

TOWN OF NEEDHAM

APPLICATION FOR GREEN COMMUNITIES DESIGNATION



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with support from the:

Select Board and School Committee

**Town of Needham
1471 Highland Avenue
Needham, MA 02492**

November 12, 2019

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SECTION 1. EXECUTIVE SUMMARY

1.1 About the Town of Needham

The Town of Needham is located on rocky uplands within a loop of the Charles River in Eastern Massachusetts. The Town is bordered by Wellesley on the west and northwest, Newton on the north and northeast, the West Roxbury section of Boston on the east, Dedham on the southeast and south, and Westwood and Dover on the south. Needham is ten miles southwest of Boston, twenty-nine miles east of Worcester, and about 208 miles from New York City. Needham is situated in the greater Boston area, which has excellent rail, air, and highway facilities. Principal highways are State Routes 128 (the inner belt around Boston) and 135, and Interstate Route 95, which shares the same roadway as State Route 128. Commuter rail service is available via four stations to Back Bay Station and South Station in Boston. Needham is a member of the Massachusetts Bay Transportation Authority (MBTA), which provides fixed bus route service between Needham Junction and Watertown Square.

The Town provides full-service police, fire and emergency medical services. It operates its own water treatment and distribution system and provides sewer services through the Massachusetts Water Resources Authority. Other services include a Free Public Library, aging services located at the Center at the Heights, Youth and Family Services, Public Health, Public Works including Building Maintenance, Highway, Parks and Forestry, Engineering, Recycling and Solid Waste (including the recycling and transfer station), Administration, Fleet and Park and Recreation programming and pools at the Rosemary Recreation Complex. The School Department operates five elementary schools, two middle schools, and a high school educating approximately 5,800 students.

Needham at a Glance

Name:	Town of Needham
Incorporated:	1711
Total Area:	12.61
Elevation:	The low elevation is 68 feet above sea level and the high is 298 feet above sea level.
Road Miles:	138
County:	Norfolk
Population:	28,886 (2010 census)
Form of Government:	Representative Town Meeting
School Structure:	K-12
FY2019 Tax Rate:	\$12.39 Residential \$24.42 Commercial
FY2019 Avg. Single Family Home Value:	\$920,256
FY2019 Avg. Single Family Home Tax Bill:	\$11,402
Coordinates:	42° 16' 52" N 71° 14' 11" W

The Town is home to a St. Joseph Elementary School, Monsignor Haddad Middle School, St. Sebastian's Day School, and Olin College of Engineering. The Beth Israel Deaconess Hospital Needham has a strong presence in Needham Center. The Town has a thriving commercial sector along Route 128 including TripAdvisor, Shark Ninja, NBC Universal, WCVB Channel 5, and many others.

1.2 Commitment to Energy Savings and Management and Renewable Energy

The Town takes a comprehensive approach to energy management. A few examples include:

- Energy Audit of 10 municipal buildings leading to \$467,370 investment in energy reduction over the past 7 years.
- Geo-thermal heating system at the Public Services Administration Building
- LEED certified Library and Sunita Williams Elementary School
- Pilot program of electric vehicles
- Installation of electric vehicle charging stations
- Inclusion of hybrid vehicles in the fleet
- Installation of 155.1 kW DC photovoltaic array on Sunita Williams School installed behind-the-meter
- Construction of 3,593 kW DC Photovoltaic array at the closed landfill generating approximately 4,771,000 kilowatt-hours per year
- Conversion of streetlights from mercury vapor to high pressure sodium (Note: LED conversions substantially complete)
- Participant in the Bike Share program

1.3 Community Supported Energy Savings and Renewable Energy Programs

In 2014, the Town sponsored Solarize Needham, resulting in ninety-nine residential solar installations. There are currently over 400 residential solar arrays in Needham. During the Fall of 2019, Needham launched Solarize Needham Plus which encourages and facilitates with homeowners the opportunities and benefits of solar photovoltaic installations, promotes the adoption of electric vehicles purchases and offers cost-effective air-source heat pump technologies for home heating and cooling solutions. The Town is currently partnering with Eversource on a residential weatherization and insulation program.

1.4 Authorization and Support by Select Board

At its meeting on **DATE** the Select Board of Needham voted to approve and submit the Application for Green Communities designation, including the energy reduction plan and the Fuel-Efficient Vehicle Policy.

1.5 Authorization and Support by School Committee

At its meeting on **DATE** the School Committee of Needham voted to adopt the energy reduction plan and Fuel-Efficient Vehicle Policy.

SECTION 2. CRITERION 1: AS-OF-RIGHT SITING-VIA GENERATION, R&D OR MANUFACTURING

2.1 DOER Requirement

As-of-Right Siting provides for the allowed use without unreasonable regulation. More specifically, as-of-right siting means that development may proceed without the need for a special permit, variance, amendment, or other discretionary approval. As-of-right development may be subject to non-discretionary site plan review to determine conformance with local zoning bylaws as well as state and federal law. As-of-right development projects that are consistent with zoning bylaws and with state and federal law cannot be prohibited.

A municipality must provide zoning in designated locations for the as-of-right siting for one of the following:

- renewable or alternative energy generating facilities,
- renewable or alternative energy research and development (R&D) facilities,
- renewable or alternative energy manufacturing facilities

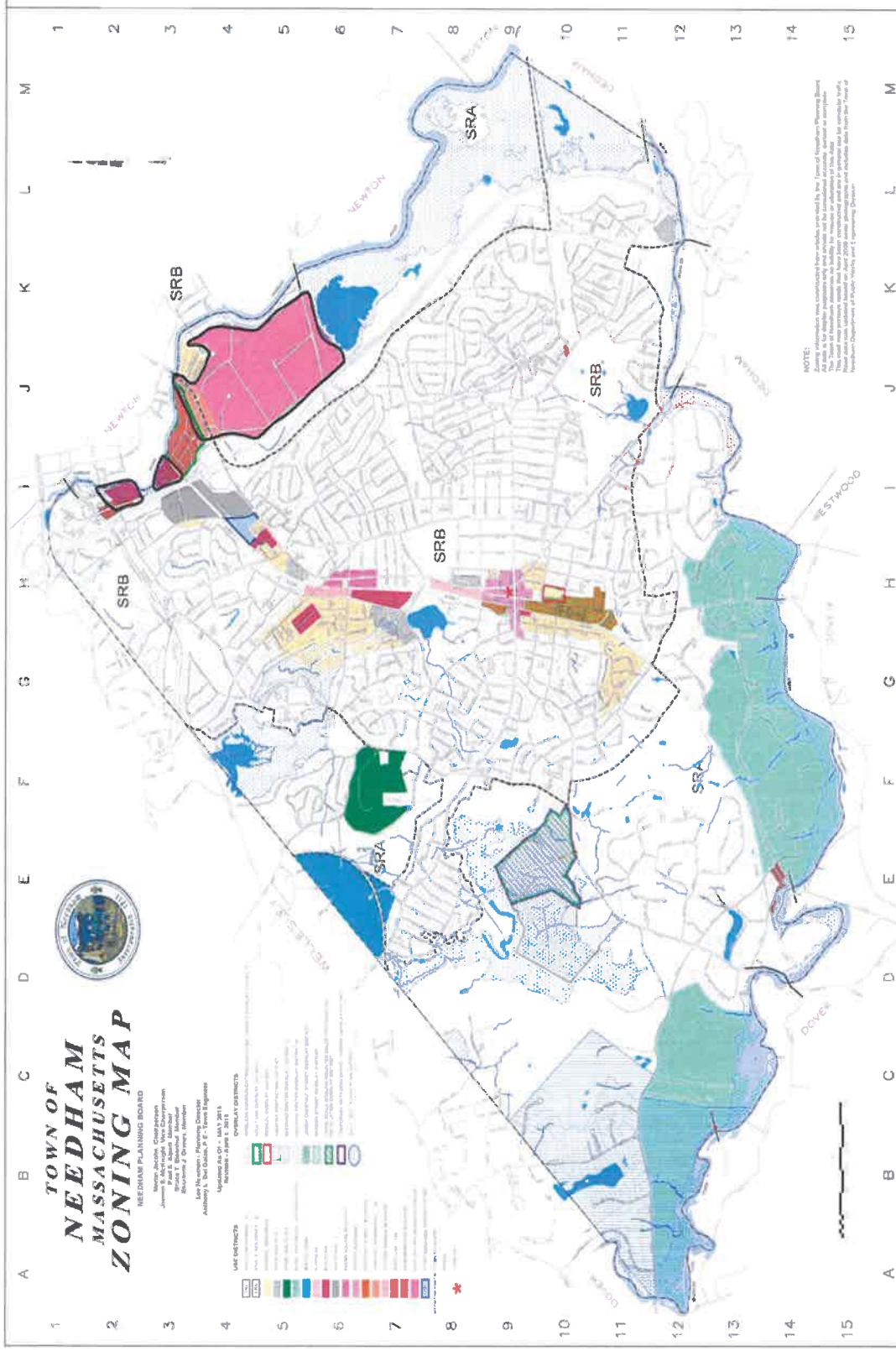
2.2 Town Compliance

The Town of Needham Zoning Bylaws provide As-of-Right Siting in several zoning districts for renewable or alternative energy research and development (R&D) facilities and renewable or alternative energy manufacturing facilities as follows:

USE	Green Community Type	Industrial	Industrial 1	New England Business Center District	Mixed Use 128 District
Zoning Bylaw Reference		3.2.1	3.2.1	3.2.4	3.2.6
Laboratory or place where scientific experimental research is conducted not including genetic or biological research laboratory.	Research & Development	✓ □	✓ □		
Medical laboratory or laboratory engaged in scientific research and development, and experimental and testing activities including, but not limited to, the fields of biology, genetics, chemistry, electronics, engineering, geology, medicine and physics, which may include the development of mock-ups and prototypes.	Research & Development			✓ □	✓ □
Light non-nuisance manufacturing providing that all resulting cinders, dust, flashing, fumes, gases, odors, smoke, noise, vibration, refuse matter, vapor, and heat are effectively confined in a building or are disposed in a manner so as not to create a nuisance or hazard to safety or health	Manufacturing	✓ □	✓ □	✓ □	✓ □

The Town acknowledges that among the four (4) categories noted above, there exists a minimum of 50,000 square feet of available space to site renewable or alternative energy research and development (R&D) facilities and/or renewable or alternative energy manufacturing facilities.

Provided below is the Town's zoning map with the applicable zones highlighted.



Please refer to Exhibit 7.1 for written certification by Town Counsel of compliance.

SECTION 3. CRITERION 2: EXPEDITED PERMITTING

3.1 DOER Requirement

Criterion 2 requires communities to adopt an expedited application and permitting process under which as-of-right energy facilities (criterion #1) may be sited within the municipality and which shall not exceed one (1) year from the date of initial application to the date of final approval. Such an expedited application and permitting process applies only to the proposed facilities which are subject to the as-of-right siting provisions, and documentation that all permits necessary to site proposed facilities can be issued within the one (1) year deadline is required.

3.2 Town Compliance

Site Plan Review is provided for in Section 7.4 of the Town's Zoning Bylaw.

- New Construction Projects sized up to 10,000 square feet of allowable permitted use are allowed by right and must apply for a Minor Project Site Plan Review, which is similar to a typical Site Plan Review in other municipalities. Such projects require comments from the Planning Board to the Building Inspector prior to the issuance of the building permit.
- New Construction Projects of allowable permitted use sized 10,000 or more square feet or involve an increase in gross floor area of 5,000 square feet, or the creation of 25 or more new off-street parking spaces, must apply for a Major Project Site Plan Special Permit. Such projects require approval by the Planning Board.
- Needham complies with the statutory requirements of MGL Chapter 40A which rarely extends established timeframe of action on the Special Permit beyond five (5) months.

