

Town of Fairhaven, Massachusetts

Energy Reduction Plan

Prepared by the Southeastern Regional Planning and Economic Development District (SRPEDD) with support from the Town of Fairhaven



In Fulfillment of the
Massachusetts Green Communities Grant Program
Criterion #3

October 2018

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I. Purpose and Acknowledgements

A. Letter from the General Government Verifying Adoption of the Energy Reduction Plan

Town of Fairhaven
Office of the Town Administrator
Fairhaven Town Hall
40 Center Street
Fairhaven, MA 01845

October 26, 2018

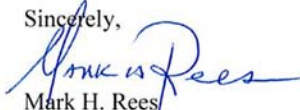
Mr. Seth Pickering
Southeast Regional Coordinator
Green Communities Division
20 Riverside Drive
Lakeville, MA

Dear Seth,

At their October 22, 2018 meeting, the Fairhaven Board of Selectmen authorized me, as Town Administrator, to adopt on their behalf the Town of Fairhaven Energy Reduction Plan for inclusion in the Town's application to the Commonwealth's Green Communities Program.

As such, please be informed that on this date, October 26, 2018, I have adopted the Energy Reduction Plan as authorized by the Board of Selectmen. The Town of Fairhaven looks forward to working the Green Communities Program as we move forward with implementing the plan.

Sincerely,


Mark H. Rees
Town Administrator
Town of Fairhaven

cc: Board of Selectmen

B. Letter from the School District Verifying Adoption of the Energy Reduction Plan

Office of the Superintendent
FAIRHAVEN PUBLIC SCHOOL DISTRICT

ADMINISTRATIVE CENTER
128 Washington Street
Fairhaven, MA 02719

Phone: 508-979-4000
Fax: 508-979-4149
Website: www.fairhavenps.org



Robert N. Baldwin, Ed.D.
Superintendent of Schools

Tara M. Kohler
Assistant Superintendent

Diane S. Sullivan
Director of Student Services

Nicole V. Potter
Director of Technology and Finance

October 26, 2018

To Whom It May Concern:

I have reviewed the Fairhaven Energy Reduction Plan. On behalf of the Fairhaven Public Schools I find this plan acceptable and support the adoption of the plan.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Robert N. Baldwin', written over a horizontal line.

Robert N. Baldwin, Ed.D.
Superintendent of Schools

RNB/jt

C. List of Contributors

The collaborative efforts of the offices of Fairhaven Town Administrator Mark Rees, Board of Selectmen Clerk Robert J. Espindola, Public Works Superintendent Vincent D. Furtado, Fairhaven Schools Superintendent Robert N. Baldwin, and MA Department of Energy Resources Green Community Regional Coordinator Seth Pickering were all vital in the production this Plan.

Much of the information in this Plan was derived from energy audits performed by Energy Source, led by Dalton Ling. Additional technical assistance was provided by the Southeastern Regional Planning and Economic Development District (SRPEDD), the author of this Plan.

II. Executive Summary

A. Narrative Summary of the Town

The Town of Fairhaven is located in southeastern Massachusetts in southeastern Bristol County. Fairhaven is located 50 miles south of Boston and 35 miles east of Providence, Rhode Island. The town has an approximate area of 14.1 square miles and is bordered by Acushnet on the north; Mattapoisett on the east; Buzzards Bay on the south; and New Bedford on the west. According to the 2010 U.S. Census, Fairhaven had a population of 15,873, having experienced a 1.8% decrease in population since 2000.

The area that is now Fairhaven was first settled by white settlers in 1659. Originally part of New Bedford, the town separated and incorporated as its own community in 1812. Originally an agricultural and shipbuilding community, it's economy expanded into the whaling industry and its related marine trades in the 19th century. The 20th century saw the decline of the whaling industry and new maritime industries emerge in Fairhaven – fishing and ship maintenance, which are still part of the towns economy, although retail trade is now the leading segment of the economy.

Fairhaven is accessible to the larger southeastern Massachusetts region via the east-west Interstate 195 and Route 6.

B. Summary of Municipal Energy Uses

- Total Number of Municipal Buildings: 16
- Total Number of Municipal Vehicles: 95
- Total Number of Street Lights: XXX
- Total Number of Traffic Lights: XX
- Water & Sewer: Fairhaven is serviced for water by the Mattapoisett River Valley Water Supply District Commission (MRVWDC). The Town's Sewer Division manages the town's wastewater and includes 2 wastewater treatment plants and 15 wastewater pumping stations.

