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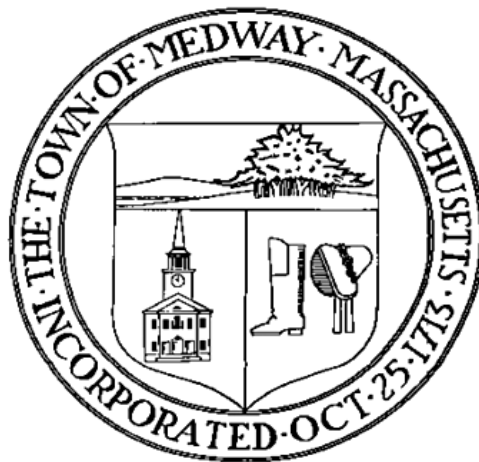
# **The Town of Medway Local Energy Action Plan**

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## **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



# Acknowledgments

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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.

MAPC wishes to express our thanks to the Barr Foundation for its support and funding for this project, as well as Naomi Mermin for her professional evaluation support and thoughtful review of the plan's development. We also wish to thank the Medway Energy Committee, Medway Business Council, Medway Housing Authority, NSTAR, Columbia Gas, Peregrine Energy Group, Trane U.S. Inc., Consigli Construction Co., Inc., and TNT Energy for their contributions to the plan. Finally, we would like to thank Jean Zove, Charlie Ticotsky, and Rebecca Davis of MAPC for their help in designing and reviewing the plan.

## **The Town of Medway**

Suzanne Kennedy, Town Administrator  
Susan Affleck-Childs, Planning and  
Economic Development Coordinator  
Dave D'Amico, DPS Deputy Director

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Secretary Marilyn Contreas  
Treasurer Taber Keally  
Executive Director Marc Draisen



Sources: Active Rain

# Executive Summary

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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

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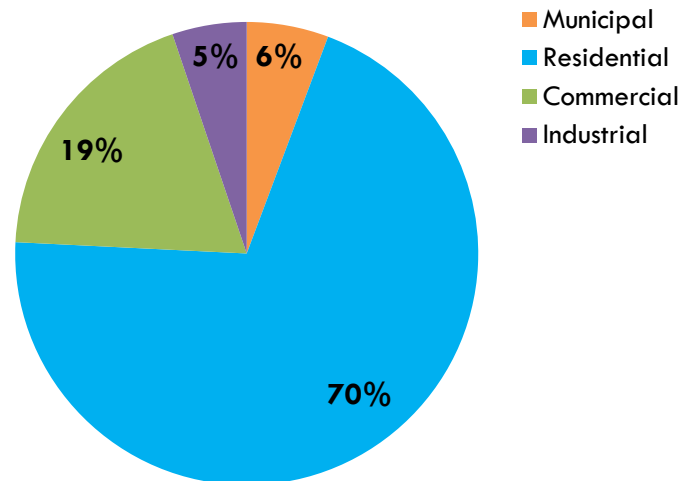
The Medway Energy Action Plan outlines how the Town of Medway can achieve community-wide energy reductions. Due to concerns over increasing energy costs, municipal fiscal responsibilities, and environmental consequences due to climate change, communities across the country are pursuing cost-effective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

**FY 2012 Medway Energy Consumption by Sectors**



## 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 implemented various projects and programs to promote energy efficiency and clean energy development in the municipal sector and in the community.

## 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%.<sup>1</sup>

## 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.

### 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

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



<sup>1</sup> 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**

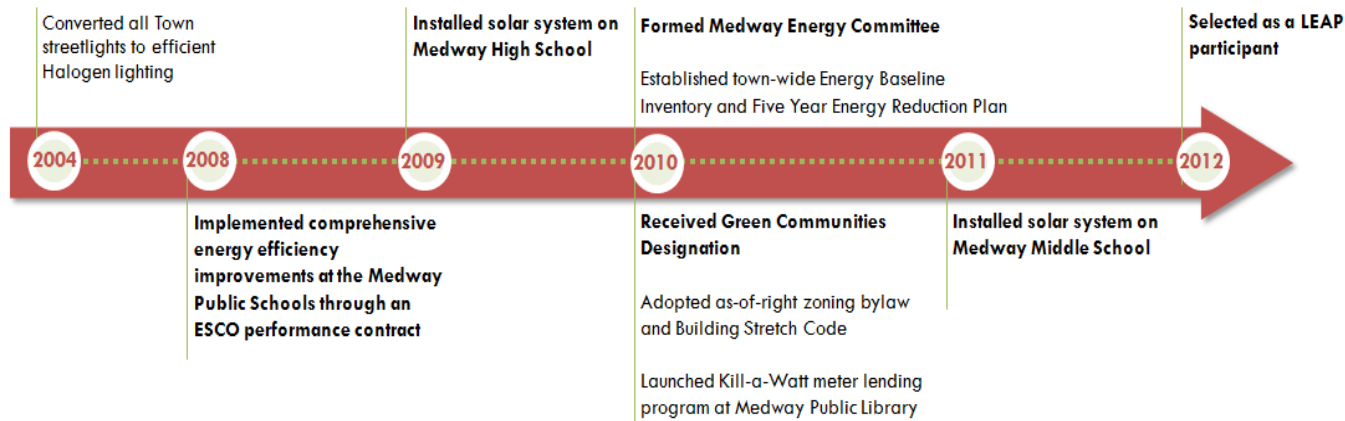
The Medway Energy Committee is a volunteer committee comprised of local volunteers appointed by the Board of Selectmen. The Committee is an advisory group to both the Town and the community that focuses on local energy conservation and renewable energy development issues. Missions of the Committee include:

- 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](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?

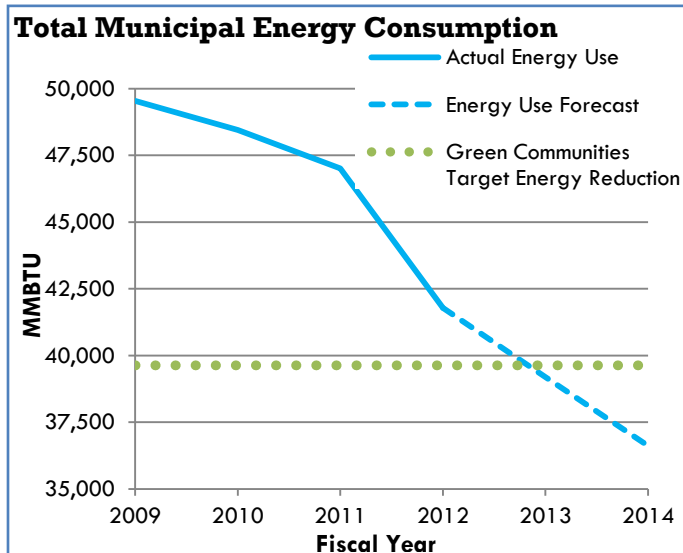
Medway monitors its municipal energy data using the MassEnergyInsight (MEI) tool. MEI is a free, web-based tool developed by Peregrine Energy Group and made available to cities and towns in Massachusetts through the Department of Energy Resources (DOER) as part of the Massachusetts Green Communities 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<sup>2</sup>

### 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



<sup>2</sup> 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<sup>3</sup>

ERP Projects	FY 2009 Energy Use (MMBTU)	% of Total MMBTU Baseline Energy Usage	ERP Projected Savings (MMBTU)	Overall Municipal Savings (%)
<b>Medway Public Schools</b>	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%
<b>Energy upgrades at non-school buildings</b>	6,836	14%	1,767	3.6%
<b>Fuel efficiency upgrades for vehicles</b>	4,208	9%	421	0.9%
<b>Variable frequency drives installation at water well</b>	2,572	5%	348	0.7%
<b>5 YEAR ENERGY REDUCTION PLAN</b>	<b>48,744</b>	<b>100%</b>	<b>10,117</b>	<b>20.8%</b>

<sup>3</sup> 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.<sup>4</sup> 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
<b>Medway Public Schools</b>	TRANE Energy Services Contract at all schools	Completed
<b>Medway Public Schools</b>	Middle School Repair Project	In-Progress
<b>Non-School buildings</b>	Energy upgrades <sup>5</sup>	<i>Expected to be completed in FY 2013</i>
<b>Fire Station 1</b>	Roof Replacement	<i>Expected to be completed in FY 2013</i>
<b>Highway Bar; Fire Station 2; Police Station</b>	Hot water boiler controls	<i>Expected to be completed in FY 2013</i>
<b>Town Hall; Highway Barn; Fire Station 1; Fire Station 2; Library; Senior Center</b>	Building envelope improvements	<i>Expected to be completed in FY 2013</i>
<b>Water well</b>	Variable frequency drives installation	In-Progress
<b>Vehicles</b>	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.

<sup>4</sup> For more information on the Medway Middle School Repair Project, please refer to the “Municipal Building Projects” section on page 9.

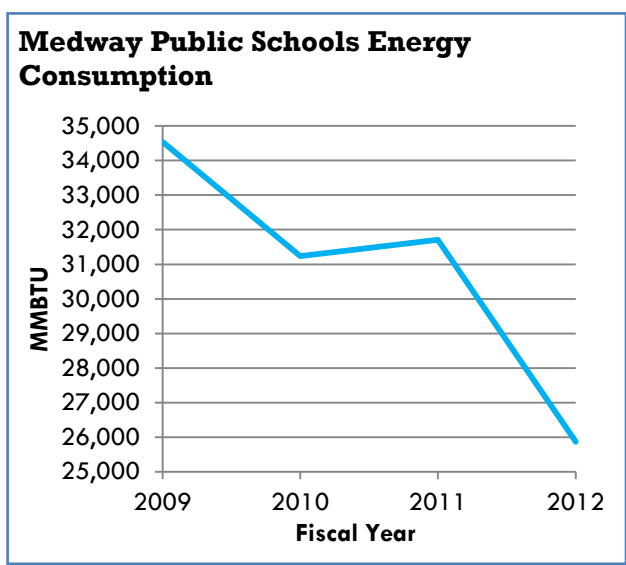
<sup>5</sup> For a detailed list of the energy efficiency improvement projects at non-school buildings and facilities, please refer to Appendix D.

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.<sup>6</sup> 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.

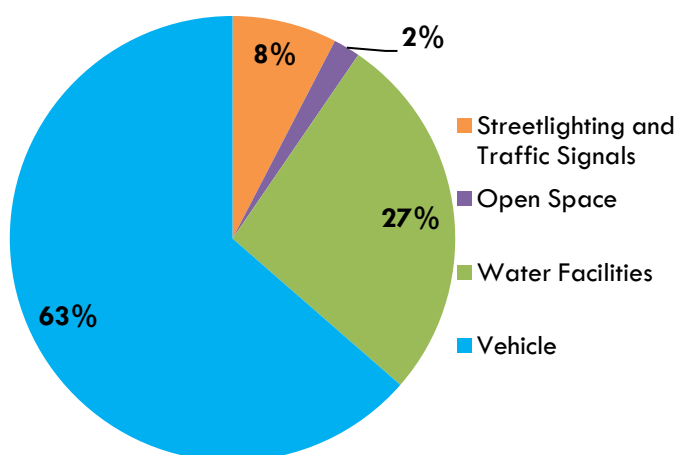


Source: Consigli/Medway Middle School Repair Project Website

## **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)**



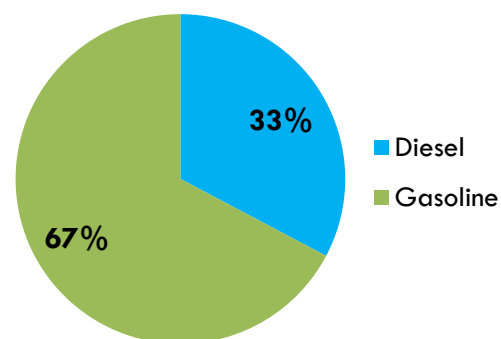
<sup>6</sup> Data on energy cost savings from the ESCO project is extracted from the 2012 Year 2 Measurement and Verification Reconciliation for Medway Public Schools report provide by Trane U.S., Inc.



## Vehicles

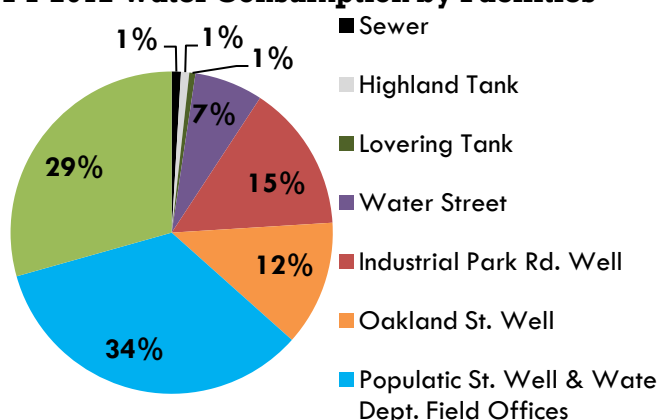
Vehicle energy usage accounted for 63% of the Town's non-building energy consumption in FY 2012. 68% of the Town's vehicle energy usage is attributable to gasoline fuel consumption. The remaining 32% is attributable to diesel fuel consumption. Proportionally, gasoline usage and diesel usage accounted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

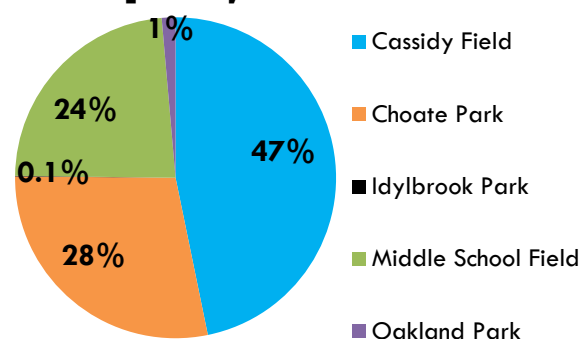
## Street Lighting and Traffic Signals

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.<sup>7</sup> 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%
<b>Total</b>	<b>100%</b>	<b>89%</b>	<b>11%</b>

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.

<sup>7</sup> 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<sup>8</sup>

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 CO <sub>2</sub>
Natural Gas	1.7 million therms	20 million lbs CO <sub>2</sub>
Fuel Oil	1.5 million gallons	34 million lbs CO <sub>2</sub>
<b>Total</b>	<b>512 thousand MMBTUs</b>	<b>85 million lbs CO<sub>2</sub></b>

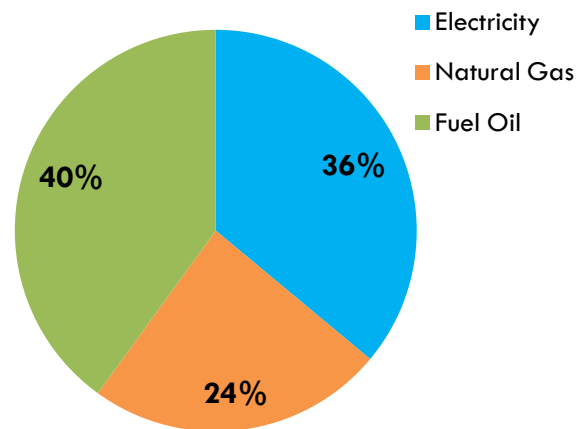
GHG emissions were derived using the energy consumption by fuel type and the following conversion factors:

#### Greenhouse Gas Emission Conversion Factors

Fuel Type	Factor (lbs CO <sub>2</sub> 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.

<sup>8</sup> 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<sup>9</sup>

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

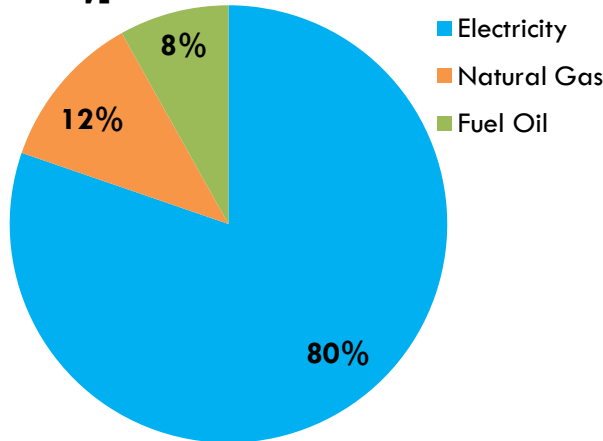
GHG emissions are derived using the energy consumption by fuel type and the following conversion factors:

### Greenhouse Gas Emission Conversion Factors

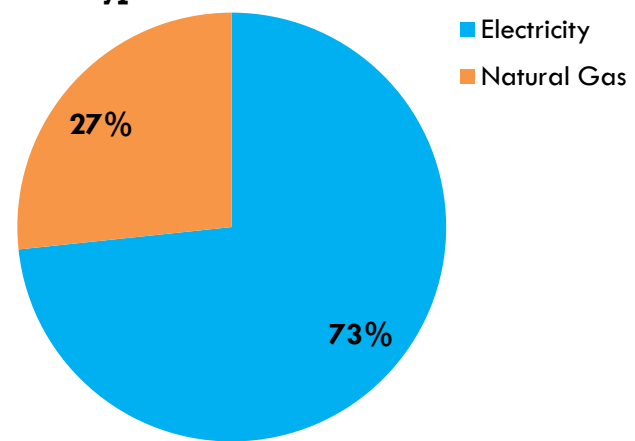
Fuel Type	Factor (lbs CO <sub>2</sub> per Fuel Unit)	Fuel Unit
Electricity	0.828	kWh
Natural Gas	11.71	Therms
Fuel Oil	22.38	gallons

Source: MassEnergyInsight

**Commercial Greenhouse Gas Emissions by Fuel Types**



**Industrial Greenhouse Gas Emissions by Fuel Types**



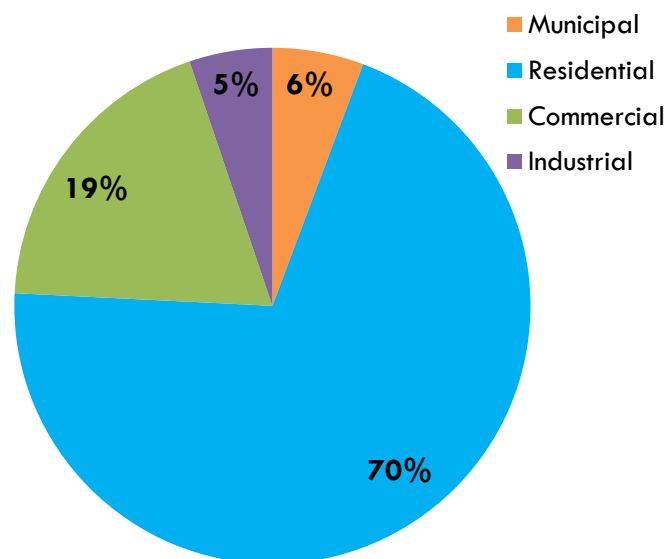
<sup>9</sup> Annual commercial and industrial energy consumption and expenditures was approximated based on the average energy consumptions for Massachusetts commercial buildings provided by the 2005 Energy Information Commercial Buildings Energy Consumption Survey. The Town of Medway is currently working 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