Please refer to Exhibit 7.2 for written certification by Town Counsel of compliance.

SECTION 4. CRITERION 3: ENERGY REDUCTION PLAN ('ERP')

4.1 DOER Requirement

Criterion 3 requires municipality (including both the general government and school district) to accomplish the following:

- I. Establish an Energy Use Baseline
- II. Develop and implement a comprehensive program designed to reduce this baseline by 20% within the 5-year period following the Baseline Year

4.2 Town Compliance

a) Purpose and Acknowledgements

- I. Letters from both General Government and School District Verifying Adoption of the ERP.
 - i. Please refer to Exhibit 7.3.1 Letters from both General Government and School District Verifying Adoption of the ERP.
- II. List of Contributors that Participated in the Baseline and ERP Process

The Town acknowledges the following individuals that participated in the development of the Energy Use Baseline and the ERP Process:

- i. Kate Fitzpatrick, Town Manager
- ii. Carys Lustig, Director of Finance and Administration for Public Services
- iii. Cecilia Simchak, Acting Director of Finance and Administration for Public Services
- iv. Barry Dulong, Director of Building Maintenance
- v. Nick Hill, Hill Energy Services
- vi. Beth Greenblatt, Beacon Integrated Solutions

b) Executive Summary

- I. Narrative Summary of the Town
 - i. Please refer to Section 1.1.
- II. Summary of Municipal Energy Uses
 - i. The Town is served by Eversource Energy for both electricity and natural gas delivery. While the Town mainly relies on natural gas for space heating, the Hillside Elementary School also uses heating oil for space heating. The Town further uses both gasoline and ultra-low sulfur diesel for vehicle use.
 - ii. Two solar photovoltaic arrays have been installed in the Town. The largest is at the capped landfill, which serves as a fully net metered facility. The second solar photovoltaic array is owned by the Town and directly provides solar generated electricity in a behind-the-meter installation.

The following table presents the Summary of Needham’s Energy Uses:

Table 1: Summary of Municipal Energy Users

CATEGORY	TYPE	QUANTITY	OWNERSHIP
Buildings	Natural Gas Heat	5	Town
	Natural Gas Heat	7	Schools
	Fuel Oil Heat	2	Schools
	Electric Heat	1	Town
	Geothermal	1	Town
Vehicles	Exempt	101	Town
	Non-Exempt	126	Town
	Exempt	11	Schools
	Non-Exempt	4	Schools
Streetlights		0	Utility-Owned
		2908	Town
Traffic Signals	Traffic/Hawk/Flashing	25	Town
Water/Sewer	Drinking Water	1	Town
	Pump Stations	11	Town

III. Summary of Energy Use Baseline and Plans for Reductions

Table 2: Summary of Municipal Energy Use Baseline

BASELINE FISCAL YEAR 2018	MMBTU Used in Baseline Year	% of Total MMBTU Baseline Energy Consumption	Projected Planned MMBTU Savings	Savings as % of Total MMBTU Baseline Energy Consumption
Buildings	86,963	76.08%	17,991	21%
Vehicles	16,100	14.08%	2,462	3%
Street/Traffic Lights	17	0.01%	1,825	2%
Water/Sewer	11,137	9.74%	504	1%
Open Space	92	0.08%	0	0%
TOTAL BASELINE	114,309	100.00%	22,782	20%

c) Energy Use Baseline Inventory

I. Identification of the Inventory Tool Used

- i. The Town of Needham inventory tool is MassEnergy Insight (MEI).

II. Identification of the Baseline Year and ERP Timeframe

- i. The Town of Needham’s Energy Use Baseline Year is fiscal year 2018 (July 2017-June 2018).

III. Municipal Energy Consumption for the Baseline Year

Table 3: Annual Municipal Energy Use in Native Units and MMBTU - Fiscal Year 2018

	Electricity		Natural Gas		#2 Distillate Fuel Oil		Propane		Gasoline		Diesel		Electric Renewable Energy		Thermal Renewable Energy		Total MMBtu
	kWh	MMBtu	Therms	MMBtu	Gallons	MMBtu	Gallons	MMBtu	Gallons	MMBtu	Gallons	MMBtu	kWh	MMBtu	Therms	MMBtu	
Town Buildings	1,942,730	6,629	74,677	7,468	3,959	550	0	0	0	0	0	0	0	0	0	0	14,647
School Buildings	6,771,645	23,105	410,534	41,053	22,450	3,121	0	0	0	0	0	0	0	0	0	0	67,279
Transfer Station	147,613		0		0		0	0	0	0	0	0	0	0	0	0	
SUBTOTAL FOR BUILDINGS	8,861,988	29,733	485,211	48,521	26,409	3,671	0	0	0	0	0	0	0	0	0	0	81,925
Drinking Water/Wastewater Treatment Plant	1,909,932	6,517	12,654	1,265	0	0	0	0	0	0	0	0	0	0	0	0	7,782
Pumping in Aggregate	677,639	2,312	10,423	1,042	0	0	0	0	0	0	0	0	0	0	0	0	3,354
Open Space*	123,038	420	7,719	772	0	0	0	0	0	0	0	0	0	0	0	0	1,192
Vehicles in Aggregate	0	0	0	0	0	0	0	0	73,194	9,076	50,535	7,024	0	0	0	0	16,100
Street and Traffic Lights in Aggregate	1,011,532	3,451	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,451
TOTAL ENERGY CONSUMPTION	12,584,129	42,937	516,007	51,601	26,409	3,671	0	0	73,194	9,076	50,535	7,024	0	0	0	0	114,309

d) Energy Reduction Plan

I. Narrative

i. Overview of Goals for Years 1-3

With Fiscal Year 2018 as the Town's Baseline Year, the Goals for Years 1-3 are as follows:

Year 1: Fiscal Year 2019:

- Lighting upgrades to LED fixtures in corridors, performance center, auditoriums and media centers.
- Replacing domestic hot water heating system at Broadmeadow Elementary School.
- Replacing the boiler at the Library with a high efficiency boiler.
- Comprehensive street lighting conversion to LEDs (Substantially complete).
- Retro-commissioning.
- Energy efficient motor replacements.
- Variable frequency drive upgrades.
- Utilization of Fleetio, a software program to track vehicle and fuel usage by vehicle and target those higher-use vehicles for reduction.

Year 2-3: Fiscal Years 2020 and 2021:

- Upgrading existing Building Management Software to Struxureware to enable consistent and more comprehensive building and systems control and management. This new software is open architecture, provides a common interface to all users and allows remote monitoring and control of facilities. Additionally, the new software provides alarming features alerting Town staff to system operational problems. The software further supports exception reporting which will allow building maintenance staff to properly maintain required building temperatures and settings designed to increase performance and reduce energy usage.
- Retro-commissioning buildings include studying the existing conditions of the mechanical systems, making a comparison to original design specifications, calculating the difference in performance, and making necessary corrections to return the systems to its original design specifications.
- Comprehensive energy audit on the Charles River Water Treatment Plant to identify energy specific improvements to be made in a building with constant use.
- Replacing the boiler at the DPW garage with high efficiency boiler.
- Conducting a facility assessment for sustainable building management at various Schools will focus on the entire building structure and will recommend additional energy efficiency improvements.

- Replacing diesel mid-size trucks with gasoline trucks.
- LED Streetlighting optimization. The Town has the ability to automatically dim the lights throughout Town. The dimming schedule can be based on time, season, events, or can be a manual change. This allows more control over the amount of energy being used during non-peak hours.
- In addition to the project listed above, the Town will continue to monitor energy consumption and work on behavioral changes to decrease usage. Space temperatures are closely monitored for optimal conditions. Setbacks are designed to decrease cooling and heating needs when buildings are unoccupied by increasing or decreasing temperature setpoints.
- Preventative maintenance will be re-evaluated to improve the efficiency of the mechanical equipment.

ii. Overview of Goals for Years 4-5

- As presented in Table 4: Energy Conservation Measures (ECMs), the Town has many anticipated projects focused on energy efficiency upgrades, including but not limited to: upgrading classroom lighting to LED, retro-commissioning High Rock Elementary School and Needham High School, conducting a study on potential energy upgrades in buildings throughout Town, replacing the roof and windows at the Emery Grover, replacing the boiler at the Hillside Elementary School, installing anti-idling technology on vehicles, replacing police cruisers with hybrid vehicles, and removing inflow from the sewer system.
- Conducting a study on energy upgrades for buildings town wide will help plan for additional projects the Town may undertake in the upcoming years to continue its commitment to energy reduction. Continuing to retro-commission additional buildings ensures that the mechanical systems perform more efficiently. Installing anti-idling technology will help decrease fuel usage on vehicles that are used daily.

iii. Identify Areas of Least Efficient/Greatest Waste (MEI-Buildings to Target)

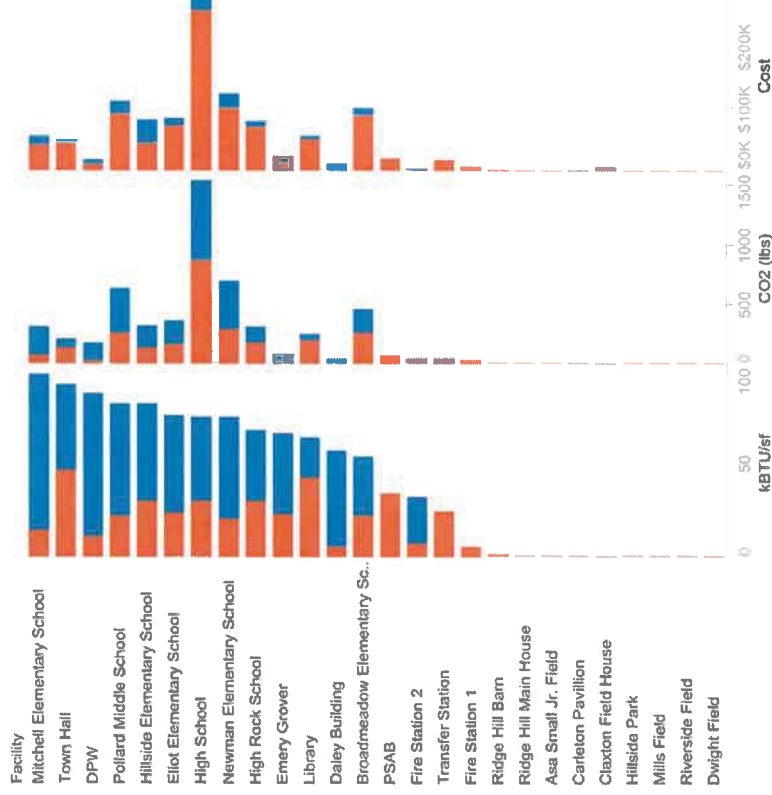
- As shown in the following MEI Chart, the Town's buildings and facilities presenting the greatest opportunity for energy savings are:
 - Needham High School
 - Newman Elementary School
 - Pollard Middle School
 - Mitchell Elementary School
 - Hillside Elementary School
 - Town Hall