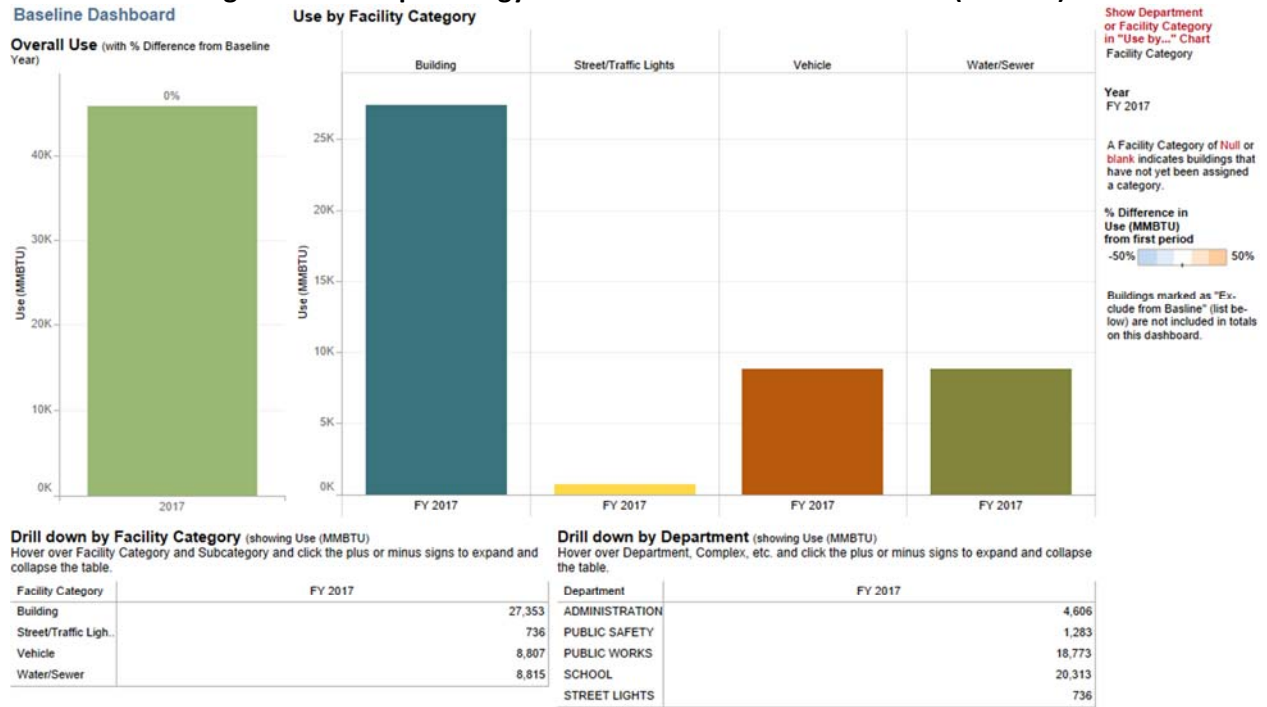
Table 1: Municipal Energy Use Summary

	Number	Ownership
Buildings	16	
Electricity	2	Municipality
Natural Gas Heat	14	Municipality
Vehicles	95	
Non-Exempt	6	Municipality
Exempt	89	Municipality
Street Lights	XXX	Municipality
Traffic Lights	XX	Municipality
Water & Sewer	17	
Wastewater Treatment Plant	2	Municipality
Wastewater Pumping Station	15	Municipality

C. Summary of Energy Use Baseline and Plans for Reductions

This Energy Reduction Plan commits Fairhaven to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2017 over five years. In the baseline year, the town used 45,711 MMBTUs of energy, which means the town must reduce usage by at least 9,142 MMBTUs over the following five-year period.

Figure 1: Municipal Energy Use Baseline Dashboard from MEI (FY 2017)



Fairhaven has identified energy savings measures in each facility category to reduce energy use 20% based on the total baseline usage, as illustrated in Table 2.

Table 2: Summary of Municipal Energy Use and Reductions

Facility Category	MMBTU Used in Baseline Year	% of Total MMBtu Baseline Energy Consumption	Projected Planned MMBtu Savings	Savings as % of Total MMBtu Baseline Energy Consumption
Buildings	27,353	59.8%	7,346	16.1%
Vehicles	8,807	19.3%	530	1.2%
Street/Traffic Lights	736	1.6%	0	0.0%
Water/Sewer/Pumping	8,815	19.3%	649	1.4%
Total	45,711	100%	8,525	18.6%

III. Energy Use Baseline Inventory

A. Identification of the Inventory Tool Used: The Town of Fairhaven used the Department of Energy Resources (DOER) MassEnergyInsight (MEI) web-based energy inventory and analysis tool.

B. Identification of the Baseline Year: Fiscal Year (FY) 2017 will serve as the baseline year. FY 2017 ran from July 1, 2016 to June 30, 2017. This will give the Town until June 30, 2022 (FY 2018 – FY 2022) to reach its 20% energy reduction goal.

C. Municipal Energy Consumption for the Baseline Year (FY 2017): In baseline year, the town used 45,711 MMBTUs of energy. The Appendix presents energy use for each municipal facility in MMBTUs and native units.

- Buildings: Fairhaven's 16 buildings use 27,353 MMBTUs, approximately 59.8% of Fairhaven's total municipal energy use. The buildings with the largest energy use are Fairhaven High School (10,802 MMBTUs) and the Elizabeth Hastings Middle School (5,691 MMBTUs) as shown in Figure 2.
- Street/Traffic Lights: There are XX streetlights and X traffic lights in Fairhaven. These lights consume 736 MMBTUs, or 1.6% of the Town's energy use.
- Vehicles: Fairhaven's 95 municipal vehicles use 19.3% of the baseline total, or 8,807 MMBTUs.
- Water/Sewer Facilities: The Town of Fairhaven is serviced for water by the Mattapoissett River Valley Water Supply District Commission and by the Town's Water/Sewer Department for wastewater. Water/Sewer facilities consume 8,815 MMBTUs, or 19.3% of the town's energy use.

Table 3A: Municipal Energy Consumption for FY2016, Native Fuel Units
ERP Guidance Table 3a - Municipal Energy Consumption for 2017 (Native Fuel Units)

		2017			
		Electric (kWh)	Gas (therms)	Gasoline (gallons)	Diesel (gallons)
Building	Leroy Wood ES	1,496			
	Public Works Office and Gara..	26,040	10,318		
	Police Station		3,863		
	East Fairhaven ES	360,520	24,896		
	Hastings MS	293,600	46,895		
	Town Hall	79,988	12,635		
	Rogers ES	5,840	0		
	School Dept. Admin.	19,530			
	Fairhaven Hist Comm	800	844		
	Oxford ES	2,320	0		
	Dump Building (EMA)	4,913			
	LRO-Karate School	4,750			
	Fire Department	170,883	3,083		
	Fire Station #5	1,670			
	Fairhaven HS	547,995	89,325		
	Senior Center/COA	63,289	4,850		
	Recreation Center	89,280	7,262		
	Animal Shelter / Dog Kennel	14,123	1,802		
	Cushman Park Band Shell (75..	4,147			
	Millicent Library	58,641	8,057		
	Total	1,749,825	213,830		
	Street/Traffic Lights	Flood Lights	5,568		
West Island Town Beach Park..		1,856			
Streetlights		208,164			
Total		215,588			
Vehicle	Vehicles			42,053	25,845
	Total			42,053	25,845

