee, it is important for the Town to set renewable energy goals if renewable energy development is a priority. Such goals will then help the Town prioritize pursuing renewable energy projects when the Town is deciding how to allocate its limited time and resources on energy projects.* It is also important to note that Medway's renewable energy goals can be tied to energy reduction goals if energy reduction goals and benchmarking are focused on the reduction of fossil fuel consumption and not limited to overall energy use.

The Town may also want to establish renewable energy goals that are focused on developing specific types of technology on municipal property, such as photovoltaic panels and organics-to-energy facilities. However, given how rapidly energy technologies evolve, it is recommended that Medway focus on establishing at least some renewable energy goals that are technology-neutral to ensure that Town is pursuing the most innovative and advance renewable energy systems.

The first step in establishing renewable energy goals should be to identify the Town's renewable energy potential. As part of MAPC's Regional Solar Initiative, Medway is receiving some guidance on identifying suitable sites for solar PV projects. If the Town of Medway is interested in pursuing other renewable energy opportunities beyond solar, such as hydroelectric and organics-to-energy generation, the Town should consider working with professional renewable energy developers and/or engineers to identify viable sites for renewable energy generation. Once the Town's renewable energy potential is identified, the Energy Committee should work with the Town Administrator to establish clean energy goals and prioritize clean energy projects based on their ability to advance such goals. Medway should closely monitor DOER and MassCEC opportunities, as both have provided funding for feasibility studies in the past.

4. Pursue Renewable Energy Projects.

Once municipal renewable energy goals are established and renewable energy potential is determined, the Town should prioritize which goals to address, keeping in mind energy grant and program opportunities offered by DOER, MAPC, and MassCEC that can help subsidize and support renewable projects. Additionally, the Town should consider collaborating with MassCEC to implement demonstration projects of new renewable technologies to leverage MassCEC's technical and financial assistance. Further, Medway should also consider capitalizing on any renewable energy projects by developing school science curriculum on the local projects. In many cases renewable energy developers can assist with such curriculum, which can educate students on clean energy science and policy, as well as support and encourage renewable energy awareness.

Integrate renewable energy projects into the Town's disaster planning

To consolidate renewable energy efforts in disaster planning, Medway should explore technologies and policies that support renewable energy emergency generation. For example, the Town should consider installing solar or fuel-cell powered back-up systems at emergency locations, such as at the Police Station and the Fire Stations. The Town should also investigate smart switch technologies and zoning strategies to ensure renewable energy distribution is maintained even when the grid goes down. In addition, Medway should also look into zoning policies that would mandate renewable energy back-up systems for cell towers.

5. Increase Energy Management and Planning Capacity

In order to realize and maintain Medway's energy savings, the Town must closely monitor how energy is used in municipal buildings and infrastructure after energy projects are completed. Given the limited capacity and time of existing municipal staff to manage energy projects, it is recommended that the Town increase its energy management and planning capacity.

To maintain energy savings in municipal facilities, the Town should establish standard facility energy management guidelines and practices, and provide training to municipal staff to ensure conservation measures are adopted and energy efficiency is maximized. Such organizing may involve the establishment of a central body that oversees all municipal building projects and maintenance. The Town should also consider technologies that support energy management work in municipal buildings. To date, all of the Medway schools have installed Energy Management Systems (EMS) through the ESCO project. Medway should work with professional energy auditors and/or engineers to assess the cost and benefits of installing EMS in remaining municipal buildings.

Further, given the significant opportunities for Medway to pursue additional grants and municipal renewable energy projects, as well as support residential and commercial clean energy efforts, the Town should consider hiring a part-time or full-time energy coordinator or energy planner. An energy coordinator or planner can manage existing energy projects and paperwork, as well as work closely with the Medway Energy Committee to identify and to pursue new projects.

6. Promote Clean Energy Policies.

To support Medway's clean energy efforts, the Energy Committee should work with the Town Administrator to reach out to elected state officials to become better informed and involved in state energy policy. Policy issues that the Town may be interested in pursuing include building energy disclosure ordinances and utility energy data disclosure.