Buildings to Target

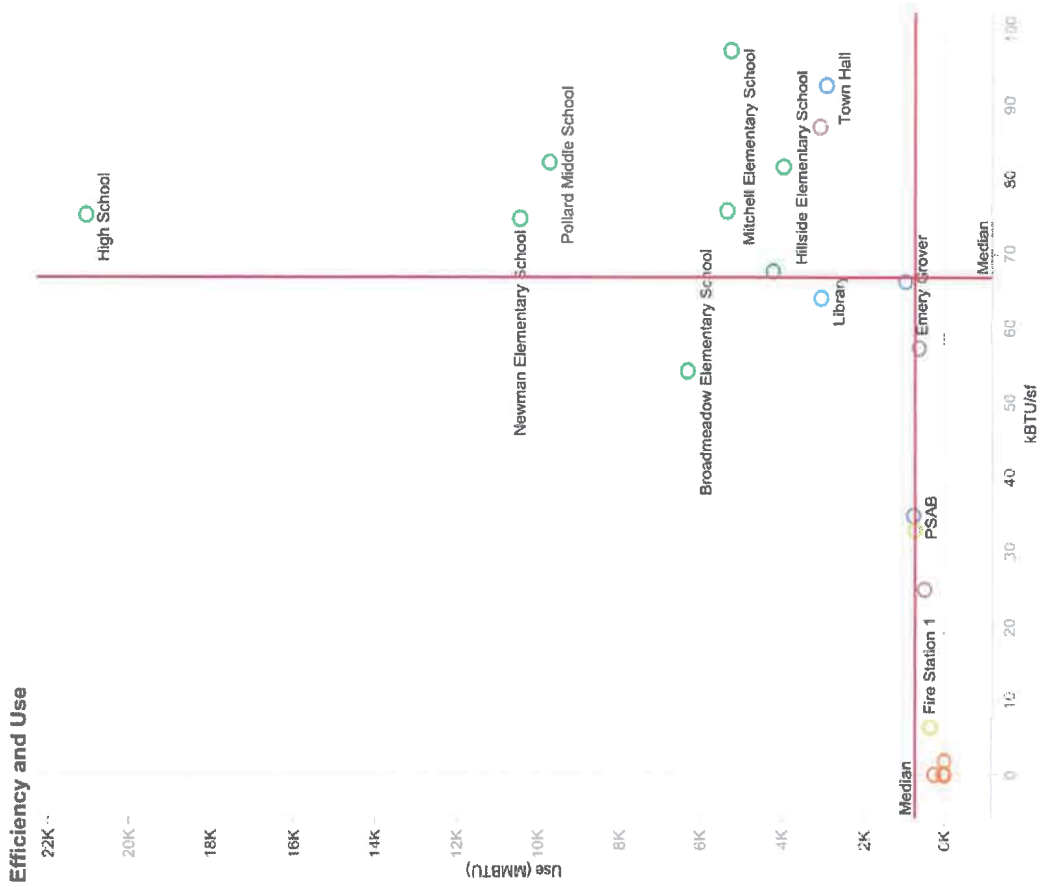
This dashboard compares buildings to one other on an energy use per area metric, measured as kBtu/square foot. In the quadrant chart on the right, buildings with the highest energy use and worst efficiency (as compared to other buildings in your portfolio) are in the upper right hand quadrant. Facilities 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

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.



II. 20 Percent Energy Reductions:

i. ERP Energy Savings Goals Summary:

CALCULATED ERP SAVINGS					
ENERGY MEASURES	CALCULATED MMBTU SAVINGS	CALCULATED COST SAVINGS	ESTIMATED NET INSTALLED COST	SIMPLE PAYBACK	PERCENT CONTRIBUTION OF BASELINE CONSUMPTION
Building Control	4,119	\$125,205	\$468,126	3.7	
Exterior Lighting	1,851	\$122,061	\$371,548	3.0	
Hot Water	56	\$990	\$75,049	75.8	
HVAC	1,988	\$68,873	\$875,333	12.7	
Interior Lighting	1,143	\$75,338	\$607,382	8.1	
Retrocommission	7,252	\$258,550	\$627,572	2.4	
Vehicles	683	\$18,996	\$15,000	0.8	
Weatherization	110	\$2,854	\$633,000	221.8	
Comprehensive Audits	2,949	\$123,675	\$9,268	0.1	
SUB-TOTAL	20,149	\$796,540	\$3,682,278	4.6	
ADDITIONAL ESTIMATED ERP SAVINGS					
ENERGY MEASURES	ADDITIONAL MMBTU SAVINGS	ADDITIONAL ESTIMATED COST SAVINGS	ESTIMATED NET INSTALLED COST	SIMPLE PAYBACK	PERCENT CONTRIBUTION OF BASELINE CONSUMPTION
Vehicles	1,780	\$44,880	\$70,000	1.6	
Comprehensive Audits	74	\$4,904	\$0	0.0	
Behavior & Training	779	\$27,786	\$100,000	3.6	
SUB-TOTAL	2,633	\$77,570	\$170,000	2.2	
GRAND TOTAL	22,782	\$874,110	\$3,852,278	4.4	20%

ii. As shown in the table above, the Town has identified 18 percent calculated energy savings plus an additional estimated 2 percent energy savings. For additional detail, please refer to Table 4: Energy Conservation Measures which has been provided as an attachment.

iii. To achieve the projected 2 percent additional estimated energy savings, the Town will undertake three key efforts:

- Installation of anti-idling technology in its fleet vehicles. These systems are designed to allow vehicles to be parked with equipment operating continuously – radios, warning lights, etc., while minimizing engine idle time and decreasing fuel consumption. The anti-idling technology senses battery condition and turns vehicles on to idle only when necessary. While idling at an emergency or construction scene, a typical police cruiser uses about 0.9 gallons of gasoline per hour. Fuel savings from anti-idling systems vary by vehicle type and usage, though they tend to be greatest for diesel and police vehicles.
- Conduct comprehensive audits to reduce stormwater Infiltration and Inflow (“SWI/I”) in the existing sewer systems. Infiltration is defined as groundwater or storm water runoff that enters the system through deteriorated pipe or manhole structures that need to be repaired. When sewer flow is reduced, wastewater pumping requirements will also be

reduced, thereby reducing energy consumption associated with wastewater pumping.

- Conduct facility assessments for sustainable building management. It is expected that the assessments will generate recommendations to improve operations and maintenance practices designed to reduce energy consumption and promote best practices for operations.

iv. Program Management Plan for Implementation, Monitoring and Oversight

Responsibility Matrix:

REQUIREMENT	RESPONSIBILITY MATRIX	
	PRIMARY	SECONDARY
Oversight of ERP Implementation	Carys Lustig	Cecilia Simchak
Implementation of ECMs - Town	Barry Dulong	Shift Supervisors
Implementation of ECMs - Schools	Barry Dulong	Shift Supervisors
Implementation of ECMs - WTP	Sean Harrington	Steve Cusick
Annual Green Communities Reporting	Carys Lustig	Cecilia Simchak

v. Identify for each Energy Conservation Measures (ECM”):

Please refer to Table 4: Energy Conservation Measures Data Excel Spreadsheet included by reference in Exhibit 7.3.2 which includes:

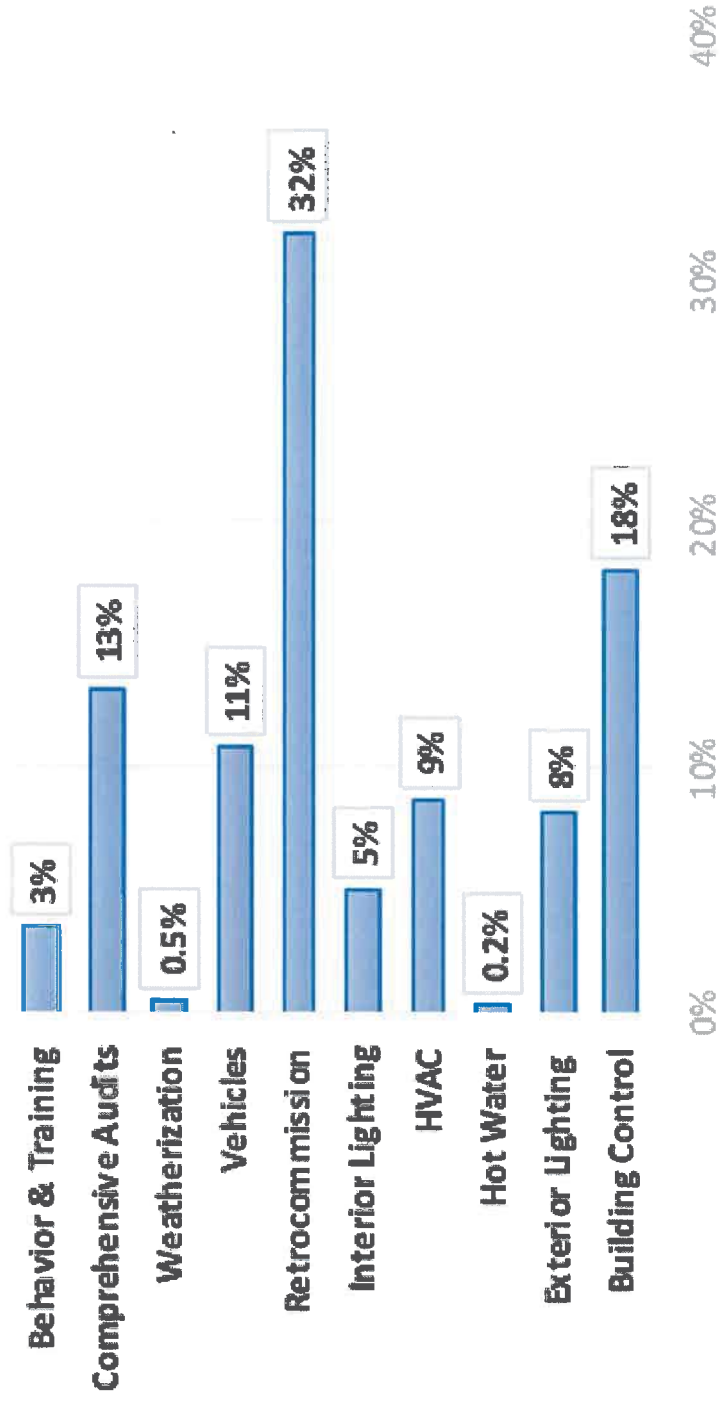
- Status and projected timeline
- Projected energy savings in native units
- Projected cost savings
- Total cost
- Any utility incentives projected or received
- Any planned use of Green Communities grant funds (if designated)
- Funding source (capital budget, operating budget, debt and type or other grants)
- Source of the calculated energy and cost savings in the reference column

Summaries of the ERP Goals by ECM and Location are presented below. With respect to the summary of the ERP Goals by ECM, the Town has segmented the data into two categories:

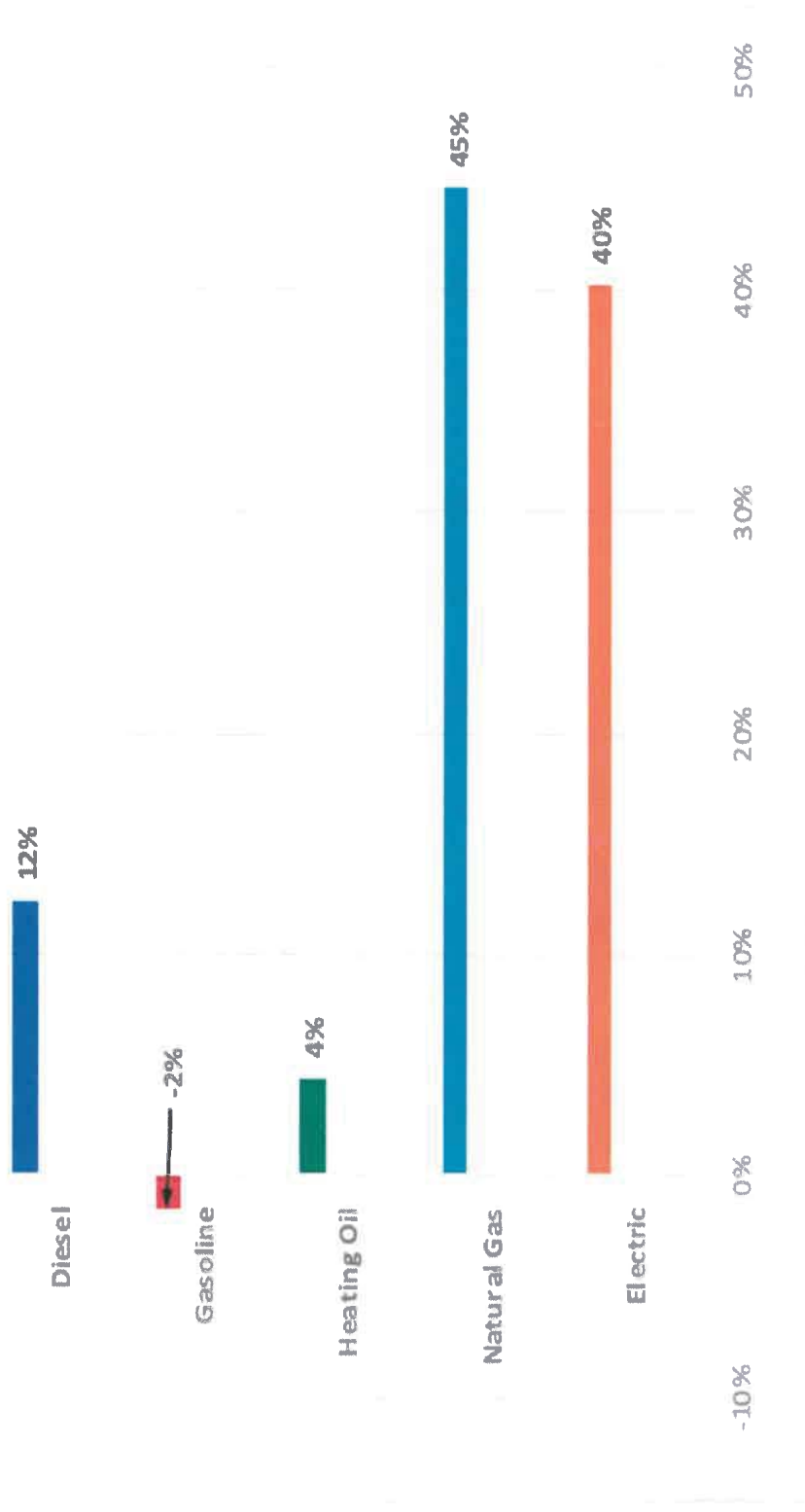
- Calculated energy savings by ECM based on energy audit data, reliable industry data or engineering calculations, and

- Estimated additional savings based on reliable industry data. The Town notes that these estimates are conservative and will be refined at the conclusion of the additional due diligence through the planned audits and studies.

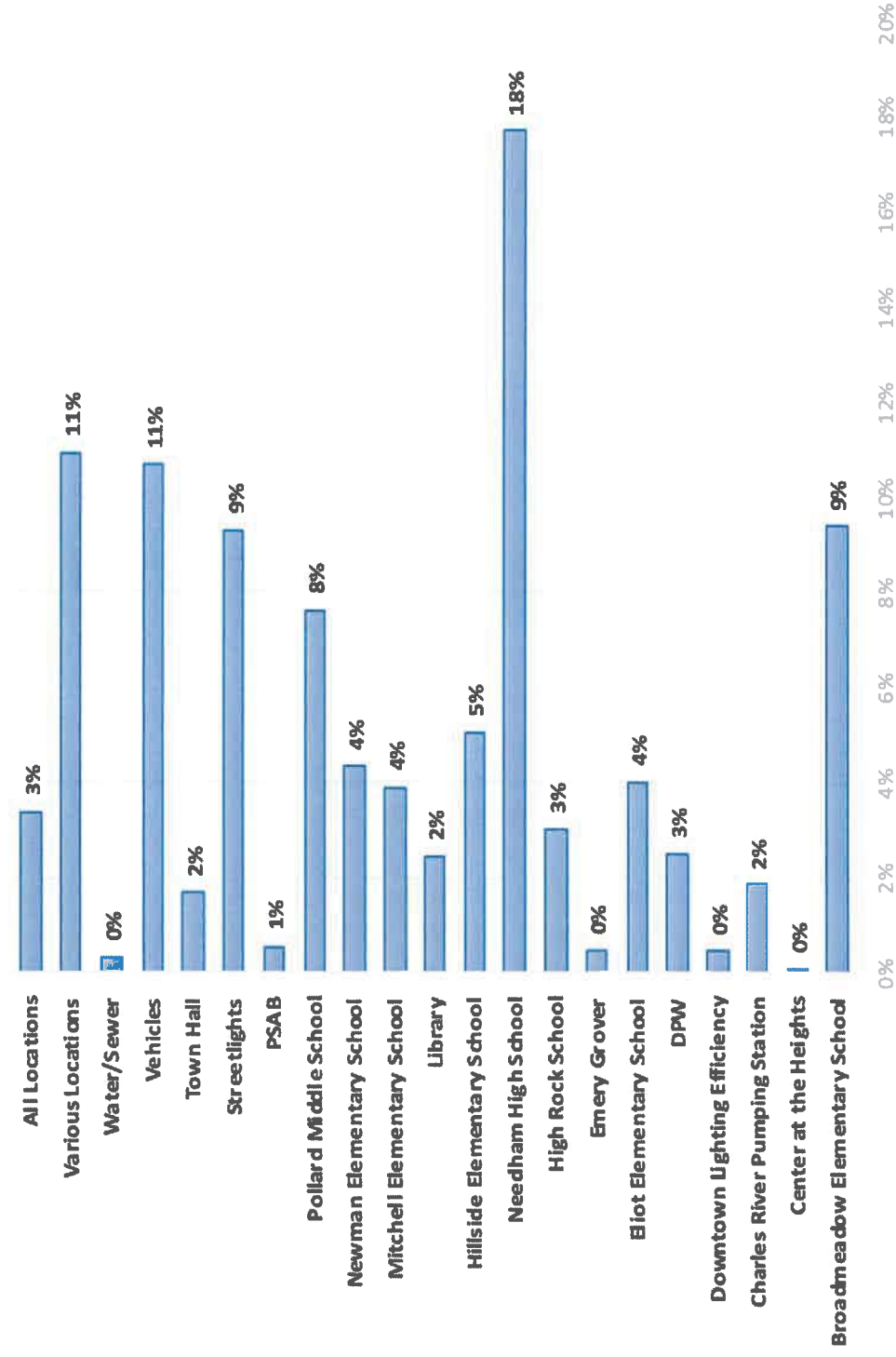
The following table presents the Town's Energy Reduction Plan Goals by ECM Category:



The following table presents the Town's Energy Reduction Plan Goals by Energy Type:



The following table presents the Town's Energy Reduction Plan Goals by Location:



III. ECMs Occurring Before Green Communities Designation

- i. As noted in Table 4: Energy Conservation Measures, the Town has completed a portion of the energy efficiency and capital upgrade projects presented in its ERP.

Of the total 20 percent MMBTU savings of Baseline consumption, the Town expects to realize 2,981 MMBTU savings from energy conservation measures undertaken in fiscal year 2019. These estimated savings represent approximately 13 percent of the overall ERP projected savings.

- ii. The Town is also currently pursuing additional energy conservation measures during this current fiscal year 2020. The Town anticipates an additional 7,367 MMBTU of energy savings resulting from projects in progress. These estimated savings represent approximately 32 percent of the overall ERP projected savings.

The table below provides a summary of completed (in FY 2019), active (in FY 2020) and planned energy conservation/capital improvement projects included in the ERP.

	MMBTU Savings	% Contribution of Total 20% ERP Savings	\$ Contribution of Total ERP Cost Savings	% Contribution of Total ERP Cost Savings	Net Installation Cost	% Contribution of Net Installation Cost
Completed	2,981	13%	\$180,001	21%	\$631,510	16%
Active	7,367	32%	\$244,638	28%	\$646,006	17%
Planned	12,435	55%	\$449,471	51%	\$2,574,761	67%
TOTAL	22,782	100%	\$874,110	100%	\$3,852,278	100%

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

- i. Municipal and School Buildings
 - The Town will have funded multiple studies during the five-year period post the Fiscal Year 2018 baseline that will help the Building Maintenance Division continue with energy reduction upgrades. These studies will include recommendations for updated technologies and equipment that are more energy efficient.
 - The Town has a system in place to continue making energy reduction upgrades for the foreseeable future as noted below. Each year the Town seeks appropriations to fund not only projects to reduce energy consumption, but also to fund studies as needed to evaluate older buildings and systems and replace or repair them to increase their efficiencies.
 - Additionally, the Building Maintenance Division plans to request an overall facility assessment on every building as it approaches its 20-year life cycle to determine whether structural and overall improvements can be made to

keep the building in use. This process will help maintain healthy buildings longer, reducing the need to major emergency repairs and decrease energy consumption in the process.

- The Town is not only looking to commit to major repairs. Simple behavioral changes can also decrease energy consumption. During the summers, the Town consolidated summer programming into the same buildings to reduce unnecessary use of energy and more efficiently operate fewer buildings. As Needham becomes a Green Community, additional education will be provided to Town employees on simple energy reduction strategies they can use in their offices.

ii. Vehicles

- The Town replaces vehicles on a life cycle basis, as determined by the type of vehicle. Typically, this occurs every seven to twelve years. Energy reduction strategies implemented in the Town's ERP will be continued into the future in order to capture all vehicles in the fleet. As technologies and efficiencies improve, older vehicles will be retired and replaced with newer, more energy efficient vehicles. The Fleet Division has initiated an investigation of available hybrid and electric vehicles for the various types of vehicles used by the Town.

iii. Street and Traffic Lighting

- The Town will continue to analyze energy consumption of street and traffic lighting and adjust based on needs. Upon completion of the effort to systematically and strategically dim streetlights, the Town will support continuous reasonable adjustments to reduce energy consumption while maintaining appropriate streetlighting levels and safety. The Town will evaluate the benefits of replacing traffic signals with more energy efficient models.

iv. Perpetuation Energy Efficiency

- On an annual basis, the Town submits two warrant articles for approval at Town Meeting. Specifically, each year the Town includes an Energy Efficiency Capital Article ("EECA") and a Facility Maintenance Article ("FMA"). These funding sources have enabled the Town to implement comprehensive energy efficiency and infrastructure upgrade improvements since 2006 under the FMA and 2013 under the EECA.

SECTION 5. CRITERION 4: FUEL-EFFICIENT VEHICLES

5.1 DOER Requirement

Criterion 4 requires communities to 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.

5.2 Town Compliance

The Town of Needham, inclusive of its school department and all municipal departments, has adopted a fuel-efficient vehicle policy. Please refer to Exhibit 7.4 for written certification by the Town Manager stating that the Town of Needham has adopted the fuel-efficient vehicle policy and for a similar certification from the Superintendent of Needham Public Schools.