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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

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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:

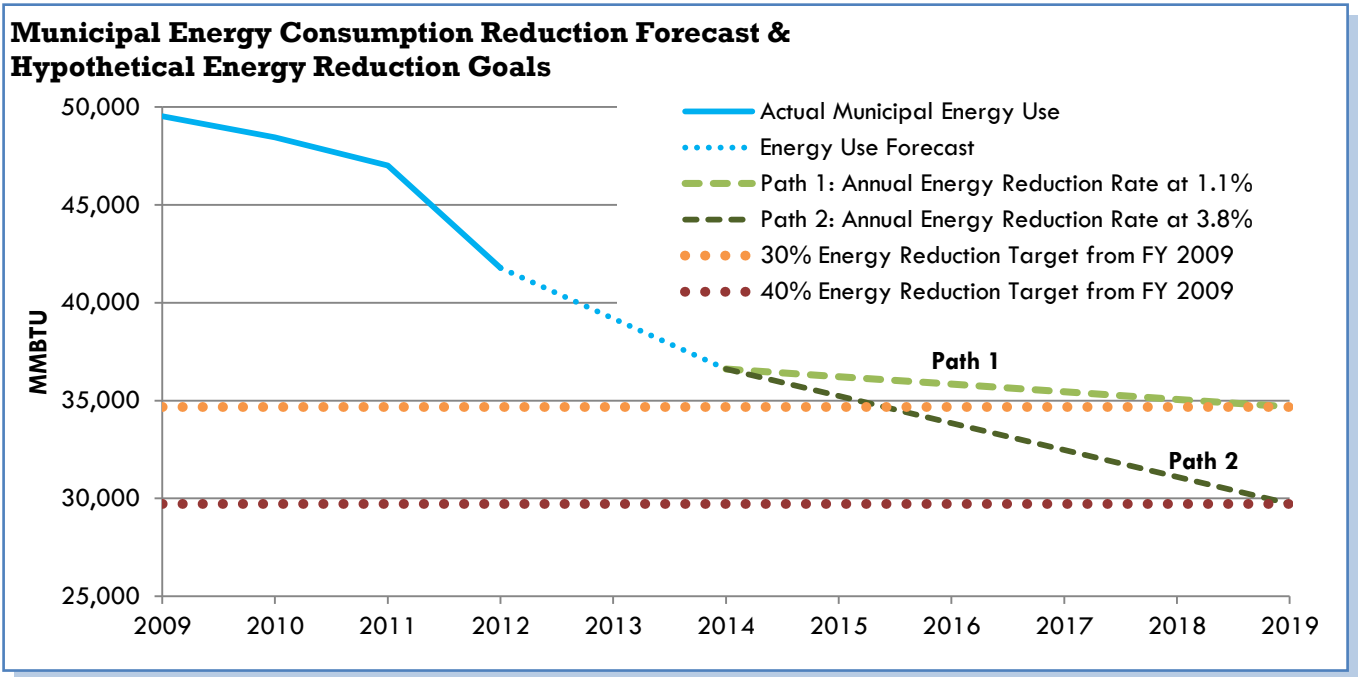
- Establish additional municipal energy reduction goals,
- Prioritize municipal energy efficiency projects,
- Establish renewable energy goals,
- Pursue renewable energy projects,
- Increase energy management and planning capacity, and
- Promote clean energy policies.

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).<sup>10</sup> 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

<sup>10</sup> 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.

- 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](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
<b>Qualified Energy Conservation Bonds (QECBs)</b>	<ul style="list-style-type: none"> <li>Very low-interest financing tool (1% - 2% is common)</li> <li>Must be used for “qualified conservation purposes,” such as: <ul style="list-style-type: none"> <li>Energy efficiency upgrades (need to have plan for 20% reduction)</li> <li>Renewable energy production</li> <li>Implementing Green Community programs (e.g. street lighting projects that are not tied to a building but affecting overall municipal energy use)</li> </ul> </li> </ul>
<b>Qualified Zone Academy Bonds (QZABs)</b>	<ul style="list-style-type: none"> <li>Can be used for school systems</li> <li>Low-interest financing tool</li> <li>Implemented through the MA School Building Authority</li> </ul>
<b>General Obligation (GO) Bond</b>	<ul style="list-style-type: none"> <li>Not secured by a specific source of revenue</li> <li>High administrative costs</li> </ul>
<b>Tax-Exempt Municipal Lease</b>	<ul style="list-style-type: none"> <li>Secured by equipment (i.e. lights, insulation, boilers, chillers, pipes)</li> <li>Subject to annual appropriation</li> <li>Has a slightly shorter term than GO bonds</li> <li>Tends to be limited to 15 years</li> </ul>
<b>Permanent State House Serial Notes</b>	<ul style="list-style-type: none"> <li>Shorter-term loan</li> <li>Available for projects that may be below typical thresholds for bonds or leases</li> </ul>

### 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.<sup>11</sup>

### 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:

<sup>11</sup> 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 <sup>12,13</sup>	Example Actions/ Projects	2013	2014	2015	2016	2017	More Info
<b>1. Track municipal energy consumption and costs.</b>	a. Monitor the Town's progress in reducing energy consumption to meet the Green Communities goal of 20% reductions by 2014.	<b>Appointed municipal staff</b> ; Energy Committee		X	X				
	b. Annually review energy supplier contracts.	<b>Energy Committee</b>		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.	<b>Energy Committee</b> ; Department of Public Services; Medway Public Schools; Town Administration		X	Ongoing				
<b>2. Build municipal capacity and leadership.</b>	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.	<b>Town Administration</b> ; 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.	<b>Energy Committee</b> ; 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.	<b>Energy Committee</b> ; 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.	<b>Energy Committee</b> ; 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.	<b>Town Administration</b>		X	Ongoing				See Part II
<b>3. Increase municipal energy efficiency.</b>	a. Retrofit streetlights with LEDs or more energy-efficient fixtures.	<b>Department of Public Services</b>	Participate in MAPC's bulk purchasing LED Lighting Project	X					
	b. Train municipal staff to manage and operate buildings in an energy efficient manner.	<b>Town Administration</b> ; 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				

<sup>12</sup> The implementers listed here may be revised once the Town hires an energy manager/coordinator.

<sup>13</sup> 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
<b>3. Increase municipal energy efficiency.</b>	c. Investigate opportunities for joint purchasing with other municipalities to reduce retrofit/efficiency costs.	<b>Town Administration;</b> Energy Committee; Planning and Economic Development Office; Department of Public Services; School Department	Regional ESCO project	X	Ongoing				
<b>4. Enhance electric vehicle and/or alternative-fuel vehicle readiness.</b>	a. Pursue grants and innovative financial options for funding EV infrastructures.	<b>Town Administration;</b> Energy Committee; Planning and Economic Development Office		X	X				
	b. Design and implement outreach program to encourage community EV adoption.	<b>Energy Committee;</b> 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.	<b>Energy Committee;</b> Town Administration; Planning and Economic Development Office; Council of Aging; School Department; Police Department; Fire Department				X	Ongoing		
<b>5. Increase municipal renewable energy adoption.</b>	a. Investigate opportunities to support renewable energy development, including power purchase agreements, net-metering, and the purchase of virtual net-metering credits.	<b>Town Administration;</b> 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.	<b>Department of Public Services;</b> 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.	<b>Planning and Economic Development;</b> Energy Committee;		X	X	X			
	d. Install solar/fuel cell powered back-up systems for emergency locations (e.g. fire and police stations).	<b>Emergency Management Team;</b> Energy Committee; Department of Public Services			X	X	X		
	e. Explore hydroelectric and organics-to-energy opportunities.	<b>Energy Committee;</b> 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.<sup>14</sup> In February 2013, the Town of Mattapoisett consolidated local support to petition NSTAR for extending natural gas services to coastal areas of the Town.<sup>15</sup>

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.

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<sup>14</sup> For more information, see <http://www.telegram.com/article/20110415/NEWS/110419780>.

<sup>15</sup> 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
<b>6. Track residential energy consumption and energy projects.</b>	a. Set residential energy reduction goal.	<b>Energy Committee;</b> Board of Selectmen		X	Ongoing				
	b. Use aggregate residential energy consumption data to set a baseline of residential energy consumption.	<b>Energy Committee;</b> 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.	<b>Housing Authority;</b> 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.	<b>Town Administration;</b> Energy Committee; Planning and Economic Development Office; Building Department		X	Ongoing				
<b>7. Increase residential awareness of energy issues and energy opportunities.</b>	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.	<b>Energy Committee;</b> 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.	<b>Energy Committee;</b> 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.	<b>Energy Committee;</b> Schools; PTA; NSTAR; Columbia Gas; Energy Service Vendors			X	X			See Part II
<b>8. Increase residential energy efficiency.</b>	a. Connect residents to financing mechanisms for clean energy projects.	<b>Town Administration;</b> 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.	<b>Energy Committee;</b> 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.	<b>Housing Authority;</b> Energy Committee	LISC/WegoWise Green Retrofit Initiative	X	Ongoing				
<b>9. Increase residential renewable energy adoption.</b>	a. Design and implement outreach programs to increase residential solar adoption.	<b>Solar Program Manager /Coach;</b> 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

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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 addition 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
<b>10. Track commercial energy consumption and energy projects.</b>	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.	<b>Energy Committee;</b> NSTAR; Columbia Gas		X	Ongoing				
	b. Design and maintain a system for collecting commercial energy consumption and retrofit work data.	<b>Energy Committee;</b> 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				
<b>11. Increase commercial awareness of energy issues and energy opportunities.</b>	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.	<b>Energy Committee; Solar Program Manager/Coach;</b> 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.	<b>Energy Committee;</b> Planning and Economic Development Office; Solar Program Manager/Coach; Economic Development Director	Commercial PACE	X	Ongoing				
<b>12. Increase commercial energy efficiency.</b>	a. Design outreach programs to encourage businesses to participate in Mass Save.	<b>Energy Committee;</b> 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.	<b>Energy Committee;</b> 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			

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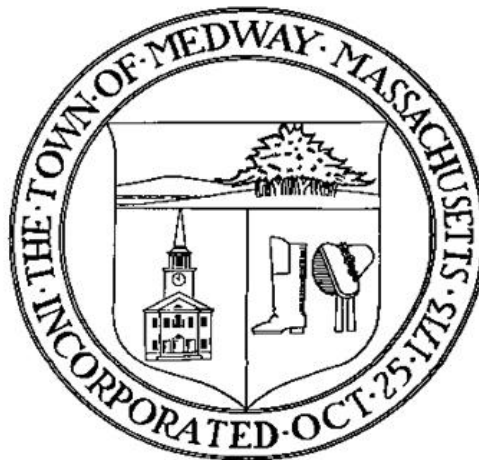
# **The Town of Medway Local Energy Action Plan**

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## **Part II – Action Strategies**

**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





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# Community Solar and Efficiency Program<sup>1</sup>

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**Action:** Design and implement a community solar and efficiency program using the “SolarizeMass” program model to connect residents and businesses to financing mechanisms for energy efficiency projects, to help residents and businesses vet vendors, and to aggregate demand for solar installation.

**Target Sectors:** Residential Sector; Commercial Sector

**Objectives Met:** Increase residential/commercial energy efficiency; Increase residential/commercial renewable energy adoption.

**Implementation Time Frame:** 2012 – 2015

**Key Implementers:** Town Administrator; Energy Committee; Planning and Economic Development Office; NSTAR; Columbia Gas; Energy Service Vendors; Solar Program Manager/Coach

For communities that want to encourage their residents to think comprehensively about their energy use, it makes sense to bundle both efficiency and solar services into one program in which residents are encouraged to get a home energy assessment at the same time as a solar site assessment. A community collective purchasing model can be used to bundle solar and energy efficiency services.

The community collective purchasing model can be used to overcome market barriers to the installation of energy efficiency upgrades and renewable energy systems in the residential sector, including: high upfront costs, complexity in the purchase and installation process, and customer inertia. Buying in bulk at the community level helps drive down costs and builds momentum around, and trust in, the selected vendor. Further, offering pricing as a limited-time-only proposition motivates residents to act. By administering a competitive procurement process for efficiency and solar services, a municipality can create confidence for its constituents that the selected vendor is qualified to meet the needs of the community and will serve the public interest.

Effective outreach and education is essential to the success of a community collective purchasing effort, and is best done by volunteer partners in addition to municipal employees who can access residents directly through multiple channels. As part of the educational component, program administrators should be sure to emphasize that reductions in energy use are just as, or even more important, than installing distributed renewable generation, such as solar.

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<sup>1</sup> Much of the information in this section is taken from *The Solarize Guidebook: A Community Guide to Collective Purchasing of Residential PV Systems*, prepared for the National Renewable Energy Laboratory.



## PROGRAM IMPLEMENTATION OVERVIEW

Implementation Steps and Responsibilities	Key Implementers	Timeframe
<b>Design Program &amp; Identify Core Team</b>	Town Administrator; Energy Committee; Planning and Economic Development Office	Months 1-3
<b>Build Partnerships &amp; Recruit Volunteers</b>	Energy Committee	Months 1-2
<b>Issue RFP &amp; Select Vendor(s)</b>	Town Administrator	Months 2-4
<b>Launch Program &amp; Advertise</b>	Town Administrator; Energy Committee; Planning and Economic Development Office	Month 4
<b>Conduct Outreach, Education and Customer Enrollment</b>	Energy Committee; Energy Service Vendors	Months 4-6
<b>Conduct Home Performance &amp; Site Assessments; Complete Installations</b>	Energy Service Vendors	Months 4-9
<b>Program Wrap-Up &amp; Evaluation</b>	Town Administrator; Energy Committee; Planning and Economic Development Office	Month 9

## PROGRAM IMPLEMENTATION STEPS

The following steps are designed such that any community can develop a combined solar and energy efficiency program, regardless of what state or private programs exist. However, it is strongly recommended that cities and towns integrate any existing opportunities or programs into their efforts, including the Commonwealth's energy efficiency program, MassSave; utility residential outreach programs; and MassCEC's SolarizeMass program.

- 1. Design Program & Identify Core Team.** Municipal staff or a dedicated Energy/Sustainability Committee member should take responsibility for organizing the program at an institutional level. It is important to, early on, identify a core program coordination team that designates responsibilities for program management, volunteer coordination, and technical support. This team should develop a timeline and work plan for the entire course of the program prior to issuing a solicitation or beginning outreach.

Depending on resource availability, it may make sense to delegate program management responsibilities to municipal staff, and volunteer coordination/outreach efforts to the Energy/Sustainability Committee. The technical support role can be filled in a variety of ways, including some or all of the following:

- Identifying (a) point(s) of contact at the utility, MassCEC, DOER and/or DEP that is able to answer questions and point the program manager to helpful resources throughout the program. Municipal leaders and volunteers who participated in the Solarize Mass program may also be able to offer guidance.<sup>2</sup>
- Dedicating a volunteer from the Energy/Sustainability Committee or the public at large who either has pre-existing knowledge of home efficiency and solar projects, or who is willing to do research and become knowledgeable, and can be available to answer questions and “coach” residents on participating in the program.

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<sup>2</sup> Municipalities participating in the Solarize Mass program include: Action; Arlington; Boston; Hopkinton; Melrose; Mendon; Montague; Newburyport; Palmer; Pittsfield-Lenox; Shirley Millbury-Sutton; and Wayland-Sudbury-Lincoln.

- Hiring a separate consultant who can help with technical aspects of the program, ranging from drafting and issuing an RFP to providing customer support during the outreach and installation phases of the program.

Note: If program funding is a challenge, organizers may want to consider assessing a small fee for program participation, either by building a per-watt fee into the contractor's scope of work (for solar installations) or by charging a flat participation fee, both of which would be passed on to the customer. The funds collected can go towards producing marketing materials for the program and associated overhead costs.

These fees are best collected as part of a single bill issued by the contractor, but any process chosen for fee collection should be explicitly agreed upon in any Memorandum of Understanding signed between a community and a contractor. In general, charging an administrative fee will not affect the ability of a vendor to offer competitive pricing, as the infrastructure of a community collective model allows them to save money on marketing.

2. **Build Partnerships & Recruit Volunteers.** Municipal staff or Energy/Sustainability Committee members should first identify strategic partners that can help with outreach for the program and that may be able to offer volunteers for other components of program administration (including serving on the Selection Committee or hosting educational events). Such partners could include: the NorthEast Sustainable Energy Association (NESEA), community groups and local nonprofits, local manufacturers of solar equipment, churches, Rotary or other service clubs, credit union or local banks, schools, etc.

It may be helpful to advertise widely for these various volunteer requirements (from program design to outreach coordination to vendor selection) in neighborhood papers, at public committee meetings, through formal presentations, and word-of-mouth outreach.

### 3. Issue RFP & Select Vendor(s)

- i. **Assemble Selection Committee.** A selection committee could include representatives from community groups that are committed to help with outreach, municipal staff, Energy Committee members, or representatives from state agencies or utilities. The goal should be to have a selection committee that represents a diverse group of interests, and includes particular knowledge of the community and its residents, as well as (if possible) expertise on home performance contracting and solar PV systems/solar developers.
- ii. **Draft RFP.** MassCEC has sample RFPs for its Solarize Mass program, into which language for requesting efficiency services can be integrated. Other communities can be a resource, as many have issued RFPs for and/or signed MOUs with companies to deliver these types of services to their residents. Some factors to consider when drafting the RFP include:

- Consider whether you want to allow companies to bid on either one or both services (efficiency or solar), and whether an award will be made to one, two, or more than two vendors.
  - Require vendors bidding on the efficiency component to be certified MassSave Home Performance Contractors.
  - Consider how you will require the vendor to manage its contact database. Will the vendor need to submit frequent reports on outreach numbers/follow-up work? Will leads be collected by the municipality and turned over to the vendor, or will the vendor collect leads directly?
  - Consider whether you will allow bidding vendors to offer additional services such as low-interest financing for home efficiency projects.
  - Consider whether you will require bidding vendors to develop a plan for community engagement and recruitment and be responsible for marketing the program as a whole, in addition to their own services.
- iii. **Interview Top Candidates & Select Vendor(s).** Procurement for these services is not subject to Chapters 30B or 25A of Massachusetts General Law, but the Selection Committee should be encouraged to conduct the evaluation process in the general spirit of a public procurement process.
- iv. **Negotiate Memorandum of Understanding with Selected Vendor(s).**
4. **Launch Program & Advertise.** Once the award(s) have been made, municipal staff should be ready to issue a press release and begin advertising the program. Consider hosting a kick-off party where residents can meet the selected vendor(s) and sign up for home energy and solar assessments on the spot. Program coordinators can look at similar programs, such as SolarizeMass, to estimate participation in the program.
5. **Conduct Outreach, Education & Customer Enrollment.** Over the course of the following months, outreach and enrollment in the program should be the primary focus for municipal staff, volunteers, and the selected vendor(s). The program coordinators should work with the vendor to develop marketing materials that ensure that each vendor's services are branded consistently with any marketing that the community is already doing around the program. Ideas for an outreach campaign include:
- **Website** - Centralize program information, upcoming events, and updates, and provide an easy way for customers to sign up for home energy and solar site assessments. A countdown clock until the final date of the program and/or an updating total of customers enrolled in the program may also be an appropriate website feature.