ACTIONS TO PROMOTE MUNICIPAL CLEAN ENERGY EFFORTS

Objective	Action	Key Implementers[12,13]	Example Actions/ Projects	2013	2014	2015	2016	2017	More Info
1. Track municipal energy consumption and costs.	a. Monitor the Town's progress in reducing energy consumption to meet the Green Communities goal of 20% reductions by 2014.	**Appointed municipal staff;** Energy Committee		X	X				
	b. Annually review energy supplier contracts.	**Energy Committee**		X Ongoing					
	c. Establish a standardized process for (1) maintaining and updating the Town's MassEnergyInsight account and (2) utilizing the data to benchmark energy reductions.	**Energy Committee;** Department of Public Services; Medway Public Schools; Town Administration		X Ongoing					
2. Build municipal capacity and leadership.	a. Build on the Town's Five Year Energy Reduction Plan to establish and maintain a plan for completing municipal retrofit work, which will include a list of priority projects, how projects will be funded, and how they will be completed.	**Town Administration;** Energy Committee; Department of Public Services; Medway Public Schools; Building Department	Annually review and update "Schedule for Implementation" section in the ERP.	X Ongoing					See Part II
	b. Annually review Energy Action Plan, document achievements, and plan for next steps.	**Energy Committee;** Town Administration; Department of Public Services		X Ongoing					See Part II
	c. Design and implement a policy for using life cycle cost analyses when making energy-related purchasing decisions.	**Energy Committee;** Town Administration; Board of Selectmen; Planning and Economic Development Office; Department of Public Services		X Ongoing					
	d. Explore financing mechanisms to help sustain energy projects and/or staff-time.	**Energy Committee;** Planning and Economic Development Office, Medway Public Schools, Town Administration, Department of Public Services		X Ongoing					
	e. Investigate the benefits of and opportunities for community choice aggregation.	Energy Committee; Planning and Economic Development Office		X	X	X			
	f. Establish an ongoing internship program to provide assistance to the Town Administrator's Office and to help with the implementation of the Energy Action Plan.	**Town Administration**		X Ongoing					See Part II
3. Increase municipal energy efficiency.	a. Retrofit streetlights with LEDs or more energy-efficient fixtures.	**Department of Public Services**	Participate in MAPC's bulk purchasing LED Lighting Project	X					
	b. Train municipal staff to manage and operate buildings in an energy efficient manner.	**Town Administration;** Department of Public Services	Educate municipal staff on how to consolidate the use of buildings for off-hours meetings to encourage the use of fewer buildings and energy efficient buildings.	X Ongoing					

[12] The implementers listed here may be revised once the Town hires an energy manager/coordinator.

[13] A stakeholder is delegated as the lead implementer for each energy action. The lead implementer will be responsible for overseeing and accomplishing the implementation of the action. Lead implementers are indicated by bold letters.

Objective	Action	Key Implementers	Example Actions/ Projects	2013	2014	2015	2016	2017	More Info
3. Increase municipal energy efficiency.	c. Investigate opportunities for joint purchasing with other municipalities to reduce retrofit/efficiency costs.	**Town Administration;** Energy Committee; Planning and Economic Development Office; Department of Public Services; School Department	Regional ESCO project	X Ongoing					
4. Enhance electric vehicle and/or alternative -fuel vehicle readiness.	a. Pursue grants and innovative financial options for funding EV infrastructures.	**Town Administration;** Energy Committee; Planning and Economic Development Office		X	X				
	b. Design and implement outreach program to encourage community EV adoption.	**Energy Committee;** Planning and Economic Development Office; Town Administration			X	X	X		
	c. Design and implement outreach programs that encourage contracted service providers for vehicles, such as school buses, to pursue alternative energy technology and energy efficiency improvements.	**Energy Committee;** Town Administration; Planning and Economic Development Office; Council of Aging; School Department; Police Department; Fire Department				X Ongoing			
5. Increase municipal renewable energy adoption.	a. Investigate opportunities to support renewable energy development, including power purchase agreements, net-metering, and the purchase of virtual net-metering credits.	**Town Administration;** Energy Committee; Planning and Economic Development Office; Department of Public Services; School Department		X	X	X			
	b. Conduct feasibility study on municipal buildings to identify facility roofs suitable for solar installations.	**Department of Public Services;** Town Administration; Energy Committee; Planning and Economic Development Office; School Department		X	X	X			
	c. Conduct town-wide feasibility study to identify locations for hosting a ground based solar farm.	**Planning and Economic Development;** Energy Committee;		X	X	X			
	d. Install solar/fuel cell powered back-up systems for emergency locations (e.g. fire and police stations).	**Emergency Management Team;** Energy Committee; Department of Public Services			X	X	X		
	e. Explore hydroelectric and organics-to-energy opportunities.	**Energy Committee;** Planning and Economic Development Office; Department of Public Services				X	X	X	

