The Town of Randolph

Energy Reduction Plan

Prepared by the Metropolitan Area Planning Council in collaboration with the Town of Randolph

In fulfillment of the
Massachusetts Green Communities Grant Program Criterion 3
Adopted by Town Council [insert date]
Adopted by School Committee [insert date]

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Purpose and Acknowledgements

[insert approval letter from Town Manager]

[insert approval letter from Superintendent]

A. List of Contributors:

Under the direction of Town Manager Brian Howard, Assistant Town Manager, Monica Lamboy and Municipal Energy Manager Kai Mueller collaborated with MA Department of Energy Resource's Green Communities Regional Coordinator Lisa Sullivan and MAPC on the development of this plan.

Much of the information in this plan was derived from energy audits performed by Trane US Inc. led by Morgan Perras, Deanna Fava, and Atul Gupta. Additional technical assistance was provided by the Metropolitan Area Planning Council (MAPC) for the development of this plan.

II. Executive Summary

A. Narrative Summary of the Town

Located in Norfolk County, the Town of Randolph was incorporated in 1793 and covers an area of 10.5 square miles. The town has a population of approximately 35,000 (2020 Census). Randolph borders the

towns of Avon, Holbrook, Braintree, Quincy, Milton, and Canton. Known as a town that possesses the tranquility of a small New England town and the vibrant fabric of a diverse community with good access to transportation networks, Randolph prides itself on its unique diversity, inclusion, and progressive nature. The town is at the crossroads of Interstate 93 and Route 24 and is connected by the commuter rail service on the Fall River/New Bedford line, linking directly to South Station.

The Town is governed by the Town Council, which has 9 members who serve 2-year terms. Randolph has a Master Plan Implementation Committee (MPIC) that functions in an advisory capacity to the Town manager, officials, and residents, regarding their Comprehensive Master Plan. The Plan has multiple goals and objectives, including but not limited to promoting sustainable land use and development practices, increasing the quantity and quality of affordable housing, and preserving wildlife.

It is served by National Grid and Eversource for its energy utility needs including electricity and natural gas. Pursuant to criterion 5 set by Massachusetts on becoming a Green Community, Randolph passed the Stretch Energy Code in 2025.

B. Summary of the Green Communities Program

Municipalities in Massachusetts must meet five criteria to earn Green Communities Designation from the Massachusetts' Department of Energy Resources:

- Pass zoning in designated locations for as-of-right siting of renewable or alternative energy generating facilities, research and development facilities, or manufacturing facilities.
- Adopt expedited process and permitting (maximum 1 year) under which facilities interested in locating their facility in a designated renewable zone may be sited within the municipality.
- Establish a baseline energy use inventory for municipal buildings, open spaces, streetlights and traffic lights, and water infrastructure and adopt a plan to reduce municipal energy use by 20% over 5 years.
- Adopt a fuel-efficient vehicle policy, develop an inventory of all municipal vehicles, and provide a plan for replacing non-exempt vehicles meeting certain fuel efficiency requirements.
- Adopt the Stretch Code.

Once a municipality meets these five requirements, the municipality is eligible for grants to finance energy efficiency and renewable energy projects in municipal facilities. Green Communities grants help municipalities increase energy efficiency, reduce energy bills, and reduce carbon emissions. By creating this Energy Reduction Plan, the Town of Randolph commits to work towards reducing municipal energy usage by 20% over the next five years (2026-2031). The Town of Randolph will actively pursue this goal through competitive grants, energy conservation measures (ECMs), and updates to its vehicle fleet. This Energy Reduction Plan is meant to serve as an outline for the Town to achieve its goal.

The Town is not bound to implementing all ECMs identified in the plan and has flexibility to change which ECMs it pursues after designation. This may especially be the case if the municipality conducts additional audits. The Town will not direct budgeted funds to a potential energy reduction project at the expense of school or municipal services. If the Town does not meet its energy reduction goal within the five-year timeframe, the Town will remain focused on advancing energy reduction initiatives and working toward more sustainable and efficient operation of its facilities.

C. Summary of Municipal Energy Uses

The Town's municipal energy usage comes from municipal buildings, municipal vehicles, recreational spaces. Table 1 provides a breakdown of the number of facilities in Randolph.

- **Municipal Buildings.** The Town has 26 municipal buildings, including 5 school buildings, 7 administrative buildings, 2 public safety buildings, 4 recreational facilities, and 1 building used for residential purposes.
- **Vehicles.** There Town manages 72 municipal vehicles and 57 school vehicles. Of these, 116 vehicles are exempt and 13 are non-exempt from the Town's Vehicle Procurement Policy
- (Criteria 4 of the Green Communities program). The Town's fleet consists of both gasoline and diesel fuel vehicles.
- **Street and traffic lights.** The Town manages approximately 2,500 streetlights and 14 traffic lights.
- **Drinking Water Pump Stations.** There are 13 pump stations scattered throughout the Town.
- **Open Spaces.** The town has multiple open spaces including Belcher Park and Powers Farm, and it abuts the Blue Hills Reservation.

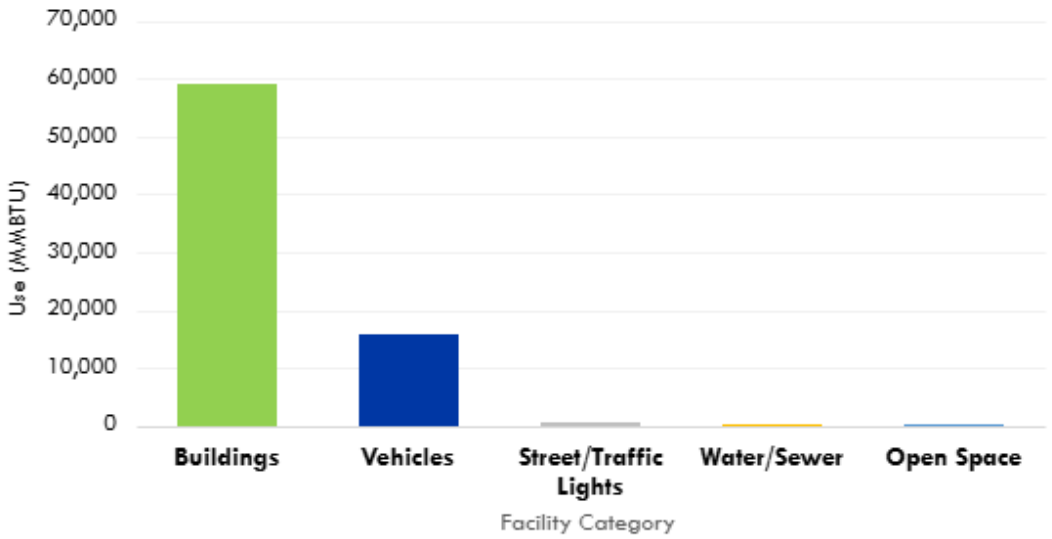
Table 1: Municipal Energy Use Summary

Subcategory	Number
Buildings	**26**
Oil Heat	1
Natural Gas Heat	22
Propane Heat	0
Biomass Heat	0
Other Heat Type	0
Electric or No heat	3
Vehicles	**129**
Gasoline or Diesel	129 *(57 are school)*
Hybrid	0
Electric	0
Streetlights & Traffic Lights	**2,514**
Streetlights	2,500
Traffic Lights	14
Water and Sewer	**13**
Drinking Water Treatment Plant	0
Drinking Water Pumping Stations	13
Wastewater Treatment Plant	0
Wastewater Pumping Stations	0

D. Summary of Energy Use Baseline and Plans for Reduction

In the baseline year (FY 2024), the Town used 75,968 MMBTUs of energy. This Energy Reduction Plan commits The Town of Randolph to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2024 over five years. The Town of Randolph's 20% energy reduction goal will be measured against the non-weather normalized baseline of MMBTUs. This means the Town must reduce usage by at least 15,194 MMBTUs.

