Town of Wareham, Massachusetts
Energy Reduction Plan

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

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

October 2018

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I. Purpose and Acknowledgements

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

Town of Wareham
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Wareham, MA 02571
E-mail: selectmen@wareham.ma.us

Town Administrator
Derek D. Sullivan
Phone: 508.291.3100, ext. 3110
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BOARD OF SELECTMEN
Alan H. Slavin, Chairman
Patrick G. Tropeano, Clerk
Peter W. Teitelbaum, Esq.
Anthony R. Scarsciotti, Jr.
Mary Bruce

October 9, 2018

To Whom It May Concern:

Please be advised that on October 9, 2018, the Wareham Board of Selectmen met at a duly noticed and regularly scheduled meeting and voted to adopt the Energy Reduction Plan for Criterion 3 of the Green Communities Application for Designation. The Board of Selectmen was given copies of the plan for review prior to the meeting.

The Selectmen voted unanimously to adopt the plan. The minutes of that meeting include the vote.

Signed in agreement,

Alan H. Slavin, Chairman

Patrick G. Tropeano, Clerk

Peter W. Teitelbaum, Esq.

Anthony R. Scarsciotti, Jr.

Mary Bruce

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

Wareham Public Schools
Multi-Service Center
48 Marion Road
Wareham, MA 02571

Kimberly B. Shaver-Hood, Ed.D.
Superintendent of Schools

Phone: 508-291-3500
FAX: 508-291-3578
E-mail:
kshaver-hood@wareham.k12.ma.us

October 24, 2018

MA Department of Energy Resources
Green Communities Division
100 Cambridge Street – Suite 1040
Boston, MA 02114

To Whom It May Concern:

Please be advised that the Wareham Public Schools hereby adopted the attached Fuel Efficiency Vehicle Policy for Criterion 4 of the Green Communities program.

Please be advised that the Wareham Public Schools hereby adopted the attached Energy Reduction Plan for Criterion 3 of the Green Communities program.

Thank you.

Sincerely,

Dr. Kimberly B. Shaver-Hood

Dr. Kimberly B. Shaver-Hood
Superintendent of Schools

C. List of Contributors

The collaborative efforts of the offices of Wareham Town Administrator Derek Sullivan, Town Planner Kenneth Buckland and MA Department of Energy Resources Green Community Regional Coordinator Seth Pickering were all vital in the production this Plan.

Much of the information in this Plan was derived from energy audits performed by RISE Engineering, led by Frank C. Davey. Additional technical assistance was provided by the Southeastern Regional Planning and Economic Development District (SRPEDD), the author of this Plan.

II. Executive Summary

A. Narrative Summary of the Town

The Town of Wareham is located in southeastern Massachusetts in southern Plymouth County. Known as "The Gateway to Cape Cod", Wareham is located 55 miles south of Boston and 45 miles east of Providence, Rhode Island. The town has an approximate area of 46.3 square miles and is bordered by Carver and Plymouth on the north; Bourne on the east; Marion on the southwest; Rochester on the west; and Middleborough on the northwest. According to the 2010 U.S. Census, Wareham had a population of 21,822, having experienced a 7.3% increase in population since 2000.

Wareham was first settled by white settlers in the late 1670s at the conclusion of King Phillip's War. Originally part of the towns of Plymouth and Rochester, Wareham incorporated as its own community in 1739. Originally an agricultural and fishing community, it's economy expanded into iron-related manufacturing and a variety of maritime industries in the 19th century. The early 20th century saw two new industries emerge in Wareham – summer tourism and cranberry growing, which have had lasting impacts on the town, as approximately one-third of the town's housing units are seasonal and cranberry growers control over 30% of Wareham's land.

Since 1950, Wareham's population has almost tripled and has transformed from a seasonal community to a more traditional suburban community, whose economic base has shifted to the service industries. Wareham is accessible to the larger southeastern Massachusetts region via Interstates 195 and 495 as well as via Routes 6, 25, and 28.