SECTION 6. CRITERION 5: STRETCH CODE ADOPTION

6.1 DOER Requirement

In accordance with M.G.L. c 25A Section 10, a municipality must require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.

Municipalities that have adopted the stretch energy code shall use the energy efficiency requirements of appendix 780 CMR 115.AA, which stipulates higher energy efficiency requirements for most new construction.

6.2 Town Compliance

On May 13, 2019, at its Annual Town Meeting, under Article 49, the Town of Needham voted to amend its General By-Laws by adding the Stretch Energy Code for the purpose of regulating the design and construction of buildings for the effective use of energy, pursuant to Appendix 115.AAA of the Massachusetts Building Code, 780 CMR, the "Energy Stretch Code", including future additions, amendments, or modifications thereto.

Please refer to Exhibit 7.5 for a copy of the Town Meeting vote as recorded with the Town Clerk.

SECTION 7. APPENDIX

- 7.1 Criterion 1: As-of-Right Siting: Town Counsel Compliance Certification**
- 7.2 Criterion 2: Expedited Permitting: Town Counsel Compliance Certification**
- 7.3 Criterion 3: ERP**
 - 7.3.1 Letters from both General Government and School District Verifying Adoption of the ERP.**
 - 7.3.2 Table 4: Energy Conservation Measures Data Excel Spreadsheet**
 - 7.3.3 MMBtu Unit Conversion Chart**
 - 7.3.4 Energy Savings Reductions: Methodologies and Sources**
- 7.4 Criterion 4: Fuel Efficient Vehicles Policy**
- 7.5 Criterion 5: Town Meeting Adoption of the Stretch Energy Code as recorded with the Town Clerk**

Town of Needham



Presentations on Green Communities Designation

Prepared by:

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Beth Greenblatt

October 16, 2019

Green Communities Requirements

Criterion 1: As-of-Right Siting

- ❖ **Requirement:** As-of-Right Siting requires the allowed use without unreasonable regulation. Development may proceed without the need for a special permit, variance, amendment, or other discretionary approval. As-of-right development may be subject to non-discretionary site plan review to determine conformance with local zoning bylaws as well as state and federal law. Designated locations include:
 - ❑ *renewable or alternative energy generating facilities,*
 - ❑ *renewable or alternative energy research and development (R&D) facilities*
 - ❑ *renewable or alternative energy manufacturing facilities*

❖ **Town Compliance:** The Town’s Zoning Bylaws allow for As-of-Right siting as follows:

USE	Green Community Type	Industrial	Industrial 1	New England Business Center District	Mixed Use 128 District
Zoning Bylaw Reference		3.2.1	3.2.1	3.2.4	3.2.6
Laboratory or place where scientific experimental research is conducted not including genetic or biological research laboratory.	Research & Development	✓	✓		
Medical laboratory or laboratory engaged in scientific research and development, and experimental and testing activities including, but not limited to, the fields of biology, genetics, chemistry, electronics, engineering, geology, medicine and physics, which may include the development of mock-ups and prototypes.	Research & Development			✓	✓
Light non-nuisance manufacturing providing that all resulting cinders, dust, flashing, fumes, gases, odors, smoke, noise, vibration, refuse matter, vapor, and heat are effectively confined in a building or are disposed in a manner so as not to create a nuisance or hazard to safety or health	Manufacturing	✓	✓	✓	✓

Green Communities Requirements

Criterion 2: Expedited Permitting

- ❖ **Requirement:** The Town must adopt an expedited application and permitting process under which as-of-right energy facilities (criterion #1) may be sited within the municipality and which shall not exceed one (1) year from the date of initial application to the date of final approval.

- ❖ **Town Compliance:** Site Plan Review is provided for in Section 7.4 of the Town's Zoning Bylaw.
 - *New Construction Projects sized up to 10,000 square feet of allowable permitted use are allowed by right and must apply for a Minor Project Site Plan Review, which is similar to a typical Site Plan Review in other municipalities. Such projects require comments from the Planning Board to the Building Inspector prior to the issuance of the building permit.*

 - *New Construction Projects of allowable permitted use sized 10,000 or more square feet, or involve an increase in gross floor area of 5,000 square feet, or the creation of 25 or more new off-street parking spaces, must apply for a Major Project Site Plan Special Permit. Such projects require approval by the Planning Board.*

 - *Needham complies with the statutory requirements of MGL Chapter 40A which rarely extends established timeframe of action on the Special Permit beyond five (5) months.*

Green Communities Requirements

Criterion 3: Energy Reduction Plan ("ERP")

- ❖ **Requirement:** The Town is required to accomplish the following:
 - *Establish an Energy Use Baseline*
 - *Develop and implement a comprehensive program designed to reduce this baseline by 20% within the 5-year period following the Baseline Year*

- ❖ **Town Compliance:** The Town has developed an Energy Reduction Plan ("ERP") designed to achieve 20% energy savings reductions through the implementation of completed, active and planned capital energy efficiency and infrastructure upgrades.
 - *Calculated ERP Savings: 18%*
 - *Additional Estimated ERP Savings: 2%*

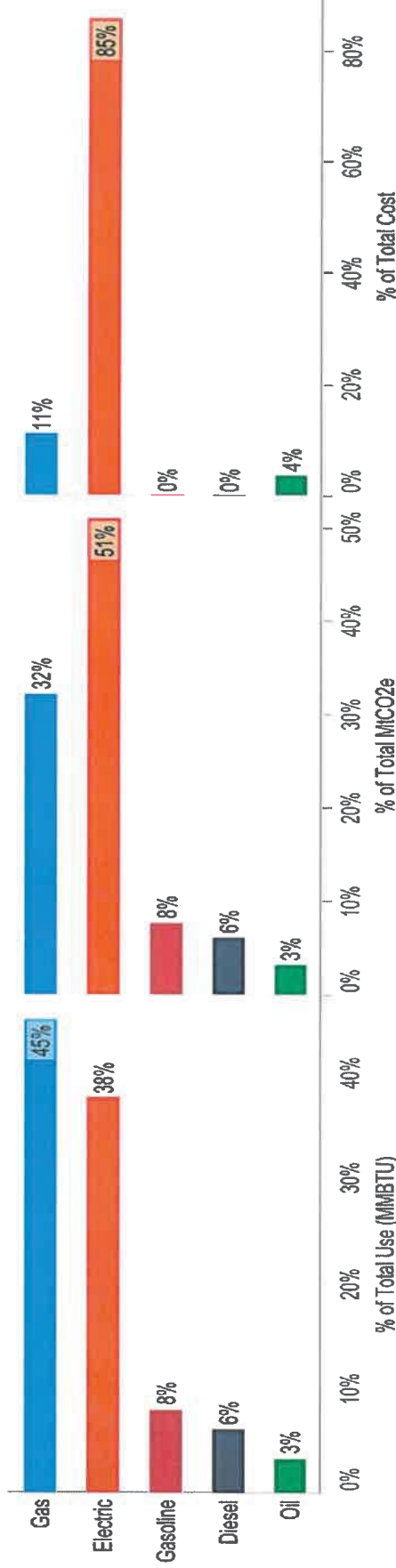
Green Communities Requirements

Criterion 3: Baseline Usage by Energy Type

Overall Use, Emissions and Cost Dashboard

Overall Use, Emissions and Cost by Fuel as a Percent of Total

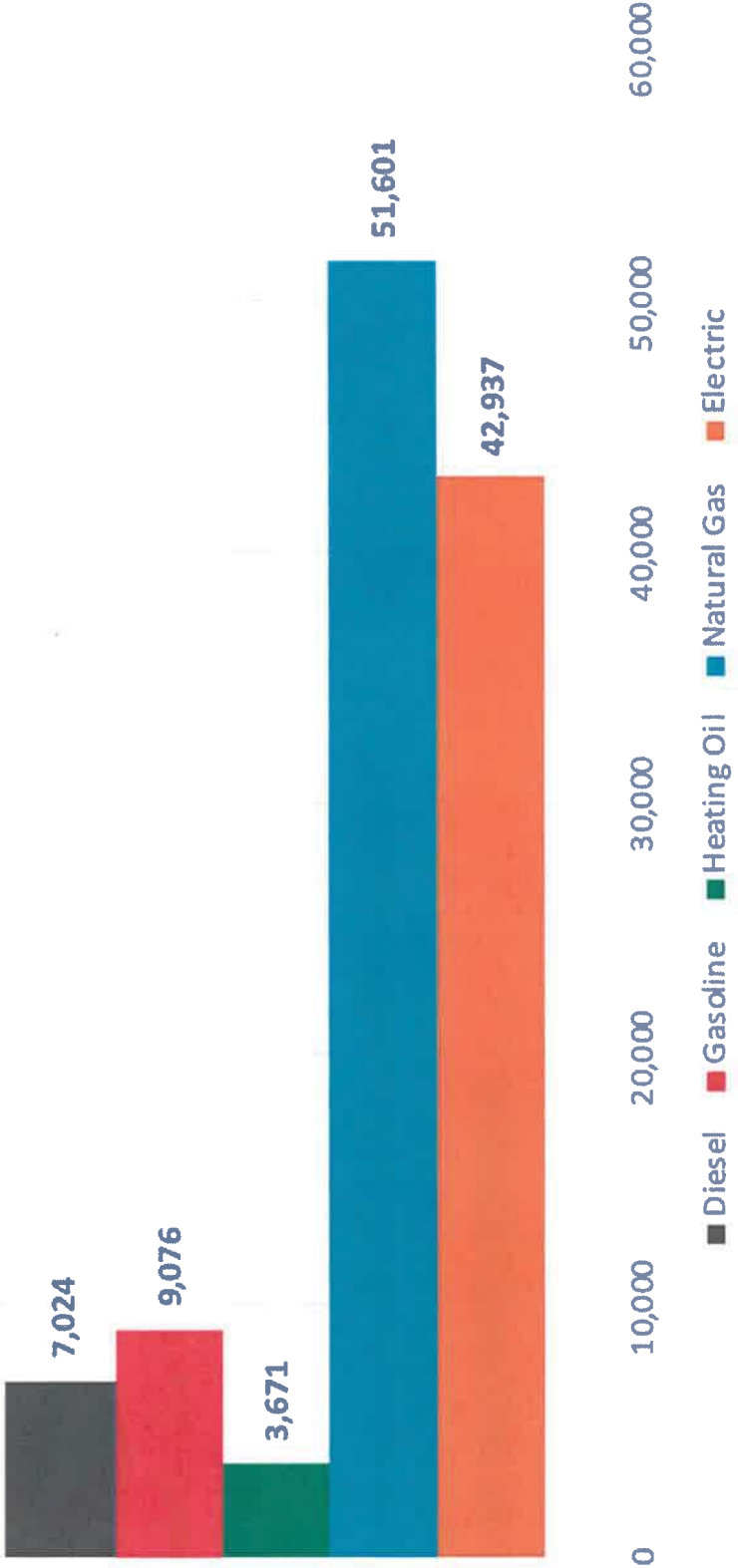
Emissions factors updated 1/4/2012 using Massachusetts-specific greenhouse gas emissions factors.