- **Other Social Media** - Consider creating a Facebook profile or page that residents who have enrolled in the program can “like” and share with their friends, or create a Twitter “hashtag” and encourage customers to “tweet” their experience receiving assessments or having work done. This can be helpful tool in communities with a younger, more transient population that may consume news more regularly from social media platforms than local papers or neighborhood newsletters.
- **Workshops** - Consider hosting a series of workshops that range from introductory to more advanced topics. Community partners may be helpful for finding venues that residents feel comfortable visiting (i.e., other than Town Hall) and advertising to their constituents.
- **Ambassadors** - Enlist residents who have completed efficiency upgrades or installed solar to be advocates for the program – have them present at workshops, record testimonial videos and post them on social media pages, etc.

6. **Conduct Assessments & Complete Installations.** This work is the responsibility of the contractor(s), but the program coordinators can decide to what extent they and their volunteers will be involved (i.e., following up with residents to obtain program feedback). If possible, there should be regular feedback between the contractor(s) and the program coordinators to determine which outreach efforts are being effective, track successes, and mitigate challenges.
7. **Program Wrap-Up & Evaluation.** Once the final date of the program is reached, the program coordinators should be prepared with a wrap-up event to celebrate the success of the program and reflect on what could have been done differently or propose next steps. The contractor(s) could be asked to sponsor this event, and the media should be invited.

## PROGRAM MONITORING

1. Check in with vendor(s) periodically after program close to monitor demand for efficiency and solar services after the limited-time offer expires.
2. Hold a follow-up meeting with key stakeholders to discuss how to support a continued residential program. Determine whether another campaign will be helpful at some point or whether certain services should just be provided on an ongoing basis (i.e., website maintained where residents can sign up for home assessments/solar audits any time).
3. Survey residents after the fact to identify obstacles and opportunities for improvement.

## EXAMPLE PROGRAMS

The section below summarizes examples of community collective purchasing programs in places around the country that have proven to be effective at driving adoption of renewable technologies in the residential sector.

Place	Portland	Massachusetts	Vermont	San Diego
Program	<a href="#">Solarize Portland</a>	<a href="#">Solarize Mass</a>	<a href="#">Vermont Solar Communities</a>	<a href="#">Reduce, Then Produce</a>
Lead Implementer	Energy Trust of Oregon/Neighborhood Coalitions	MassCEC	VPIRG	CA Center for Sustainable Energy
Targeted Technology	Solar PV	Solar PV	Solar PV and hot water	Efficiency upgrades and solar PV
# Campaigns	6	13	10	1
Installations	560	162	60	7 solar, 11 efficiency upgrades
Contractor Selection	Multiple, smaller contractors	One contractor selected per community	One contractor selected overall	Two solar contractors, 30 efficiency contractors invited
Unique Attributes	“Buy local” manufacturer option	Tiered pricing; state-provided outreach toolkit	Collection of lead generation fee	Requiring home performance assessment prior to solar assessment

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## Resources

The primary resource used in developing this strategy was [The Solarize Guidebook: A community guide to collective purchasing of residential PV systems](#). (Produced for the National Renewable Energy Laboratory, May 2012.) Communities considering launched a community collective effort should read this document in full for an expanded version of this strategy summary.

Eugene: The Resource Innovation Group won a utility grant for Solarize Eugene 2012, addressing PV and hot water. <http://solarenergydesign.com/solar-electric-systems/solarize-eugene>

GroupEnergy launched multiple collective purchasing programs for the workplace in early 2012. [www.mygroupenergy.com](http://www.mygroupenergy.com)

“Lighten Our Load” was developed for Columbia Sportswear by Energy Trust of Oregon in 2008. [www.energytrust.org](http://www.energytrust.org)

MadiSUN Group Solar Program serves residential and commercial customers in Madison, Wisconsin. <http://www.cityofmadison.com/sustainability/city/madisun/>

Make Mine Solar is a collective hot water purchasing program, based in Minneapolis, Minnesota. [www.mnrenewables.org/MakeMineSolar](http://www.mnrenewables.org/MakeMineSolar)

One Block Off the Grid is active in 20 cities nationwide, supporting volume purchasing for residential customers. [www.1bog.org/](http://www.1bog.org/)

San Jose Employee Solar Group Buy was offered to City employees and retirees in 2010. The program became the model for the SunShares Program of the Bay Area Climate Collaborative. <http://baclimate.org/impact/sunshares.html>

Solar Beaverton offers PV, hot water, and even EV charging stations in a group purchase format. <http://www.beavertonoregon.gov/index.aspx?NID=412>

Solarize Pendleton: The City of Pendleton, Oregon, offered zero-interest loans to finance solar installations and created program replication materials <http://solarizependleton.com/main/replication>

Solarize Portland: With over six campaigns and 560 installations, Portland leads the way and helps other cities run Solarize campaigns. <http://www.portlandonline.com/bps/index.cfm?c=51902>

Solarize Salem: The Salem Creative Network organized a co-op to help fund its PV and hot water campaigns. <http://solarizesalem.org>

Solarize Santa Barbara: More than 49 neighbors went solar through a program from Community Environmental Council. <http://www.cecsb.org/solarize-santa-barbara>

Solarize Washington: A series of residential PV campaigns from Northwest SEED began in 2011. [www.solarizewa.org](http://www.solarizewa.org)

Solarize Massachusetts: Massachusetts Clean Energy Center (MassCEC) in partnership with Green Communities Division of the Massachusetts Dept of Energy Resources ran campaigns in four cities. <http://www.masscec.com/index.cfm/cdid/12093/pid/11159>

VPIRG Energy ran successful “Solar Communities” programs for PV and hot water across Vermont. The co-directors of VPIRG Energy have subsequently launched SunCommon. <http://suncommon.com>



# Energy Education in Schools

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**Action:** Support and encourage energy awareness and conservation within the school science curriculum as allowed within national and state standards, and promote activities that educate students and parents on clean energy science, policy, and opportunities.

**Target Sector:** Residential Sector

**Objective Met:** Increase residential awareness of energy issues and energy opportunities.

**Implementation Time Frame:** 2014 – 2015

**Key Implementer:** Energy Committee; Schools; Parent-Teacher Association; NSTAR; Columbia Gas; Energy Service Vendors

Schools can be a valuable portal for distributing information about clean energy to Medway youth and their parents. Municipal and school staff can develop clean energy-related curricula to educate students about energy issues and increase their awareness of energy opportunities, both in terms of their behavior and their future interests. This action strategy highlights how clean energy education can be integrated into Medway Public Schools curricula, building upon the examples from the National Energy Education Development (NEED) Project, as well as those from across the Commonwealth.

## MEDWAY CLEAN ENERGY EDUCATION OVERVIEW

The Medway Public Schools has demonstrated great effort in promoting clean energy education to Medway youth in the past. Town energy education projects include:

- Medway High School's Project Green Club;
- Medway Middle School's Green Team;
- Solar installation project on, and live solar energy monitoring at, Medway High School;
- Solar installation project on Medway Middle School;
- Education collaboration with Medway Community Farm;
- Medway High School Carpool Day; and
- Middle School's Green Team Carbonrally Challenge.

## OPTIONS FOR CURRICULUM EXPANSION

The NEED Project provides energy education and support to teachers and students across the country with the goal of increasing youth understanding of energy issues. Teachers and students can access a range of educational materials, including activity guides, information books, games and puzzles, at the [NEED website](#).

The table below summarizes the NEED resources available for intermediate to secondary education energy curriculum. Those bolded are highlighted in more detail in this document.

<b>I. Efficiency and Conservation</b>	<ul style="list-style-type: none"> <li>• <b>Energy Conservation Contract</b></li> <li>• Energy Expos</li> <li>• Exploring Climate Change</li> <li>• Learning and Conserving</li> </ul>	<ul style="list-style-type: none"> <li>• Museum of Solid Waste and Energy</li> <li>• Plug Loads</li> <li>• Saving Energy at Home and School</li> <li>• <b>School Energy Survey</b></li> </ul>
<b>II. Sources of Energy</b>	<ul style="list-style-type: none"> <li>• Energy Enigma</li> <li>• <b>Energy Expos</b></li> <li>• Exploring Hydroelectricity</li> <li>• Exploring Nuclear Energy</li> <li>• Exploring Photovoltaics</li> <li>• Exploring Wind Energy</li> <li>• Fossil Fuels to Products</li> </ul>	<ul style="list-style-type: none"> <li>• Great Energy Debate</li> <li>• Great Energy Rock Performances</li> <li>• LNG: Liquefied Natural Gas</li> <li>• Marine Energy</li> <li>• Secondary Energy Infobook+ Activities</li> <li>• U.S. Energy Geography</li> </ul>
<b>III. Transportation</b>	<ul style="list-style-type: none"> <li>• Energy Expos</li> <li>• H<sub>2</sub> Educate</li> <li>• <b>Transportation Fuels Debate</b></li> </ul>	<ul style="list-style-type: none"> <li>• Transportation Fuel Enigma</li> <li>• Transportation Fuels Infobook</li> <li>• Transportation Rock Performances</li> </ul>
<b>IV. Raising Awareness</b>	<ul style="list-style-type: none"> <li>• Carbon Capture and Storage</li> <li>• <i>Current Energy Affair</i></li> <li>• Energy Analysis</li> <li>• Energy and Our Rivers</li> <li>• Energy Around the World</li> <li>• <b>Energy Carnival</b></li> <li>• Energy Jeopardy</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Math Challenge</li> <li>• <b>Energy on Stage</b></li> <li>• Energy Rock Performances</li> <li>• Global Trading Game</li> <li>• NEED Songbook</li> <li>• Yesterday in Energy</li> </ul>

The ability for schools to utilize or pursue the educational materials and events in the chart above will depend upon available resources, capacity, and student interests. Teachers and school administrators should assess what strategies will be most beneficial to the students and will be most successful given the unique circumstances of the school.

The section below highlights strategies that have proven to be both cost-effective to implement and successful in improving knowledge and awareness of clean energy issues, as well as local examples in the Commonwealth that have proven successful in integrating energy into intermediate education.

### I. Efficiency and Conservation

#### **Energy Conservation Contract**

In the Energy Conservation Contract program, students discuss with their families their daily energy use and educate them about energy savings opportunities using the [NEED's Household Rating Guide](#). Family members are asked to sign a one-month Energy Conservation Contract

to commit to making a conscious effort to reduce their energy use. The students and their families will revisit the Rating Guide and estimate energy savings at the end of the one-month period. Students are encouraged to ask family members to sign another contract for a 12-months energy conservation commitment.

**Why it is Effective:** This activity educates both students and adults about energy-saving opportunities, including conservation measures and appliances upgrades and weatherization.

**One Step Further:** Schools can work with utilities and energy vendors to distribute flyers on utility energy efficiency programs along with the Household Rating Guide.

### **School Energy Survey**

Through the School Energy Survey activity, students follow [NEED's School Energy Survey Guide](#) step-by-step instructions to gather and analyze data on energy consuming appliances and systems in their schools. Students will document annual energy consumption, cost, and carbon emission of appliances using energy information gathered from the nameplates of the devices, Kill-A-Watt monitors, and any other data already collected by the school or municipality. Based on the findings, the students will assess the costs and benefits associated with potential solutions and put together a school energy action plan. As an extension, students can monitor and evaluate their interventions on the school energy consumption over time.

**Why it is Effective:** This student-driven program can educate students about all aspects of energy conservation, from cost to carbon emission. The program can raise students' awareness on energy conservation and help them apply their math skills, while providing them with a strong sense of accomplishment and of belonging to the school.

**One Step Further:** Allow student groups to prepare energy action plans and compete with each other. Teachers will be judges and select the best plan based on costs and benefits. The selected plan will be implemented and energy savings will be monitored. The school will announce the energy and cost savings on a regular basis to celebrate the students' success.

### **The City of Taunton, MA – Gang Green (Student Energy Management Team)**

In order to build the capacity to carry out energy management work and raise students' awareness on energy conservation, Friedman Middle School in Taunton created "Gang Green," a student group charged with monitoring and collecting energy data throughout the school building. The group is responsible for presenting data and creating an energy management bulletin board identifying data collection schedules and zones that each student is responsible for covering. To motivate participation, all Gang Green student members received special T-shirts, hard hats, and certificates. In 2009, the energy education program received the Massachusetts Executive Office of Energy and Environmental Affairs Secretary's Award for Excellence in Energy and Environmental Education.

## **Towns of Acton and Boxborough, MA – Green Council (Student Energy Management and Conservation Team)**

Student-driven projects are valuable tools for promoting energy efficiency and conservation at schools, since they provide hands-on educational experience and demonstrate visible results. A group of students from the Acton-Boxborough Regional High School initiated a series of waste reduction and energy efficiency efforts in the school following the [“Eight Pathways”](#) ECO Schools USA Program. The student-driven energy management organization, [Green Council](#), was developed to support the sustainability efforts and goals of existing clubs and organizations, such as the Recycling Club and Envirothon Team. Since 2011, the Council has been working toward receiving the ECO Schools Program’s Green Flag certification. The students’ first action was developing a waste audit for the school. Based on their results, the students worked with faculty members and community organizations to identify and implement a list of waste reduction actions on campus.

The Acton-Boxborough Regional High School action plan focused on a complete reorganization of the school’s waste system. By providing and labeling recycle and compost bins in the cafeteria, the Green Council helped the school increase recycling by 250% from the previous year. To strengthen energy reduction efforts, the students also developed the [Power Down Project](#), an energy conservation initiative intended to promote energy and cost savings through monitoring the energy consumption of on-campus electric appliances through various outreach activities including an Energy Fair and a faculty light bulb exchange program. Other Green Council strategies included a campaign to encourage the use of reusable water bottles, drinking local tap water, and the construction of a rain garden with the aid of the local garden club.

To date, the school has achieved a 10% reduction in energy use from the baseline year, and has reduced the amount of trash bags heading to the dumpster daily from 40 bags to 4. For the students’ excellent effort, the Green Council received the Green Flag Award in 2012.

## **II. Energy Sources**

### **Energy Expos**

To put on an Energy Expo, students work in groups to create an energy exhibition that reinforces their own energy knowledge and shares information on energy sources with other students. The activity covers a wide range of topics revolving around energy sources, such as renewable energy, fossil fuels, clean energy and greenhouse gases, the geography of energy sources, and the science of energy generation (examples can be found in [NEED’s Energy Expos Guide](#)). The energy exhibits can be in any format, including posters, hands-on activities, demonstrations, presentations, and art and crafts. Students can use their academic skills and creativity to effectively present their energy knowledge and research effort to their peers, teachers, and parents.

**Why it is Effective:** The activity facilitates peer-to-peer information sharing on renewable energy knowledge. Students can learn about the different sources of energy and assess the pros and cons of each source. Through creating the exhibits, the activity can also reinforce the students’ research, writing, public speaking, art, and other academic skills.

**One Step Further:** The schools can work with solar vendors and the municipality to co-host the event, as well as invite families and the community to attend. Students can present their energy exhibits during the expo, educating the community about renewable energy. Solar vendors and the municipality can also participate in the event by helping residents access to credible solar and energy efficiency opportunities. Schools can also create a competition for

the best exhibit(s). The winning students and their families could receive energy related prizes sponsored by the municipality and the solar vendors, such as free roof-assessment services.

### **United States Department of Energy – Renewable Energy Activities (Experiments Teaching Guide)**

The [Renewable Energy Activities Teaching Guide](#), developed by the National Renewable Energy Lab, consists of a series of hands-on activities teachers and students can work on to develop simple renewable energy systems. Using basic science knowledge and daily materials, students can create their own mini renewable energy experiments, such as building a hydro-mill, comparing different grasses for biomass output, and building hot-water solar collectors. The interactive activities can educate students about basic energy information and the science of renewable energy generation. It provides a great opportunity for students to develop an understanding in and interest of renewable energy through hands-on experiences.

### **City of Medford, MA – Wind Turbine Project**

The City of Medford, with support from its Energy Committee, erected the Medford Turbine at McGlynn School in 2009. The project currently provides 10% of the school's energy and has saved over \$25,000 on annual energy expenditures. McGlynn School students can assess real-time data on wind speed and the energy output of the system, gaining knowledge on renewable energy generation through this live demonstration. The school teachers have established middle school wind curriculum, Northwind 100 Lesson, around the project to educate students about the different parts and vocabularies associated with the engineering behind, and the energy and cost savings of the wind turbine.

## **III. Transportation**

### **Transportation Fuels Debate**

Students work together to research and prepare to participate in a debate on transportation. Each student group will first select a transportation fuel, such as gasoline, biofuel, natural gas, and diesel, and introduce basic information on the fuel to the class. The groups will follow with a presentation on the advantages or disadvantages of each fuel. The students will then debate on the pros and cons of each fuel for both personal vehicles and fleet vehicles. Teachers will judge and select the winning team based on each group's ability to defend their proposition and challenge others. Detailed rules and resources can be found in NEED's [Transportation Fuels Debate Guide](#).

**Why it is Effective:** Students can learn about the pros and cons of different vehicle fuels through a constructive debate. The interactive activity facilitates information sharing and allows students to think about energy issues in a broader way. The activity also helps strengthen the students' analytical and critical thinking research, collaboration and public speaking skills.

**One Step Further:** Encourage students to interview local stakeholders that use the different transportation fuels. Students can learn about the rationale that motivates these drivers to pick the specific transportation fuel, as well as the challenges such users face, such as cost, availability, and energy efficiency.

### **Town of Norwell, MA – Alternative Travel Group (Alternative Fuel Vehicles Project)**

The South Shore Charter Public School in Norwell initiated the Alternative Travel Group project, an initiative to educate students on alternative fuel vehicles and encourage the community to reduce vehicle emissions. In 2009, the school launched the Veggie Van, a non-hydrogenated-oil-fueled vehicle that transports students to field trips and sports events. The van ran on used vegetable oil collected from local restaurants. Used vegetable oil was chosen among other clean fuels because of its low carbon footprint and because of the educational and environmental opportunities. This innovative project not only educates students on alternative fuel sources, but also provides students with hands-on experience to learn about the engineering and chemistry of alternative fuels. The project received a Secretary's Award for Excellence in Energy and Environmental Education in 2009.

## **IV. Raising Awareness**

### **Energy Carnival**

A school can create a school-wide or community-wide Energy Carnival that combines students' academic skills, energy knowledge, and physical fitness with games. Student teams will rotate around carnival stations to participate in games (examples can be found in [NEED's Energy Carnival Guide](#)) by answering questions, solving problems, and earning "energy bucks". Teams with the most energy bucks will be awarded with prizes. Games include solving energy-related math problems, energy jumbles, Pictionary, etc. Individuals and families can also participate.

**Why it is Effective:** Students and the community will learn about energy issues at a fun and entertaining event. Students cannot only apply their energy knowledge on various energy issues, they will also have the opportunity to exercise and develop team-building skills.