Recommendations for Residential Energy Goals and Actions

With the residential sector accounting for approximately 70% of Medway's energy consumption, it is critical that any effort to reduce Medway's energy consumption addresses residential use. Residents in Massachusetts that are served by investor-owned utilities are able to participate in MassSave, a state and utility energy efficiency program. All Medway residents served by NSTAR and Columbia Gas are therefore eligible to participate in MassSave. MassSave offers residents free energy assessments, as well as rebates and incentives for insulation, air sealing and the installation of energy efficiency measures, such as efficient lighting and Energy Star appliances. With such an established energy program already in place, the Town of Medway should focus its efforts on encouraging residents to participate in MassSave, rather than designing a completely new energy efficiency improvement program.

Any outreach effort to encourage residential participation in MassSave should be collaborative in nature, leveraging the energy and MassSave institutional knowledge of NSTAR and Columbia Gas and energy service vendors and the local and community expertise of municipal staff, the Medway Energy Committee, and other community stakeholders.

As mentioned earlier in this plan, the lack of aggregate residential energy use creates a barrier to setting energy reduction targets and to benchmarking energy reduction goals. Therefore, it is critical that the Town of Medway work with NSTAR, Columbia Gas, and/or approved MassSave vendors to develop an agreed upon system for accessing residential aggregate data by zip code on a semi-annual basis.

The first step to increasing residential energy efficiency is establishing an outreach team and developing an outreach strategy to target residents. An outreach team can comprise of Energy Committee members, municipal and school staff, energy service vendors, NSTAR and Columbia Gas representatives, and other key community stakeholders with pre-existing knowledge and/or interest in home efficiency and renewable energy projects. Recommendations for how to create a successful efficiency outreach strategy can be found in "Outreach Strategies for Energy Efforts" in Part II of this plan. Once an outreach team and a strategy are established, the Town should set a MassSave participation goal. For the first year, it is recommended that the goal should be to increase residential MassSave participation by 25% based, meaning if 406 households participated in year

Participation in NSTAR's MassSave Energy Efficiency Programs (2012)

Program	Jobs
Retrofits	10
New Construction	2
Direct Install	13
ENERGY STAR HVAC	70
ENERGY STAR Homes	7
ENERGY STAR Lighting	6
ENERGY STAR Appliances	187
Low-Income Multi-Family	2
Low-Income Single-Family	11
Residential Conservation Service	406

Source: NSTAR

2012, the goal for 2013 would be 508 participants. With aggregate baseline data, the Town will also be able to approximate the expected percentage of energy reductions that would be associated with this participation goal. After a year of targeted outreach, the Town can adjust its participation and reduction goals accordingly based on remaining opportunity and likelihood of certain achievements.

In addition to creating a general outreach effort for all residents, the Town should consider developing targeted outreach strategies for (1) residents who are more likely to participate in MassSave, such as single- or multi-family, owner-occupied households; and (2) those that face more barriers to MassSave participation, such as fuel oil users. The "Community Solar and Efficiency Program" strategy in Part II provides more detailed guidance on how to target such efforts.