B. Summary of Municipal Energy Uses

- Total Number of Municipal Buildings: 16
- Total Number of Municipal Vehicles: 144
- Total Number of Street Lights: 1,700
- Total Number of Traffic Lights: 0
- Water & Sewer: 1 wastewater treatment plant and 45 wastewater pumping stations

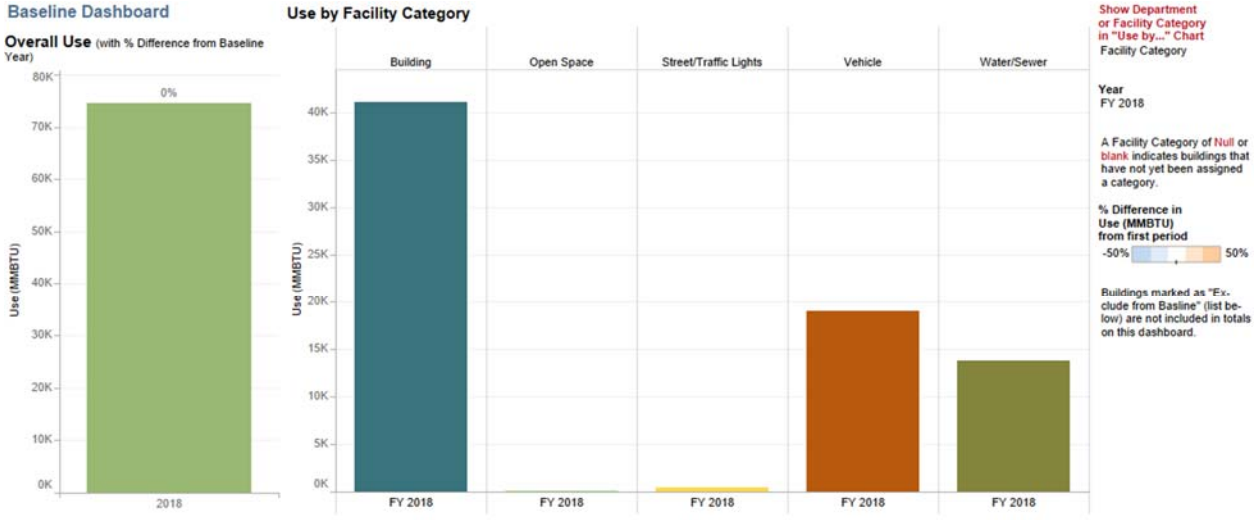
Table 1: Municipal Energy Use Summary

	Number	Ownership
Buildings	**16**	
Oil Heat	0	
Natural Gas Heat	15	Municipality
Electricity	1	Municipality
Vehicles	**144**	
Non-Exempt	15	Municipality
Exempt	129	Municipality
Street Lights	1,700	Municipality
Traffic Lights	0	
Water & Sewer	**46**	
Drinking Water Treatment Plant	0	
Drinking Water Pumping Station	0	
Wastewater Treatment Plant	1	Municipality
Wastewater Pumping Station	45	Municipality

C. Summary of Energy Use Baseline and Plans for Reductions

This Energy Reduction Plan commits Wareham to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2018 over five years. In the baseline year, the town used 74,447 MMBTUs of energy, which means the town must reduce its usage by at least 14,890 MMBTUs over the following five-year period.

Figure 1: Municipal Energy Use Baseline Dashboard from MEI (FY 2018)



Drill down by Facility Category (showing Use (MMBTU))
Hover over Facility Category and Subcategory and click the plus or minus signs to expand and collapse the table.

Facility Category	FY 2018
Building	41,055
Open Space	108
Street/Traffic Ligh..	492
Vehicle	19,038
Water/Sewer	13,754

Drill down by Department (showing Use (MMBTU))
Hover over Department, Complex, etc. and click the plus or minus signs to expand and collapse the table.

Department	FY 2018
Null	34
EMS	323
Harbormaster	50
Library	1,537
Municipal Maintenance	14,473
Police	5,718
School Department	38,542
Sewer/Pumping	13,754
Street/Traffic Lights	14

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

Table 2: Summary of Municipal Energy Use and Reductions

Facility Category	MMBTU Used in Baseline Year	% of Total MMBTU Baseline Energy Consumption	Projected Planned MMBTU Savings	Savings as % of Total MMBTU Baseline Energy Consumption
Buildings	41,055	55.1%	13,276	17.8%
Vehicles	19,038	25.6%	0	0.0%
Street/Traffic Lights	492	0.7%	0	0.0%
Water/Sewer/Pumping	13,754	18.5%	672	0.9%
Open Space	108	0.1%	0	0.0%
Total	**74,447**	**100%**	**13,948**	**18.7%**

III. Energy Use Baseline Inventory

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

B. Identification of the Baseline Year: Fiscal Year (FY) 2018 will serve as the baseline year. FY 2018 ran from July 1, 2017 to June 30, 2018. This will give the Town until June 30, 2023 (FY 2019 – FY 2023) to reach its 20% energy reduction goal.