**One Step Further:** Partner with community stakeholders, such as local high schools, businesses, community organizations, and utilities. Invite local restaurants to sponsor food and prizes at the community Energy Carnival. This event can be used as a great outreach activity to educate the community about clean energy opportunities and utilities' energy efficiency programs.

### **Martha's Vineyard – Energy Carnival (School and Community Event)**

The Vineyard Energy Project and the Cape Light Compact co-sponsored Oak Bluffs School's Energy Carnival in 2011. The Cape Light Compact provided volunteers and financial assistance for the carnival, and all stations were led by students in the Energy Club from Martha's Vineyard Regional High School. 350 students from Martha's Vineyard Public Schools and Martha's Vineyard Public Charter School participated in 15 station activities, which included making coin batteries, creating a human circuit, generating electricity from fruit, playing a wheel energy game, and demonstrations of a Van de Graff generator, energy efficiency efforts, and solar and wind power.



### **Current Energy Affair**

The Current Energy Affair activity is modeled after a TV news broadcast and allows students to report on major issues related to electric power generation. Students present to classes on electric power generation using information from NEED's Electricity Factsheet and the lead stories provided in [NEED's Current Energy Affair Packet](#).

**Why it is Effective:** This role-playing activity facilitates peer-to-peer knowledge sharing among students and allows them to develop an understanding on a wide range of energy knowledge. Students conduct research and learn from each other's presentations about different aspects of electric power generation, including generation sources, distribution, management, and history.

**One Step Further:** Develop an ongoing news broadcast (e.g. during lunch time or morning announcements) and ask different groups of students to present on an energy topic or issue. Students can also give an update on the school's clean energy progress.

### **Energy on Stage**

Students work together to put on energy plays based on familiar stories and characters, such as "Sparkle White and the Seven Dwarfuels" and "Harry Spotter and the Quest of Windy Myths" (examples of scripts can be found in [NEED's Energy on Stage Guide](#)). The plays can range from informal performances during class to elaborate theatre performances with props and costumes.

**Why it is Effective:** Students can learn about energy facts and reinforce their energy knowledge using a conversation method. This interactive and entertaining activity can enrich students' energy vocabulary and provide an opportunity for them to communicate with each other and build confidence through performance.

**One Step Further:** Put on a school ticketed energy play. Invite families and the local community to enjoy a performance by the students and learn about energy information. All funding can go to the school's clean energy projects and retrofits.

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## **Resources**

This strategy is developed based on the teaching guides and education materials available on the National Energy Education Development website. <http://www.need.org/>

# Local Green Business Program

**Action:** Design outreach programs to inform businesses of the benefits of and incentives, as well as other financial opportunities for energy efficiency upgrades and encourage businesses to participate in MassSave.

**Target Sector:** Commercial Sector

**Objective Met:** Distribute Increase commercial energy efficiency.

**Implementation Time Frame:** 2012 – 2015

**Key Implementers:** Energy Committee; Planning and Economic Development Office; Medway Business Council; Energy Service Vendors

The purpose of a Green Business Program is twofold: (1) to acknowledge the clean energy efforts and energy savings of the business community and (2) to encourage local businesses to take advantage of energy and renewable energy opportunities, such as MassSave. As part of the program, neighboring businesses or business sectors can compete to showcase their efforts in increasing local commercial energy efficiency and adopting clean energy practices. To celebrate their success, the Town can reward businesses with prizes such as window decals, certificates, marketing opportunities, and technical assistance.

## PROGRAM OVERVIEW

Implementation Steps and Responsibilities	Key Implementers	Projected Time Requirement
Establish program	Energy Committee; Planning and Economic Development Office; Medway Business Council	10 hours
Prepare program material	Energy Committee	10 hours
Review applications and select recipients	Energy Committee	20 hours
Energy Efficiency Expertise	Energy Service Vendors	

## PROGRAM IMPLEMENTATION STEPS

1. Meet with Medway Business Council or local business group, local business stakeholders, and utility representatives to identify the opportunities and challenges in promoting clean energy efforts in the commercial sector. Create focus groups, workshops, and surveys to gain further insight.
2. Establish specific program objectives and outcomes using Energy Action Plan goals and input from local businesses. Examples of program objectives may include:
  - Increase participation in MassSave by 25%.
  - Reduce commercial energy consumption in the food services sector by 10% by 2015.

- Work with NSTAR, Columbia Gas, and/or approved MassSave vendors to develop an agreed upon system for accessing commercial aggregate data by zip code on a semi-annual basis.
  - Create a database to track local businesses' energy and cost savings from participation in energy efficiency programs through MassSave.
3. Design a Green Business Program that encourages and helps businesses access energy opportunities.
- a. Meet with the Medway Business Council, business associations, and local business stakeholders to select the most suitable Green Business program model(s) based on the following factors:
    - Program objectives
    - Size of the commercial sector
    - Diversity of businesses
    - Target businesses if applicable
    - Nature of business districts
  - b. Develop a baseline survey to be used to verify eligibility to be in the program and assess businesses' existing efforts. Request energy audits from the past 3 years and documentation of energy efficiency upgrades within the past 5 years.
  - c. Create a list of performance measures and a scoring system that businesses must fulfill in order to receive a Green Business Award or technical assistance. Examples of program standards include adopting energy efficient operations, such as computer power management and walk/ride day or producing renewable energy on site.
  - d. Identify the budget available for the program and work with the Medway Business Council and the utilities to delegate roles and responsibilities.
  - e. Meet with the Medway Business Council, and Energy Service Vendors to identify prizes for the award recipients. Examples of prizes include: certificates, window decal, technical assistance, and marketing opportunities through municipal websites, social media, and local broadcasts.
  - f. Establish a program application and award recipient announcement deadline.
  - g. Draft program descriptions, award applications, and other advertising material.
  - h. Finalize all program materials with the Business Council and Energy Service Vendors.

#### 4. Launch Green Business Program.

- a. Hold forums and events to distribute program documents to local businesses.
- b. Review applications and select award recipients based on the established criteria.
- c. Announce award recipients at award ceremony or during community events and local media broadcasts.
- d. Follow-up with award recipients annually to inform them of additional clean energy opportunities and to track energy savings and cost savings.
- e. Advertise success stories.

## PROGRAM MODELS

There are several ways a municipality can create a Green Business Program. Based on the size of the commercial sector and the diversity of local businesses, a municipality can select one or a combination of several program model(s) to create a community-specific Green Business Program that will most effectively promote clean energy in the commercial sector. The section below summarizes examples of Green Business Programs that have proven to be successful in promoting green practices and energy efficiency in the commercial sector.

Municipality	I. Boston	II. San Francisco	III. Chicago
Program	<a href="#">Green Business Award</a>	<a href="#">Green Business Program</a>	<a href="#">Green Office Challenge</a>
Key Implementers	City Office of Environmental and Energy Services	City Department of Environment	City Department of Environment
Program Model	By sector	By sector	Sector-specific; By ownership
Performance Measures	Sustainable and environmentally beneficial activities	Program standard scorecard	ENERGY STAR Portfolio Manager or Tenant scorecard
Benefits and Award	Green Business Awards	Green Business Program membership; technical assistance; marketing toolkit	Green Office Challenge Awards; technical assistance
Unique Attribute	Encourages innovative strategies	Increases awareness of standard guidelines	Promotes actions in target sectors

### I. Boston Green Business Award

The City of Boston and its Office of Environmental and Energy Services created the Boston Green Program, which comprises of the Green Business Award, Green Residential Award, and Sustainable Food Leadership Award programs, in 2006 to acknowledge sustainable and environmentally beneficial practices in the community. The annual Boston Green Business Award program aims to engage the commercial sector by celebrating local success in sustainable business practices, such as waste management, energy conservation, clean energy promotion, and sustainable operations. Businesses in Boston can apply to earn the Green Business Award in one of the following four categories: (1) commercial; (2) industrial; (3) non-profit; and (4) academic, cultural, and healthcare institutions.

Candidates for the Green Business Award are selected by nomination. The nomination process requires a description of three or more environmentally beneficial activities that demonstrates the businesses' exceptional performance in promoting sustainable business practices. Examples of possible sustainable and environmentally beneficial practices include: energy efficiency upgrades, sustainable procurement policies, on-site renewable energy production, and the design and implementation of a comprehensive waste reduction/reuse/recycling plan. The Green Business Award recipients are announced at an annual award ceremony to acknowledge their sustainable effort.

### ***How to Adopt the Model***

Local businesses can voluntarily apply to earn a Green Business Award under different business categories. Each application should include an energy audit of the business and descriptions of the businesses' clean energy actions, as well as the action results, such as energy savings or event participation, if applicable. The Boston model allows businesses to freely describe their environmentally beneficial activities. This design encourages local businesses to think outside the box and pursue innovative strategies for promoting sustainability. Award recipients under each category are selected based on the number of clean energy actions they have practiced, the resulted savings, their community outreach effort, and the educational value and the innovativeness of their practices. The performance guidelines may vary based on the business categories. For example, community outreach may be valued more in the non-profit sector, while the educational value and innovativeness of an action may be more important for academic and healthcare institutions.

## **II. San Francisco Green Business Program**

The San Francisco Green Business Program is a component of the Bay Area Green Business Program and the California Green Business Program. It was developed by the City's environmental department, SF Environment, to provide technical assistance to the commercial sector and to publicly recognize businesses that adopt sustainable and profitable practices. Local businesses under one of the following eight business sectors can apply to become a member of the SF Green Business Program by completing the program standard checklists.

- [Hotels](#)
- [Restaurants](#)
- [Offices](#)
- [Retailers](#)
- [Dentists](#)
- [Garment Cleaning](#)
- [Catering](#)
- [Janitorial Cleaning](#) (Program is under development)

Each performance standard checklist creates a rigid guideline for selecting SF Green Business members. Businesses must demonstrate that they are strictly in compliance with the environmental regulations on the checklist. These program standards comprise of various green business actions, including solid waste management and reduction, energy conservation, water conservation, and pollution prevention. For applicants who cannot meet all of the standard requirements, the program provides technical assistance and an [online toolkit](#) to help them implement green business measures. Businesses that meet all program requirements become a Green Business member and receive a San Francisco Green Business seal. A Green Business seal is a verification of a business's effort to be aware of the City's environmental regulations. The members also receive technical assistance and marketing opportunities to share their success through the Green Business Program website and the [Bay Area Green Business Program marketing toolkit](#).

### ***How to Adopt the Model***

The SF Green Business Program encourages local businesses to adopt specific environmental measures to achieve the municipality's sustainability goal. To adopt this model, a municipality can create specific clean energy checklists for different business sectors. The checklists should incorporate any relevant actions listed in the Local Energy Action Plan, as well as other clean energy standards and measures that are suitable for helping businesses reduce energy consumption. All businesses should be required to complete the checklists annually to remind businesses of additional actions they can take, as well as to help the municipality both keep track of measures the commercial sector has adopted and to identify business sectors or projects that require more outreach. Businesses that demonstrate strong compliance with the guideline will be automatically considered as a candidate for the annual Green Business Award. Award recipients will be selected based on the specific measures the businesses have taken and their outcomes. For businesses that are unable to meet the requirements, the program can offer technical assistance and expertise through toolkits, workshops, and other outreach programs to guide them through the process.

## **III. Chicago Green Office Challenge**

The Chicago Green Office Challenge is a sector-specific program created by the Chicago Department of Environment. The Challenge is a strategy of the [Chicago Climate Action Plan](#) and aims to promote sustainable and energy efficiency buildings in Chicago's downtown business district offices. Both office tenants and property managers are eligible to participate in the on-going Challenge.

- [Tenants](#) - Once registered to participate in the Challenge, the participating tenants complete an online scorecard to generate a baseline score that verifies green actions the office has taken. The Challenge guides tenants through "key milestones" needed to improve their scores by providing them with training and technical assistance to establish goals, create plans, implement plans, and evaluate performance. Once the participants complete these milestones, they can submit their final scores and receive



public recognitions for their green business efforts at an award ceremony hosted by the Chicago Department of Environment.

- **Property managers** - Property managers follow a similar application process to what the office tenants do, but instead of scorecards, managers are required to complete an online data form to establish a baseline in four areas: energy, water, waste, and tenant engagement. The property managers are recommended to use ENERGY STAR's Portfolio Manager for tracking energy and water use. In order to accomplish the challenge, property managers need to implement measures to achieve the challenge goals listed in following table. The participants receive different levels of achievement depending on the number of goals they achieved. The program provides expertise to guide property managers throughout the whole process to complete the Challenge.

#### **Chicago Green Office Challenge – Property Manager Challenge Goals**

	<b>Base Goal</b>	<b>Stretch Goal</b>
<b>Energy Use Reduction (Electric and Natural Gas)<sup>3</sup></b>	10%	30%
<b>Waste Reduction</b>	30%	50%
<b>Water Use Reduction</b>	10%	20%
<b>Tenant Engagement</b>	25%	50%

#### **Chicago Green Office Challenge – Property Manager Levels of Achievements**

	<b>Option 1</b>	<b>Option 2</b>
<b>Leadership in Property Manager Excellence Award</b>	3 Stretch Goals	-
<b>Property Manager Excellence Award</b>	2 Stretch Goals	4 Base Goals
<b>Property Manager Achievement Award</b>	1 Stretch+ 1 Base Goals	3 Base Goals
<b>Property Manager Award</b>	1 Stretch Goal	2 Base Goals

#### **How to Adopt the Model**

A sector-specific program can strategically engage businesses that are high energy users. Target sectors can be identified by employment size or energy consumption using the commercial baseline provided in this Energy Action Plan or by working with local utilities to identify high users. Based on the operation of the target sectors, a municipality can create a scorecard that includes recommended energy actions for each business type. Each action can be assigned with a score. In order to complete the challenge, businesses are required to obtain a certain score.

The program should provide training and technical assistance to guide businesses through the process, including setting goals, identifying applicable strategies from the scorecard, developing plans, implementing plans, and evaluating performances. Each program applicant is required to submit a recent energy audit and provide energy records, such as utility bills, to track energy consumption and set baseline for identifying reduction goals. On an annual basis, businesses are responsible for informing the municipality of the clean energy measures taken, aggregated energy and cost savings, and the updated Green Business score. The program can have multiple levels of achievement. As a business proceeds to score higher by implementing more green actions, it will move to a higher level of achievement. This design

<sup>3</sup> Properties that have earned an ENERGY STAR rating of 75+ automatically achieve the challenge goal.

motivates businesses to stay with the program and continue to take clean energy actions. Participants who reach the highest level of achievement will be awarded in a ceremony.

## PROGRAM MONITORING

1. Establish energy efficiency program participation goals and energy reduction goals for the Green Business Program.
2. Hold annual meetings with the Business Council, Energy Service Vendors, and local businesses to learn about the opportunities and challenges in promoting clean energy efforts in the commercial sector through the Green Business Program.
3. Hold annual meetings with the utilities to assess program participation, determine aggregated savings, and identify new program opportunities and incentives.

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## Resources

ICLEI's [Green Business Challenge website](http://www.iclei.org/green-business-challenge) provides valuable information to guide local governments through the process of building successful Green Business Programs. Local governments can develop a tailored program using ICLEI's [Green Business Challenge web application](http://www.iclei.org/green-business-challenge), as well as get planning process tips and examples of successful Green Business Programs through various guides and toolkits. For more information, see: [http://www.iclei.org/climate\\_and\\_energy/green-business-challenge/](http://www.iclei.org/climate_and_energy/green-business-challenge/)

A Better City's [Sustainability Toolkit](http://www.abettercity.org/toolkit/index.html) is a living document designed to provide guidance for businesses, institutions, and buildings owners in the Greater Boston area to implement sustainable business practices. This toolkit is a great starting point for local governments and businesses with the interest in planning for green business development to identify and prioritize implementable and effective green business strategies. The document is categorized into eight areas ("Cleaning and Toxics," "Energy Efficiency," "People and Culture," "Purchasing," "Renewable Energy," "Transportation," "Waste Reduction," and "Water Efficiency"). Local governments and businesses can access informative guidance on sustainable business measures including new technology, policies, financing options, and rebates and incentives, as well as their benefits and local case studies. For more information, see: <http://www.abettercity.org/toolkit/index.html>

[UnCommon Sense](http://www.yellowstonebusiness.org/UncommonSense/) is a Green Business leadership program organized by the Yellowstone Business Partnership that helps local businesses in the Yellowstone-Teton region adopt sustainable and responsible practices. The program is a 2-year program and costs \$1,200 to enter. Participating business owners and business managers attend workshops and teleconferences to learn about sustainable business opportunities and gain peer support. The program website provides additional information about the program structure and materials needed to build a similar program. For information, see: <http://www.yellowstonebusiness.org/UncommonSense/>

Boston Green Business Award. “Green Business Award.” Available online at:  
<http://www.cityofboston.gov/environmentalandenergy/greenawards/businesses.asp>

Chicago Green Office Challenge. “Chicago Green Office Challenge.” Available online at:  
<http://www.chicagogreenofficechallenge.org/>

San Francisco Green Business Program. “SF Green Business.” Available online at:  
<http://www.sfgreenbusiness.org/>

# Municipal Energy Internship Program

**Action:** 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.

**Target Sector:** Municipal Sector

**Mission Met:** Build municipal capacity and leadership.

**Implementation Time Frame:** On-going

**Key Implementer:** Town Administrator

In order to sustain and expand Medway's clean energy efforts, the Town should pursue opportunities to build greater municipal capacity for spearheading the Town's clean energy work. Medway is well positioned to collaborate with students on the Town's energy efforts. This strategy describes how the Town can establish an ongoing internship program that will (1) provide assistance to the Town Administrator's Office and the Energy Committee, (2) help with the implementation of the Medway Energy Action Plan, and (3) serve as a hands-on learning experience for students interested in the planning and implementation of municipal-led energy projects.

## PROGRAM IMPLEMENTATION OVERVIEW

Implementation Steps	Actions	Estimated Staff Time Requirement
1. Identify internship program objectives and goals.	Town Administrator establishes the objectives, goals, and deliverables of the internship program.	2 hours
2. Design internship program.	Town Administrator drafts internship posting.	2 hours
	Town Administrator explores internship program opportunities.	3-10 hours
3. Launch internship program.	Town Administrator creates a schedule for hiring.	3 hours
	Town Administrator distributes internship posting based on the hiring schedule.	2 hours
	Town Administrator reviews applications, interviews candidates, and hires intern.	10 hours
	Town Administrator trains and supervises intern.	5-40 hours per week as-needed and depending on intern schedule
4. Maintain the program.	Town Administrator updates internship posting.	4 hours annually
	Town Administrator follows hiring schedule.	5-10 hours annually
	Town Administrator monitors program's success.	10 -15 hours annually

## PROGRAM IMPLEMENTATION STEPS

### 1. Identify internship program objectives and goals.

The design of a successful internship program should be objective-driven. It is important that the Town understand the goals and deliverables of its internship program. Prior to establishing the program, it is recommended that the Town Administrator work with the Energy Committee to establish clear program objectives and goals. Aspects that should be considered when designing the internship program include:

- The immediate objectives and long-term goals of the internship program,
- Position responsibilities (i.e., immediate projects, ongoing tasks, research projects),
- Benefits to the intern (i.e., experience, training, travel opportunities, conferences, performance reviews, networking),
- Desired intern position qualifications (i.e., experience, education, skills, professional interests, availabilities),
- Length of each internship,
- Available funding source(s) for the position, and
- Identification of a municipal staff member who will provide senior-level support and day-to-day supervision of the position.

