

Town of Middleborough, Massachusetts

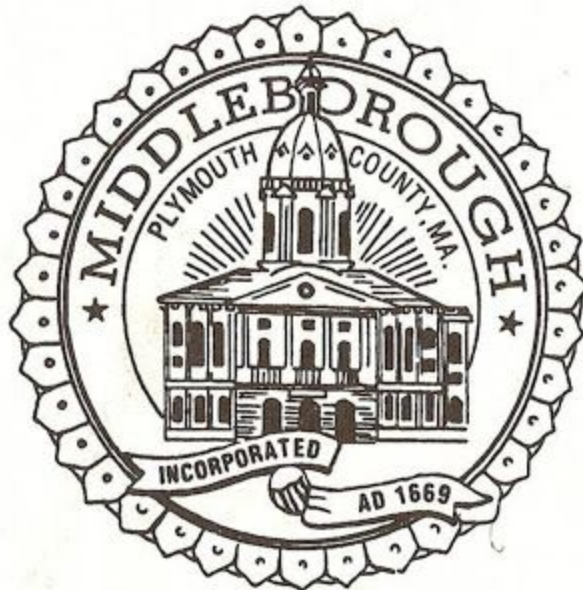
BASELINE ENERGY REPORT &

ENERGY REDUCTION PLAN

In fulfillment of the

MASSACHUSETTS GREEN COMMUNITIES GRANT PROGRAM

CRITERIA 3



Prepared by

Town of Middleborough, Massachusetts

November 2017

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I. Purpose and Acknowledgements

The Town of Middleborough has completed and adopted this Energy Reduction Plan (“ERP”) for submission to the Massachusetts Department of Energy Resources in fulfillment of Criteria 3 of the requirements for Green Community designation. Below are the signed letters verifying adoption.

B.

The Town of Middleborough has completed and adopted this Energy Reduction Plan (“ERP”) for submission to the Massachusetts Department of Energy Resources in fulfillment of Criteria 3 of the requirements for Green Community designation. The following groups, departments, and individuals contributed and participated in the Baseline and ERP Process:

Andrew Sukeforth, Administrative Analyst

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Sandra Richter, Gas & Electric Department

Kathy Piatelli, Business Manager

Jim Hutchinson, Facilities Director

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Peregrine Energy Group

Energy New England

Energy Management Associates

Echo

JK Muir

The Cadmus Group

II. Executive Summary

A. Narrative of the Summary of the Town

About the Town of Middleborough

Middleborough is located 40 miles to the south of Boston in Plymouth County, and is the second largest municipality in terms of area (72.2 square miles) in the state of Massachusetts. It is bordered by a myriad of towns; Bridgewater and Halifax to the north, Plympton and Carver to the east, Wareham and Rochester to the south, and Lakeville, Taunton, and Raynham to the west. It is around 30 miles east of Providence, Rhode Island and 15 miles west of Plymouth.

Middleborough is also home to many rivers, brooks, ponds, and swamps. Waterways in the town include the Taunton River, Nemasket River, and the Weweantic River. The town has many ponds, three of which it shares with Lakeville; Assawompset, Pocksha, and Great Quittacas.

The Town is also the home to many modes of transportation; primarily railroads and highways. Interstate 495 goes through the town, eventually connecting to Cape Cod. Other major highway routes include Route 44, 18, 28, and 105, which link many of the southeastern Massachusetts towns and communities to Middleborough. Three rail lines operate in the town, connecting commuters and freight businesses to Boston, Cape Cod, and Taunton.

Middleborough's population is 23,116 as of the United States 2010 census. The town is run by an open town meeting style of government, which is led by five members serving on the board of selectmen and a town manager. Middleborough is a historic mill town and is considered the "Cranberry Capital of the

B. Summary of Municipal Energy Uses

Buildings

Although the Town of Middleborough has a total population of only 23,116, the Town has an extensive number of buildings that it will include in its Energy Reduction Plan. The portfolio of buildings covered by the baseline and reduction plan are described in more detail below.