Given that fuel oil usage accounts for 40% of Medway's residential greenhouse gas emission, the Town should provide supports to residents that are interested in switching to cleaner heating options. There are recent examples in Massachusetts where communities have successfully petitioned their natural gas providers for distribution extensions. In 2011, NSTAR expanded service in the Town of Shrewsbury, distributing natural gas to an additional 100 households.[14] In February 2013, the Town of Mattapoisett consolidated local support to petition NSTAR for extending natural gas services to coastal areas of the Town.[15]

In addition to natural gas line extensions, which can be a costly and timely process, the Town should also look into helping current fuel oil users adopt new technologies, such as air source heat pump, solar water-heating, and geothermal heating, that are cleaner and more efficient. For example, Medway can design targeted outreach campaigns to inform residents of and provide assistance in accessing existing federal and state renewable energy incentives, such as the federal Residential Renewable Energy Tax Credits and the MassCEC Commonwealth Solar Hot Water program. In addition, the Town should also monitor and explore potential state initiatives and incentive programs in the future.

Beyond an outreach program, other actions that could potentially help the Town reach residential energy goals include making sure new and renovated buildings are following the Town's Stretch Code, as well as connecting residents to renewable energy incentives.

[14] For more information, see http://www.telegram.com/article/20110415/NEWS/110419780.
[15] For more information, see http://www.wickedlocal.com/mattapoisett/news/x846054593/Mattapoisett-to-petition-for-natural-gas-line-extensions#axzz2Ku8hc2gv.

ACTIONS TO PROMOTE RESIDENTIAL CLEAN ENERGY EFFORTS

Objective	Action	Key Implementers	Example Actions/ Projects	2013	2014	2015	2016	2017	More Info
6. Track residential energy consumption and energy projects.	a. Set residential energy reduction goal.	**Energy Committee;** Board of Selectmen		X Ongoing					
	b. Use aggregate residential energy consumption data to set a baseline of residential energy consumption.	**Energy Committee;** NSTAR; Columbia Gas		X Ongoing					
	c. Develop an ongoing system for tracking energy consumption and benchmarking reductions in residential buildings managed by the Housing Authority.	**Housing Authority;** Energy Committee	LISC/WegoWise Green Retrofit Initiative	X Ongoing					
	d. Review building permits to assess the number and types of energy conservation and renewable energy projects taking place in Medway.	**Town Administration;** Energy Committee; Planning and Economic Development Office; Building Department		X Ongoing					
7. Increase residential awareness of energy issues and energy opportunities.	a. Collect and distribute information on the benefits of and incentives, rebates, and other financial opportunities for energy efficiency upgrades, thermal imaging, and solar development.	**Energy Committee;** NSTAR; Columbia Gas; Energy Service Vendors	Designate areas to display energy facts and program information; Maintain a website that provides centralized information.	X Ongoing					
	b. Hold workshops and community events that showcase local residential energy projects and cost savings.	**Energy Committee;** NSTAR; Columbia Gas; Energy Service Vendors		X	X				
	c. Support and encourage energy awareness and conservation within the school science curriculum as allowed within national and state standards; promote activities that educate students and parents on clean energy science, policy and opportunities.	**Energy Committee;** Schools; PTA; NSTAR; Columbia Gas; Energy Service Vendors			X	X			See Part II
8. Increase residential energy efficiency.	a. Connect residents to financing mechanisms for clean energy projects.	**Town Administration;** Building Department; Energy Committee; Planning and Economic Development Office		X Ongoing					See Part II
	b. Design and implement outreach programs to increase participation in the Mass Save program.	**Energy Committee;** NSTAR; Columbia Gas; Energy Service Vendors; Planning and Economic Development Office; Building Department	Work with utilities and energy vendors to create outreach programs to encourage residents to receive energy assessments and use rebates and incentives to complete work.	X	X	X			See Part II
	c. Identify and pursue opportunities to improve efficiency in residential buildings managed by the Housing Authority.	**Housing Authority;** Energy Committee	LISC/WegoWise Green Retrofit Initiative	X Ongoing					
9. Increase residential renewable energy adoption.	a. Design and implement outreach programs to increase residential solar adoption.	**Solar Program Manager /Coach;** Town Administration; Energy Committee; Planning and Economic Development Office	Participate in the "SolarizeMass" program and/or design an outreach campaign based on the program model.	X	X	X			See Part II