### 2. Design internship program.

- Draft internship posting.** The Town Administrator should draft an internship posting using the Medway Energy Action Plan for guidance. When drafting the posting, the Administrator should consider projects and ongoing tasks that can be fulfilled by an intern, as well as identify the responsibilities and qualification requirements the intern should have. The Administrator should review the posting with the Energy Committee to ensure priority projects and tasks are considered.
- Review internship program opportunities.** Once the Town determines the role and responsibilities of the intern position(s), the Town should consider the various options it has for creating an internship. The Town of Medford's proximity to universities and high schools including Dean College, Medway High School, and Franklin Vocational Technical High School, as well as major universities in the region, such as Harvard University, Tufts University, and Northeastern University provides a great opportunity for the Town to increase collaboration with nearby education institutions through an energy internship program. Through an ongoing internship program, students can apply their academic knowledge and experiences to help the Town implement clean energy projects in Medway, and the Town can deliver practical experience and professional development to the students.

### **3. Launch internship program.**

- i. **Distribute internship posting.** Once the Town finalizes the internship program, the Town should advertise the position opening based on an establishing hiring schedule.
- ii. **Interview candidates.** The Town Administrator is responsible for reviewing applications, interviewing candidates and hiring the intern. Upon hire, the Administrator should complete any required documentation for the school or the intern.
- iii. **Supervise intern.** The Town Administrator is responsible for giving assignments to intern and providing guidance and supervision on an as-needed basis.

### **4. Maintain internship program.**

- i. **Update internship posting.** Prior to each hiring round, the Town should update the internship posting based on upcoming project needs.
- ii. **Follow hiring schedule.** Each hiring round the Town should send the internship posting to all university and program contacts.
- iii. **Monitor the program's success.** On an ongoing basis the Town Administrator should assess the effectiveness of the program. Example strategies for evaluating program performance include meeting annually with university/high school contacts to assess the internship program structure (i.e. time frame, salary, student recruitment process, etc.) and conducting initial, mid-term, and final check-ins with each intern to establish and review internship project goals.

# Annual Review of Energy Action Plan

**Action:** Annually review Energy Action Plan, document achievements, and plan for next steps.

**Target Sector:** Municipal Sector

**Objective Met:** Build municipal capacity and leadership.

**Implementation Time Frame:** Ongoing

**Key Implementer:** Town Administrator; Energy Committee; Department of Public Services

The Medway Energy Action Plan is intended to be a living document that can be continually supplemented and passed down to stakeholders in the community on an ongoing basis. To that end, the Town should annually review progress made towards meeting the goals and implementing the actions described in the plan, and update it as needed. This strategy describes how the Town and the Energy Committee can establish an annual review process to review and update the Energy Action Plan, evaluate strategy implementation processes, document achievements, and identify new opportunities and goals for the municipal, residential, and commercial sectors.

## PROGRAM OVERVIEW

Implementation Steps	Objectives	Key Implementers	Projected Staff Time Requirement
<b>Conduct annual review.</b>	Create annual report to document the actions adopted and achievements made.	Energy Committee	5 hours
<b>Plan for next steps.</b>	Hold annual meetings with local clean energy stakeholders to update goals and identify implementation projects for the project year.	Town Administrator; Energy Committee; Department of Public Services	10 hours

## PROGRAM IMPLEMENTATION STEPS

The following section describes a two-step process for implementing an annual review of the Energy Action Plan:

### 1. Create an Annual Energy Action Update.

Every year the Energy Committee should conduct an annual review of the community's clean energy efforts, documenting the progress made in implementing the Energy Action Plan. The review should culminate in an annual Medway Energy Action Update that serves as a written record of the community's clean energy work. The report should document the strategies and



specific actions adopted over the past year, as well as the goals accomplished. The report will be uploaded annually onto the municipal clean energy website to inform the community of the municipality's clean energy effort and success. The following items could be included in the annual update, when possible and relevant:

- **Energy baselines and benchmarking** - An energy baseline should identify the aggregated annual energy consumptions and expenditures for the municipal, residential, and commercial sectors. Data and reports from the MassEnergyInsight account can be used to benchmark municipal energy reductions. If a semi-annual process for obtaining updated utility data in the residential and commercial sectors is established, comparisons to this baseline can and should also be made. If possible, this section should also include information on other quantifiable metrics, such as customer participation rates in MassSave utility programs.
- **Progress** – The Energy Action Update should provide an overview of the community's progress in implementing projects, as well as an assessment of whether the community is on track with achieving its goals as documented in the plan. The Energy Committee should revise the Energy Action Plan Chart at the end of every project year to adjust for changes, such as project's timeframe, key implementers, or new projects. If there are scheduled projects that have not advanced, the Energy Committee should try to identify the challenges that have so far stood in the way of progress, as well as provide recommendations on how to overcome such challenges.

In addition to the Energy Action Plan, the Energy Committee should also monitor the progress of the implementation of the 2010 Five Year Energy Reduction Plan. Similar to the Energy Action Plan Chart, the Energy Committee should work with the Town on an annual basis to document accomplishments, revise the schedule for implementation of the Energy Reduction Plan to adjust for any changes, and identify unrealized measures. The following “Energy Reduction Action Schedule for Implementation” chart summarizes the envisioned schedule for the implementation of energy reduction measures for each municipal building between FY 2010 and FY 2014.

**Energy Reduction Action Schedule for Implementation<sup>4</sup>**

Energy Reduction Action	FY 2010				FY 2011				FY 2012				FY 2013				FY 2014			
Fiscal Year Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Medway Public Schools ESCO			X																	
Middle School Repairs															X					
Burke ES Windows													X							
McGovern ES Windows																	X			
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												

<sup>4</sup> 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.

- **Adopted Strategies and Projects** - An “Adopted Strategies and Projects” section allows for comprehensive documentation of the adoption process of each strategy. It is important to keep a detailed record of the implementation process of the Energy Action Plan, so new employees, volunteers, and other municipalities can build upon this institutional knowledge for future project implementation. The Energy Committee should identify all strategies from the Energy Action Plan that have been implemented and/or are being implemented in this section. There should be a description of each strategy, as well as the resources contributed to the implementation process. Below is a list of attributes that should be considered for each strategy.

- |                                   |   |
|-----------------------------------|---|
| ▪ Overview of the strategy        | ▪ Current stage of implementation (planning, in progress, or completed) |
| ▪ Goals fulfilled by the strategy | ▪ Specific actions (e.g. programs, policy, projects, outreach events)   |
| ▪ Process of implementation       | ▪ Short-term results  |
| ▪ Key implementers                | ▪ Projected outcomes (e.g. energy and cost savings, payback year)       |
| ▪ Key contacts                    |   |
| ▪ Financing mechanisms            |   |

- **Performance Evaluation** - It is important that the review process acknowledge the effectiveness of previously adopted strategies. The Energy Committee should benchmark each strategy prior to the adoption for performance evaluation purpose and assess the outcomes of the strategies at the end of each year. The performance evaluation section highlights both strategies that demonstrate the best outcomes and ones that are experiencing the biggest challenges with implementation. For each of the listed strategies, the Energy Committee should discuss the factors that contribute to the success or difficulties with adopting the strategy and provide recommendations for future implementations.

## 2. Plan for Next Steps.

One purpose of the annual review is to identify new clean energy opportunities and to plan for next steps. At the end of each fiscal year, the Energy Committee should work with the Town Administrator, the Department of Public Services, the Medway Public Schools, the Building Department, and other key local energy stakeholders to decide on new implementation actions for the upcoming project year. The Town should consider the followings:

- Revise Energy Action Plan.** Edit strategies utilizing input from the annual report and annual process review. If necessary, adjust the recommended timeline listed on the Energy Action Plan Chart.

- b. **Identify goals, strategies, and implementable projects for the upcoming year based on the following attributes:** Action Plan Chart, the progress of past projects, internal capacity, and availability of funding.
- c. **Designate key implementers for each strategy.**
- d. **Prepare for project implementation.** Identify the available resources and possible performance measures for each strategy to provide guidance for adoption. Create and distribute memos informing key implementers of the selected strategies for the upcoming year and recommendations for implementation. Update local clean energy websites to inform the community of the municipality's goals for the upcoming year.

# Planning For Municipal Retrofit Projects

**Action:** 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.

**Target Sectors:** Municipal sector

**Objective Met:** Build municipal capacity and leadership.

**Implementation Time Frame:** Ongoing

**Key Implementers:** Town Administrator; Energy Committee; Department of Public Services; Medway Public Schools; Building Department

This chart should be used as a guide to help municipalities organize and plan municipal retrofit projects. Many of these actions can be done simultaneously. The time frame and implementers listed below should serve as a guide; each municipality should customize these two sections given their context.



## Organize Data and Information.

Actions	Steps	Questions to Consider	Timeframe	Implementers
<b>Organize municipal energy consumption data.</b>	<ol style="list-style-type: none"> <li>1. Set up a <a href="#">MassEnergyInsight</a> (MEI) account.</li> <li>2. Review the MEI account data.</li> <li>3. Address any outliers or numbers that seem inaccurate: <ul style="list-style-type: none"> <li>• Compare MEI data to hardcopy of bills.</li> <li>• Review building and equipment history to account for irregularities.</li> <li>• If necessary, conduct audits of buildings.</li> </ul> </li> <li>4. Make necessary changes to MEI.</li> <li>5. Establish energy consumption baseline for benchmarking purposes.</li> </ol>	<ul style="list-style-type: none"> <li>• Which department(s) receives invoices for the utility bills?</li> <li>• If recording vehicle fuel data: What is the process for refueling/payment (individual credit cards vs. municipal fueling station)?</li> <li>• Are there building occupants or contractors that can help explain outliers in the data?</li> </ul>	10 – 40 hours	Town Administrator; Energy Committee; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.
<b>Document municipal retrofit and audit work by building.</b>	<ol style="list-style-type: none"> <li>1. Compile a list of past and current retrofit and audit work by building. For each building include: <ul style="list-style-type: none"> <li>• Location, square footage, and employees/tenants.</li> <li>• Information related to last audit or past retrofit work, such as dates, costs, funding sources, estimated energy and cost savings, project leads, etc.</li> </ul> </li> </ol>		10 – 40 hours	Town Administrator; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.
<b>Identify potential upcoming projects.</b>	<ol style="list-style-type: none"> <li>1. Identify repairs or replacements that will likely be needed in the next five years.</li> <li>2. Identify deferred maintenance projects, upcoming capital improvement projects, and any other municipal projects of interest.</li> </ol>	<ul style="list-style-type: none"> <li>• Does your municipality anticipate any new construction, demolition, or major renovation projects in the next five years?</li> <li>• Does your municipality anticipate buying/selling or leasing/renting any new property in the next five years?</li> </ul>	5 – 10 hours	Town Administrator; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.

## Review Decision-Making Processes.

Actions	Steps	Questions to Consider	Timeframe	Implementer
<b>Identify reasons for retrofit work.</b>	<ol style="list-style-type: none"> <li>1. Identify both established and underlying goals that drive municipal retrofit work.</li> <li>2. Identify additional factors that influence the municipal decision-making process for retrofits.</li> </ol>	<ul style="list-style-type: none"> <li>• Do you have or do you plan to have a 20% reduction goal as part of the Green Communities Program?</li> <li>• Do you want to create operational savings?</li> <li>• Do you need to replace failing or broken equipment?</li> <li>• Do you want to tackle deferred maintenance?</li> <li>• Do you want to avoid upfront costs?</li> <li>• Do you want to take advantage of funding opportunities?</li> <li>• How do you think about costs and savings (e.g., simple payback, return on investment (ROI), long-term cash flow, net present value (NPV))?</li> </ul>	3 – 10 hours	Town Administrator; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.
<b>Identify project priorities.</b>	<ol style="list-style-type: none"> <li>1. Assess how your goals and your decision-making processes align.</li> <li>2. Identify project priorities for the up-coming year.</li> </ol>	<ul style="list-style-type: none"> <li>• What is your total budget for the year?</li> <li>• What likely emergency work is coming up and can avoid last minute decision-making?</li> </ul>	3 – 10 hours	Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.

## Design Implementation Process.

Actions	Steps	Questions to Consider	Timeframe	Implementer
<b>Establish an Energy Management Plan.</b>	<ol style="list-style-type: none"> <li>1. Identify a person and process for maintaining and monitoring MEI and documenting future retrofit/audit work</li> <li>2. Establish cross-departmental energy management team to meet quarterly to discuss projects and identify new project priorities</li> </ol>		3 – 10 hours	Town Administrator; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.
<b>Create plan for retrofit projects for upcoming year.</b>	<ol style="list-style-type: none"> <li>1. Identify what project components are missing.</li> <li>2. Meet with utilities and additional stakeholders to address barriers or challenges.</li> </ol>	<ul style="list-style-type: none"> <li>• Is there someone with capacity and time to do project management?</li> <li>• Is there someone to manage procurement?</li> <li>• Do you have financing secured?</li> <li>• Do you have contractors secure?</li> </ul>	5 – 15 hours	Town Administrator; Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.
<b>Pursue retrofit work.</b>	<ol style="list-style-type: none"> <li>1. Procure or secure any additional project components.</li> <li>2. Implement projects.</li> <li>3. Benchmark and verify savings.</li> </ol>		Will vary depending on projects.	Municipal staff from the Planning and Economic Development Office, DPS, Medway Public Schools, and the Building Department.

# Outreach Strategies for Energy Efforts

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**Action:** Design and implement outreach strategies for successful energy efforts.

**Target Sectors:** Municipal Sector; Residential Sector; Commercial Sector

**Objective Met:** Increase participation in and support of energy projects and programs.

**Implementation Time Frame:** Ongoing

**Key Implementers:** Energy Committee; Planning and Economic Development Office; NSTAR; Columbia Gas; Energy Service Vendors; Medway Business Council, Building Department

For any energy project or program to be successful, participation and engagement is critical. Whether you are spearheading a municipal energy project or developing a residential outreach program, it is important that proper messaging and marketing is used to ensure desired goals are achieved.

MAPC recommends that all stakeholders involved in community energy efforts, such as municipal staff and volunteers, use the outreach and marketing techniques described below to create more effective programs and projects.

## COMMUNITY BASED SOCIAL MARKETING

Research has found that outreach campaigns that focus entirely on education are not effective:

*The failure of mass media campaigns to foster sustainable behavior is due in part to the poor design of the messages, but more importantly to an underestimation of the difficulty of changing behavior....Information campaigns alone will rarely bring about behavior change.*

- Doug McKenzie Mohr, Community Marketing Expert

There are several factors that influence the success of an energy campaign. Based on research in the field and MAPC's past experiences, key elements to successful outreach efforts include:

- A clear vision of desired behaviors or actions
- A streamlined process to influence the development of targeted behaviors or actions
- Effective and knowledgeable leaders
- Focused and personalized messages



Community based social marketing (CBSM) is an outreach strategy that is gaining increasing popularity in sustainability campaigns across the country. CBSM goes beyond traditional outreach efforts by leveraging community relationships and social interactions to build upon informational campaigns. Specifically, CBSM requires those performing outreach to think carefully about their desired goals and how they can utilize local, community-based interests, values and relationships to achieve such goals.

## THE 7 STEPS OF COMMUNITY BASED SOCIAL MARKETING<sup>5</sup>

### 1. Identify behaviors and barriers.

To effectively promote energy actions, you must first identify what energy behavior(s) you are looking to change, since each behavior might have different barriers. Are you trying to encourage people:

- To sign up for an energy audit?
- To turn off lights more frequently?
- To use a programmable thermostat?
- To collect and review energy data and project information on an ongoing basis?
- To do something else?

After you identify the energy-related behavior(s) you would like to promote, you must then identify the barriers to such behaviors. Do people not exhibit the preferred behaviors because of:

- Lack of awareness?
- Lack of interest?
- Lack of time?
- Lack of resources?
- A combination of these reasons?
- Something else?

You may be able to identify these barriers using knowledge gained from past experiences. You may also want to do additional research, such as creating a survey or holding a focus group, to make sure you know what the real barriers are to convincing people to pursue the desired energy-related behaviors.

### 2. Build commitment.

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<sup>5</sup> This section builds upon Doug McKenzie-Mohr's *Fostering Sustainable Behavior*.

Research has found that people have a strong desire to be seen as consistent, and therefore building commitment is an important step in encouraging a particular behavior. Collecting written pledges is a simple and effective way to build commitment. Such pledges not only give a person more incentive to follow through with an action, but the pledges can also be displayed to advertise community members' commitment and actions.

#### *Written Pledge Guidelines:*

- Keep it simple and non-authoritarian (e.g., "I pledge to sign up for a MassSave audit" or "I pledge to lower my thermostat at night and when I leave the house").
- Offer a pledge card to remind people of their pledges.

Local leaders and influential community members should be used to assist with the pledge collection, as they will help legitimize the cause among a large number of constituents.

### **3. Use prompts.**

Prompts are effective reminders. Examples of prompts include:

- Pledge displays, such as yard signs or pictures of people holding their written pledges posted in town hall or a public library;
- Stickers on light switches, thermostats, dishwashers, and washing machines;
- Door hangers or mailers praising those who have taken steps to pursue clean energy efforts;
- Door hangers or mailers with reminders about next steps for those who may have pledged to do something, such as have a home energy assessment, but have not yet followed up.

### **4. Build social norms.**

Incorporating social norms into a group's messaging can make outreach more effective. Descriptive norms indicate which behaviors are normally engaged in by a community. When a hotel sign states that most guests reuse their towels, it is using a descriptive norm to encourage guests to reuse towels. You can use descriptive norms to promote an energy behavior by describing or displaying people's participation in whatever action you are trying to promote. However, it should be noted that research has found that if an undesirable behavior is a frequent occurrence, showcasing the frequency of the negative behavior may actually encourage others

#### **Tip #1: Use descriptive norms only to promote desirable behaviors.**

##### More Effective:

*"90% of guests at Hotel Eco-Friendly choose to re-use their towels. If you do not require towel service, please hang your towels back on the rack."*

##### Less Effective:

*"Hotel Eco-Friendly uses 100,000 gallons of water per month to wash towels. Help us conserve: hang your towels back on the rack if you do not require daily service."*

to engage in that action. For example, showing that people do not recycle will actually encourage more people to do this negative action instead of a positive action. Therefore, one should only use descriptive norms to promote a desirable behavior.

**Tip #2: Back up an injunctive norm (“praise”) with a descriptive norm (“information”).**

**Not Helpful:**

“😊 -- You used 10% less energy in June than in May. Thanks for helping the planet!”