Green Communities Requirements

Criterion 3: Baseline Usage by Energy Type in MMBTUs

- ❖ **Baseline Year:** Fiscal Year 2018
- ❖ **Total Baseline Usage:** 114,309 MMBTUs



Green Communities Requirements

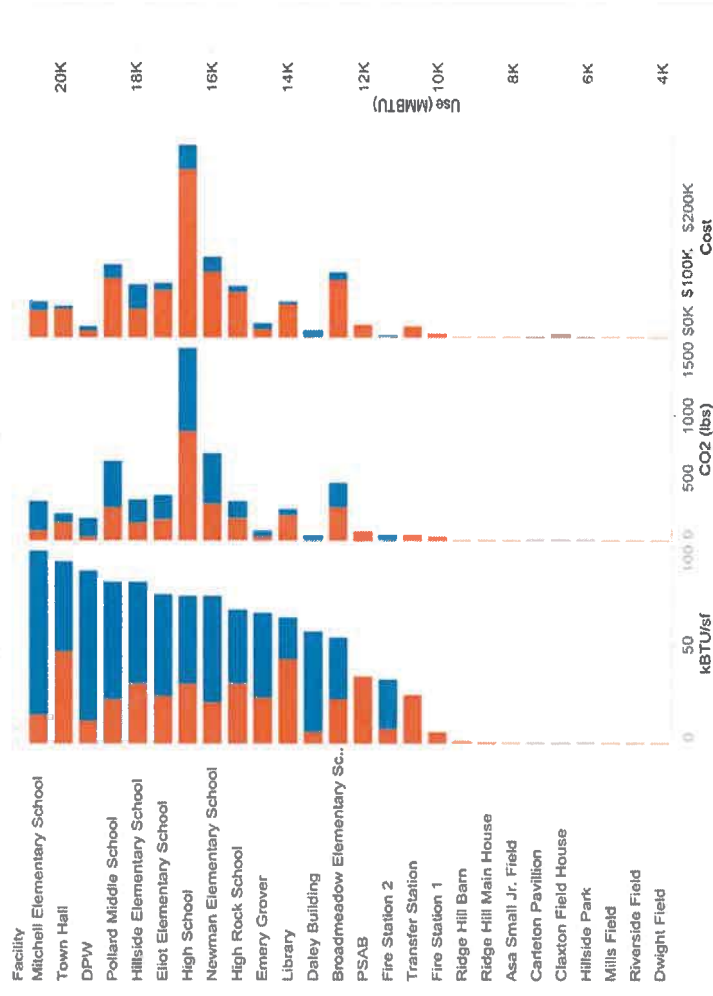
Criterion 3: ERP- Buildings to Target

Buildings to Target

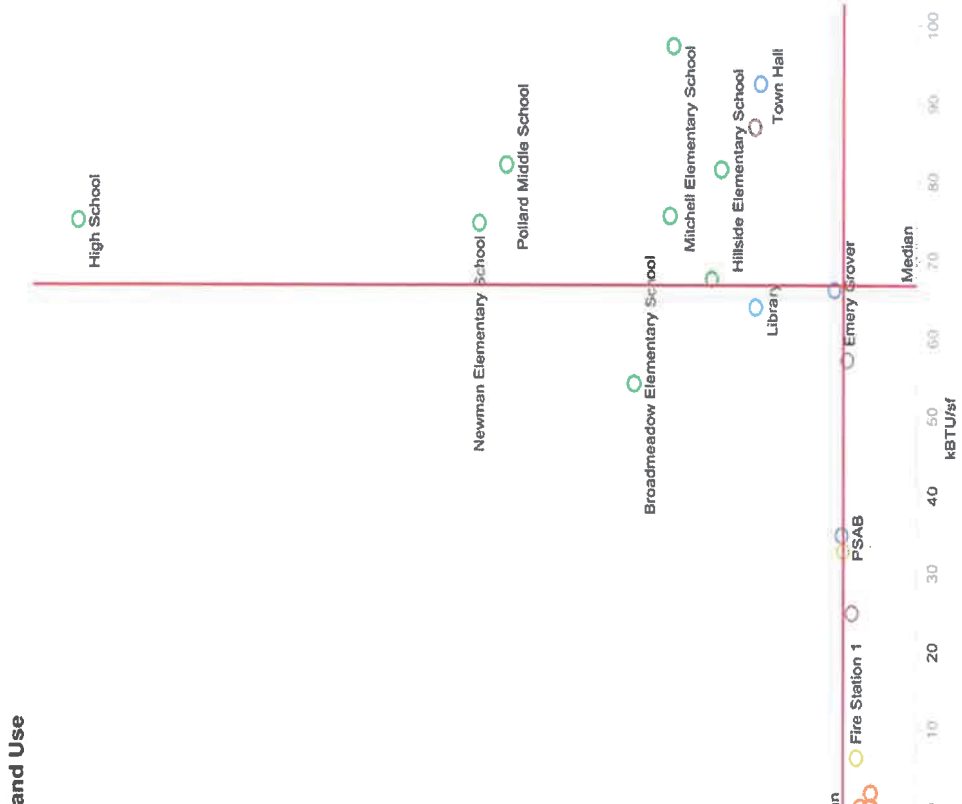
This dashboard compares buildings to one other on an energy use per area metric, measured as kBTU/square foot. In the quadrant chart on the right, buildings with the highest energy use and worst efficiency (as compared to other buildings in your portfolio) are in the upper right hand quadrant. Facilities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

Building Efficiency, Emissions and Cost

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

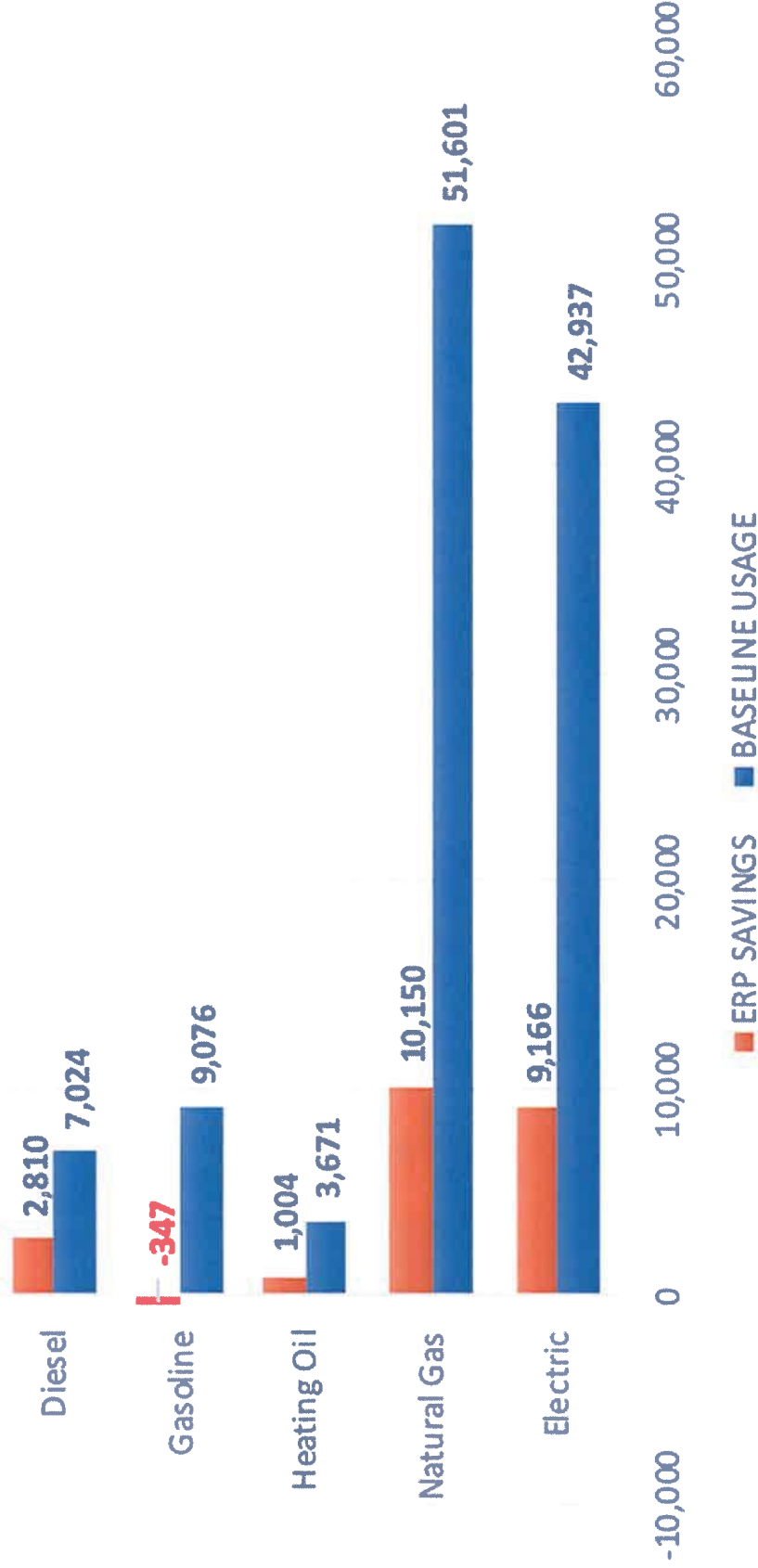


Select a building name above to see how efficient it is compared to your other buildings. Lower numbers indicate greater efficiency.



Green Communities Requirements

Criterion 3: ERP Summary – ERP Savings Versus Baseline Usage



Green Communities Requirements

Criterion 3: ERP Savings by Energy Measure – Costs and Benefits

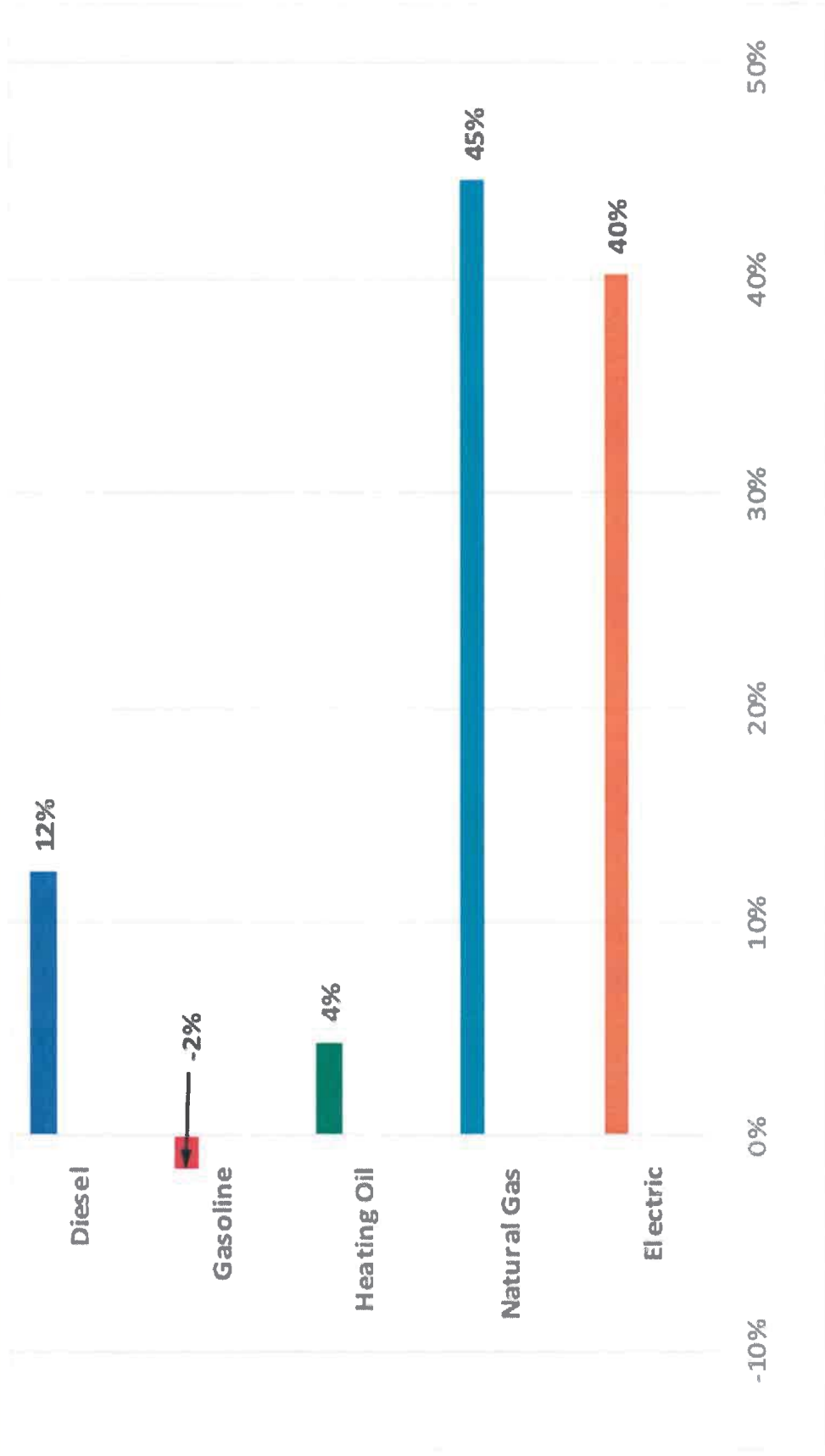
❖ ERP Savings Represents 20% of the FY 2018 Baseline