Water/Sewer	Manhattan Ave Pumping Stati..	34,385		
	Scoticut Neck Water Tank/Gr..	702		
	Railroad Ave Sewer Pump Sta..	112,880		
	Mill Rd 'Pump Station' (Storag..	1,048		
	River Road Pump Station (Sto..	573	10,423	
	Pease Park Storm Drain Pum..	1,648		
	South Street Sewer Pumping ..	301,200		
	Pilgrim Ave Sewer Pumping S..	22,398		
	Taber Street Sewer Pumping ..	175,213		
	Abbey St Sewer Pumping Stat..	16,345		
	Bridge St Sewer Pumping Stat..	2,862		
	Tinkham Lane Well Pumping ..	111,400		
	Boston Hill Water Tank	705		
	215 Alden Sewer Pump Statio..	83		
	239 Alden Sewer Pump Statio..	438		
	240 Alden Sewer Pump Statio..	56		
	Pine Grove Sewer Pump Stati..	7,836		
	West Island Satellite Wastewa..	53,359		
	Causeway Road Pumping Sta..	10,418		
	James St Sewer Pump Station	2,210		
	Wolf Island Well Pumping Stat..	82,708		
	Rocky Point Sewer Pump Stat..	6,203		
	Marguerite Sewer Pump Stati..	6,320	20	
	Bernese St Sewer Pump Stati..	28,592	276	
	Camel St Sewer Pump Station	3,430		
	Shore Drive Sewer Pump Stat..	3,157		
	Sunrise Court Sewer Pump St..	3,575		
	Weybridge Sewer Pump Stati..	4,517		
	Rivard St Pump Station	11,532		
	Sewer Ops. Building	1,030,460	3,430	
Unassigned Water/Sewer Acc..		4,522		
Total	2,036,253	18,671		
Grand Total	4,001,666	232,501	42,053	
			25,845	

Table 3B: Municipal Energy Consumption for FY2016, MMBTU
ERP Guidance Table 3b - Municipal Energy Consumption for 2017
(MMBTU)

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

		2017					
		Diesel	Electric	Gas	Gasoline	Total	
Building	Leroy Wood ES		5			5	
	Public Works Office and Gara..		89	1,032		1,121	
	Police Station			386		386	
	East Fairhaven ES		1,230	2,490		3,720	
	Hastings MS		1,002	4,690		5,691	
	Town Hall		273	1,264		1,536	
	Rogers ES		20	0		20	
	School Dept. Admin.		67			67	
	Fairhaven Hist Comm		3	84		87	
	Oxford ES		8	0		8	
	Dump Building (EMA)		17			17	
	LRO-Karate School		16			16	
	Fire Department			583	308		891
	Fire Station #5			6			6
	Fairhaven HS			1,870	8,933		10,802
	Senior Center/COA			216	485		701
	Recreation Center			305	726		1,031
	Animal Shelter / Dog Kennel			48	180		228
	Cushman Park Band Shell (75..			14			14
	Millicent Library			200	806		1,006
Total			5,970	21,383		27,353	
Street/Traffic Lights	Flood Lights		19			19	
	West Island Town Beach Park..		6			6	
	Streetlights		710			710	
	Total		736			736	
Vehicle	Vehicles	3,592			5,215	8,807	
	Total	3,592			5,215	8,807	

Water/Sewer	Manhattan Ave Pumping Stati..		117			117
	Sconticut Neck Water Tank/Gr..		2			2
	Railroad Ave Sewer Pump Sta..		385			385
	Mill Rd 'Pump Station' (Storag..		4			4
	River Road Pump Station (Sto..		2	1,042		1,044
	Pease Park Storm Drain Pum..		6			6
	South Street Sewer Pumping ..		1,028			1,028
	Pilgrim Ave Sewer Pumping S..		76			76
	Taber Street Sewer Pumping ..		598			598
	Abbey St Sewer Pumping Stat..		56			56
	Bridge St Sewer Pumping Stat..		10			10
	Tinkham Lane Well Pumping ..		380			380
	Boston Hill Water Tank		2			2
	215 Alden Sewer Pump Statio..		0			0
	239 Alden Sewer Pump Statio..		1			1
	240 Alden Sewer Pump Statio..		0			0
	Pine Grove Sewer Pump Stati..		27			27
	West Island Satellite Wastewa..		182			182
	Causeway Road Pumping Sta..		36			36
	James St Sewer Pump Station		8			8
	Wolf Island Well Pumping Stat..		282			282
	Rocky Point Sewer Pump Stat..		21			21
	Marguerite Sewer Pump Stati..		22	2		24
	Bernese St Sewer Pump Stati..		98	28		125
	Camel St Sewer Pump Station		12			12
	Shore Drive Sewer Pump Stat..		11			11
	Sunrise Court Sewer Pump St..		12			12
	Weybridge Sewer Pump Stati..		15			15
	Rivard St Pump Station		39			39
	Sewer Ops. Building		3,516	343		3,859
	Unassigned Water/Sewer Acc..			452		452
	Total		6,948	1,867		8,815
Grand Total		3,592	13,654	23,250	5,215	45,711

Figure 2: MEIs Buildings to Target Dashboard

In Figure 2 below, the points further to the right have a higher energy use per square foot (i.e. less energy efficient), while the points higher up use more total energy. Fairhaven High School, for example, uses the most energy of any building in Fairhaven.