C. Municipal Energy Consumption for the Baseline Year (FY 2018): In the baseline year, the town used 74,447 MMBTUs of energy. The Appendix presents energy use for each municipal facility in MMBTUs and native units.

- Buildings: Wareham's 16 buildings consume 41,055 MMBTUs, approximately 55.1% of Wareham's total municipal energy use. The buildings with the largest energy use are the Wareham Middle School (10,478 MMBTUs) and Wareham High School (9,268 MMBTUs), as shown in Figure 2.

- Street/Traffic Lights: There are 1,700 streetlights and 0 traffic lights in Wareham. These lights consume 492 MMBTUs, 0.7% of the Town's energy use.

- Vehicles: Wareham's 144 municipal vehicles use 25.6% of the baseline total, or 19,038 MMBTUs.

- Water/Sewer Facilities: The Town of Wareham is serviced for wastewater by the town's Sewer Department. Sewer facilities consume 13,754 MMBTUs, or 18.5% of the town's energy use.

Table 3A: Municipal Energy Consumption for FY2018, Native Fuel Units

ERP Guidance Table 3a - Municipal Energy Consumption for 2018 (Native Fuel Units)

		2018			
		Electric (kWh)	Gas (therms)	Gasoline (gallons)	Diesel (gallons)
Building	Boys & Girls Club/Donov..	36,160	18,101		
	East Wareham ES	22,063	3,749		
	John William Decas ES	282,459	45,207		
	Minot Forest IS	244,049	42,877		
	Wareham MS	873,624	74,973		
	Wareham SHS	1,093,989	55,349		
	West Wareham School	5,393			
	Work Shed	6,569			
	Onset Pier Interior	6,696			
	Onset Pier Exterior	1,456			
	Main	140,640	9,309		
	Spinney	5,170	1,090		
	Main	112,687	5,168		
	Train Station	476			
	Main	20,654	2,527		
	Town Hall	173,520	16,511		
	Multi-Service Center	90,320	16,379		
	Spillane Football Field	1,821			
	Maintenance Building	19,753			
	Tremont Nail	25,600	4,891		
	Onset Restrooms	711			
	Kennedy Lane	26,396			
	Main Building	81,600			
	Garage	9,091			
	Substation - Onset	1,322			
	Everett School	72	0		
	Onset Bath House	246			
	West Wareham School	8,464	1,788		
	Recycling	2,759			
	Community Development	7,219			
	Total	**3,300,979**	**297,919**		

Open Space	Onset Gazebo	192			
	Onset Band Stand	159			
	Center Cemetery	0			
	Town Green	1,114			
	Charge Pond	3,855			
	Onset Pier	11,097			
	Tennis Courts	6,183			
	Tempest Knob	1,233			
	Lopes Field	3,089			
	Mill Street Dam	1,040			
	Police Memorial	1,561			
	Dudley L. Brown Square - On..	204			
	Charlotte Furnace Road	1,804			
	Total	**31,531**			
Street/Traffic Lights	Lighthouses - Cran Hwy	52			
	Lights	4,059			
	Traffic Signal	50			
	Traffic Light	95			
	Onset Ave	301			
	Roby Street	344			
	Kennedy Lane	3,792			
	Shore Avenue	485			
	Off Tihonet	2,064			
	Circle Drive	1,233			
	Main Street Lights	24,402			
	Riverside Drive	241			
	Onset Ave - Period Street Lig..	107,003			
	Total	**144,121**			
Vehicle	Police Department Vehicles			38,558	
	School Department Vehicles			9,407	49,229
	MMD & Town Vehicles			16,253	30,450
	Total			**64,218**	**79,679**
Water/Sewer	Wareham Wastewater Pollutio..	2,342,544	26,631		
	Pumping Stations	857,032	1,736		
	Total	**3,199,576**	**28,367**		
Grand Total		**6,676,207**	**326,286**	**64,218**	**79,679**