Middleborough has grown substantially over its history, as the Town has gained over 20,000 residents since the construction of its Town Hall in 1873, and as a result, has spawned a need for more municipal buildings and structures to support this growth and to meet standards. One such example has been the Town Hall Annex building, in which the Town repurposed an historic bank building in the downtown area in the late 1990's to meet public demand. Housed in this building are most of the day-to-day activities of the Town's government, including the Town Clerk, Town Accountant, Building Commission, Town Treasurer, Health Department, and Veterans Services.

Other construction and repurposing efforts by the Town have included turning the Lincoln D. Lynch School into a satellite campus for Massasoit Community College, and the renovation of historic structures, such as the Oliver House and the Green School. The Town Hall building itself houses the Board of Selectmen, Board of Assessors, Information Technology, Middleborough Cable Access, and the Town Manager. Also included in the historic structure are the grand ballroom and meeting rooms.

Middleborough's School Department has six buildings currently; the Memorial Early Childhood Center, Mary K. Goode Elementary School, Henry B. Burkland Elementary School, John T Nichols Jr. Middle School, Middleborough High School, and the Middleborough School Superintendent Building. There are preliminary plans and discussion for a new high school in town, whether it be for a completely new school or renovation type project. This new high school will be covered by this Plan, and the old one will not be.

The Town has three fire stations, one in the downtown area, and one each in the south and north ends of town. There is also a historic police station located next to the Central Fire Station, located at the old Peirce General Store property and has been in operation by the Town's police since the 1930s. The Town's voters recently approved the construction of a new police station, which will be located on Wood Street. Like the high school, this new police station will be covered under this Plan.

Middleborough's town library is also a historic landmark, being built in 1904 and going through a major renovation project in 1992. The Town also operates a Council on Aging center for its elder population. The Parks and Recreation Department operates and oversees multiple properties in town, including the popular Field of Dreams Complex, Oliver Mill Park, and its main base of operation, Pierce Playground.

The majority of the buildings in town are heated by natural gas and electric heat, with only one building being heated by oil (Soule Homestead).

The Town of Middleborough has opportunities to improve building performance and operations that will result in energy reductions savings during the duration of this Plan.

Vehicles

The Town of Middleborough has a total of 183 vehicles in service. The Town consumed 102,737 gallons of unleaded gasoline and 66,129 gallons of diesel fuel to power its vehicles. Vehicles account for 24% of Town energy use on an MMBtu basis.

Streetlights and Traffic Signals

For FY15 the Town of Middleborough consumed 433,023 kWh / 4,045 MMBtu. Streetlights account for 5% of Town energy use on an MMBtu basis.

Water and Sewer

Middleborough operates a Wastewater Treatment Facility, which will be undergoing a \$25 million dollar renovation upgrade that will be completed in 2017. This project is designed to meet the standards set forth by the Environmental Protection Agency and the Department of Environmental Protection. The Town also has two water storage tanks and eleven groundwater sources, and operates six pump stations for its sewage and eleven wells for its water. This building accounts for 11% of Town energy use on an MMBtu basis.

Table 1: Summary of Municipal Energy Users

	Number	Ownership
Buildings		
Oil Heat	1 - (Soule Homestead)	Muni
Natural Gas Heat	21	Muni
Electric Heat	1	Muni
Unheated	0	Muni
Vehicles		
Non-Exempt	24	Muni
Exempt	159	Muni
Streetlights	1,146	Muni
Traffic Signals (Intersections)	1	Muni
Water and Sewer		
Wastewater Treatment Plant	1	Muni
Drinking Water Treatment Plant	1 (11 wells)	Muni
Pumping Stations	6	Muni