Recommendations for Commercial Energy Goals and Actions

Medway's commercial and industrial sectors account for 24% of the community's energy consumption, and therefore also demand attention when looking to reduce Medway's overall energy consumption. Similar to the recommendations made for targeting the residential sector, a campaign to reduce energy in Medway's businesses requires coordination among the Town, NSTAR, Columbia Gas, and the Medway Business Council. Additionally, those working to engage the commercial sector must also address the same baselining and benchmarking challenges that exist with the residential sector.

In order to increase clean energy awareness and action in Medway's commercial sector, an outreach team and outreach strategy must be established. As local stakeholders consider how to engage local businesses, they should consider focusing on businesses that have specific energy consumption patterns, such as the food sales and services industries. The "Local Green Business Program" strategy in Part II details how the Town can develop a more advanced green business program.

Initially, it is recommended that the Town set a goal of increasing commercial MassSave participation by 25%, meaning if 20 businesses participated in year X, the following year's goal would be 25 participants. However, as with the residential sector 25% reduction goal, the Town should anticipate adjusting this overall goal and/or developing more targeted goals once a standard system for accessing commercial aggregated data on a semi-annual basis is secured.

In additional to encouraging businesses to participate in the utility MassSave program, other actions that could potentially help the Town reach commercial energy goals include making sure new and renovated buildings are following the Town's Stretch Code, as well as connecting businesses to renewable energy incentives.

ACTIONS TO PROMOTE COMMERCIAL CLEAN ENERGY EFFORTS

Objective	Action	Key Implementers	Example Actions/ Projects	2013	2014	2015	2016	2017	More Info
10. Track commercial energy consumption and energy projects.	a. Use aggregated commercial energy consumption data to set a baseline of commercial energy consumption that can be used to benchmark energy reductions; identify large users.	**Energy Committee**; NSTAR; Columbia Gas		X Ongoing					
	b. Design and maintain a system for collecting commercial energy consumption and retrofit work data.	**Energy Committee**; Planning and Economic Development Office; Medway Business Council; Town Administration	Review building permits to assess the number and types of energy conservation and renewable energy projects taking place in Medway.	X Ongoing					
11. Increase commercial awareness of energy issues and energy opportunities.	a. Collect and distribute information on the benefits of and incentives, rebates, as well as other financial opportunities for energy efficiency upgrades, thermal imaging, and solar development.	**Energy Committee; Solar Program Manager/Coach**; Medway Business Council; Economic Development Director; Town Administration	Hold Council meetings and other business events to inform local businesses of the benefits of energy efficiency incentives.	X Ongoing					See Part II
	b. Design financing models to provide business owners with the financial incentives for clean energy improvements.	**Energy Committee**; Planning and Economic Development Office; Solar Program Manager/Coach; Economic Development Director	Commercial PACE	X Ongoing					
12. Increase commercial energy efficiency.	a. Design outreach programs to encourage businesses to participate in Mass Save.	**Energy Committee**; Planning and Economic Development Office; Medway Business Council; Economic Development Director; Energy Service Vendors; Town Administration	Create competitions such as Green Business Awards between neighboring businesses or between sectors.	X	X	X			See Part II
	b. Design outreach programs that target sector-specific and/or project-specific retrofit opportunities.	**Energy Committee**; NSTAR; Columbia Gas; Medway Business Council; Economic Development Director; Town Administration	Grocery focused energy efficiency program; community farm, commercial lighting fixture upgrades; commercial ventilation control upgrades.	X	X	X			