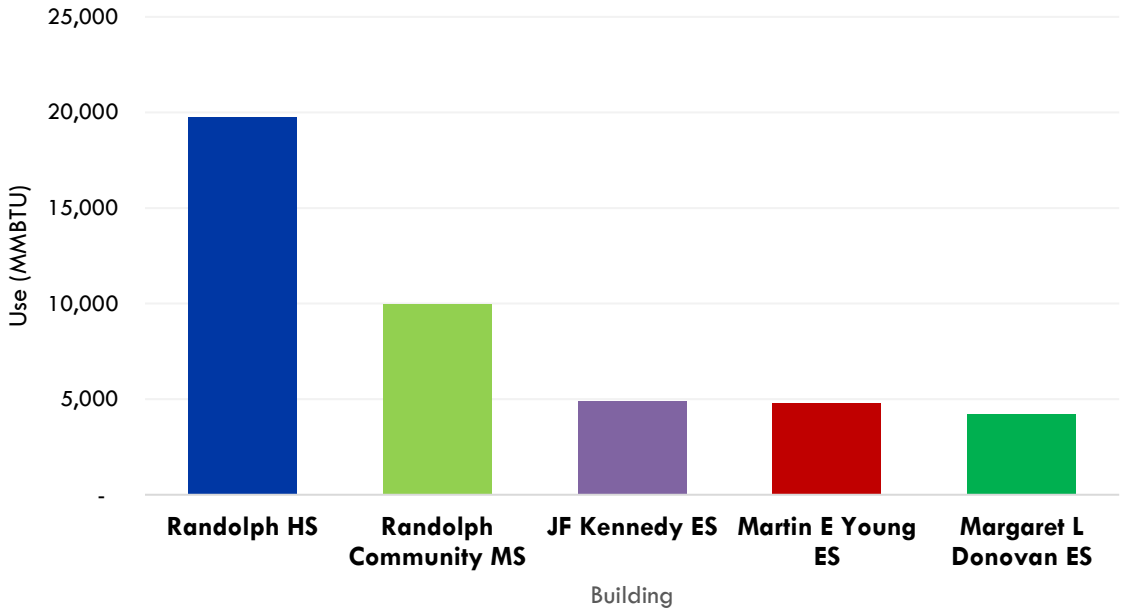
Figure 1. Municipal Energy Use Baseline (FY 2024) by Facility Category



As shown in **Figure 1**, buildings made up over 78% of the usage by facility type (i.e. building, vehicles, street/traffic light, water/sewer, and open space), followed by vehicles at 20.6%. Within buildings, schools generally account for a large share of the energy usage.

Figure 2 shows the energy usage of the top five energy consuming facilities. Randolph High School has the largest energy use among municipal buildings at 19,759 MMBTU (26% of the total energy usage of the town), followed by four other schools. Town Hall and the Joseph J. Zapustas Ice Arena are the sixth and the seventh largest energy consuming facilities, respectively.

Figure 2. Municipal Energy Use Baseline (FY 2024) by Building



The Town of Randolph has identified energy savings measures in each facility category to reduce energy use 20.6% based on the total non-weather normalized usage, as illustrated in **Table 2**.

Table 2: Summary of Municipal Energy Use & 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	59,597	78.5%	13,221	17.4%
Vehicles	15,674	20.6%	2,450	3.2%
Street/Traffic Lights	596	0.8%	-	0.0%
Water/Sewer	251	0.3%	-	0.0%
Open Space	116	0.2%	-	0.0%
Total Energy Use	**75,968**	**100.0%**	**15,671**	**20.6%**

The planned projected MMBTU Savings for vehicles refers to calculations done in Table 5 on page 24. These savings may be achieved if the Town chooses to pass an anti-idling policy, use synthetic oils, and chooses to closely monitor tire air pressure and the use of fuel efficient

tires. These are projected savings if the Town chooses to go down any of the aforementioned routes.

III. Energy Use Baseline Inventory

A. Identification of the Inventory Tool Used

The Town of Randolph used the Department of Energy Resources' (DOER) MassEnergyInsight (MEI), a web- based energy inventory and analysis tool. Energy use is measured in British thermal units (MMBTUs), which allow all fuel types (e.g. electricity, natural gas, diesel, etc.) to be converted to a common unit. See Appendix E for the conversions used.

B. Identification of the Baseline Year

The Fiscal Year 2024 will serve as the baseline year. It ran from July 1, 2023, to June 30, 2024. This will give the Town until July 1, 2031 (FY2026 – FY2031) to reach its 20% energy reduction goal.

C. Municipal Energy Consumption for the Baseline Year (FY 2024)

Appendix A presents **Table 3A** that shows energy use for each municipal facility in native units and MMBTUs in the Baseline year. Note that Appendix A shows non-weather normalized data, because MEI only provides weather-normalized data for total town usage and fuel type. In the baseline year, the Town used 75,968 MMBTUs of energy. 5 buildings alone comprised 57% of this total energy use (as shown in Table 3b).

Table 3b. Top 5 Energy Consuming Facilities in Randolph

Facility	MMBTUs	Percent of FY24 Baseline
Randolph HS	19,759	26%
Randolph Community MS	9,978	13%
JF Kennedy ES	4,906	6%
Martin E Young ES	4,809	6%
Margaret L Donovan ES	4,202	6%
Total FY 2024 Usage for Top Five	**43,655**	**57%**
Total FY 2024 Usage Baseline	**75,968**	**100%**

Natural gas was the fuel type that contributed to the most energy use in the Town's energy use baseline as shown in Figure 3.