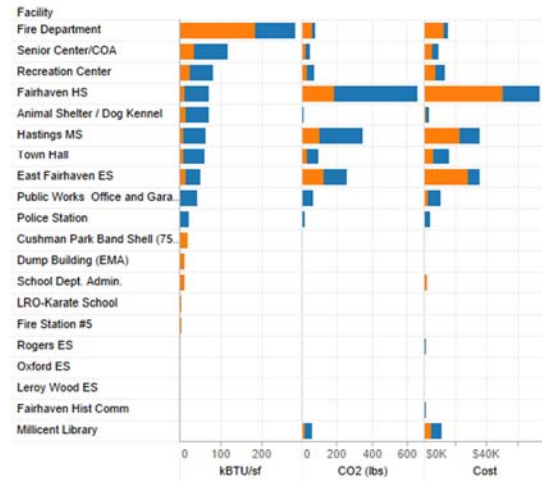
Buildings to Target

This dashboard compares buildings to one other on an energy use per area metric, measured as kBtu/square foot. In the quadrant chart on the right, buildings with the highest energy use and worst efficiency (as compared to other buildings in your portfolio) are in the upper right hand quadrant. Facilities of the types Open Space, Water/Sewer, Street/Traffic Lights, and Vehicles are not displayed. Diesel and Gasoline records attached to a building are not included in the kBtu/SF calculation.

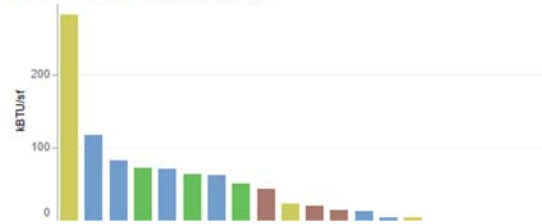
Building Efficiency, Emissions and Cost

■ Heating ■ Electric

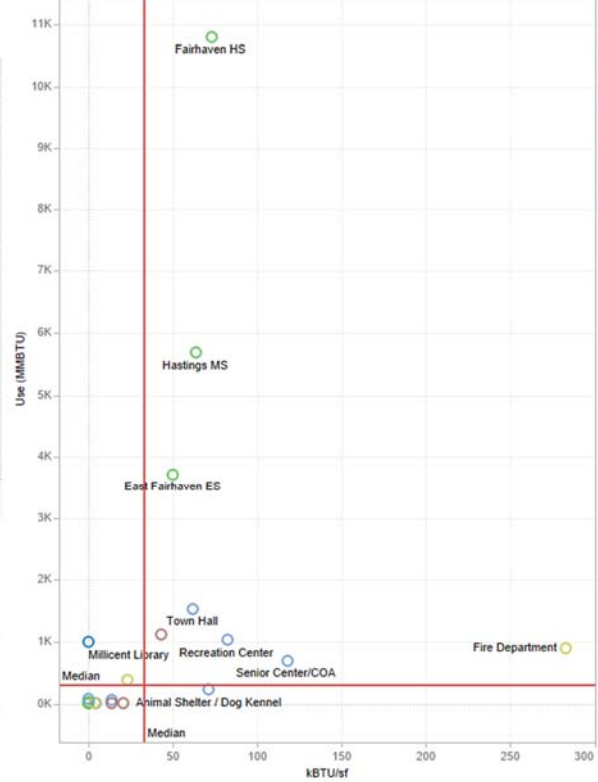
Emissions factors updated 1/4/2012 using Massachusetts-specific greenhouse gas emissions factors.



Select a building name above to see how efficient it is compared to your other buildings. Lower numbers indicate greater efficiency.



Efficiency and Use



Building Subcategory
Click to highlight and unhighlight

- Null
- Administration
- Public Safety
- Public Works
- School

Building Subcategory All

Year FY 2017

Fuel types All

IV. Energy Reduction Plan

A. Narrative Summary

As shown below, the town has identified energy savings measures to reduce usage from FY 2017 by 8,647 MMBTUs or 18.9%.

▪ **Install Condensing Boilers**

It is recommended new condensing boilers are installed at a few buildings in Fairhaven. Condensing boilers (average efficiency 92%) can obtain a much higher efficiency than the standard non-condensing boiler (average efficiency 80%). The scope of this work includes the following:

- Supply and install Lochinvar condensing boilers
- Removal and disposal of existing boilers and all necessary piping and components of the old system no longer required
- Installation of direct venting system for combustion air and exhaust air
- Install outside air controls for maximum efficiency
- Commissioning and startup of new boiler systems

By implementing this measure at the High School, East Fairhaven Elementary School, Library, Department of Public Works, Fire Station, and Wastewater Treatment Plant, the town will save 22,005 therms and \$26,406 annually.

▪ **Install LED Lighting and Controls**

It is recommended that high efficiency LED light fixtures/kits are installed to replace the fluorescent fixtures. This measure will reduce the energy consumption based on the decrease in lighting power output and the use of adaptive control technology. The scope of this work includes the following:

- Supply and installing new LED lighting fixtures/kits
- Remove and recycle existing fluorescent fixtures
- Warranty on new LED lighting fixtures of seven years

By implementing this measure at the High School, Hastings Middle School, Leroy Wood Elementary School, East Fairhaven Elementary School, School Department Administration Building, Council on Aging, Recreation Center, Town Hall, Department of Public Works, Police Station, Fire Station, and Wastewater Treatment Plant, the town will save 535,908 kWh of electricity and \$91,104 annually.