**More Helpful:**

“😊 -- 15 of the 25 houses on this block used less energy in June than in May. Keep up the good work!”

Injunctive norms provide information on behaviors of which a community approves or disapproves. The use of happy or sad emoticons when reporting on someone’s success in reducing energy consumption is an example of using injunctive norms. However, sometimes using just an injunctive norm fails to result in a desired outcome. For example, in a study that used door hangers to promote energy conservation, researchers found that residents who received a message that just used an injunctive norm, such as praise or smiley face for their level of energy conservation actually increased their energy consumption. However, those who received a message

with a descriptive and an injunctive norm of praise were more likely to maintain their level of energy conservation. When using social norms, one should think carefully about the potential impact of the message and consider using descriptive information with praise to promote desirable actions.

## **5. Offer incentives.**

Incentives can create motivation. MassSave, the state’s energy efficiency program, already provides financial rebates and incentives to businesses, residents, and municipalities. If the people you are trying to reach are not motivated by financial incentives, you might find it more effective to explain to residents or businesses that they have actually already paid into the MassSave system through a System Benefits Charge on their utility bill.

Other incentives that you can offer that may be effective include:

- Offering prizes for competition or challenge winners. Prizes should be meaningful (no one really cares about getting another free reusable bag). Some energy campaigns have sought donations from utility providers or private businesses to provide incentives such as solar panels on schools and gift cards to local businesses.
- Providing public recognition in the local paper, on the municipal website, etc. Public recognition uses injunctive norms to praise people for good behavior and this type of incentive may be particularly effective for those who are not motivated by financial incentives.

## **6. Market your message.**

A key component of CBSM is using social interactions to market a campaign's message. Although the media and informational campaigns can be effective in encouraging a small group of people to become early adopters of a particular action, research has found that personal interactions are crucial in promoting the adoption of a behavior more broadly.

Promoting residential and business energy efficiency actions through social means can be challenging because such actions are often invisible to neighbors, friends, and peers. This challenge further highlights the benefit of using prompts and commitments to make actions more noticeable in the community.

Tips for designing your message:

- Know your audience: listen to people's interests/concerns and use this to design outreach methods (e.g., if people don't care about costs, don't use "free" as a selling point; if people are busy, be able to show them how little time/effort the action requires)
- Use nonpolitical language
- Make the message easy to remember
- Make the message specific
- Always stay positive
- Use the right messengers

### **Competitions & Challenges**

Competitions and challenges can be designed in a variety of ways, such as among local businesses, among schools, among municipal departments, among municipalities, etc. Before creating a competition or challenge it is important to build partnerships with community leaders and organizations that will participate in and/or promote local energy efforts. Such leaders or organizations may include:

- Schools (school superintendent, school board, teachers, etc.)
- Places of worship (clergy)
- Youth (school clubs, Boy Scouts, Girl Scouts, etc.)
- Neighborhood associations
- Local businesses and business organizations

Examples of competitions and challenges in Massachusetts:

- **Greenfield's 10% Challenge** – The Greening Greenfield Challenge asks residents to participate in the challenge by pledging to do a range of energy reduction actions. Those who join the challenge receive a lawn sign and monthly information/tips on how reduce energy consumption. 40 plus businesses have also joined the challenge. For more information see: <http://greeninggreenfield.org/>
- **SouthCoast Energy Challenge** – The SouthCoast Energy Challenge is a regional campaign that challenges residents to make an online pledge to participate in a range of energy reduction activities either individually or as part of a team. The challenge has users track their progress on MyEnergy, an online webtool,. For more information see: <http://southcoastenergychallenge.org/press>

### ***Themed Workshops & Parties***

Themed workshops or parties are a great way to have people who are not initially interested in energy-related issues get together to talk about an issue of interest that does in fact relate directly to energy issues. The workshops or parties can be held in various places depending on the audience (e.g., house parties, community centers, Mass Audubon sanctuaries, schools, places of worship, etc.)

Examples of workshops or parties in Massachusetts:

- **Ice Dams Workshops** – The Center for EcoTechnology (CET) holds a workshop entitled “Ice Dam Prevention: Why they happen and what to do about it.” During the workshop CET discusses why ice dams are a problem, their underlying causes, building science, options for remediation and prevention and resources available for weatherization. For more information see: <http://www.cetonline.org/>
- **Climate Change at the Local Level** – Mass Audubon hosted a workshop in Worcester that focused on the potential impact of climate change on local resources (e.g., the Blackstone River watershed) and local action steps that can be taken to address these potential impacts. Mass Audubon’s workshop focused on the MA Green Communities Act, but a group could just as easily talk about residential audits and retrofits. For more information see: <http://www.nbcares.org/node/865>
- **New Homebuyer Workshops** – The Housing Assistance Corporation on Cape Cod (HAC) holds new homebuyer workshops that include sections on the benefits of energy efficiency. A group could hold a similar workshop both for new homebuyers, as well as for those who are planning to do major renovations to their home. For more information see: <http://www.haconcapecod.org/>

### ***Enhanced “Traditional” Outreach***

- **Information Tables** – Although setting up information tables can sometimes be effective, many groups struggle to table at a) events where people are already interested in energy and know what to do, or b) locations such as grocery stores, where people

are busy and do not want to stop to talk. Some methods to improve tabling success may include:

- **Ask passersby to make a written pledge.** Encourage them to sign a written statement committing to whatever action you are promoting (e.g., “I will get a MassSave home energy assessment”), and then follow up with them via phone and email to remind them of the pledge and their commitment.
- **Offer a reward for signing up, either directly or through a raffle/drawing.** A gift card to a business located near the tabling location can provide an immediately relevant incentive, and is also a good way to engage surrounding businesses in your efforts.
- **Advertising in Newspapers and Mailings** – While traditional advertising and mailings can be informative and educational, this outreach strategy can easily be overlooked by its intended audience. Some ways to increase the effectiveness of this strategy could include:
  - **Present injunctive and descriptive norms in an easily digestible form.** Compelling images, visualizations of relevant behavioral data, and a clear and succinct layout can all contribute to a message that is more likely to be viewed and comprehended. However, even a simple advertisement can be effective so long as the intended outcome is clear (e.g., “Attend a free workshop next Tuesday on how to reduce home oil heating costs this winter!”)
  - **Advertise in media that is more likely to be viewed.** This could include official mailings from the municipality, power and water bills, etc.
- **Email** – These days everyone is overwhelmed with email. To increase the number of viewers of a mass email, consider asking a well-known leader or organization to send out the email on behalf of an effort. One town in Massachusetts had great success having the municipal government send out an email about residential energy opportunities. Further, emails that focus just on the energy action you are promoting will likely be more effective than embedding a message about the action somewhere in a general newsletter that touches on multiple topics or has multiple articles.

## **7. Identify external barriers.**

As you proceed with your outreach, it is important to make note of the external barriers that prevent residents from moving forward with particular behaviors or actions. These barriers should be reported to the relevant key stakeholders, e.g., municipal leadership, MAPC energy staff, utility and MassSave program administrators, to ensure stakeholders are aware of the issues or problems that need further attention.

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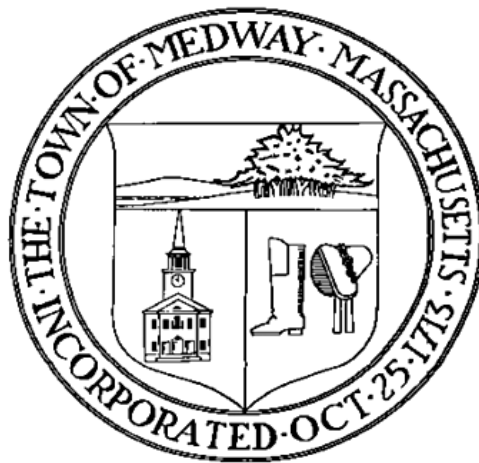
# **The Town of Medway Local Energy Action Plan**

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## **Part III - Appendix**

**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





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# Appendix A: Methodology for Weather Normalization

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## SUMMARY

This document is intended to provide guidance to communities for approximating weather normalization of their building energy consumption baseline. Energy consumption in thermally controlled buildings is dependent on outside air temperature. In order to compare building energy consumption from year to year and more accurately measure the effectiveness of energy efficiency measures, communities can adjust building energy consumption data based on historic weather data. In the absence of professional energy data analysis tools, this document can be used as a guide to approximate weather normalization for building energy consumption based on regional historic weather data.

The methodology in this document describes how to adjust building energy consumption for weather conditions based on historic temperature data in the Massachusetts coastal division. However, this data is publically available on the national level and can be replicated for a community anywhere in the United States with some modifications to historical weather data specific to geographic locations. In the interest of simplicity, this methodology only addresses three heating fuels: natural gas, fuel oil, and propane. Communities that rely heavily on other fuels (i.e., wood, electricity) or communities that consume significant amount by cooling buildings should consider expanding the methodology to account for the specific energy use patterns.

For reference, the following conversion factors are used to compare physical fuel units with Btu (British thermal units):

Energy Unit Conversion Factors		
Fuel Type	Units	Factor
Electricity	MMBTU/ kWh	0.003412
Natural Gas	MMBTU/ therm	0.1
Fuel Oil	MMBTU/ gallon	0.139

## REFERENCED DATA SET

National Climate Data Center (NCDC) Historical Climatologically Series (HCS) 5-1, 2007-2012

- Massachusetts Coastal Division (for communities outside the MAPC region, please refer to a different division according to your location.)
- Available online at:  
<http://www1.ncdc.noaa.gov/pub/orders/CDODiv2610105927925.txt>

## TERMS TO KNOW

Term	Definition
<b>Outside Air Temperature</b>	“Outside air temperature” is the temperature measured outside a building.
<b>Weather Normalization</b>	“Weather normalization” is the process of adjusting building energy consumption for weather conditions based on historical outside air temperature data. Also known as “weather correction.”
<b>Base Temperature</b>	The “base temperature” is the outside air temperature threshold below which a building needs to be heated. In the U.S. the typical base temperature used for most buildings is 65°F (18°C).
<b>Heating Degree Days (HDD)</b>	“Heating degree days” measure how much (in degrees) and for how long (in days) the outside air temperature is below the base temperature within a given period.
<b>Average Year Degree Days (ADD)</b>	“Average year degree days” is the average annual degree day value measured within a given period (in years).

## STEP-BY-STEP INSTRUCTIONS

**Step 1. Select a measurement period.** A measurement period is the timeframe in which historical temperature data is collected. The start date of a measurement period should be the baseline year for a building. The end date of a measurement period should be AT LEAST five years after the baseline year or the energy reduction target year of the building. (*For demonstration purpose, the measurement period selected for this document is FY 2008 to FY 2012.*)

**Step 2. Determine the monthly heating degree days for the measurement period.** Use the dataset NCDC HCS 5-1 to determine the monthly heating degree days in the Massachusetts Coastal Division for each month during the measurement period and organized the data in a spreadsheet. Please note that NCDC HCS data is only available in .TXT format. Communities need to manually enter the data into a spreadsheet. A complete “Heating Degree Days Chart” for the Massachusetts Coastal Division from FY 2008 to FY 2012 is available at the end of this document.

Example:

SHEET 1 – HDD				
	A	B	C	D
1	FISCAL YEAR	YEAR	MONTH	HDD
2	2008	2007	July	5
3	2008	2007	August	7

**Step 3. Determine the aggregated heating degree days for each fiscal year.** Use “SUM” function to find the total heating degree days for each fiscal year.

Example: Calculate the total heating degree days for FY 2008.

SHEET 1 – HDD				
	A	B	C	D
1	FISCAL YEAR	YEAR	MONTH	HDD
2	2008	2007	July	5
3	2008	2007	August	7
4	2008	2007	September	56
5	2008	2007	October	262
6	2008	2007	November	693
7	2008	2007	December	1023
8	2008	2008	January	1026
9	2008	2008	February	927
10	2008	2008	March	846
11	2008	2008	April	531
12	2008	2008	May	291
13	2008	2008	June	17
14	2008	Total HDD		5,684

To find the “Total HDD” (cell D14), the following formula is used:

**=SUM (D2:D13)**

**Step 4. Determine the average year degree day value for the given measurement period.** The average year degree day is usually the five year, ten year, or twenty year average of the total heating degree days. For cross-regional comparisons purposes, a standard degree day value may also be used. A five year average for the Massachusetts coastal division is the value used in this example. To find the average value for a period of years, divide the sum of the total heating degree days in each fiscal year by the number of fiscal years in the measurement period.

Example: Calculate the average year degree day value for FY 2008 to FY 2012.

SHEET 1 – HDD				
	A	B	C	D
1	FISCAL YEAR	YEAR	MONTH	HDD
14	2008	Total HDD		5,684
27	2009	Total HDD		6,109
40	2010	Total HDD		5,544
53	2011	Total HDD		5,947
66	2012	Total HDD		4,786
67	Average Year Degree Day			5,614

To find the “Average Year Degree Day” (cell D67), the following formula is used:

**=AVERAGE (D14,D27,D40,D53,D66)**

**Step 5. Determine each building’s baseline energy consumptions by fuel type.** Create a building inventory on a separate sheet in your weather normalization Excel workbook. List energy consumption for each building by fuel types in the selected baseline year.

SHEET 2 – BUILDING INVENTORY					
	A	B	C	D	E
1	BUILDING	2009 ELECTRICITY (kWh)	2009 GAS (therms)	2009 OIL (gallons)	2009 PROPANE (gallons)
2	Town Hall	90,800	4,980	-	-
3	Senior Center	30,700	-	4,200	-
4	Fire Station	35,000	44,20	-	240
5	High School	1,650,300	65,000	-	300

**Step 6. Determine the energy consumption per degree day by building and heating fuel type.**

*Note: Weather normalization should be applied to heating fuel consumption only. The consumption of fuels whose usage is not affected by weather conditions, such as electricity, gasoline, and diesel should not be adjusted.*

Calculate the energy consumption per degree day by building and heating fuel type (gas, oil, propane) by dividing the total baseline energy consumption by the total number of heating degree days in the baseline year.

Example: Calculate the gas consumption (therms) per degree day for the Town Hall for FY 2009.

SHEET 2 – BUILDING INVENTORY							
	A	C	D	E	F	G	H
1	BUILDING	2009 GAS (therms)	2009 OIL (gallons)	2009 PROPANE (gallons)	2009 GAS (therms) per DEGREE DAY	2009 OIL (gallons) per DEGREE DAY	2009 PROPANE (gallons) per DEGREE DAY
2	Town Hall	4,980	-	-	0.82	?	?
3	Senior Center	-	4,200	-	?	?	?
4	Fire Station	44,20	-	240	?	?	?
5	High School	65,000	-	300	?	?	?

In this example, the therms per degree day for the Town Hall in FY 2009 (SHEET 2 cell F2) is the quotient of the Town Hall's 2009 gas consumption (SHEET 2 cell C2) divided by the total heating degree days in 2009 (SHEET 1 cell D27). The following formula is used:

$$=C2/'SHEET 1 - HDD'!$D$27$$

At the end of this step, the sheet should look like this:

SHEET 2 – BUILDING INVENTORY							
	A	C	D	E	F	G	H
1	BUILDING	2009 GAS (therms)	2009 OIL (gallons)	2009 PROPANE (gallons)	2009 GAS (therms) per DEGREE DAY	2009 OIL (gallons) per DEGREE DAY	2009 PROPANE (gallons) per DEGREE DAY
2	Town Hall	4,980	-	-	0.82	-	-
3	Senior Center	-	4,200	-	-	0.67	-
4	Fire Station	44,20	-	240	0.72	-	0.039
5	High School	65,000	-	300	10.6	-	0.049

**Step 7. Perform simple-ratio based weather normalization to determine the adjusted energy consumption by building and heating fuel type.** To find the normalized equivalents of each



consumption value, multiply each energy consumption per degree day value (SHEET 2, columns F through H) by the average year degree day value (SHEET 1, cell D67).

Example: Calculate the weather normalized gas consumption (therms) for the Town Hall for FY 2009.

SHEET 2 – BUILDING INVENTORY							
	A	F	G	H	I	J	K
1	BUILDING	2009 GAS (therms) per DEGREE DAY	2009 OIL (gallons) per DEGREE DAY	2009 PROPANE (gallons) per DEGREE DAY	WEATHER NORMALIZED GAS (therms)	WEATHER NORMALIZED OIL (gallons)	WEATHER NORMALIZED PROPANE (gallons)
2	Town Hall	0.82			4,603	?	?
3	Senior Center		0.67		?	?	?
4	Fire Station	0.72		0.039	?	?	?
5	High School	10.6		0.049	?	?	?

In this example, the weather normalized gas consumption for the Town Hall in FY 2009 (SHEET 2 cell I2) is the product of the Town Hall's 2009 gas consumption per degree day (SHEET 2 cell F2) multiplied by the average year degree day value (SHEET 1 cell D67). The following formula is used:

$$=F2*\text{SHEET 1} - \text{HDD}!\$D\$67$$

At the end of this step, the sheet should look like this:

SHEET 2 – BUILDING INVENTORY							
	A	F	G	H	I	J	K
1	BUILDING	2009 GAS (therms) per DEGREE DAY	2009 OIL (gallons) per DEGREE DAY	2009 PROPANE (gallons) per DEGREE DAY	WEATHER NORMALIZED GAS (therms)	WEATHER NORMALIZED OIL (gallons)	WEATHER NORMALIZED PROPANE (gallons)
2	Town Hall	0.82	-	-	4,603	-	-
3	Senior Center	-	0.67	-	-	3,761	-
4	Fire Station	0.72	-	0.039	4,042	-	219
5	High School	10.6	-	0.049	59,508	-	275

**Step 8. Determine the total weather normalized energy consumption for each building.** Find the sum of the (non-adjusted) electricity consumption and the weather normalized heating fuel energy consumption for each building in MMBTU's.

Example: Calculate the total weather normalized energy consumption for Town Hall for FY 2009.

SHEET 2 – BUILDING INVENTORY						
	A	B	I	J	K	L
1	BUILDING	ELECTRICITY (kWh)	WEATHER NORMALIZED GAS (therms)	WEATHER NORMALIZED OIL (gallons)	WEATHER NORMALIZED PROPANE (gallons)	WEATHER NORMALIZED TOTAL (MMBTU)
2	Town Hall	90,800	4,603	-	-	770
3	Senior Center	30,700	-	3,761	-	?
4	Fire Station	35,000	4,042	-	219	?
5	High School	1,650,300	59,508	-	275	?

In order to add up fuel consumptions measured in different physical fuel units, please remember to convert all energy consumption value in physical fuel units to MMBTU's. To find the total weather normalized consumption for the Town Hall (cell L2), the following formula is used:

$$=B2*0.003412 + I2*0.1 + J2*0.139 + K2*0.091$$

At the end of this step, the sheet should look like this:

SHEET 2 – BUILDING INVENTORY						
	A	B	I	J	K	L
1	BUILDING	2009 ELECTRICITY (kWh)	WEATHER NORMALIZED GAS (therms)	WEATHER NORMALIZED OIL (gallons)	WEATHER NORMALIZED PROPANE (gallons)	WEATHER NORMALIZED TOTAL (MMBTU)
2	Town Hall	90,800	4,603	-	-	770
3	Senior Center	30,700	-	3,761	-	628
4	Fire Station	35,000	4,042	-	219	544
5	High School	1,650,300	59,508	-	275	11,606

## RESULTS

The following is a comparison of the energy use baseline in each building before and after weather normalization. The weather normalization process adjusted the building energy consumptions for additional energy used for heating due to weather that was colder than average in the FY 2009 baseline (relative to the overall 5-year, FY 2008 to FY 2012 weather data measurement period). The weather normalized energy consumption value is therefore lower than the non-adjusted values.