Figure 3. Energy Usage in FY 2024 By Fuel

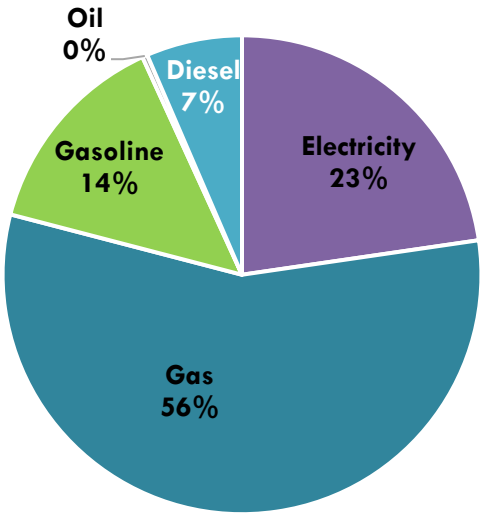
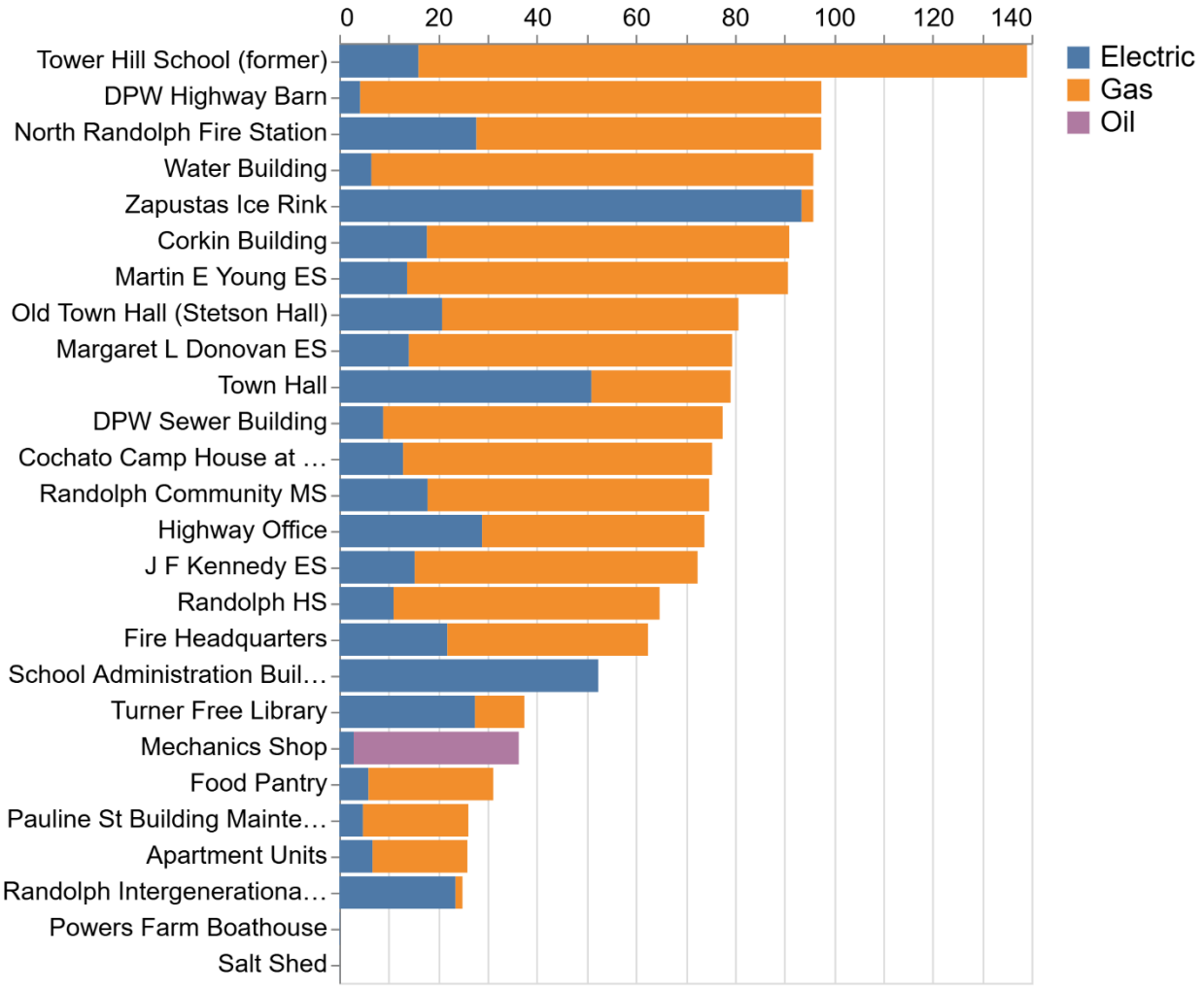


Figure 4a. Energy Use Intensity (kBTU/sf) vs MMBtu by Building Subcategory

Energy Use Intensity (EUI) is a measure of the energy used per square foot, with lower EUIs indicating more efficient buildings. Buildings with a higher EUI generally have more opportunities for cost-effective energy efficiency upgrades.

In Figure 4, points further to the right have a higher EUI, which signifies a higher use per square foot (i.e. less energy efficient). Points that are more vertical use more total energy. The former Tower Hill School (depicted as the pink dot in the Vehicle Maintenance Buildings sub-category), for example, has a relatively high usage per square foot than all of the other town and school buildings. Red lines show the medians for the Town's buildings. For more detail on the Energy Use Intensity per square foot for each building, refer to Figure 4b below.

Figure 4b. Energy Use Intensity (kBTU/sf) by Building



D. Existing Energy Management Processes

With the Town's new Municipal Energy Manager, the Town Manager's Office is equipped to take a leadership role in managing energy for the town and to collaborate with the Superintendent and School Facilities Director on energy management of the schools. Vehicles and equipment are purchased by each department individually, subject to funding available or approved by the Town Council.

E. Energy Reduction Goal

The Town of Randolph's 20% energy reduction goal will be measured against the non-weather normalized baseline of 75,968 MMTBUs. The Town will need to reduce its non-weather normalized energy consumption by at least 15,194 MMBTUs over a five-year period.

The Town will focus on reducing energy consumption in its least efficient and top energy consuming buildings through a combination of mechanical, lighting, and weatherization and building envelope measures. The Town is also considering behavioral measures such as a School Behavior Based Savings Program.

IV. Energy Reduction Plan

A. Narrative Summary

The Town has identified energy saving measures to reduce non-weather normalized usage from FY 2024 by 15,671 MMBTUs or 20.6% (as shown in Table 4, pages 17-19). Energy conservation measures include mechanical, weatherization, and lighting upgrades. The measures are summarized in the following sections.

This Energy Reduction Plan is meant to serve as a guide and provide a roadmap for the Town to work on to achieve its goal. The Town is not bound to implement all selected Energy Conservation Measures (ECMs) identified in the plan. After becoming a Designated Green Community, the Town has the flexibility to change its pursued ECMs, especially after doing deeper audits with a selected vendor. These measures will also translate to reduced operations and maintenance costs. Behavioral and policy measures related to Randolph's public schools and vehicle fleet have been calculated to provide additional savings for the Town's consideration throughout the five-year plan.