▪ **Install Energy Management Systems**

It is recommended that an Energy Management System will be installed or will replace the existing obsolete systems. Energy Savings will also occur from the new furnished controls to tighten and refine building temperature conditions. In conjunction with the local controllers and their energy savings features, it will also allow for remote control, monitoring and alarming of the mechanical equipment. The full scope of work is shown below:

- Provide and install new controllers on a variety of mechanical equipment the High School, Hastings Middle School, Senior Center/Recreation Center, Town Hall, and Library.
- Provide and install a supervisory controller which will include graphics, trend data and email alerts.
- Provide and install DDC actuators/valves to replace any pneumatic actuators/valves
- Field commissioning, graphical interface and checkout
- Field Training and O&M Manuals and documentation
- Classroom Training
- Provide all necessary controls, programming and graphics to provide a fully functional control system.

By implementing this measure at the High School, Hastings Middle School, Senior Center/Recreation Center, Town Hall, and Library, the town will save 115,145 kWh of electricity, 7,227 therms of natural gas, and \$28,247 annually.

▪ **Install Advanced Rooftop Unit Controls/Replace Rooftop Units**

It is recommended that the Catalyst RTU controls are installed on eleven RTUs. This measure also includes replacing six RTUs. The RTU controller will also include a Variable Frequency Drive and following strategies will be implemented.

- “Opti-Run” Fan Control – Produces average fan energy savings of approximately 70%, while operating the unit within the manufacturer’s rated design parameters. The monitors key system variables and adjusts the fan speed as needed to ensure proper equipment operation. These combined capabilities go beyond the abilities of a typical variable frequency drive (VFD) installation.
- Integrated Economizer – Controls the economizer to allow for the simultaneous use of mechanical cooling and “free” outside air to satisfy a space. Most economizers operate on an “either/or” basis, leaving considerable energy savings unrealized.
- Advanced Economizer Logic – The controller is an Advanced Digital Economizer that is coupled with fan speed control to maximize the use of outside air for free cooling beyond traditional economizer control. It introduces the ability to sense and compare outside air and return air based on dry bulb temperature or dew point depending upon the climate. New patent-pending techniques proactively cool the interior commercial space before there is an actual call for cooling provides even greater savings.
- Demand Control Ventilation – Demand Control Ventilation (DCV) uses a self-calibrating CO2 sensor to reduce excessive ventilation commonly found on commercial spaces. The controller establishes occupancy levels and matches the amount of ventilation air delivered to the true needs of the space. This eliminates the cost required to heat and cool excess outside air. This strategy is documented in ANSI/ASHRAE Standard 62.

By implementing this measure at the East Fairhaven Elementary School, Senior Center/Recreation Center, and Police Station, the town will save 42,578 kWh of electricity, 488 therms of natural gas, and \$7,824 annually.

▪ **Install Variable Frequency Drives/Motors**

It is recommended Variable Frequency Drives (VFDs) and high efficiency motors (if applicable) are installed on each pump/fan and controlled via differential pressure, and temperature, allowing for electrical savings. This measure identifies supply fans at the High School and hot water pumps at the Hastings Middle School, Library, Department of Public Works, and Wastewater Treatment Plant. The scope of work includes the following:

- Supply and install twenty-three Variable Frequency Drives (VFDs) in place of the existing motor starters.
- Remove and replace six existing motors with new NEMA premium motors
- Start-up and testing of the new VFDs and motors
- Integrate into Energy Management System (if applicable)
- Warranty for one year

By implementing this measure at the High School, Hastings Middle School, Library, Department of Public Works, and Wastewater Treatment Plant, the town will save 86,926 kWh of electricity and \$14,777 annually.

▪ **Install High Efficiency Transformers**

It is recommended that twelve standard efficiency transformers at the High School and East Fairhaven Elementary School are replaced with Rex High Efficiency Transformers. By implementing this measure, the overall energy consumption of the transformers will decrease which will lead to annual energy cost savings. The scope of work includes the following:

- Furnish and install twelve Rex High Efficiency Transformers
- Removal of existing Transformers

By implementing this measure at the High School and East Fairhaven Elementary School, the town will save 44,074 kWh of electricity and \$7,493 annually.

▪ **Install Modulating Burners**

It is recommended new modulating burners are installed for the two steam boilers at the East Water Plant. The controls also include installation of two 5 hp Variable Frequency Drives on the

combustion blower. The scope of work for installing one Auto Flame Mini Mark Combustion Control and Boiler Management system, which include the following:

- Four (4) independent fuel characterization profiles
- Integral flame safeguard and supervision control
- Self-diagnostic error checking software
- Lockout history display
- Fuel and air servo motors with valves
- 1" x 3" VGA screen display with infrared proximity sensor and screensaver
- Internal calendar clock display and logging function

By implementing this measure at the East Water Plant the town will save 11,821 kWh of electricity, 3,573 therms, and \$6,298 annually.

▪ **Install Refrigeration Controls**

It is recommended that the refrigeration controls are installed to control the facility walk-in cooler/freezer. It is also recommended that the motors are replaced with Electronically Commutated Motors (ECMs). ECMs have a better motor efficiency compared to shaded pole motors (roughly 78%). In conjunction with the local controllers and their energy savings features, it will also allow for remote control, monitoring and alarming of the walk-in coolers/freezers. The scope of this work includes the following:

- Supply and install zones of energy savings CoolTrol refrigeration controls to cycle temperature and evaporator fans
- Replace existing shaded pole motors with high efficiency EC motors in evaporators
- Dew-point pulse control for anti-sweat door heaters
- Start-up and testing of the new controls/motors
- Installation to be performed by licensed electricians during business hours

By implementing this measure at the High School, Hastings Middle School, and Leroy Wood Elementary School, the town will save 27,539 kWh of electricity and \$4,682 annually.