- 18% - Calculated ERP Savings; 2% - Estimated Additional ERP Savings

CALCULATED ERP SAVINGS						
ENERGY MEASURES	CALCULATED MMBTU SAVINGS	CALCULATED COST SAVINGS	ESTIMATED NET INSTALLED COST	SIMPLE PAYBACK	PERCENT CONTRIBUTION OF BASELINE CONSUMPTION	
Building Control	4,119	\$125,205	\$468,128	3.7		
Exterior Lighting	1,851	\$122,061	\$371,548	3.0		
Hot Water	56	\$980	\$75,049	75.8		
HVAC	1,988	\$68,873	\$875,333	12.7		
Interior Lighting	1,143	\$75,336	\$607,382	8.1		
Retrocmission	7,252	\$258,550	\$627,572	2.4		
Vehicles	683	\$18,996	\$15,000	0.8		
Weatherization	110	\$2,854	\$633,000	221.8		
Comprehensive Audits	2,949	\$123,675	\$9,268	0.1		
SUB-TOTAL	20,149	\$796,540	\$3,682,278	4.6	18%	
ADDITIONAL ESTIMATED ERP SAVINGS						
ENERGY MEASURES	ADDITIONAL MMBTU SAVINGS	ADDITIONAL ESTIMATED COST SAVINGS	ESTIMATED NET INSTALLED COST	SIMPLE PAYBACK	PERCENT CONTRIBUTION OF BASELINE CONSUMPTION	
Vehicles	1,780	\$44,880	\$70,000	1.6		
Comprehensive Audits	74	\$4,904	\$0	0.0		
Behavior & Training	779	\$27,766	\$100,000	3.6		
SUB-TOTAL	2,633	\$77,570	\$170,000	2.2	2%	
GRAND TOTAL	22,782	\$874,110	\$3,852,278	4.4	20%	

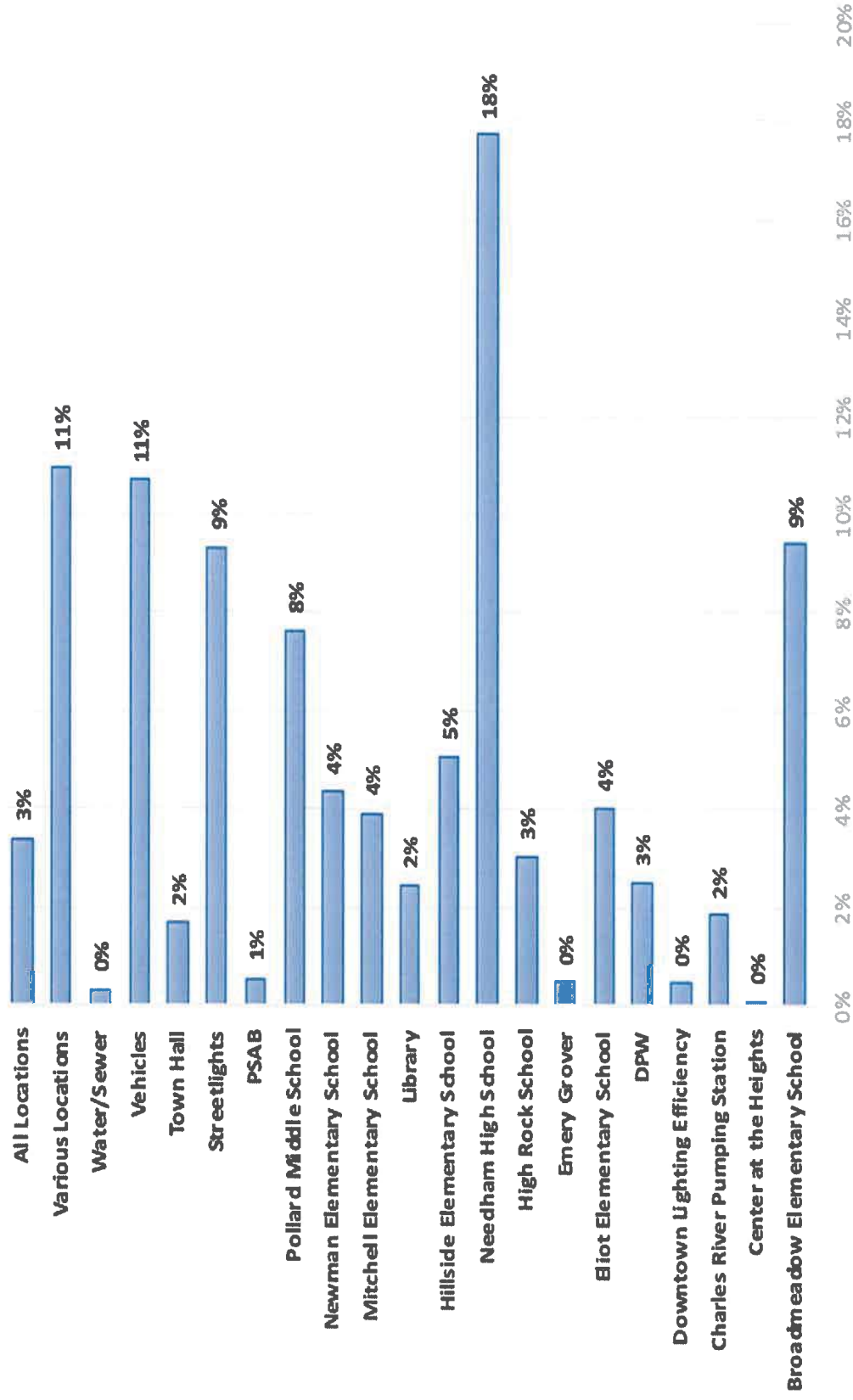
Green Communities Requirements

Criterion 3: Distribution of 20% ERP Savings by Energy Type



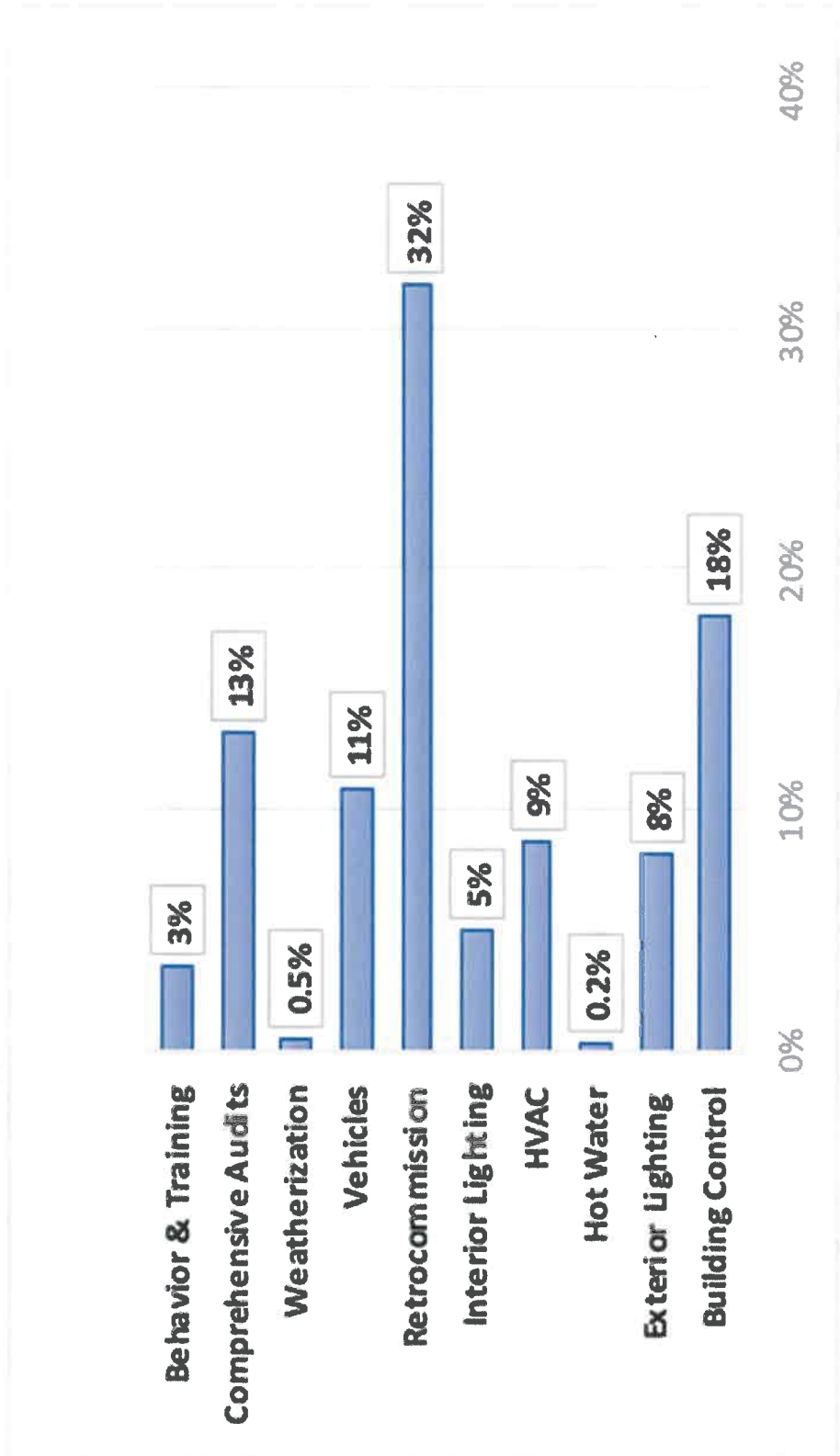
Green Communities Requirements

Criterion 3: Distribution of 20% ERP Savings by Location



Green Communities Requirements

Criterion 3: Distribution of 20% ERP Savings By Energy Measure



Green Communities Requirements

Criterion 3: ERP Project Status – Completed, Active and Planned

	MMBTU Savings	% Contribution of Total 20% ERP Savings	\$ Contribution of Total ERP Cost Savings	% Contribution of Total ERP Cost Savings	Net Installation Cost	% Contribution of Net Installation Cost
Completed	2,981	13%	\$180,001	21%	\$631,510	16%
Active	7,367	32%	\$244,638	28%	\$646,006	17%
Planned	12,435	55%	\$449,471	51%	\$2,574,761	67%
TOTAL	22,782	100%	\$874,110	100%	\$3,852,278	100%

Note: Net Installation Cost accounts for conservative estimates of utility incentives. The Town will apply for all applicable available incentives at the time of installation.