The following sections provide a building-level summary of planned energy conservation measures

i. Overview of Goals for Years 1-3:

Energy Management Processes

The scheduling of projects and buildings to focus on provides a guideline but will be reevaluated on a year-to-year basis to determine the Town and School's best course of action to take as well as unforeseen factors that could push back or move forward on a project. The Town Manager's Office

and the School's Superintendent Office will manage the order and timing of implementing energy reduction projects by taking the following measures on a year-to-year basis:

- Create a process and schedule to regularly review and check set points, particularly in largest buildings;
- Plan to develop energy efficient purchasing policy;
- Plan to amend certain job descriptions with Green Communities implementation responsibilities;
- Coordinate implementation items with all essential personnel and evaluate all potential School Department projects with their capital expenditure plan.

Energy Conservation Measures
During years 1-3 the Town has identified the following buildings and associated energy conservation measures for implementation.

Year 1

Town Hall

- Lighting
    - Converting any non-LED lamp or fixture to a new LED lamp or fixture; add occupancy sensors and daylight sensors where it is most economical.
- HVAC
    - New energy-efficient RTUs; right-size & optimize zones
- Control
    - BMS

Stetson Hall

- HVAC
    - New energy-efficient HVAC equipment; right-size and optimize zones
- Control
    - BMS
- Building Envelope
    - Penetration Air Sealing; Window Weatherization

Fire HQ

- Lighting
    - Converting any non-LED lamp or fixture to a new LED lamp or fixture; add occupancy sensors and daylight sensors where it is most economical.

Multiple School Buildings

- Control
    - BMS

Young Elementary

- HVAC
    - New boiler

JFK Elementary

- HVAC
    - New boiler

Year 2

Randolph High School:

- Building Envelope
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)
- Exploratory decarbonization and electrification study

Town Hall:

- Building Envelope
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)

Fire Station 2:

- Building Envelope
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)

Joseph J. Zapustas Ice Arena:

- Explore Building Envelope Improvements
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)

Year 3

Randolph Community Middle School:

- Building Envelope
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)
- Exploratory decarbonization and electrification study

Randolph High School:

- HVAC improvements

Former Tower Hill School:

- Building Envelope
    - Door Weather Stripping; Overhang Air Sealing; Overhead Door Weather Stripping; Penetration Air Sealing; Roof-Wall Intersection Air Sealing; Window Weatherization (Glazing Corners)

Multiple Buildings

- Exploratory solar and battery storage study

Joseph J. Zapustas Ice Arena:

- Explore ice-making machine

ii. Overview of Goal for Years 4-5:

Energy Management Processes

The same philosophy behind the goals of years 1-3 remain with project goals in years 4-5. All projects and buildings will be reevaluated on a year-to-year basis to determine immediate need and compliance with the direction of essential personnel and committees. Logically, projects in years 4-5 are those that may take a longer time to implement either in scope or cost and therefore have been pushed back for the purpose of this Energy Reduction Plan. However, circumstances are open to change depending on the direction and year-to-year reevaluation by the Town.

Energy Conservation Measures

During years 4-5 the Town has identified the following buildings and associated energy conservation measures for implementation.

Years 4 and 5

Multiple Buildings:

- Implement selected decarbonization and electrification measures
- Implement identified solar projects

iii. Energy Efficiency Identification Measures:

- The Town of Randolph should continue to utilize MEI to review data and identify if year-over-year trends are occurring as expected. Unexpected increases or the failure of some categories to decrease despite known interventions/retrofits should prompt further inquiry.
- Use MEI's building "Buildings to Target" tab to identify underperforming and/or wasteful buildings based on Energy Use Intensity (see Figure 4 above).
- Conduct research and talk with experts such as energy auditors, DOER, MAPC, Massachusetts Clean Energy Center and others to find out if new technologies have come to market that could provide new savings in existing facilities. MAPC recommends exploring Massachusetts Clean Energy Center's Commercially Ready Technology's list. See http://www.masscec.com/.

iv. Funding

The total amount of funding needed, after incentives, to complete the projects identified in this ERP is nearly $13.7 million After the Town's Designation Grant funding of $230,000 is expended, the Town would be eligible for up to $250,000.00 annually through Green Communities Competitive Grant program. All prior projects must be completed before applying for additional funds each year – which may mean the Town does not apply for funding each consecutive year, depending on project

timelines. The Town will need to complement the grant funding with local investments and other grant funding sources in order to achieve its goal over the next five year. The funding recommendations are based on past programmatic structure and timing for the Green Communities Competitive Grant program.

The Town will also need to leverage supplemental grant funding to support achieving its 20% reduction over the five years. The Town may consider pursuing MSBA (Massachusetts School Building Authority - https://www.massschoolbuildings.org/programs) funding to support energy conservation measures implemented at the schools. Another funding source that the Town intends to pursue, due to its standing as an MVP community, is Municipal Vulnerability Preparedness Action Grant Funds. Where there is overlap between preparedness and energy conservation measures, the Town will seek to support its energy reduction goals in this way. The Town will actively pursue other applicable grants when they become available and utilize resources available from MAPC and DOER to identify viable opportunities over the course of the five years.

B. Path to 20% Energy Use Reduction by the end of FY 2031

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

Document Tracking

The Town of Randolph will store all files for Green Communities, including this Energy Reduction Plan, audits, and MEI login credentials, in a cloud-based folder on the Town's computer server. Once designated, the Town will also store its annual reports, grant closeout paperwork, and grant application materials in this folder.

Green Communities Administration Lead & Point of Contact

The Town's Assistant Town Manager, Monica Lamboy, will be the Town's Administrative Lead/Point of Contact for Green Communities activities. The Town's Municipal Energy Manager, Kai Mueller, will be responsible for preparation and submission of the Town's annual reports, grant applications, and grant project related reporting. Mueller will also be responsible for providing annual updates to the Town Council on the Town's progress towards the 20% reduction goal over the next five years.

MEI Maintenance Lead

Municipal Energy Manager, Kai Mueller, will be responsible for maintaining and updating the Town's MEI data.

Energy Conservation Measure Implementation Lead

Assistant Town Manager Monica Lamboy and Municipal Energy Manager Kai Mueller will be responsible for implementation of energy conservation measures, quarterly updates, and coordination of additional necessary building audits. The Town Manager's Office and the School Superintendent will also be responsible for leading implementation at the schools.

Regular Evaluation and Tracking

Municipal Energy Manager Kai Mueller will be responsible for regular evaluation and tracking.

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

Building audits were conducted by Trane US Inc. in the Spring and Summer of 2025. The audit report, submitted on October 16, 2025, provides a wide variety of ECMs recommended to achieve 17.4% energy savings (15,194 MMBTUs). The ECM categories include upgrading lighting with LED, building envelope improvement, HVAC upgrades, and others. The Audit Report is included in **Appendix B**.

Vehicle policy and maintenance measures targeting overall vehicle usage will provide another 3.2% energy savings (2,450 MMBTUs). The supporting documentation for these policy and maintenance measures are available in **Appendix C**.

MAPC developed estimates for energy savings through building operator certification trainings and **behavior-based energy programs** in schools, based on published research from the report Powering Down from the US Green Building Council's Center for Green Schools. These supplementary measures identify 1.08% additional energy savings (824 MMBTUs). The supporting documentation is included in **Appendix D**.

iii. Energy Conservation Measures

Table 4 lists recommended energy conservation measures. References for each measure is 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, water and sewer) are subtotaled to arrive at a municipal grand total of 15,671 MMBTUs.