▪ **Install Heat Pump System at the Fire Station**

It is recommended that condensers are installed. Heat pump systems are extremely efficient, and less energy is required to produce the necessary building cooling load than using window AC units. A great benefit of ductless split systems are separate zone controls. The full scope of work is shown below:

- Furnish and install two heat pump condenser
- Furnish and install five indoor heads
- Install all piping and electrical wiring for a complete system
- Start and test new equipment
- Provide 1-year labor warranty

By implementing this measure at the Fire Station, the town will save 5,640 kWh of electricity and \$959 annually.

▪ **Install Kitchen Fan Controls**

It is recommended a kitchen hood control system is installed on the ventilation and exhaust fans and controlled based on temperature. When the kitchen ovens and grills are turned on and the kitchen is active; the exhaust temperature will increase, and this will allow the Variable Frequency Drives to turn on to satisfy exhaust conditions. When the kitchen equipment gets turned off, the VFDs will ramp down which will reduce the schools' energy consumption. The scope of this work includes the following:

- Supply and install Variable Frequency Drives (VFDs) in place of the existing motor starters for kitchen exhaust and ventilation fans
- Install temperature/optic sensors in the kitchen exhaust ductwork
- Start-up and testing of the new VFDs
- Warranty for one year

By implementing this measure at the High School and Hastings Middle School, the town will save 11,301 kWh of electricity, 2,440 therms of natural gas, and \$4,849 annually.

▪ **Convert from Oil to Natural Gas at the School Administration Building**

It is recommended 92% gas- fired condensing is used to replace an 80% non-condensing oil-fired boiler. There are also additional cost savings since the price of natural gas (estimated \$1.2/ Therm) is cheaper than the price of oil (\$1.6/Therm). The scope of this work includes the following:

- Supply and install natural gas fired hot water boiler
- Removal and disposal of existing oil fired boilers and all necessary piping and components of the old system no longer required
- Installation of direct venting system for combustion air and exhaust air
- Commissioning and startup of new boiler systems

By implementing this measure at the School Administration Building, there will be an increase in natural gas use of 961 Therms; but a reduction in oil savings of 820 gallons. Therefore, the overall cost savings of this measure is \$979.

▪ **Retrocommissioning**

Retrocommissioning is the first stage in the building upgrade process. The staged approach accounts for the interactions among all the energy flows in a building and produces a systematic method for planning upgrades that increases energy savings. When the staged approach is adopted and performed sequentially, each stage includes changes that will affect the upgrades performed in subsequent stages, thus setting up the overall process for the greatest possible energy and cost savings. In this staged approach, retrocommissioning comes first because it provides an understanding of how closely the building comes to operating as intended. It also helps to identify improper equipment performance, what equipment or systems need to be replaced, opportunities for saving energy and money, and strategies for improving performance of the various building systems. It is recommended that Fairhaven High School, the Hastings Middle School, and the East Fairhaven Elementary School are all retrocommissioned. According to the Energy Star program <https://www.energystar.gov/sites/default/files/buildings/tools/EPA BUM CH5 RetroComm.pdf> each building that is retrocommissioned can expect to achieve a 7.5% savings in energy use.

▪ **Vehicle Policy and Maintenance Measures**

Adoption of a Town-Wide Anti-Idling Policy for Municipal Vehicles: Idling vehicles contribute significantly to air pollution and waste fuel, increasing fleet management costs. Municipalities across the Commonwealth and the nation have seen significant cost and greenhouse gas emission reductions since implementing Town-wide “no-idling” policies for municipal vehicles. According to the U.S. Department of Energy <https://www.fueleconomy.gov/feg/maintain.jsp> communities that adopt a town-wide anti-idling policy for municipal vehicles can expect to achieve a 3% savings in vehicle fuel use.

Closely Monitor Tire Pressure, Use 100% Synthetic Oil and Use Fuel Efficient Tires: By maintaining appropriate air pressure in vehicle tires, using 100% synthetic oil and fuel efficient tires, communities can expect to achieve a 3% savings in vehicle fuel use.

The above policy and maintenance measures will be managed by the town’s soon to be named Sustainability Manager.

B. Path to 20% Energy Use Reduction by the end of Fiscal Year 2022

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

The Town Administrator's Office, in collaboration with the School Department, will be responsible both for oversight of the Energy Reduction Plan and for implementation of energy conservation measures within the Town. The Town Administrator's Office will be responsible for the annual reporting requirements to maintain designation and eligibility for annual competitive grant funding.

2. Summary of Energy Audit(s) or Other Sources for Projected Energy Savings

- Building audits were provided by Energy Source in 2018 and provide an energy savings of 6,480 MMBTUs or 14.2%. The Energy Source audits are included in the Appendix.
- Retrocommissioning of Fairhaven High School, the Hastings Middle School, and the East Fairhaven Elementary School would result in the savings of 1,515 MMBTUs or 3.3%.
- Vehicle policy and maintenance targeting overall vehicle usage would result in the savings 530 MMBTUs or 1.2%. The supporting documentation for these policy and maintenance measures are available in the Appendix.

3. Energy Conservation Measures

Table 4 lists recommended energy conservation measures. References for each measure are included in the table and these references are included as appendices to the Energy Reduction Plan. Projected annual MMBTU savings for each category (buildings, vehicles, and street and traffic lights) are subtotaled to arrive at a municipal grand total.