### Before weather normalization:

BUILDING	2009 ELECTRICITY (kWh)	2009 GAS (therms)	2009 OIL (gallons)	2009 PROPANE (gallons)	TOTAL (MMBTU)
Town Hall	90,800	4,980	-	-	808
Senior Center	30,700	-	4,200	-	689
Fire Station	35,000	44,20	-	240	583
High School	1,650,300	65,000	-	300	12,158

**After weather normalization:**

BUILDING	2009 ELECTRICITY (kWh)	WEATHER NORMALIZED GAS (therms)	WEATHER NORMALIZED OIL (gallons)	WEATHER NORMALIZED PROPANE (gallons)	WEATHER NORMALIZED TOTAL (MMBTU)
Town Hall	90,800	4,603	-	-	770
Senior Center	30,700	-	3,761	-	628
Fire Station	35,000	4,042	-	219	544
High School	1,650,300	59,508	-	275	11,606

## Resources

**Massachusetts Coastal Division Heating Degree Day Table (FY 2008 to FY 2012)**

FY Year	Year	Month	HDD	FY Year	Year	Month	HDD
2008	2007	July	5	2011	2010	July	0
2008	2007	August	7	2011	2010	August	0
2008	2007	September	56	2011	2010	September	41
2008	2007	October	262	2011	2010	October	344
2008	2007	November	693	2011	2010	November	654
2008	2007	December	1023	2011	2010	December	1051
2008	2008	January	1026	2011	2011	January	1184
2008	2008	February	927	2011	2011	February	994
2008	2008	March	846	2011	2011	March	846
2008	2008	April	531	2011	2011	April	531
2008	2008	May	291	2011	2011	May	255
2008	2008	June	17	2011	2011	June	47
2008	Total HDD:		5,684	2011	Total HDD:		5947
2009	2008	July	0	2012	2011	July	0
2009	2008	August	11	2012	2011	August	0
2009	2008	September	62	2012	2011	September	49
2009	2008	October	440	2012	2011	October	297
2009	2008	November	693	2012	2011	November	510
2009	2008	December	942	2012	2011	December	806
2009	2009	January	1246	2012	2012	January	958
2009	2009	February	944	2012	2012	February	812
2009	2009	March	893	2012	2012	March	648
2009	2009	April	504	2012	2012	April	438
2009	2009	May	261	2012	2012	May	208
2009	2009	June	113	2012	2012	June	60
2009	Total HDD:		6,109	2012	Total HDD:		4,786
2010	2009	July	11	5-Year Average Year Degree Day:			5,614
2010	2009	August	0				
2010	2009	September	114				
2010	2009	October	440				
2010	2009	November	516				
2010	2009	December	1032				
2010	2010	January	1138				
2010	2010	February	941				
2010	2010	March	707				
2010	2010	April	447				
2010	2010	May	181				
2010	2010	June	17				
2010	Total HDD:		5,544				

# Appendix B: Methodologies for Creating a Local Energy Baseline

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## SUMMARY

This document is meant to serve as a guide for developing a rough baseline of building energy consumption and expenditures in a community's residential and commercial sectors. In the absence of utility data, this methodology can serve as an approximation of aggregate-level energy use based on census data, labor statistics, and building energy survey analyses. It is meant to serve as a baseline for the purposes of local energy planning efforts, and provide insight as to the types and scale of energy use within a community. However, since the inputs are based on static data sources, the baselines derived using this methodology cannot be used to benchmark and monitor subsequent changes in use, i.e., the success of an energy efficiency outreach program.

The methodology in this document describes how to derive local energy baselines for communities in Massachusetts. However, this data is publically available on the national level and could be replicated for a community anywhere in the United States (with some modifications to regionally-specific assumptions). In the interest of simplicity, these baselines include only electricity, natural gas and fuel oil consumption. Communities that rely heavily on other fuels (i.e., wood, propane, district heating) should consider expanding the methodology to account for those fuel types.

For reference, the following conversion factors are used to compare physical fuel units with Btu (British thermal units):

Energy Unit Conversion Factors		
Fuel Type	Units	Factor
Electricity	MMBTU/ kWh	0.003412
Natural Gas	MMBTU/ therm	0.1
Fuel Oil	MMBTU/ gallon	0.139

## Residential Sector

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### REFERENCED DATA SETS

- American Community Survey (ACS), 2006-2010 5-Year Community Estimates
  - Occupied Housing Units, Units in Structure
  - Heating Fuel
- Energy Information Administration (EIA) Residential Energy Consumption Survey (RECS) , 2005

## STEP-BY-STEP INSTRUCTIONS

**Step 1. Find the number of housing units, by type.** Use ACS 2010 estimates by municipality for Housing Units in Structure to determine the total number of housing units for the following types:

- Single-Family, Detached
- Single-Family, Attached
- Multi-Family, 2-4 Units (Sum of 2-Family and 3-4 Units categories)
- Multi-Family, 5+ Units (Sum of 5-19 Units, 20-49 Units, and 50+ Units categories)
- Other

**Step 2. Determine the percentage of homes within a community that heat with different fuel types.** Use ACS 2010 estimates by municipality for Heating Fuel to determine the total number of units that heat with the following major fuel types:

- Utility Gas (natural gas)
- Fuel Oil
- Electricity

Example:

MUNICIPALITY	TOTAL UNITS	SF_DETACHED	SF_ATTACHED	2-4 UNITS	5+ UNITS	% GAS HEAT	% FUEL OIL HEAT
Chelsea	13,009	1,345	594	6,748	4,322	48%	18%

**Step 3. Determine average use and expenditures by fuel type for each housing unit type.**

Start with EIA RECS 2005 Consumption and Expenditures data in Tables 8-10 to determine average consumption and expenditures by housing type. These numbers are national averages. In order to scale these national averages to a region- or state-specific level, the national averages must first be weighted by the percentages of housing unit types at the regional or state level.

Example: Calculate the average annual electricity consumption of a single-family, detached home in New England. The following quantities are known based on EIA and ACS data:

	A	B	C	D	E
1		US Average Electricity Consumption (kWh)	% Units in US	% Units in New England	New England Average Electricity Consumption
2	All Households	11,480	100%	100%	7,432
3	Single Family, Detached	13,159	63%	58%	?
4	Single Family, Attached	9,240	6%	4%	?
5	2-4 Units	7,460	8%	16%	?
6	5+ Units	7,001	17%	18%	?
7	Other	11,787	6%	4%	?

There are some variations between the percentage breakdown of housing unit types in New England versus the US; most noticeably, New England has twice as high a concentration of two- to four-unit apartments as the US as a whole. In order to account for this when comparing an average New England home (i.e., averaged across all housing units) with an average US home, the first step is to obtain a weighted US Average Electricity Consumption (cell B2) based on the percentage breakdown of housing unit types in New England. The following formula is used:

$$=\text{SUMPRODUCT}(\text{B3:B7}, \text{C3:C7})/\text{SUM}(\text{C3:C7})$$

In other words, this represents what the average US household electricity consumption would be if the percentage breakdown of housing unit types in the US were the same as it is in New England. The results are as follows:

	Electricity Consumption (kWh)
Average NE Household	7,432
Average US Household	11,480
Average US Household, NE-Adjusted	10,914
% Difference between NE and US, NE-Adjusted	47%

The average New England household uses approximately 47% less electricity than a US household, with variations in housing stock held constant. To obtain average electricity use by housing unit type in New England, simply reduce the amounts in cells B3:B7 by 47%.

	A	B	C	D	E
1		US Average Electricity Consumption (kWh)	% Units in US	% Units in New England	New England Average Electricity Consumption
2	All Households	11,480	100%	100%	7,432
3	Single Family, Detached	13,159	63%	58%	6,993
4	Single Family, Attached	9,240	6%	4%	4,910
5	2-4 Units	7,460	8%	16%	3,964
6	5+ Units	7,001	17%	18%	3,721
7	Other	11,787	6%	4%	6,264

Note: The average electricity, natural gas, and fuel oil consumption for MA households is not reflected in EIA data. Instead, use the total residential consumption for the state divided by the number of households using that fuel, as follows:

	Electricity	Natural Gas	Fuel Oil
Total Households Using Fuel (millions)	2.5	1.8	0.8
MA Residential Consumption (trillion BTU)	66.4	137	85.3
Average Use per Household (MMBTU)	27	81	100

Due to insufficient data, energy expenditure data for MA towns is based on New England averages.

**Step 4. Determine total energy consumption and expenditures.** Multiply the number of housing units by each type times the average consumption for that housing type, and add together. Heating fuels (natural gas and oil) are also multiplied by the percentage of units in a community using that fuel.

# Commercial Sector

## REFERENCED DATA SETS

- The Energy Information Administration’s Commercial Building Energy Survey (CBECS), 2003
- The MA Executive Office of Wages and Labor Division (EOWLD)’s ES-202 – Employment and Wages Survey

## STEP-BY-STEP INSTRUCTIONS

**Step 1. Find the total number of employees and establishments, by industry and Primary Building Activity (PBA).** EOWLD ES-202 survey data lists the number of employees and establishments by industry, sorted by the industry standard North American Industry Classification System (NAICS) codes. Set up the ES-202 raw data with the following columns:

	A	B	C	D	E
1	<b>Municipality</b>	<b>NAICS Code</b>	<b>NAICS Title</b>	<b>Employment</b>	<b>Establishments</b>
2	Chelsea	311	Food Manufacturing	973	11

Use the following SUMIFS function to determine employees and establishments by PBA for each community:

**=SUMIFS(sumrange, criteriarange1, criteria1, criteriarange2, criteria2)**

Variable	Means
<b>sumrange</b>	Column D (for employment) or Column E (for establishments)
<b>criteriarange1</b>	Column B
<b>criteria1</b>	3-Digit NAICS code
<b>criteriarange2</b>	Column A
<b>criteria2</b>	Municipality

It may be helpful to set up a reference sheet with NAICS codes to link to for the purposes of setting up this formula.

EIA CBECS analysis data based on Primary Building Activity (PBA) rather than NAICS codes. The following crosswalk (generated by EIA) correlates the Primary Building Activity (PBA) codes used in CBECS with standard three-digit NAICS codes between 400 and 1000.

	PBA	NAICS Code (3-digit)
A	Education	611
B	Food Sales	445
C	Food Service	722
D	Inpatient Health Care	622
E	Outpatient Health Care	621
F	Lodging	623, 721
G	Retail (non-mall)	441, 442, 443, 444, 451, 452, 453, 532
H	Retail (mall)	446, 448
I	Office	454, 486, 511, 516, 517, 518, 519, 521, 522, 523, 524, 525, 531, 533, 541, 551, 561, 624, 921, 923, 924, 925, 926, 928
J	Public Assembly	481, 482, 485, 487, 512, 515, 711, 712, 713
K	Public Order/ Safety	922
L	Religious Worship	813
M	Service	447, 483, 484, 488, 491, 492, 811, 812
N	Warehouse/ Storage	423, 424, 493
O	Other	562, 927

To get the total number of employees and establishments by PBA, sum the quantities for each of the above NAICS codes for each PBA.

## Step 2. Determine average energy use and consumption by employee for each PBA.

CBECS Tables 14, 24 and 34 provide average energy use and expenditures by building, square footage, and employee for each PBA. Although square footage would be the most reliable factor for scaling up community-level data, information on square footage by PBA on a community level of not easily obtained. Therefore, average use and expenditures by employee is used for the purposes of this methodology. These are all US averages.

- **Exception: Enclosed and Strip Malls.** The 2003 CBECS survey employed a different data collection method for mall buildings, and therefore energy data is not available by employee. Total energy use in the Mall category is calculated by multiplying the total number of establishments by the average energy use per building.

**A note on fuel oil:** The data available in the 2003 CBECS on fuel oil consumption per employee and building is incomplete for some PBAs. Two options were explored for the purposes of this methodology:

- Option 1<sup>1</sup>: Compare average fuel oil use to average natural gas use in the same building types, using Office buildings as a baseline. For example, if a PBA that uses natural gas uses 50% more natural gas than an Office building, assume that if the same PBA used fuel oil, it would use 50% more fuel oil than an Office building.

<sup>1</sup> Option 1 generates a more conservative estimate of fuel oil use and is the preferred method for this methodology.



- Option 2: Find the average consumption of fuel oil for an average New England building (across all PBAs), and divide it by the average number of employees in an industry. Use this as the scaling factor.

### Step 3. Determine total energy use and expenditures.

- Multiply the total number of employees in each PBA by the average energy consumption/expenditures (by fuel type) for that PBA;
- For electricity, assume a factor of 100%;
- For natural gas and fuel oil, assume a factor equal to the percentage of residences that heat with each fuel type respectively. For example, if 30% of the housing units in a community heat with fuel oil, the following equation would be used:  

$$(\text{Total \# Employees}) \times (\text{Average Fuel Oil Consumption by Employee}) \times 30\%$$

## Industrial Sector

### REFERENCED DATA SETS

- The Energy Information Administration's Manufacturing Energy Consumption Survey (MECS), 2006
- The MA Executive Office of Wages and Labor Division (EOWLD)'s ES-202 – Employment and Wages Survey

### STEP-BY-STEP INSTRUCTIONS

**Step 1. Find the total number of employees and establishments by industry type.** EOWLD ES-202 survey data lists the number of employees and establishments by industry, sorted by the industry standard North American Industry Classification System (NAICS) codes. Use a “SUMIF” function by municipality to determine employees and establishments by three-digit NAICS codes. This sector encompasses NAICS codes between 311 and 339. Industrial energy uses between 100 and 200 (such as power generation and utility operations) are not incorporated in this methodology.

NAICS_3	Industry	NAICS_3	Industry
311	Food	326	Plastics and Rubber Products
312	Beverage and Tobacco Products	327	Nonmetallic Mineral Products
313	Textile Mills	331	Primary Metals
314	Textile Product Mills	332	Fabricated Metal Products
315	Apparel	333	Machinery
316	Leather and Allied Products	334	Computer and Electronic Products
321	Wood Products	335	Electrical Equip., Appliances, and Components
322	Paper	336	Transportation Equipment
323	Printing and Related Support	337	Furniture and Related Products
324	Petroleum and Coal Products	339	Miscellaneous
325	Chemicals		

## Step 2. Determine average energy consumption by employee for each industry.

“MECS Table 6.1 – MMBTU/Employee in the Northeast” provides a reference table for total MMBTU use per employee for each industry. For each community, multiply the number of employees in an industry times the average MMBTU use for that industry.

## Step 3. Approximate percentage breakdown of fuel types for total energy use.

“MECS Table 1.1 – Consumption of Energy for All Purposes” provides a total quantity of energy consumption by industry in trillion Btu.

- “MECS Table 5.4 – End Uses of Fuel Consumption” provides a total quantity of energy consumption by fuel type and industry in trillion Btu.
- Divide the total quantity of energy consumption by fuel type by the total quantity of energy consumption overall to obtain a percentage that can be used to approximate how much of each fuel type is used by each industry in each community.
- Sum the total MMBTU overall and by fuel use for all industry types for each community to obtain total energy use information.

Note: This methodology for the industrial sector currently accounts for energy consumption only; expenditures are not included.

### Example:

	A	B
1	<b>Industry</b>	<b>311 - Food</b>
2	MMBTU/Establishment (US Avg)	83,947
3	MMBTU/employee (Northeast)	435
4	Total Energy Consumption (trillion)	1186
5	Total Electricity Consumption (trillion BTU)	266
6	% Electricity of Total	22%
7	Total NG Consumption (trillion BTU)	635
8	% NG of Total	54%
9	Total Fuel Oil Consumption (trillion BTU)	42
10	% Fuel Oil of Total	4%

Chelsea, MA	# Employees	Total MMBTU	Electricity MMBTU
311 - Food	973	$(973 \times B3) = 422,768$	$(422,768 \times B6) = 93,008$

## Appendix C: Residential Energy Use and Expenditures by Housing Types

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Annual residential energy consumption and expenditures was approximated based on the following assumptions for households heating with either natural gas or oil:

Average Annual Use & Expenditures by Housing Type - Natural Gas vs. Oil Heat					
Housing Type	Electricity (kWh)	Natural Gas (thousand CF)	Gas-Heated Home, Total (\$)	Fuel Oil (gallons)	Oil Heated Home, Total (\$)
Single-Family, Detached	8,825	88	\$2,270	814	\$2,922
Single-Family, Attached	6,197	82	\$1,885	686	\$2,331
Multi-Family, 2-4 Units	5,003	81	\$1,816	726	\$2,339
Multi-Family, 5+ Units	4,695	50	\$1,232	762	\$2,317
Other	7,905	64	\$1,752	503	\$2,066

Source: Energy Information Administration Residential Energy Consumption Survey, 2009

## Appendix D: Non-School Building and Facility Energy Upgrades Summary

The following table summarizes the recommended energy efficiency improvement for non-school buildings and facilities and their implementation status. The listed energy projects are recommendations from the TNT Energy Audit report and the Town-wide Facility Management Study (TWFMS).