Table 4. Estimated Energy Savings in Randolph Municipal Facilities

Measure		Status	Energy Data				Financial Data						Reference	
Category/Building	Energy Conservation Measure	Status (Completed with month/year or Planned Quarter/year)	Projected Annual Energy Savings				Projected Annual Cost Savings ($)	Estimated Total Project Cost ($)	Green Communities Grant* ($)	Estimated Utility Incentives ($)	Estimated Cost After Utility Incentives ($)	Estimated Payback After Incentives (years)	Funding Source	Source for Energy Savings
			Electricity Savings (kWh)	Natural Gas Savings (therms)	Vehicle Gasoline (gallons)	Diesel Savings (Gallons)								
NATIVE UNIT TOTALS:			**5,063,444**	**430,171**	**86,629**	**4,932**	**247,553**	**$ 13,812,240**		**$ 311,635**	**$ 13,500,605**	**54.5**		
John F. Kennedy Elementary School	Lighting	**Planned FY26-31**	4,807				$1,250.26	$13,752.82		**$1,683**	**$12,070**	**9.7**	Performance Contract	Trane Energy Reduction Plan
Margaret L. Donovan Elementary School	Lighting	**Planned FY26-31**	3,603				$979.98	$10,779.74		**$1,261**	**$9,519**	**9.7**	Performance Contract	Trane Energy Reduction Plan
Martin E. Young Elementary School	Lighting	**Planned FY26-31**	4,500				$1,223.88	$13,462.71		**$1,575**	**$11,888**	**9.7**	Performance Contract	Trane Energy Reduction Plan
Randolph Community Middle School	Lighting	**Planned FY26-31**	9,380				$2,275.14	$25,026.55		**$3,283**	**$21,744**	**9.6**	Performance Contract	Trane Energy Reduction Plan
Randolph High School	Lighting	**Planned FY26-31**	39,420				$9,435.31	$103,788.37		**$13,797**	**$89,991**	**9.5**	Performance Contract	Trane Energy Reduction Plan
School Administration Building	Lighting	**Planned FY26-31**	6,047				$1,759.90	$19,358.91		**$2,116**	**$17,243**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Facilities Maintenance Building	Lighting	**Planned FY26-31**	16,104				$4,687.01	$51,557.16		**$5,636**	**$45,921**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Stetson Hall / Old Town Hall	Lighting	**Planned FY26-31**	10,074				$3,126.22	$34,388.38		**$3,526**	**$30,862**	**9.9**	Performance Contract	Trane Energy Reduction Plan
Town Hall	Lighting	**Planned FY26-7**	14,028				$3,313.22	$36,445.43		**$4,910**	**$31,535**	**9.5**	Performance Contract	Trane Energy Reduction Plan
North Randolph Fire Station 2	Lighting	**Planned FY26-31**	556				$149.19	$1,641.07		**$194**	**$1,447**	**9.7**	Performance Contract	Trane Energy Reduction Plan
Fire Headquarters	Lighting	**Planned FY26-7**	10,432				$2,540.13	$27,941.44		**$3,651**	**$24,290**	**9.6**	Performance Contract	Trane Energy Reduction Plan
Turner Free Library	Lighting	**Planned FY26-31**	2,317				$429.13	$4,720.39		**$811**	**$3,909**	**9.1**	Performance Contract	Trane Energy Reduction Plan
Joseph J. Zapustas Ice Arena	Lighting	**Planned FY26-31**	6,144				$2,565.76	$28,223.38		**$2,150**	**$26,073**	**10.2**	Performance Contract	Trane Energy Reduction Plan
Imagination Station Snack Shack	Lighting	**Planned FY26-31**	116				$29.10	$320.05		**$41**	**$279**	**9.6**	Performance Contract	Trane Energy Reduction Plan
Randolph Intergenerational Community Cer	Lighting	**Planned FY26-31**	0				$0.00	$0.00		**$0**	**$0**		Performance Contract	Trane Energy Reduction Plan
Belcher Park - Cochato Camp House	Lighting	**Planned FY26-31**	1,137				$1,333.43	$14,667.68		**$398**	**$14,270**	**10.7**	Performance Contract	Trane Energy Reduction Plan
Powers Farm Boathouse	Lighting	**Planned FY26-31**	130				$36.18	$397.95		**$45**	**$353**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Salt Shed	Lighting	**Planned FY26-31**	9				$2.55	$28.05		**$3**	**$25**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Sewer Building	Lighting	**Planned FY26-31**	983				$569.54	$6,264.96		**$344**	**$5,921**	**10.4**	Performance Contract	Trane Energy Reduction Plan
Corkin Building	Lighting	**Planned FY26-31**	1,443				$410.81	$4,518.86		**$505**	**$4,014**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Food Pantry	Lighting	**Planned FY26-31**	728				$207.51	$2,282.59		**$255**	**$2,028**	**9.8**	Performance Contract	Trane Energy Reduction Plan
Pauline Street Building	Lighting	**Planned FY26-31**	466				$132.85	$1,461.30		**$163**	**$1,298**	**9.8**	Performance Contract	Trane Energy Reduction Plan
John F. Kennedy Elementary School	Envelope	**Planned FY26-31**	961	645			$652.99	$5,876.93		**$1,110**	**$4,767**	**7.3**	Performance Contract	Trane Energy Reduction Plan
Margaret L. Donovan Elementary School	Envelope	**Planned FY26-31**	541	1,137			$838.22	$7,544.02		**$1,554**	**$5,990**	**7.1**	Performance Contract	Trane Energy Reduction Plan