Table 4: Energy Conservation Measures for Fairhaven Municipal Energy Use

Measure		Status	Energy Data						Financial Data					Reference		
Category/Building	Energy Conservation Measure	Status (Completed Year or Planned Year)	Projected Annual Energy Savings						Projected Annual Cost Savings	Estimated Total Project Cost (\$)	Green Communities Grant (\$)	Estimated Utility Incentives (\$)	Estimated Cost After Utility Incentives (\$)	Estimated Payback After Incentives (Years)	Funding Source	Source for Energy Savings
			Electricity Savings (kWh)	Natural Gas Savings (Therms)	Oil Savings (Gallons)	Gasoline Savings (Gallons)	Diesel Savings (Gallons)	Propane Savings (Gallons)								
Fairhaven High School	LED Lighting	Planned/TBD	85,338	0	0	-	-	-	\$14,507	\$173,857	-	\$12,801	\$161,056		-	Energy Source Audit, 2018
Fairhaven High School	Condensing Boilers	Planned/TBD	0	9,919	0	-	-	-	\$11,902	\$358,024	-	\$10,000	\$348,024		-	Energy Source Audit, 2018
Fairhaven High School	Transformers	Planned/TBD	34,405	0	0	-	-	-	\$5,849	\$49,523	-	\$6,881	\$42,642		-	Energy Source Audit, 2018
Fairhaven High School	Refrigeration Controls	Planned/TBD	8,881	0	0	-	-	-	\$1,510	\$13,260	-	\$1,776	\$11,484		-	Energy Source Audit, 2018
Fairhaven High School	Kitchen Exhaust Fan Controls	Planned/TBD	10,878	1,573	0	-	-	-	\$3,737	\$30,831	-	\$5,160	\$25,671		-	Energy Source Audit, 2018
Fairhaven High School	Steam Modulating Controls	Planned/TBD	11,281	3,573	0	-	-	-	\$6,298	\$76,923	-	\$8,546	\$68,377		-	Energy Source Audit, 2018
Fairhaven High School	Energy Management System	Planned/TBD	41,364	3,223	0	-	-	-	\$10,946	\$54,600	-	\$6,000	\$48,600		-	Energy Source Audit, 2018
Fairhaven High School	Variable Frequency Drives/Motors	Planned/TBD	6,908	0	0	-	-	-	\$1,174	\$7,105	-	\$1,400	\$5,705		-	Energy Source Audit, 2018
Fairhaven High School	Retrocommissioning	Planned/TBD	41,100	6,699	0	-	-	-			-				-	Energy Star (www.energystar.gov)
Hastings Middle School	LED Lighting	Planned/TBD	4,890	0	0	-	-	-	\$831	\$5,218	-	\$734	\$4,485		-	Energy Source Audit, 2018
Hastings Middle School	Refrigeration Controls	Planned/TBD	10,833	0	0	-	-	-	\$1,842	\$19,890	-	\$2,167	\$17,723		-	Energy Source Audit, 2018
Hastings Middle School	Kitchen Exhaust Fan Controls	Planned/TBD	423	876	0	-	-	-	\$1,112	\$11,856	-	\$1,000	\$10,856		-	Energy Source Audit, 2018
Hastings Middle School	Energy Management System	Planned/TBD	27,114	2,237	0	-	-	-	\$7,293	\$46,800	-	\$6,000	\$40,800		-	Energy Source Audit, 2018
Hastings Middle School	Variable Frequency Drives/Motors	Planned/TBD	24,463	0	0	-	-	-	\$4,159	\$36,410	-	\$8,500	\$27,910		-	Energy Source Audit, 2018
Hastings Middle School	Retrocommissioning	Planned/TBD	22,020	3,517	0	-	-	-			-				-	Energy Star (www.energystar.gov)
Leroy Wood Elementary School	LED Lighting	Planned/TBD	73,598	0	0	-	-	-	\$12,512	\$98,405	-	\$11,040	\$87,365		-	Energy Source Audit, 2018
Leroy Wood Elementary School	Refrigeration Controls	Planned/TBD	7,825	0	0	-	-	-	\$1,330	\$13,000	-	\$1,565	\$11,435		-	Energy Source Audit, 2018
East Fairhaven Elementary School	LED Lighting	Planned/TBD	65,733	0	0	-	-	-	\$11,175	\$98,398	-	\$9,860	\$88,538		-	Energy Source Audit, 2018
East Fairhaven Elementary School	Condensing Boilers	Planned/TBD	0	5,058	0	-	-	-	\$6,070	\$99,876	-	\$8,000	\$91,876		-	Energy Source Audit, 2018
East Fairhaven Elementary School	Transformers	Planned/TBD	9,669	0	0	-	-	-	\$1,644	\$29,515	-	\$1,934	\$27,581		-	Energy Source Audit, 2018
East Fairhaven Elementary School	Advanced RTU Controls	Planned/TBD	10,009	112	0	-	-	-	\$1,836	\$23,396	-	\$4,000	\$19,396		-	Energy Source Audit, 2018