Table 3A: Municipal Energy Consumption for FY2018, MMBTU

ERP Guidance Table 3b - Municipal Energy Consumption for 2018 (MMBTU)

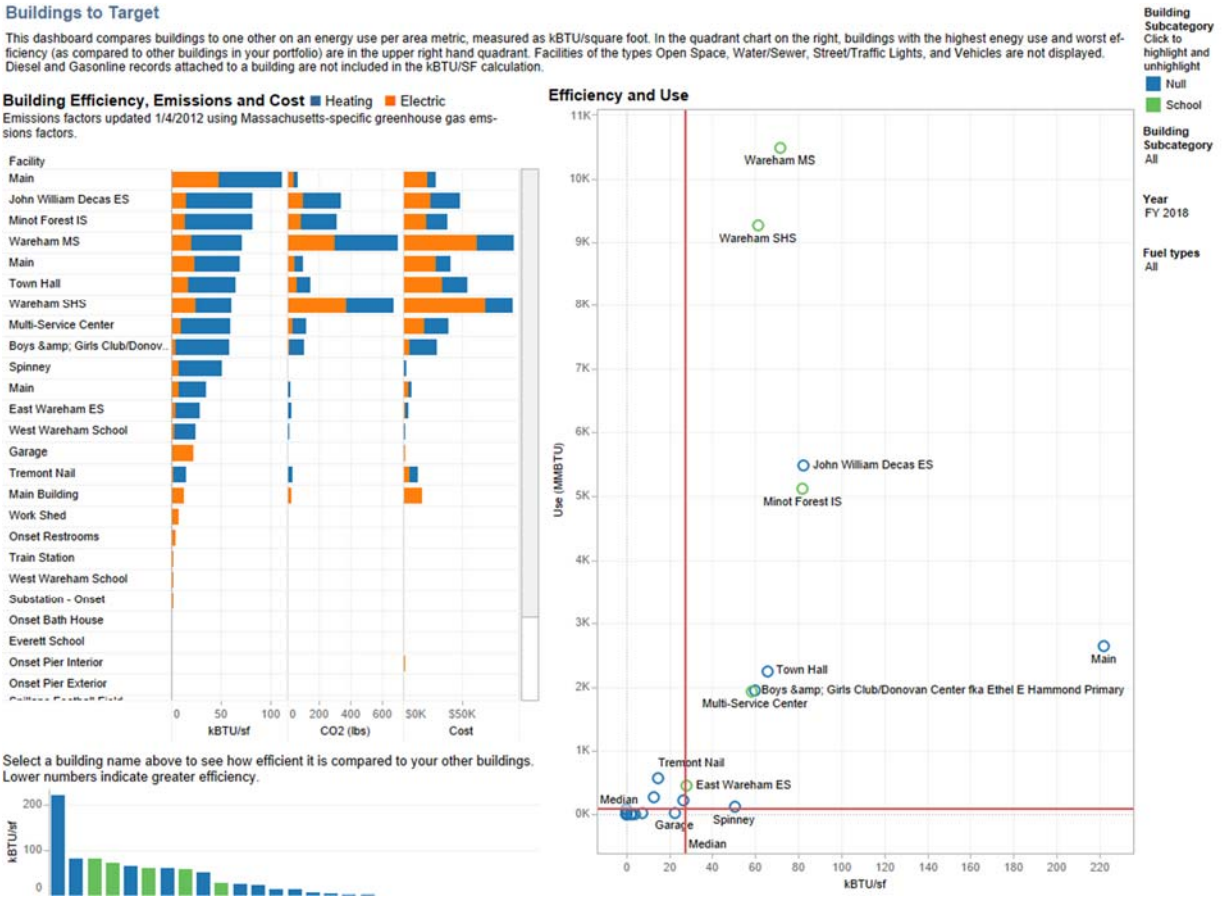
Please make sure that any data submitted to DOER contains complete Data!