C. Summary of Energy Use Baseline and Plans for Reductions

Table 2: Summary of Municipal Energy Use Baseline

Baseline: FY2015	MMBtu Used in Baseline Year	% of Total MMBtu Baseline Energy Consumption	Projected Planned MMBtu Savings	Savings as % of Total MMBtu Baseline Energy Consumption Buildings
Buildings + Null	54,217	60%	14,821	16.5%
Vehicles	21,931	24%	174	0.19%
Streetlights\Traffic	4,045	5%	1,477	1.65%
Water/Sewer	9,506	11%	4,003	4.46%
Total	89,699	100%	20,475	22.8%

III. Energy Use Baseline Inventory

A. Inventory Tool Used

The Town of Middleborough will be using the inventory tool MassEnergyInsight to track its baseline. With assistance from the Department of Energy Resources, initial setup of accounts have been accomplished. Most building accounts have been completed through this MassEnergyInsight tool. Fuel for vehicles for the baseline year FY15 is accounted for (as shown below in Table 3) through information provided by the various town departments, but has not yet been uploaded to MassEnergyInsight.

There is expected to be wide interest in MassEnergyInsight once it is introduced officially to the Town's Departments. The School Department, Department of Public Works, Police Department, Fire Department, Council on Aging, and Park Department will all be stakeholders in the software program.

B. Baseline Year

Middleborough will be using FY2015 as its baseline year, and the five-year timeframe for the 20% energy reduction goal is FY2016-FY2020.

C. Municipal Energy Consumption for the Baseline Year

Taken from data and information from MassEnergyInsight, the table below (Table 3) shows the Town's energy use during our baseline year FY 2015, both in native units and on a MMBtu basis.

ERP Guidance Table 3a - Municipal Energy Consumption for 2015 (Native Fuel Units)

		2015						
		Electric (kWh)	Gas (therms)	Oil (gallons)	Gasoline (gallons)	Diesel (gallons)	Propane (gallons)	Wood Pellets
Null	Null	214,221	14,605					
	Total	214,221	14,605					
Building	Memorial Early Childhood Ce..	445,000	36,485					
	Henry B Burkland IS	723,360	78,022					
	Middleborough HS	844,400	54,202					
	Soule Homestead	13,346		1,187			396	2
	Library	234,160	7,829					
	Police Station	129,390	6,009					
	Central Fire Station	102,571	7,319					
	Public Works Garage		3,860					
	Mary K. Goode ES	211,600	66,430					
	Animal Shelter	7,392	1,473					
	Town Hall Annex	144,160	4,411					
	Town Hall	225,000	11,107					
	North Fire Station	28,189	1,984					
	South Fire Station	10,402	1,886					
	Council on Aging	142,000	12,135					
	John T. Nichols MS	1,087,723	51,773					
	Lincoln D Lynch School		8,306					
	School Street School	37,039	15,050					
	Total	4,385,732	368,281	1,187			396	2
Street/Traffic Lights	Streetlight	1,185,411						
	Total	1,185,411						
Vehicle	Vehicles				102,737	66,129		
	Total				102,737	66,129		
Water/Sewer	Water Pumping Station	23,535	3,989					
	Water Well Pumping Stations ..	38,720						
	Wastewater Treatment Plant	1,149,120	16,622					
	East Grove Street Treatment ..	12,889						
	Tispaquin	60,517	2,159					
	Rock WPS	197,560						
	Miller st WPS	228,116						
	Cross St WPS	131,643	90					
	Plympton St WPS	75,757						
	East Main Street	198,167						
	Total	2,116,024	22,860					
Grand Total		7,901,388	405,746	1,187	102,737	66,129	396	2

ERP Guidance Table 3b - Municipal Energy Consumption for 2015 (MMBTU)

Please make sure that any data submitted to DOER contains complete Data!