Building/ Facility	Energy Efficiency Improvement Projects	Implementation Year	Projected Savings		Status	Recommendation Source
			Energy (MMBTU)	Cost (\$)		
Town Hall	Lighting & Sensors LED Option	2012 Q1	45	\$2,208	Completed	TNT Energy Audit
	Hot Water Heating System	-	89	\$1,084	Recommended	TNT/ TWFMS
	Vending Machine Controls	2011 Q4	7	\$328	Completed	TNT Energy Audit
	Building Envelope Improvements	-	-	\$1,912	Complete in FY 2013	TNT Energy Audit
Highway Barn	Lighting and Sensors	2011 Q4	18	\$479	Completed	TNT Energy Audit
	Hot Water Boiler Controls	-	110	\$2,018	Complete in FY 2013	TNT Energy Audit
	Building Envelope Improvements	-	-	\$1,071	Complete in FY 2013	TNT Energy Audit
Fire Station 1	Lighting and Sensors	-	15	\$831	Recommended	TNT Energy Audit
	Vending Machine Controls	2011 Q4	8	\$355	Completed	TNT Energy Audit
	Building Envelope Improvements	-	-	\$215	Complete in FY 2013	TNT Energy Audit
	Roof replacement	-	-	-	Complete in FY 2013	TWFMS
Fire Station 2	Lighting and Sensors	2011 Q4	7	\$391	Completed	TNT Energy Audit
	Hot Water Boiler Controls	-	-	\$898	Complete in FY 2013	TNT Energy Audit
	Vending Machine Controls	2011 Q4	8	\$355	Completed	TNT Energy Audit
	Building Envelope Improvements	-	-	\$2,504	Complete in FY 2013	TNT Energy Audit
Library	Lighting and Sensors	2012 Q1	105	\$5,991	Completed	TNT Energy Audit
	Central HVAC Controls	2012 Q1	2,593	\$3,112	Completed	TnT/ TWFMS
	Energy Management System Base	-	2,593	\$3,112	Recommended	TNT Energy Audit
	Energy Management System	-	-	-	Recommended	TNT Energy Audit
	Rooftop Units	2012 Q1	-	-	Completed	TNT Energy Audit
	Building Envelope Improvements	-	-	\$1,957	Complete in FY 2013	TNT/ TWFMS
Police Station	Lighting and Sensors LED Option	2012 Q2	29	\$1,644	Completed	TNT Energy Audit
	Hot Water Boiler Controls	-	82	\$930	Complete in FY 2013	TNT Energy Audit
	Central HVAC Controls	2012 Q2	1,832	\$3,230	In Progress	TNT Energy Audit
	Computer Room Air Conditioning	-	-	-	Recommended	TNT Energy Audit
	Energy Management System Base	-	1,832	\$3,230	Recommended	TNT Energy Audit
	Energy Management System	-	-	-	Recommended	TNT Energy Audit
	Vending Machine Controls	2011 Q4	7	\$292	Completed	TNT Energy Audit
	Building Envelope Improvements	2011 Q4	-	\$988	Completed	TNT Energy Audit

Building/ Facility	Energy Efficiency Improvement Projects	Implementation Year	Projected Savings		Status	Recommendation Source
			Energy (MMBTU)	Cost (\$)		
<b>Senior Center</b>	Lighting and Sensors	2011 Q4	17	\$1,534	Completed	TNT Energy Audit
	Hot Water Boiler Controls	2012 Q1	93	\$1,703	Completed	TNT Energy Audit
	Building Envelope Improvements	-	-	\$590	Complete in FY 2013	TNT Energy Audit
	LED Lighting	2012 Q1	-	-	Completed	-
<b>Industrial Park Rd. Well</b>	VFD	2011 Q2	-	-	Completed	-
<b>Oakland St. Well</b>	VFD	2014 Q2	-	-	Recommended	-
<b>Populating St. Well &amp; Water Dept. Field Offices</b>	New Window Units	2011 Q3	-	-	Completed	-
	VFD	2014 Q2	-	-	Complete in FY 2013	-
<b>Village St. Well</b>	VFD	2011 Q2	-	-	Completed	-
<b>Vehicles (Gasoline)</b>	Anti-Idling Devices	2014 Q2	-	-	Under Review	-
<b>Vehicles (Diesel)</b>	Anti-Idling Devices	2014 Q2	-	-	Under Review	-

Source: TNT Energy Audit Report for All Buildings; 2011 Town-wide Facility Management Study; 2010 Town of Medway Energy Baseline Inventory and Five Year Energy Reduction Plan; Medway Green Community Grant Progress and Financial Quarterly Report (April – June 2012)

## Appendix E: TRANE Energy Services Company (ESCO) Project Summary

The following “TRANE ESCO Project Summary” table summarizes the energy improvements made across all of the Medway Public School buildings through the TRANE ESCO performance contract:

### TRANE ESCO Project Summary

School	Unit Ventilator Replacement & EMS Integration	Lighting Upgrade	Pump & Motor Replacement with Variable Frequency Drive	Computer Energy Management	Building Envelope Upgrades	Miscellaneous Energy Savings	Water Conservation
High School	EMS upgrades	All	19	316	35 doors	X	
Middle School	110 with EMS upgrades	All	4	138	56 doors	X	18 water restrictors
Burke Elementary School	29 with 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

Source: 2010 Town of Medway Energy Baseline Inventory and Five Year Energy Reduction Plan

The following “Year 2 TRANE ESCO Project Savings Summary” table summarizes the energy use and expenditure savings through the TRANE ESCO performance contract during the second annual guarantee period (April 1, 2011 to March 31, 2012):

### Year 2 TRANE ESCO Project Savings Summary

Utility	Guaranteed Savings	Reconciled Savings	Deviation
Electric Energy (kWh)	1,032,335 kWh	1,127,368 kWh	95,033 kWh
Electric Demand (kW)	2,127 kW	2,698 kW	571 kW
Fuel (therms)	17,194 therms	16,517 therms	-677 therms
Water (kGal)	676 kGal	676 kGal	0 kGal
<b>Total Savings</b>	<b>\$223,619</b>	<b>\$247,882</b>	<b>\$24,263</b>

Source: Year 2 Measurement and Verification Reconciliation for Medway Public Schools, 2012

# Appendix F: Medway LEAP Working Group Meeting (May 1) Handouts<sup>2</sup>

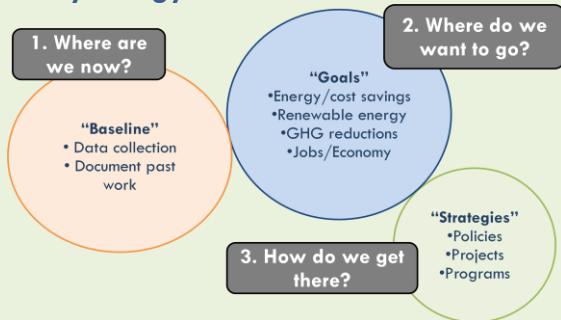
The Metropolitan Area Planning Council (MAPC) is a regional planning agency serving the people who live and work in the 101 cities and towns of Metropolitan Boston. Our mission is to promote smart growth and regional collaboration. We work toward sound municipal management, sustainable land use, protection of natural resources, efficient and affordable transportation, a diverse housing stock, public safety, economic development, an informed public, and equity and opportunity among people of all backgrounds. Our regional plan, "MetroFuture," guides our work and engages the public in responsible stewardship of the region's future.

## What is LEAP?

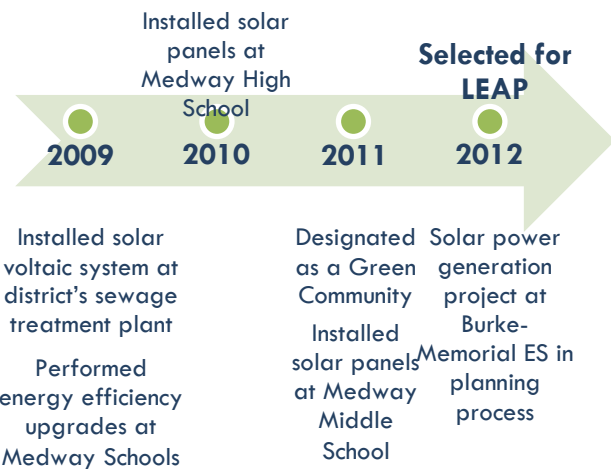
**Mission:** To help cities and towns create and implement local energy action plans over two years.



## Medway Energy Action Plan: 3 Parts



## Where are we now?



Past Energy Action	Municipal	Community	Business
Committed Staff/ Volunteer Time to Energy Work	●	◐	○?
Tracking of Energy Consumption	●	○	○
Energy Goals & Commitments	◐	◐	○?
Renewable Energy Projects	◐	○?	○?
Energy Efficiency Projects	◐	○?	○?
Outreach and Education Programs	○	○?	○?
Local Cleantech Business	○	○	○?

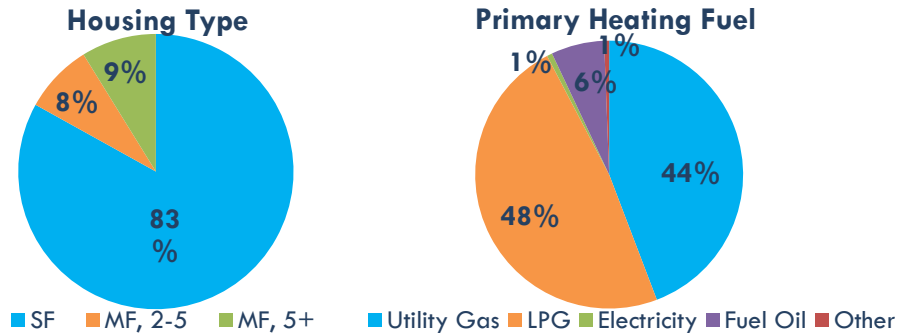
### Key:

- Yes
- ◐ Some/In Progress
- None

<sup>2</sup> The energy consumption data in this document was an estimation derived using publicly available data such as census data, labor statistics, and building energy survey analyses in the absence of aggregated utility data. In summer 2012 after the development of this handout, MAPC has improved the methodology (for more information on the methodology used for the development of this Plan, see Appendix B) used for estimating community energy baseline. The energy consumption data in this handout may thereby differ from the data in the "Residential, Commercial, and Industrial Energy Profile" section in Part I of this Energy Action Plan and should only be used as a reference.

## RESIDENTIAL SECTOR

# of households: 4,594    Owner-occupied: 89%    Renter-occupied: 11%



### Residential Annual Energy Consumption:

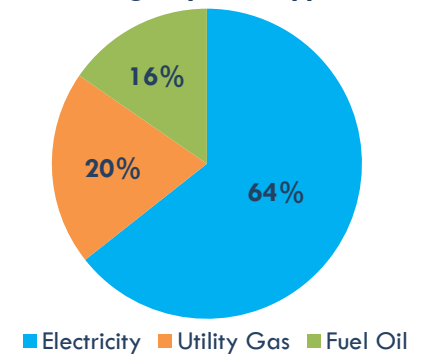
Electricity: **36 million kWh**  
 Natural gas: **1.2 million therms**  
 Heating oil: **493 thousand gallons**

**Residential Annual Energy Expenditures: \$11 million**

## COMMERCIAL SECTOR\*

Type	# Est.	# Employees
Food Sales	9	178
Food Services	25	373
Outpatient Care	18	98
Retail (Non-Mall)	19	81
Retail (Mall)	4	28
Office	91	602
Public Assembly	8	51
Service	25	135
Warehouse	8	31
<b>Total</b>	<b>207</b>	<b>1,577</b>

### Usage by Fuel Type



### Commercial Annual Energy Consumption:

Electricity: **28 million kWh**  
 Natural gas: **298 thousand therms**  
 Heating oil: **162 thousand gallons**

**Commercial Annual Energy Expenditures: \$3.2 million**

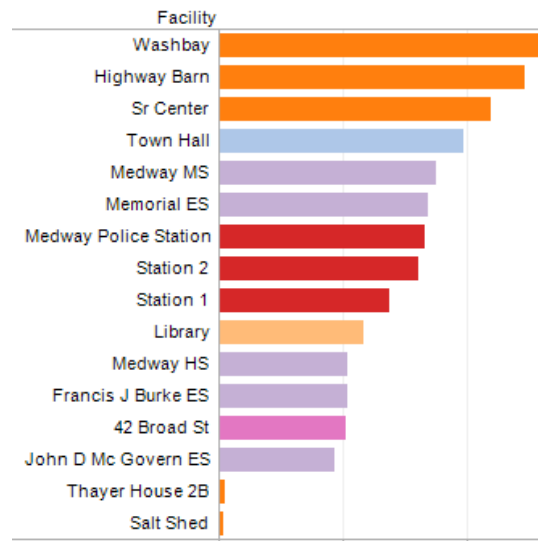
\* Does not include manufacturing/industrial sectors, in which Medway has an additional 1,530 jobs and 49 establishments

## MUNICIPAL SECTOR

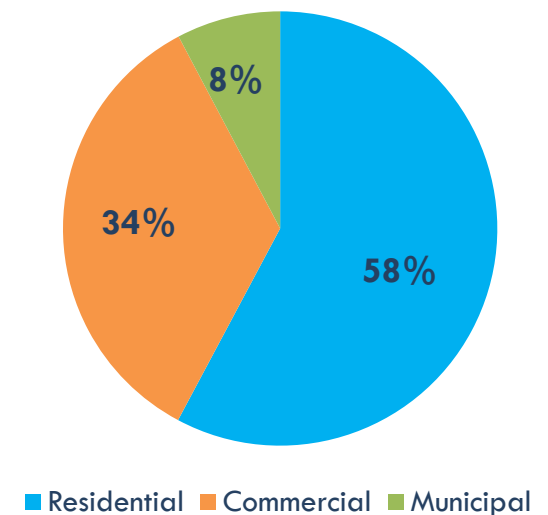
### Municipal Annual Energy Consumption:

Electricity: **4.2 million kWh**  
 Natural gas: **260 thousand therms**  
 Heating oil: **10 thousand gallons**

**Municipal Annual Energy Expenditures: \$1.1 million**



### Medway Building Energy Consumption by Sector





# Appendix G: Medway LEAP Working Group Meeting (May 1) Minutes

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**Location:** Medway Senior Center

**Date:** Tuesday, May 1, 2012

**Time:** 6:30 – 8:30 pm

**Meeting Leader:** Erin Brandt, Metropolitan Area Planning Council

**Facilitator:** Helen Aki, Metropolitan Area Planning Council

**Note Taker:** Po-Yu Yuen, Metropolitan Area Planning Council

**Attendees:** Energy Committee members, municipal staff, Medway residents, Next Step Living representative, Medway business owners and Milford Daily News representative

## Meeting Agenda

1. Welcome and Introductions
2. Purpose and Desired Outcomes
3. Introduction to Metropolitan Area Planning Council (MAPC) and LEAP
4. Past Community Achievements
5. Baseline: “Where are we now?”
6. Brainstorm
  - a. What are the best things about living/ working in Medway?
  - b. What are the greatest challenges?
  - c. What past community efforts worked well and why?
  - d. What do you think should be part of LEAP’s objectives and goals?
  - e. What would you like to see be achieved through LEAP?

## Meeting Purposes and Desired Outcomes

- To launch the LEAP program with stakeholders in the Medway community
- To present an overview of the program
- To begin discussions on opportunities in pursuing clean energy work in Medway
- To learn about past experience with energy work in Medway
- To begin discussions on developing next steps
- This meeting was for general brainstorming purposes
- In-depth discussions on pros and cons of any particular ideas were not encouraged
- This meeting aimed to develop clean energy ideas that would tie to the community’s priorities

## Introduction to MAPC and LEAP

Erin gave an overview of MAPC and LEAP. See handout.

## Past Community Achievements

Meeting participants were asked to discuss past energy efforts and projects in considerations initiated by the Town, residents, local businesses, and community organizations in Medway. The following information was given:

- The schools has been purchasing energy from a competitive supplier and has saved energy expenditure on gas/electricity consumption
- The middle school is currently doing energy efficiency retrofits
- Some residents have been using geothermal power
- The Town lets people borrow energy meters from the public library
- Master Plan does mention energy concerns
- The Medway Community Farm is looking to upgrade its oil heating system in the community farm house
  - The farm may have alternative heating options, such as using biodiesel as an alternative fuel, ductless system, and solar power

## Brainstorming

Meeting participants were asked to brainstorm to help MAPC and the Town of Medway develop a strong understanding of the community's unique characteristics, challenges, and priorities and goals in clean energy work.

### 1. "What are the best things about living/working in Medway?"

- Rural atmosphere
- Benefits from the Community Preservation Act
- The Town Charter with professional staff
- Strong school system
- Historical aspects (Medway will be 300 years old in 2013)
- Well-located
  - Metropolitan center
  - Close to major highways
  - Accessible to public transportations

### 2. "What are the challenges to living/working in Medway?"

- Developing an energy baseline to acknowledge and benchmark success
- Public meetings do not get a big draw unless they are about a controversial topic
- Absence of town center as a focal point for community outreach effort
- Getting people to sign up for emails
- It is hard to reach residents who are not connected to the schools (those who are older or who don't have any children)
- It is hard to reach commercial and industrial groups
- No single business group, however, Medway Business Council will help distribute energy information to commercial sector
- Bringing affordable housing to 10%

### 3. What past community efforts worked well and why?

- Events
  - Medway Pride Day – well attended
  - Annual town meeting
  - Town elections
  - Annual mailing of town's financial report/annual report

- Good for reaching residents
- Does not reach commercial and industrial sector
- The Town is considering converting the town report to electronic format
- Outreach Strategies
  - The Town has recently redesigned the webpage
  - Advertising through annual financial report
  - The schools are a good entry point for distributing information

4. What do you think should be part of LEAP's objectives and goals?

- Waste reduction
- Energy footprint reduction
- Cost savings
- Helping residents conserve energy costs and reduce energy waste
- Water resource management
- The Town sees LEAP as an opportunity to “fill-in-the-gaps” for energy actions in Medway’s master plan
- Benchmarking the Town’s clean energy effort and measuring success
- Pulling in all town members (municipal departments, residents, businesses) to establish an economic of scale for clean energy projects development
- Educating residents and local businesses about clean energy opportunities, incentives, and assistances on an equity basis
- Strengthening outreach efforts

5. What would you like to see be achieved through LEAP?

- Benchmarking
  - Develop strategies to track energy consumption in residential and commercial sectors
    - Create a template to obtain normalized and standardized energy data for a common database (like MassEnergyInsight)
    - Acquire energy records from businesses participating in energy efficiency programs as a requirement
  - Benchmark energy consumption for affordable housings
  - Track energy consumption and translating it into cost and carbon emissions
- Energy Efficiency Programs
  - Streamline clean energy programs processes for businesses
    - Work with utilities program administrator to develop a Medway-specific business energy program
  - Explore financing mechanisms for energy efficiency improvement work for affordable homes
  - Perform energy efficiency improvement at the schools
  - Connect residents to MassSave
  - Potentially use thermal imaging for outreach
- Renewable Energy Programs
  - Install electric vehicles charging stations
  - Solar demand aggregation

- Programs Participation, Outreach, and Education
  - Use the Town as a model to teach and spearhead clean energy opportunities in the residential and commercial sectors
  - Use Medway's 300<sup>th</sup> Birthday as an outreaching opportunity
  - Branding
    - "Medway Green Household"
    - "Medway Green Business"
    - Yard signs
  - Initiate grassroots outreach through the schools
  - Develop a systematic process to pre-screen and vet vendors that approach town
  - Use local cable broadcast to outreach
  - Designate a central place for distributing resources about clean energy opportunities
    - Create a "Clean Energy Packet" that contains information on vendors, financial incentives programs, etc. for residents and businesses
  - Target the growing senior population as a point for distributing information
- Financing Mechanisms and Cost Saving Strategies
  - Aggregation and joint purchasing of power
    - Aggregate local businesses for wholesale energy purchase
  - Identify financing mechanisms and grant applications
- Other Ideas
  - Renovating mills and making them energy efficient; pursue hydraulic turbine opportunities
  - Look at potential to aggregate electricity purchasing
  - Develop compressed natural gas infrastructure

### **Next Steps**

- MAPC will continue to compile research for energy action plan
- The Working Group will be invited to discuss the draft action plan
- MAPC will deliver major points of the draft action plan at the Fall Town Meeting
- The draft plan will be open for public comment before it is formally adopted
- MAPC will work with the Town of Medway stakeholders to begin implementing action plan strategies