		2018				
		Diesel	Electric	Gas	Gasoline	Total
Building	Boys & Girls Club/Donov..		123	1,810		**1,933**
	East Wareham ES		75	375		**450**
	John William Decas ES		964	4,521		**5,484**
	Minot Forest IS		833	4,288		**5,120**
	Wareham MS		2,981	7,497		**10,478**
	Wareham SHS		3,733	5,535		**9,268**
	West Wareham School		18			**18**
	Work Shed		22			**22**
	Onset Pier Interior		23			**23**
	Onset Pier Exterior		5			**5**
	Main		480	931		**1,411**
	Spinney		18	109		**127**
	Main		384	517		**901**
	Train Station		2			**2**
	Main		70	253		**323**
	Town Hall		592	1,651		**2,243**
	Multi-Service Center		308	1,638		**1,946**
	Spillane Football Field		6			**6**
	Maintenance Building		67			**67**
	Tremont Nail		87	489		**576**
	Onset Restrooms		2			**2**
	Kennedy Lane		90			**90**
	Main Building		278			**278**
	Garage		31			**31**
	Substation - Onset		5			**5**
	Everett School		0	0		**0**
	Onset Bath House		1			**1**
	West Wareham School		29	179		**208**
	Recycling		9			**9**
	Community Development		25			**25**
	Total		**11,263**	**29,792**		**41,055**

Open Space	Onset Gazebo		1			1
	Onset Band Stand		1			1
	Center Cemetery		0			0
	Town Green		4			4
	Charge Pond		13			13
	Onset Pier		38			38
	Tennis Courts		21			21
	Tempest Knob		4			4
	Lopes Field		11			11
	Mill Street Dam		4			4
	Police Memorial		5			5
	Dudley L. Brown Square - On..		1			1
	Charlotte Furnace Road		6			6
	Total		108			108
Street/Traffic Lights	Lighthouses - Cran Hwy		0			0
	Lights		14			14
	Traffic Signal		0			0
	Traffic Light		0			0
	Onset Ave		1			1
	Roby Street		1			1
	Kennedy Lane		13			13
	Shore Avenue		2			2
	Off Tihonet		7			7
	Circle Drive		4			4
	Main Street Lights		83			83
	Riverside Drive		1			1
	Onset Ave - Period Street Lig..		365			365
	Total		492			492
Vehicle	Police Department Vehicles				4,781	4,781
	School Department Vehicles	6,843			1,166	8,009
	MMD & Town Vehicles	4,233			2,015	6,248
	Total	11,075			7,963	19,038
Water/Sewer	Wareham Wastewater Pollutio..		7,993	2,663		10,656
	Pumping Stations		2,924	174		3,098
	Total		10,917	2,837		13,754
Grand Total		11,075	22,779	32,629	7,963	74,446

Figure 2: MEIs Buildings to Target Dashboard

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



IV. Energy Reduction Plan

A. Narrative Summary

As shown below, the town has identified energy savings measures to reduce usage from FY 2018 by 13,948 MMBTUs or 18.7%.

- **Jon W. Decas Elementary School**

  Kitchen Hood Controls: Install controls to the kitchen hood to reduce the time the exhaust fan is running at full load.

  Door Weather-Stripping: Install weather stripping to six (6) exterior doors to reduce unwanted air flow.

  Refrigeration Controls and Replacement Evaporator Motors: Install evaporator fan controls and electronically commutated motors (EC motors) on the evaporator fans on the one (1) walk-in cooler and one (1) walk-in freezer that do not have refrigeration controllers.

  LED Lighting: Replace existing inefficient lighting (T8 and T12 fluorescent, CFLs, incandescent, and halogen bulbs on site) with high efficiency LED bulbs.

  Faucet Aerators: Install low flow aerators (1.5 GPM) to restrict the flow of water through faucets in all bathrooms and 90% of the classrooms that either have no aerators or aerators rated at 2.2 GPM.

  Programmable Thermostats: Replace manual thermostats with programmable thermostats in classrooms so setback temperatures may be controlled remotely for unoccupied, or nighttime durations.

- **Wareham High School**

  Kitchen Hood Controls: Install controls to the kitchen hoods in the kitchen and culinary room to reduce the time each exhaust fan is running at full load.

  Door Weather-Stripping: Install weather stripping to 13 exterior doors to reduce unwanted air flow.