		2015							Total
		Diesel	Electric	Gas	Gasoline	Oil	Propane	Wood Pellets	
Null	Null		731	1,461					2,191
	Total		731	1,461					2,191
Building	Memorial Early Childhood Ce..		1,518	3,649					5,167
	Henry B Burkland IS		2,468	7,802					10,270
	Middleborough HS		2,881	5,420					8,301
	Soule Homestead		46			165	36	33	280
	Library		799	783					1,582
	Police Station		441	601					1,042
	Central Fire Station		350	732					1,082
	Public Works Garage			386					386
	Mary K. Goode ES		722	6,643					7,365
	Animal Shelter		25	147					173
	Town Hall Annex		492	441					933
	Town Hall		768	1,111					1,878
	North Fire Station		96	198					295
	South Fire Station		35	189					224
	Council on Aging		485	1,214					1,698
	John T. Nichols MS		3,711	5,177					8,889
	Lincoln D Lynch School			831					831
	School Street School		126	1,505					1,631
	Total		14,964	36,828		165	36	33	52,026
Street/Traffic Lights	Streetlight		4,045						4,045
	Total		4,045						4,045
Vehicle	Vehicles	9,192			12,739				21,931
	Total	9,192			12,739				21,931
Water/Sewer	Water Pumping Station		80	399					479
	Water Well Pumping Stations ..		132						132
	Wastewater Treatment Plant		3,921	1,662					5,583
	East Grove Street Treatment ..		44						44
	Tispaquin		206	216					422
	Rock WPS		674						674
	Miller st WPS		778						778
	Cross St WPS		449	9					458
	Plympton St WPS		258						258
	East Main Street		676						676
	Total		7,220	2,286					9,506
Grand Total		9,192	26,960	40,575	12,739	165	36	33	89,699

IV. Energy Reduction Plan

A. Narrative Summary

The Town of Middleborough and School Department, hereafter referred to as simply the Town, has created an efficient energy reduction plan with the assistance of an extensive auditing process for the Town and School buildings. The Town will use the energy audits to comprehensively replace and upgrade Town-wide infrastructure. The existing High School and Police Station are in the baseline and future reporting will follow the Green Communities Building Stock Change Guidance.

1. Goals for Years FY 2016 - 2017

Energy projects approved by Town Committees and Departments. Utilized State grants when possible.

Buildings

- Upgrade Nichols Middle School, Henry Burkland Elementary School, Mary Goode Elementary, School Street School, Memorial Early Learning Center.
- Upgrade Wastewater Treatment Plant
- Upgrade East Grove Street Water Treatment Plant

Vehicles

- Acquire plug-in vehicles via MASSEVIP grant funding

Lighting

- Begin upgrading all Town lighting to LED including streetlights

Goals for Years FY 2018 - 2019

Execute Phase 1 as approved by Town Committees and Departments. Using the Green Communities Designation grant, State grants, and matching grants from the Middleboro G&E.

Buildings

- Upgrade most urgent HVAC systems
- Insulate buildings\replace windows
- Continue upgrading all Town lighting to LED

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use State and Federal funding for electrified vehicles to help replace aging vehicles

2. Goals for Years FY 2020 - 2021

Execute Phase 2 as approved by Town Committees and Departments. Using the Green Communities initial grant, State grants, and matching grants from the Middleboro G&E.

Buildings

- Continue upgrading HVAC systems
- Continue insulation\replacement of windows
- Continue upgrading all Town lighting to LED

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use State and Federal funding for electrified vehicles to help replace aging vehicles

Goals for Years FY 2020 - Beyond

Execute Phase 3 as approved by Town Committees and Departments. Using the Green Communities grants, State grants, and matching grants from the Middleboro G&E.

Buildings

- Continue upgrading HVAC systems
- Continue insulation\replacement of windows
- Complete any and all LED projects not yet finished

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use State and Federal funding for electrified vehicles to help replace aging vehicles

3. Overview of Least Efficiency / Greatest Need

The Town will replace and upgrade Town-wide infrastructure. The energy efficiency program will run with input from the Capital Planning, School, Finance, and Green Energy Committees and in conjunction with the School Department, Town Manager's Office and Board of Selectmen.