East Fairhaven Elementary School	Retrocommissioning	Planned/TBD	27,039	1,867	0	-	-	-			-				-	Energy Star (www.energystar.gov)
School Dept. Admin. Buildings	LED Lighting	Planned/TBD	1,647	0	0	-	-	-	\$280	\$1,335	-	\$247	\$1,088		-	Energy Source Audit, 2018
School Dept. Admin. Buildings	Convert Oil to Gas	Planned/TBD	0	-961	820	-	-	-	\$979	\$16,480	-	\$1,500	\$14,980		-	Energy Source Audit, 2018
Fairhaven Council on Aging/ Recreation Center	LED Lighting	Planned/TBD	86,190	0	0	-	-	-	\$14,652	\$89,304	-	\$12,929	\$76,376		-	Energy Source Audit, 2018
Fairhaven Council on Aging/ Recreation Center	Energy Management System	Planned/TBD	35,923	883	0	-	-	-	\$7,167	\$80,600	-	\$18,000	\$62,600		-	Energy Source Audit, 2018
Fairhaven Council on Aging/ Recreation Center	Advanced RTU Controls	Planned/TBD	20,426	240	0	-	-	-	\$3,760	\$160,691	-	\$6,000	\$154,691		-	Energy Source Audit, 2018
Fairhaven Town Hall	LED Lighting	Planned/TBD	14,248	0	0	-	-	-	\$2,422	\$30,215	-	\$2,137	\$28,078		-	Energy Source Audit, 2018
Fairhaven Town Hall	Energy Management System	Planned/TBD	0	553	0	-	-	-	\$664	\$19,656	-	\$1,800	\$17,856		-	Energy Source Audit, 2018
Fairhaven Library	Condensing Boilers	Planned/TBD	0	1,755	0	-	-	-	\$2,107	\$102,837	-	\$6,000	\$96,837		-	Energy Source Audit, 2018
Fairhaven Library	Energy Management System	Planned/TBD	10,474	331	0	-	-	-	\$2,178	\$54,600	-	\$6,000	\$48,600		-	Energy Source Audit, 2018
Fairhaven Library	Variable Frequency Drives/Motors	Planned/TBD	13,136	0	0	-	-	-	\$2,233	\$19,890	-	\$3,000	\$16,890		-	Energy Source Audit, 2018
Fairhaven Department of Public Works	LED Lighting	Planned/TBD	58,391	0	0	-	-	-	\$9,926	\$76,097	-	\$8,759	\$67,338		-	Energy Source Audit, 2018
Fairhaven Department of Public Works	Condensing Boilers	Planned/TBD	0	1,840	0	-	-	-	\$2,207	\$111,070	-	\$12,000	\$99,070		-	Energy Source Audit, 2018
Fairhaven Department of Public Works	Variable Frequency Drives/Motors	Planned/TBD	20,013	0	0	-	-	-	\$3,402	\$26,520	-	\$5,000	\$21,520		-	Energy Source Audit, 2018
Fairhaven Police Station	LED Lighting	Planned/TBD	43,987	0	0	-	-	-	\$7,478	\$44,889	-	\$6,598	\$38,291		-	Energy Source Audit, 2018
Fairhaven Police Station	Advanced RTU Controls	Planned/TBD	12,143	136	0	-	-	-	\$2,227	\$7,458	-	\$1,000	\$6,458		-	Energy Source Audit, 2018
Fairhaven Fire Station	LED Lighting	Planned/TBD	14,583	0	0	-	-	-	\$2,479	\$10,615	-	\$2,187	\$8,428		-	Energy Source Audit, 2018
Fairhaven Fire Station	Condensing Boilers	Planned/TBD	0	687	0	-	-	-	\$825	\$67,010	-	\$4,000	\$63,010		-	Energy Source Audit, 2018
Fairhaven Fire Station	Ductless Split System	Planned/TBD	5,640	0	0	-	-	-	\$959	\$45,500	-	\$0	\$45,500		-	Energy Source Audit, 2018
Fairhaven Wastewater Treatment Plant	LED Lighting	Planned/TBD	87,303	0	0	-	-	-	\$14,842	\$94,420	-	\$13,095	\$81,325		-	Energy Source Audit, 2018
Fairhaven Wastewater Treatment Plant	Condensing Boilers	Planned/TBD	0	2,746	0	-	-	-	\$3,295	\$108,981	-	\$9,500	\$99,481		-	Energy Source Audit, 2018
Fairhaven Wastewater Treatment Plant	Variable Frequency Drives/Motors	Planned/TBD	22,406	0	0	-	-	-	\$3,809	\$27,643	-	\$7,000	\$20,643		-	Energy Source Audit, 2018
Vehicle Maintenance	Town-wide "No Idling" policy for municipal vehicles	Planned/TBD	0	0	0	1,262	775	-	-	-	-	-	-		-	U.S. Department of Energy (www.fueleconomy.gov)
Vehicle Maintenance	Closely Monitor Tire Air Pressure, Use 100% Synthetic Oil and Use Fuel Efficient Tires	Planned/TBD	0	0	0	1,262	775	-	-	-	-	-	-		-	U.S. Department of Energy (www.fueleconomy.gov)

Totals	970,281	46,864	820	2,524	1,550	0	\$193,618	\$2,442,698	-	\$234,114	\$2,208,584	-	-	-
Total MMBTUs Saved	3,308	4,686	123	315	215	-	-	-	-	-	-	-	-	-

C. Summary of Long-Term Energy Reduction Goals – Beyond 5 Years

1. Municipal Buildings (including schools)

To better strategize for the long-term maintenance and management of municipal buildings, Fairhaven will work with internal schools and town staff as well as outside consultants, when necessary, to assess and document the condition of major municipal buildings on an annual basis. In addition to exposing continuing opportunities for energy use reductions, this effort will provide the Town with a clear, long-term asset management strategy for the effective budgeting and maintenance of buildings.

2. Vehicles (including schools)

The Fuel-Efficient Vehicle policy will have become engrained within municipal purchasing practices after five years, and the Town will seek to explore even more efficient policies and tracking systems to enable more efficiency.

3. Perpetuating Energy Efficiency

Ongoing dialogue with Town and School staff can tap into the knowledge of the employees who use and maintain the buildings every day. It can empower building staff to develop a detailed repair and management schedule and collect data on problems and inefficiencies that may be missed by traditional third party audits. The use of a web-based application system like See Click Fix creates additional real-time opportunities for efficiencies in operation and maintenance.

The Town of Fairhaven will grow its capacity to retrofit and build more efficient facilities, purchase more efficient vehicles, and illuminate the Town through more efficient lighting throughout the 5-year period. These practices will become more engrained in the culture of the Town and will provide opportunities to instill the ethos into additional policies and programs for more dedicated long-term funding streams and strategies.

V: Appendices

- Building Energy Audits – Energy Source
- SRPEDD Vehicle Calculations
- MMBTU Conversion Chart