Measure		Status	Energy Data				Financial Data						Reference	
Category/Building	Energy Conservation Measure	Status (Completed with month/year or Planned Quarter/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)	Vehicle Gasoline (gallons)	Diesel Savings (Gallons)								
Martin E. Young Elementary School	Envelope	**Planned FY26-31**	600	3,840			$2,497.34	$22,476.10		**$4,818**	**$17,658**	**7.1**	Performance Contract	Trane Energy Reduction Plan
Randolph Community Middle School	Envelope	**Planned FY28-9**	1,876	2,642			$2,000.26	$18,002.35		**$3,827**	**$14,175**	**7.1**	Performance Contract	Trane Energy Reduction Plan
Randolph High School	Envelope	**Planned FY27-8**	3,154	5,619			$3,908.20	$35,173.82		**$7,846**	**$27,328**	**7.0**	Performance Contract	Trane Energy Reduction Plan
School Administration Building	Envelope	**Planned FY26-31**	121	650			$449.90	$4,049.08		**$823**	**$3,226**	**7.2**	Performance Contract	Trane Energy Reduction Plan
Facilities Maintenance Building	Envelope	**Planned FY26-31**	483	450			$427.59	$3,848.34		**$709**	**$3,139**	**7.3**	Performance Contract	Trane Energy Reduction Plan
Stetson Hall / Old Town Hall	Envelope	**Planned FY26-7**	403	424			$404.83	$3,643.49		**$650**	**$2,993**	**7.4**	Performance Contract	Trane Energy Reduction Plan
Town Hall	Envelope	**Planned FY27-8**	2,104	371			$752.18	$6,769.63		**$1,182**	**$5,588**	**7.4**	Performance Contract	Trane Energy Reduction Plan
North Randolph Fire Station 2	Envelope	**Planned FY26-31**	333	217			$301.54	$2,713.88		**$377**	**$2,337**	**7.7**	Performance Contract	Trane Energy Reduction Plan
Fire Headquarters	Envelope	**Planned FY27-8**	209	165			$215.52	$1,939.66		**$271**	**$1,669**	**7.7**	Performance Contract	Trane Energy Reduction Plan
Turner Free Library	Envelope	**Planned FY26-31**	695	108			$267.80	$2,410.20		**$373**	**$2,037**	**7.6**	Performance Contract	Trane Energy Reduction Plan
Joseph J. Zapustas Ice Arena	Envelope	**Planned FY27-8**	3,686	23			$1,539.46	$13,855.11		**$1,318**	**$12,537**	**8.1**	Performance Contract	Trane Energy Reduction Plan
Randolph Intergenerational Community Cer	Envelope	**Planned FY26-31**	898	117			$420.69	$3,786.20		**$454**	**$3,332**	**7.9**	Performance Contract	Trane Energy Reduction Plan
Pauline Street Building	Envelope	**Planned FY26-31**	19	350			$245.06	$2,205.57		**$427**	**$1,779**	**7.3**	Performance Contract	Trane Energy Reduction Plan
John F. Kennedy Elementary School	Controls	**Planned FY26-7**	24,036	4,606			$9,129.75	$372,284.00		**$13,940**	**$358,344**	**39.3**	Performance Contract	Trane Energy Reduction Plan
Margaret L. Donovan Elementary School	Controls	**Planned FY26-7**	9,008	8,123			$7,387.28	$185,136.00		**$12,900**	**$172,236**	**23.3**	Performance Contract	Trane Energy Reduction Plan
Martin E. Young Elementary School	Controls	**Planned FY26-7**	10,500	4,250			$5,438.97	$291,500.00		**$8,775**	**$282,725**	**52.0**	Performance Contract	Trane Energy Reduction Plan
Randolph Community Middle School	Controls	**Planned FY26-7**	46,901	18,872			$22,413.47	$733,722.00		**$39,062**	**$694,660**	**31.0**	Performance Contract	Trane Energy Reduction Plan
Randolph High School	Controls	**Planned FY26-7**	65,700	32,106			$33,744.70	$1,677,500.00		**$61,522**	**$1,615,978**	**47.9**	Performance Contract	Trane Energy Reduction Plan
Facilities Maintenance Building	Controls	**Planned FY26-31**	2,147	1,500			$1,581.49	$83,600.00		**$2,551**	**$81,049**	**51.2**	Performance Contract	Trane Energy Reduction Plan
Stetson Hall / Old Town Hall	Controls	**Planned FY26-7**	5,037	2,422			$3,161.87	$140,476.00		**$4,669**	**$135,807**	**43.0**	Performance Contract	Trane Energy Reduction Plan
Town Hall	Controls	**Planned FY26-7**	29,225	1,592			$7,996.59	$22,500.00		**$12,139**	**$10,361**	**1.3**	Performance Contract	Trane Energy Reduction Plan
Town Hall	Controls	**Planned FY26-7**	2,900	152			$789.40	$7,500.00		**$1,197**	**$6,303**	**8.0**	Performance Contract	Trane Energy Reduction Plan
North Randolph Fire Station 2	Controls	**Planned FY26-31**	5,556	1,238			$2,703.28	$5,000.00		**$3,430**	**$1,570**	**0.6**	Performance Contract	Trane Energy Reduction Plan
Fire Headquarters	Controls	**Planned FY26-31**	3,477	942			$1,788.24	$12,500.00		**$2,347**	**$10,153**	**5.7**	Performance Contract	Trane Energy Reduction Plan
Turner Free Library	Controls	**Planned FY26-31**	2,317	154			$627.82	$26,800.00		**$996**	**$25,804**	**41.1**	Performance Contract	Trane Energy Reduction Plan
Department of Public Works Highway Office	Controls	**Planned FY26-31**	1,100	160			$341.59	$2,500.00		**$577**	**$1,923**	**5.6**	Performance Contract	Trane Energy Reduction Plan
Sewer Building	Controls	**Planned FY26-31**	197	392			$506.20	$2,500.00		**$539**	**$1,961**	**3.9**	Performance Contract	Trane Energy Reduction Plan
John F. Kennedy Elementary School	HVAC Upgrades	**Planned FY26-31**	4,807				$1,250.20	$32,000.00		**$1,682**	**$30,318**	**24.3**	Performance Contract	Trane Energy Reduction Plan
John F. Kennedy Elementary School	HVAC Upgrades	**Planned FY26-7**	9,614				$2,500.41	$1,520,000.00		**$3,365**	**$1,516,635**	**606.6**	Performance Contract	Trane Energy Reduction Plan
Margaret L. Donovan Elementary School	HVAC Upgrades	**Planned FY26-31**	5,405				$1,470.02	$24,000.00		**$1,892**	**$22,108**	**15.0**	Performance Contract	Trane Energy Reduction Plan
Martin E. Young Elementary School	HVAC Upgrades	**Planned FY26-7**	6,200				$1,686.24	$24,000.00		**$2,170**	**$21,830**	**12.9**	Performance Contract	Trane Energy Reduction Plan
Randolph Community Middle School	HVAC Upgrades	**Planned FY26-31**	14,070				$3,412.67	$60,000.00		**$4,925**	**$55,075**	**16.1**	Performance Contract	Trane Energy Reduction Plan
Randolph High School	HVAC Upgrades	**Planned FY28-9**	13,140				$3,145.10	$1,520,000.00		**$4,599**	**$1,515,401**	**481.8**	Performance Contract	Trane Energy Reduction Plan
Fire Headquarters	HVAC Upgrades	**Planned FY26-31**	1,739	235			$658.34	$60,000.00		**$891**	**$59,109**	**89.8**	Performance Contract	Trane Energy Reduction Plan