Green Communities Requirements

Criterion 4: Fuel-Efficient Vehicles

- ❖ **Requirement:** The Town is required to purchase only fuel-efficient vehicles for municipal and school use whenever such vehicles are commercially available and practicable.
- ❖ **Town Compliance:** The Town and School Department will consider adopting a fuel-efficient vehicle policy consistent with the requirements of the Green Communities Program.

Green Communities Requirements

Criterion 5: Stretch Code Adoption

- ❖ **Requirement:** The Town must require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.
- ❖ **Town Compliance:** On May 13, 2019, at its Annual Town Meeting, under Article 49, Needham Town Meeting Members voted to amend its General By-Laws by adding the Stretch Energy Code for the purpose of regulating the design and construction of buildings for the effective use of energy, pursuant to Appendix 115.AAA of the Massachusetts Building Code, 780 CMR, the “Energy Stretch Code”, including future additions, amendments, or modifications thereto.

Select Board of Needham

Policy Number:	SB – ADMIN.006
Policy:	Fuel Efficient Vehicle Policy
Date Approved/Select Board:	
Date Approved/School Committee:	

1. INTRODUCTION

The Select Board of Needham and the Needham School Committee have approved the following fuel-efficient vehicle policy to govern the replacement of all non-exempt municipal vehicles with fuel-efficient vehicles, as defined below.

2. POLICY STATEMENT

To reduce the Town of Needham's fuel consumption and energy costs, the Select Board and the School Committee adopt a policy to purchase only fuel-efficient vehicles to meet this goal, except as expressly set forth below.

3. APPLICABILITY

This policy applies to all divisions and departments of the Town of Needham.

4. DEFINITIONS

Combined City and Highway MPG (EPA Combined fuel economy) – Combined Fuel Economy means the fuel economy from driving a combination of 43 percent city and 57 percent highway miles and is calculated as follows:

$$\text{Combined City and highway MPG} = \frac{1}{\left(\frac{0.43}{\text{CityMPG}}\right) + \left(\frac{0.57}{\text{HighwayMPG}}\right)}$$

Drive System – The manner in which mechanical power is directly transmitted from the drive shaft to the wheels. The following codes are used in the drive field:

- AWD: All Wheel Drive: four-wheel drive automatically controlled by the vehicle power train system
- 4WD: 4 Wheel Drive: driver selectable four-wheel drive with 2-wheel drive option
- 2WD: 2-wheel Drive.

Heavy-Duty Vehicle – A heavy-duty vehicle is defined as a vehicle with a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds.

5. GUIDELINES

- 5.1 All departments/divisions will purchase the most fuel-efficient vehicles for municipal use (including police, fire and highway) whenever such vehicles are commercially available and practicable.
- 5.2 The Town of Needham will maintain an annual vehicle inventory for all vehicles and a plan for replacing any non-exempt vehicles that meet, at a minimum, the fuel efficiency ratings contained in the most recent guidance for Criterion 4 published by the MA Department of Energy Resources' Green Communities Division. The fuel efficiency ratings contained therein are based on the most recently published US Environmental Protection Agency combined city and highway MPG ratings for vehicles.
- 5.3 It is the responsibility of the Town of Needham to check the Green Communities Division's Guidance for Criterion 4 for updates prior to ordering replacement vehicles.

5.4 Exemptions

- Heavy-duty vehicles such as school busses, fire trucks, ambulances, and heavy-duty trucks
- Motorcycles
- Passenger and cargo vans
- Police cruisers

The Town of Needham commits to purchasing fuel-efficient cruisers, passenger vans and cargo vans when they become commercially available and practicable. Police and Fire Department administrative vehicles must meet fuel-efficient requirements.

- 5.5 Inventory An inventory of all Town vehicles is contained in Attachment A and shall be updated on an annual basis.

6. FUEL EFFICIENT VEHICLE REPLACEMENT PLAN

- 6.1 All non-exempt vehicles shall be replaced with fuel-efficient vehicles that meet the fuel efficiency ratings outlined in the Policy.
- 6.2 Vehicles shall be replaced when they are no longer operable and will not be recycled from one municipal department to another unless the recycled replacement vehicle meets the fuel efficiency ratings outlined in the Policy.
- 6.3 When an exempt vehicle is replaced, the function of the vehicle will be reviewed for potential replacement with a more fuel-efficient vehicle, including a fuel-efficient non-exempt vehicle.
- 6.4 The Town of Needham will review the Vehicle Inventory and the Green Communities Criterion 4 Guidance on an annual basis to review new acquisitions during the capital planning process.

7. QUESTIONS AND ENFORCEMENT

All inquiries should be directed to the department/division responsible for fleet management and/or fleet procurement. This Fuel-efficient Vehicle Policy will be enforced by the Town Manager/designee.

ECMs		Status			Energy Data (Projected Annual Savings)							Financial Data				Reference Data	
Building/Site Name	Energy Conservation Measure Name	ECM Type (select one from drop-down)	Status (select one from drop-down)	Status Date (month/yr completed or planned)	Electricity Savings (kWh)	Natural Gas (therms)	Oil (gallons)	Projected Annual Propane Savings (gallons)	Gasoline (gallons)	Diesel (gallons)	Projected Annual Cost Savings (\$)	Total Installed Cost (\$)	Green Community Grant (\$)	Utility Incentives (\$)	Net Cost (\$)	Funding Source(s) for Net Costs	Source for Projected Savings
Broadmeadow Elementary Sc..	BMS Upgrade to Struxureware	Building Control	Active	Sep-21	29,098	4,600					\$14,689	\$19,515			\$19,515	Capital Plan	See Appendix
Broadmeadow Elementary Sc..	Demand Control Ventilation	HVAC	Planned	Jun-22	16,586	4,753					\$12,145	\$48,000	\$21,000	\$4,147	\$22,853	Future	2014 EMA Audit
Broadmeadow Elementary Sc..	Corridor Lighting (easif)	Interior Lighting	Complete		42,409						\$9,542	\$6,447			\$6,447	Operating	2014 EMA Audit
Broadmeadow Elementary Sc..	Gym Lighting	Interior Lighting	Planned		14,371						\$3,233	\$11,040		\$4,000	\$7,040	Capital Plan	2014 EMA Audit
Broadmeadow Elementary Sc..	Domestic Hot Water Replacement	Hot Water	Complete			559					\$990	\$75,049			\$75,049	Capital Plan	Calculation by N. Hill, CEM, LEED-AP
Broadmeadow Elementary Sc..	VFD & Motor	HVAC	Complete		10,227						\$2,301	\$1,000			\$1,000	Operating	Calculation by N. Hill, CEM, LEED-AP
Broadmeadow Elementary Sc..	Upgrade Classroom lighting	Interior Lighting	Planned		21,758						\$4,896	\$93,625		\$32,100	\$81,525	Future	Based on EMG Audit
Broadmeadow Elementary Sc..	Performance Cir Lighting	Interior Lighting	Complete		20,149						\$4,534	\$16,920			\$16,920	Capital Plan	Based on EMG Audit
Broadmeadow Elementary Sc..	Retrocommission	Retrocommission	Active		77,454	3,926					\$24,376	\$23,472			\$23,472	Capital Plan	Based on USEPA and others, see Appendix
Center at the Heights	BMS Upgrade to Struxureware	Building Control	Active		6,420	9					\$1,480	\$10,793			\$10,793	Capital Plan	See Appendix
Center at the Heights	Demand Control Ventilation	Building Control	Planned		1,209	7					\$285	\$7,200			\$7,200	Future	See Appendix
Charles River Pumping Station	Energy Audit	Comprehensive	Active		89,202	1,248					\$22,279	\$9,268			\$9,268	Capital Plan	AEGOM audit to be completed Fall 2019
Downtown Lighting Efficiency	Upgrade lighting from HPS to LED	Exterior Lighting	Planned	Dec-19	30,502						\$6,863	\$20,062			\$20,062	Capital Plan	Calculation by N. Hill, CEM, LEED-AP
DPW	Boiler Replacement	HVAC	Planned	Jun-20		4,112					\$7,278	\$460,000			\$460,000	Capital Plan	17.5% est savings based on similar projects
DPW	Retrocommission	Retrocommission	Planned		11,815	1,316					\$4,987	\$28,300			\$28,300	Future	Based on USEPA and others, see Appendix
Eliot Elementary School	BMS Upgrade to Struxureware	Building Control	Active	Jun-20	16,002	1,133					\$5,606	\$19,207			\$19,207	Capital Plan	See Appendix
Eliot Elementary School	Retrocommission	Retrocommission	Active	Jun-19	53,340	3,778					\$18,688	\$57,000			\$57,000	Capital Plan	Based on USEPA and others, see Appendix
Eliot Elementary School	Upgrade Classroom lighting	Interior Lighting	Planned		17,197						\$3,869	\$96,875		\$30,000	\$56,875	Future	Based on EMG Audit
Eliot Elementary School	Demand Control Ventilation	Building Control	Planned		3,215	949					\$2,402	\$9,000			\$9,000	Future	See Appendix
Eliot Elementary School	VFD & Motor	HVAC	Complete	Jun-19	23,862						\$5,369	\$2,000			\$2,000	Operating	Calculation by N. Hill, CEM, LEED-AP
Emery Grover	Roof Replacement	Weatherization	Planned	Jun-21			451				\$1,631	\$235,000			\$235,000	Capital Plan	Calculation by N. Hill, CEM, LEED-AP
Emery Grover	Window Replacement	Weatherization	Planned	Jun-20			398				\$1,223	\$398,000			\$398,000	Capital Plan	Calculation by N. Hill, CEM, LEED-AP
High Rock School	BMS Upgrade to Struxureware	Building Control	Active		15,161	605					\$4,481	\$26,515			\$26,515	Capital Plan	See Appendix
High Rock School	Corridor Lighting	Interior Lighting	Planned		5,010						\$1,127	\$71,205		\$23,560	\$47,625	Capital Plan	Based on EMG Audit
High Rock School	Retrocommission	Retrocommission	Planned		57,838	2,453					\$17,355	\$50,000			\$50,000	Capital Plan	Based on USEPA and others, see Appendix
High Rock School	Upgrade Classroom lighting	Interior Lighting	Planned		17,273						\$3,886	\$71,205		\$23,480	\$47,715	Future	Based on EMG Audit
High Rock School	Demand Control Ventilation	Building Control	Planned		3,486	616					\$1,874	\$16,000			\$16,000	Future	See Appendix
High School	Upgrade Classroom lighting	Interior Lighting	Planned		95,550						\$21,499	\$319,200			\$206,530	Future	Based on EMG Audit
High School	BMS Upgrade to Struxureware	Building Control	Active		76,136	4,134					\$24,447	\$121,993			\$121,993	Capital Plan	See Appendix