Buildings

- HVAC
- Insulation\Windows
- Interior and Exterior Lighting

Vehicles

- Subject to Fuel Efficient Vehicle Policy
- Use State and Federal funding for electrified vehicles to help replace aging vehicles

Lighting

- Led Streetlight Retrofit

B. Getting to a 20% Energy Reduction Within 5 Years

Goals for Years FY 2016 - 2017 (July 1, 2015 - June 30, 2017)

Overview

The Middleborough Gas & Electric Department has recently begun the replacement of high pressure sodium lights with the installation of more efficient LED lighting. All streetlights in the Town will be replaced in the coming fiscal year. Lighting at municipal buildings is not expected to undergo any changes through the Middleborough Gas & Electric Company. Many Town buildings also require upgrades\replacements in this timeframe.

Goals

- Replace older energy systems with new and higher efficient ones
- Utilize State grants, and matching grants from Middleboro Gas & Electric towards Phase 1

Buildings

- Henry B. Burkland
 - Replace the pool boiler
 - Upgraded Interior Lighting
 - Boiler- New Burners Steam Heating
- John T. Nichols Jr. Middle School
 - New Condensing Boilers
- Mary K. Goode Elementary School
 - Boiler- New Burners Steam Heating
- Memorial Early Learning Center

- Boiler- New High Efficiency Burner
- School Street School
 - Boiler- New Burner Steam Heating
- Wastewater Treatment Plant-
 - Anaerobic & Anoxic Mixing
 - Building System Improvements
 - Diffused Air System
 - Internal Mixed Liquor Recycle
 - Odor Control System
 - Return Activated Sludge Programmable Logic
- East Grove Water Treatment Plant-
 - Rehabilitate\Replace Pumps
 - Internal Mixed Liquor Recycle (VFDs)
 - Premium Efficiency Motors

Vehicles

- Utilize MASSEVIP funding to acquire several plug-in electric high efficiency vehicles.

Goals for Years FY 2018 - 2019

Overview

Goals for FY 2018-2019, the majority target areas of this plan include the upgrade or replacement of structural systems in Town buildings. Based off the energy audits performed for the Town, the Capital Planning Committee along with the rest of the budgeting process will review which areas will receive upgrades and/or replacements. Another important piece of phase 1 is to maintain the fuel efficient vehicle policy as part of meeting Green Communities criterion 4. Potential funding will assist the Town in upgrading an aging and inefficient vehicle fleet.

Goals

- Execute Phase 1 energy audit recommendations approved by the Capital Planning Committee along with other Town budgeting processes.
- Use the Green Communities Designation grant, State grants, and matching grants from Middleboro Gas & Electric towards Phase 1

Buildings

- Upgrade HVAC systems
- Insulate buildings\replace windows
- Utilize funding to help upgrade lighting at Town buildings

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use funding for electrified vehicles to help replace aging vehicles

Lighting

- LED lighting has made high pressure sodium lights obsolete. Costs associated with the constructing and conversion of these obsolete lights to the newer LED technology have drastically gone down. Currently, the Town has plans to convert all of these streetlights to these new technologies and is in the implementation phase. This will result in substantial energy savings

Goals for Years FY 2020 - 2021

Overview

All of the work required to make the Town more energy efficient will need to be broken up into more than one phase to make the process more practical. Any structural systems carried over from phase 1 will be upgraded or replaced during phase 2.

Maintaining a fuel efficient vehicle policy will once again be one of targets during this phase. As in phase 1, funding will be utilized in order to assist the Town in upgrading an aging and inefficient vehicle fleet. Lighting upgrade and replacement is likely to be replaced in phase 1, but any projects not completed will be targeted. As newer technologies continue to become established and implemented around the globe, the Town will have the opportunity to adopt them.