Measure		Status	Energy Data				Financial Data						Reference	
Category/Building	Energy Conservation Measure	Status (Completed with month/year or Planned Quarter/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)	Vehicle Gasoline (gallons)	Diesel Savings (Gallons)								
Pauline Street Building	HVAC Upgrades	**Planned FY26-31**	350	225			$253.88	$25,000.00		**$393**	**$24,607**	**96.9**	Performance Contract	Trane Energy Reduction Plan
John F. Kennedy Elementary School	Boilers	**Planned FY26-31**		2,763			$1,726.70	$1,440,000.00		**$3,316**	**$1,436,684**	**832.0**	Performance Contract	Trane Energy Reduction Plan
Margaret L. Donovan Elementary School	Boilers	**Planned FY26-31**		3,249			$1,974.82	$1,080,000.00		**$3,899**	**$1,076,101**	**544.9**	Performance Contract	Trane Energy Reduction Plan
Martin E. Young Elementary School	Boilers	**Planned FY26-31**		2,250			$1,367.60	$1,314,000.00		**$2,700**	**$1,311,300**	**958.8**	Performance Contract	Trane Energy Reduction Plan
Facilities Maintenance Building	Boilers	**Planned FY26-31**		1,500			$956.61	$864,000.00		**$1,800**	**$862,200**	**901.3**	Performance Contract	Trane Energy Reduction Plan
Stetson Hall / Old Town Hall	Boilers	**Planned FY26-31**		1,817			$1,199.40	$468,000.00		**$2,180**	**$465,820**	**388.4**	Performance Contract	Trane Energy Reduction Plan
Randolph Intergenerational Community Cer	Boilers	**Planned FY26-31**		335			$445.95	$180,000.00		**$402**	**$179,598**	**402.7**	Performance Contract	Trane Energy Reduction Plan
Food Pantry	Boilers	**Planned FY26-31**		350			$227.50	$41,400.00		**$420**	**$40,980**	**180.1**	Performance Contract	Trane Energy Reduction Plan
Stetson Hall / Old Town Hall	Replace Chiller	**Planned FY26-7**	8,059				$2,500.91	$350,000.00		**$2,821**	**$347,179**	**138.8**	Performance Contract	Trane Energy Reduction Plan
Joseph J. Zapustas Ice Arena	Replace Chiller	**Planned FY28-9**	78,000				$32,573.15	$580,000.00		**$27,300**	**$552,700**	**17.0**	Performance Contract	Trane Energy Reduction Plan
Martin E. Young Elementary School	Pumps	**Planned FY26-31**	12,500				$3,399.67	$50,000.00		**$4,375**	**$45,625**	**13.4**	Performance Contract	Trane Energy Reduction Plan
Randolph Community Middle School	Pumps	**Planned FY26-31**	16,500				$4,002.06	$56,000.00		**$5,775**	**$50,225**	**12.5**	Performance Contract	Trane Energy Reduction Plan
J F Kennedy ES	School Behavior Based Savings Program	**Planned FY26-31**	30,272				$4,238.00	$5,000.00		**$0**	**$5,000**	**1.2**	Grant Funding/Capital Investment	MAPC Calculations, Appendix D
Margaret L Donovan ES	School Behavior Based Savings Program	**Planned FY26-31**	21,840				$3,058.00	$5,000.00		**$0**	**$5,000**	**1.6**	Funding/Capital Investment	MAPC Calculations, Appendix D
Martin E Young ES	School Behavior Based Savings Program	**Planned FY26-31**	21,366				$2,991.00	$5,000.00		**$0**	**$5,000**	**1.7**	Funding/Capital Investment	MAPC Calculations, Appendix D
Randolph Community MS	School Behavior Based Savings Program	**Planned FY26-31**	69,939				$9,791.00	$5,000.00		**$0**	**$5,000**	**0.5**	Funding/Capital Investment	MAPC Calculations, Appendix D
Randolph HS	School Behavior Based Savings Program	**Planned FY26-31**	98,100				$13,734.00	$5,000.00		**$0**	**$5,000**	**0.4**	Funding/Capital Investment	MAPC Calculations, Appendix D
Buildings Subtotal	**MMBTU Saved:**	**13,221**	**768,509**	**105,990**	**-**	**-**	**$ 247,553**	**$ 13,812,240**	**$ -**	**$ 311,635**	**$ 13,500,605**	**54.54**		
Vehicle Policy	Policies that Affect Fleet Gas and Diesel Usage	**Planned FY26-31**		0	**2,450**	**-**					**$ -**		Funding/Capital Investment	MAPC Calculations, Appendix C
Vehicle Subtotal	**MMBTU Saved:**	**2,450**	**0**	**0**	**2,450**	**-**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**-**		
	Total MMBTU Saved	**15,671**	**2,622**	**10,599**	**2,450**	**-**								

*Please note that the 'Green Communities Grant' column is for reference only and will be filled in based on the designation and future competitive grant requests.

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

A. Municipal Buildings (including schools)

To better strategize for the long-term maintenance and management of municipal buildings, Town staff will work with school and town staff as well as outside consultants, when necessary, to assess and document the condition of major municipal and school buildings. 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.

B. Vehicles (including schools)

The Fuel-Efficient Vehicle policy will have become engrained within municipal purchasing practices after 5 years. The Town is committed to exploring and replacing vehicles with comparable battery electric, plug-in hybrid, and hybrid electric models, where feasible. While the Town will work towards complete electrification in the long run, the Town will likely be considering hybrid vehicles especially given the current market limitations on electric options for large vehicles. The Town will also seek to explore even more efficient policies and tracking systems to enable more efficiency. Additional measures include implementing an anti-idling policy, closely monitoring tire air pressure and using efficient tires, and 100% synthetic oil to reduce the number of annual oil changes needed. These additional measures, detailed in Table 5, provide more opportunity for energy savings and increase the town's savings from about 17.4% to 20.6%.

C. Perpetuating Energy Efficiency

An annual municipal audit by Town and Schools staff can tap into the knowledge of the employees who use and maintain the building 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 Town of Randolph 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.

The Town may consider developing an energy reinvestment plan/mechanism to reinvest the savings from energy conservation measures into additional energy efficiency measures.

V. Appendix A: Table 3A - Municipal Energy Consumption for FY 2024

Table 3a: Municipal Energy Use Baseline (FY2024)

Facility	Electric		Gas		Oil		Gasoline		Diesel		Total MMBTU
	kWh	MMBTU	therms	MMBTU	Gallons	MMBTU	Gallons	MMBTU	Gallons	MMBTU	
Corkin Building	14,811	51	2,090	209							**260**
DPW Highway Barn	9,915	34	7,460	746							**780**
DPW Sewer Building	7,657	26	2,022	202							**228**
Old Town Hall (Stetson Hall)	122,480	418	12,021	1,202							**1,620**
Pauline St Building Maintenance	6,402	22	969	97							**119**
School Administration Building	40,733	139									**139**
Town Hall	567,327	1,936	10,683	1,068							**3,004**
Cochato Camp House at Belcher Park	3,456	12	570	57							**69**
Powers Farm Boathouse	13	0									**0**
Randolph Intergenerational Community Center	247,881	846	512	51							**897**
Zapustas Ice Rink	855,254	2,918	730	73							**2,991**
Turner Free Library	215,600	736	2,672	267							**1,003**
Apartment Units	8,417	29	820	82							**111**
Fire Headquarters	73,225	250	4,643	464							**714**
North Randolph Fire Station	71,200	243	6,109	611							**854**
Highway Office	30,481	104	1,619	162							**266**
Salt Shed	17	0									**0**
Food Pantry	7,683	26	1,122	112							**138**
Mechanics Shop	6,847	23			1,922	267					**291**
Water Building	6,847	23	3,218	322							**345**
J F Kennedy ES	302,720	1,033	38,736	3,874							**4,906**
Margaret L Donovan ES	218,400	745	34,569	3,457							**4,202**
Martin E Young ES	213,680	729	40,801	4,080							**4,809**
Randolph Community MS	699,387	2,386	75,913	7,591							**9,978**

Randolph HS	981,000	3,347	164,123	16,412							**19,759**
Tower Hill School (former)	71,360	243	18,708	1,871							**2,114**
Buildings Subtotal	**4,782,793**	**16,319**	**430,110**	**43,011**	**1,922**	**267**					**59,597**
Pump Stations	172,979	590	61	6							**596**
Water/Sewer Subtotal	**172,979**	**590**	**61**	**6**							**596**
FB Merrick Cir HH 1-3	115	0									**0**
FB Merrick Cir HH 1-5	163	1									**1**
P95 N Main St Access Point (AP)	28	0									**0**
Traffic & Street Lights	64,224	219									**219**
Traffic and Fire	9,061	31									**31**
Street Lights/Traffic Lights Subtotal	**73,591**	**251**									**251**
Randolph HS field lights	28,400	97									**97**
Williams Gazebo	259	1									**1**
Fountain at Crawford Square park	5,422	18									**18**
Open Space Subtotal	**34,081**	**116**									**116**
Vehicles Subtotal							**86,629**	**10,742**	**35,483**	**4,932**	**15,674**
TOTAL ENERGY USE	**5,063,444**	**17,276**	**430,171**	**43,017**	**1,922**	**267**	**86,629**	**10,742**	**35,483**	**4,932**	**75,968**

VI. Appendix B: 2025 Energy Audit Report – TRANE

Please find the report here:
https://drive.google.com/file/d/1WE7X8Zww07d0L4otwyBNiLLqTxrYo8ya/view?usp=sharing

VII. Appendix C: MAPC Vehicle Calculations

Table 5: Policies that Affect Fleet Gas and Diesel Usage

Anti-Idling Policy**		Notes
All FY 2024 Gasoline Usage (Gallons)**	86,629	
All FY 2024 Diesel Usage (Gallons)	35,483	
Percent Savings	10%	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.*
Gallons Gasoline Saved per Year	8,663	
Gallons Diesel Saved per Year	3,548	
MMBTUs Saved per Year	**1,531**	
Closely Monitor Tire Air Pressure and Use Fuel Efficient Tires		
All FY 2024 Gasoline Usage (Gallons)	86,629	
All FY 2024 Diesel Usage (Gallons)	35,483	
Percent Savings	4%	Maintaining appropriate air pressure in vehicle tires can decrease that vehicles fuel consumption by as much as 4%.*
Gallons Gasoline Saved per Year	3,465	
Gallons Diesel Saved per Year	1,419	
MMBTUs Saved per Year	**613**	
Use 100% Synthetic Oil		
All FY 2024 Gasoline Usage (Gallons)	86,629	
All FY 2024 Diesel Usage (Gallons)	35,483	
Percent Savings	2%	The use of 100% synthetic oils reduces fuel consumption, the number of annual oil change and labor costs.*
Gallons Gasoline Saved per Year	1,733	

Gallons Diesel Saved per Year	710	
MMBTUs Saved per Year	**306**	
Total MMBTUs	**2,450**	
*http://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf		

VIII. Appendix D: MAPC Behavior-Based Energy Savings

A School Behavior-Based Energy Use Reduction Program will allow The Town of Randolph to not only better understand the inefficiencies in their building operations but will also help them implement programs that will work synergistically with their existing investments in energy infrastructure in school buildings. Further, this program can support or expand school curriculum by using "buildings as a teaching tool" for students. MAPC assumed a conservative 10% savings per year for electricity use in each school in Randolph. See Table 6.

Table 6: School Behavior-Based Savings Program

School	MMBTU Electricity FY 2024	Reduction from Program	MMBTU Saved Electricity (Annual)	kWh Saved Electricity (Annual)	Cost Savings Electricity (Annual)
J F Kennedy ES	1,033	10%	103.3	30,272	$4,238
Margaret L Donovan ES	745	10%	74.5	21,840	$3,058
Martin E Young ES	729	10%	72.9	21,366	$2,991
Randolph Community MS	2,386	10%	238.6	69,939	$9,791
Randolph HS	3,347	10%	334.7	98,100	$13,734
Total	**8,241**		**824**	**241,516**	**$ 33,812**

Schools in the region that have created a behavior-based energy conservation program have achieved dramatic reductions in electricity use, ranging from 20 to 30%, as a direct result of the behavior-based strategies. More information can be found in the Powering Down report the US Green Building Council's Center for Green Schools at http://centerforgreenschools.org/sites/default/files/resource-files/Behavior-based- Efficiency.pdf.

In 2016, four MAPC communities (Hamilton, Wenham, Salem and Swampscott), hired a consultant to oversee the implementation of a behavior-based energy reduction program in one school in each school district. The programs used a faculty lead to work with students that developed programs to ensure everyday energy savings – such as lights being turned off – as well as larger weekly savings, such as powering down all applicable electronics by end of day Friday. The programs also connected students to the facilities staff. In this way, students became an extension of the facilities staff to help monitor issues and check up on set

points.

Based on MAPC's program with the four schools, MAPC would recommend budgeting about $15,000 to $20,000 for a consultant. Hiring a consultant is recommended. Each school would also want to set aside about $500 to $1000 per year to pay for materials the students may need to implement their behavioral awareness programs.

The Town of Randolph also recently hired a Municipal Energy Manager through the Mass Save's Municipal Energy Manager Grant. Kai Mueller, who serves in this position, could be a valuable resource to support or oversee school-based behavioral energy programs.

IX. Appendix E: MMBTU Conversion Chart – DOER

MMBTU Conversion Chart

Fuel Energy Content of Common Fossil Fuels per DOE/EIA

BTU Content of Common Energy Units – (1 million BTU equals 1 MMBTU)

1 kilowatt hour of electricity = 0.003412 MMBTU 1 therm = 0.1 MMBTU

1 ccf (100 cubic foot) of natural gas = 0.1028 MMBTU (based on U.S. consumption, 2007) 1 gallon of heating oil = 0.139 MMBTU

1 gallon of propane = 0.091 MMBTU 1 cord of wood = 20 MMBTU

1 gallon of gasoline = 0.124 MMBTU (based on U.S. consumption, 2007) 1 gallon of E100 ethanol = 0.084 MMBTU

1 gallon of E85 ethanol = 0.095 MMBTU 1 gallon of diesel fuel = 0.139 MMBTU

1 gallon of B100 biodiesel = 0.129 MMBTU 1 gallon of B20 biodiesel = 0.136 MMBTU[3] 1 gallon of B10 biodiesel = 0.137 MMBTU 1 gallon of B5 biodiesel = 0.138 MMBTU[7]

1 barrel of residual fuel oil = 6.287 MMBTU