- Execute Phase 2 energy audit recommendations approved by the Capital Planning Committee along with other Town budgeting processes.
- Use Green Community competitive grants, State grants, and matching grants from Middleboro Gas & Electric towards Phase 2

Buildings

- Continue upgrading facilities
- Finish insulation\replacement of windows
- Finish replacing all Town lighting to LED

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use State and Federal funding for electrified vehicles to help replace aging vehicles

Goals for Years FY 2022 - Beyond

Overview

Like the other two phases, the Town plans to maintain a fuel efficient vehicle policy and upgrade building systems.

- Execute Phase 3 energy audit recommendations approved by the Capital Planning Committee along with other Town budgeting processes.
- Use the Green Communities initial grant, State grants, and matching grants from Middleboro Gas & Electric towards Phase 3

Buildings

- Continue upgrading facilities
- Complete any LED projects not yet finished

Vehicles

- Maintain fuel efficient vehicle policy as part of meeting Green Communities criterion 4
- Use funding for electric vehicles to help replace aging vehicles

Buildings

An energy audit has been performed for the Town on various Town buildings. Continued assessments of Town buildings by Energy New England have been mutually agreed upon, with the Middleborough Gas & Electric's assistance.

Criterion Five states that the Town of Middleborough must reduce life cycle costs of new construction of facilities by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies. The resulting grants, both the initial and competitive phases, would be a large piece of the overall strategy in arriving at 20% energy reduction within 5 years.

New construction will take place shortly in the Town of Middleborough on a variety of projects. One of these projects will be the new Middleborough Police Station on Wood St. However, there will be opportunities for energy efficient and cost saving projects in the long term. Grant opportunities from Green Community designation would help make all Town buildings more cost efficient.

The other major project is the construction of a new Middleborough High School. Schools account for much of the total energy output in the Town, totaling almost 80% of the energy expended from Town buildings. Establishing more energy efficient strategies in one of the oldest municipal buildings would help bring down energy costs in the short and long term. Grant opportunities from Green Community designation would help make the building even more cost efficient.

Vehicles

Criterion Four of the Green Communities Program states that communities must purchase only fuel efficient vehicles for municipal use whenever such vehicles are commercially available and practicable. The purpose behind this criterion is to reduce carbon dioxide emissions by municipal vehicles, which has a positive impact on the environment and saves municipalities money. The Town of Middleborough has taken advantage of the Massachusetts Electric Vehicle Incentive Program (MassEVIP), which allows communities to acquire electric vehicles and acquire/install charging stations at little to no cost. The grant program has helped the Town acquire multiple electric vehicles for Town departments and employees, and has also resulted in the installation of multiple charging station locations. There is the potential for the addition of more electric vehicles and charging stations in the Town. Grant funding through Green Communities would assist in this process.

Lighting

The Town of Middleborough and Gas & Electric has plans to convert all of its streetlights to LED lighting. Initial grant funding through Green Community designation, as well as through the competitive grant application phase, would assist the Town in replacing and upgrading lighting at all school building sites as well as Town buildings covered under the baseline.

1. Program Management Plan for Implementation, Monitoring, Oversight Implementation

- The Capital Planning Committee along with the Town budgeting process will review and create an upgrade and replacement plan.

Monitoring

- Municipal employees will keep track of data, utilizing Mass Energy Insight
- The Green Energy Committee will review reports

Oversight

- The Town Manager's Office has oversight of Town projects
- Green Energy Committee will review reports
- Municipal employees will keep track of data, utilizing Mass Energy Insight

2. Energy Conservation Measures

See Table 4 attachment.

Summary of Energy Audits or Other Sources for Projected Energy Savings

An energy audit has been performed for the Town on various Town buildings by Bill Branton of Energy New England, including the Town Hall, Town Hall Annex, Council on Aging, and Park Department Building. Energy New England has now performed and completed energy audits for all of the Town's buildings.

C. Long-Term Energy Reduction Goals - Beyond 5 Years

Other Energy Efficient Projects

- Maintain updated energy audits
- Upgrades to Wastewater Treatment Plant
- Council on Aging, School Department buildings, Park Department facilities upgrades/renovations
- Expansion of electric vehicle fleet and electric vehicle charging stations