  High Efficiency Condensing Boilers: Replace the six (6) existing Patterson-Kelley boilers rated at 85% efficiency with new high efficiency condensing boilers.

  High Efficiency Condensing Water Heater: Replace the one (1) standard 80% efficiency gas-fired water heater with a high efficiency water heater.

  Refrigeration Controllers: Install evaporator fan controls and electronically commutated motors (EC motors) on the evaporator fans on the one (1) walk-in cooler and one (1) walk-in freezer that do not have refrigeration controllers.

Variable Frequency Drives on Hydronic Pumps: Install variable frequency drives (VFDs) on the hydronic pumps to vary the energy consumed based on demand.

LED Lighting Upgrade: Replace the existing inefficient lighting with high efficiency LED bulbs.

Faucet Aerators: Install low flow aerators (1.5 GPM) to restrict the flow of water through faucets in locker rooms, bathrooms, teacher's lounges and hallways throughout the building that do not have aerators.

Programmable Thermostats: Replace manual thermostats with programmable thermostats in classrooms so setback temperatures may be controlled remotely for unoccupied, or nighttime durations.

High Efficiency RTUs: Install three (3) new high efficiency rooftop units to replace three (3) existing rooftop units that are operating at a sub-standard efficiency.

- **Wareham Middle School**

  Kitchen Hood Controls: Install controls on the two (2) kitchen hoods in the kitchen that do not have controls to reduce the time each exhaust fan is running at full load.

  Door Weather-Stripping: Install weather stripping to one (1) door to reduce unwanted air flow.

  High Efficiency Condensing Boilers: Replace the two (2) Smith Cast Iron hydronic boilers rated at 85% efficiency with new high efficiency condensing boilers.

  High Efficiency Water Heater – Kitchen: Replace the one (1) 85% standard efficiency water heater with a high efficiency water heater.

  Refrigeration Controls: Install evaporator fan controls and electronically commutated motors (EC motors) on the evaporator fans on the one (1) walk-in cooler and one (1) walk-in freezer that do not have refrigeration controllers.

  LED Lighting Upgrade: Replace the existing inefficient lighting with high efficiency LED bulbs.

  Faucet Aerators: Install low flow aerators (1.5 GPM) to restrict the flow of water through faucets in the science lab and classrooms throughout the building that either have no aerators or aerators rated at 2.2 GPM.

- **Town Hall**

  Heat Pump Water Heater: Replace the one (1) standard efficiency 10-gallon electric resistance water heater with a 10-gallon high efficiency heat pump water heater.

  Boiler Reset Controls: Install boiler controls for the existing boiler or newly installed hydronic boiler, which allow for scheduling and varying temperature set-points throughout the day.

Pipe/Valve/Tank Insulation: Install insulation on 185 linear feet of condensate return piping, five (5) 4”-6” gate valves, and one (1) 52” by 28” condensate tank with no insulation.

LED Lighting Controls: Add occupancy/motion controls.

Faucet Aerators: Install low-flow aerators (1.5 GPM) to restrict the flow of water through several faucets that have high-flow aerators rated 2.5 to 3.0 GPM.

Steam Trap Survey and Repairs: Contact the utility for a list of approved vendors to survey the approximately 90 to 120 steam traps in the building. National Grid will reimburse the town the cost of the steam trap survey and 50% of the cost of repairs under the Gas Efficiency Program.

- **Boys & Girls Club/Donovan Center**

  Door Weather-Stripping: Install weather stripping to two (2) doors to reduce unwanted air flow.

  High Efficiency Condensing Water Heater: Replace the standard efficiency water heater with a high efficiency water heater.

  Boiler Reset Controls: Install boiler controls on the existing boiler, which allow for scheduling and varying temperature set-points throughout the day.

  Pipe/Valve/Tank Insulation: Install insulation on 50 linear feet steam piping, 150 linear feet of condensate return piping, 20 linear feet of domestic hot water piping, one (1) condensate tank, one (1) 6” gate valve, one (1) 6” control valve, and two (2) 6” T valves that are not insulated, causing over and under-heating in the building.

  LED Lighting Upgrade: Replace the existing inefficient lighting with high efficiency LED bulbs.

  Faucet Aerators: Install low-flow aerators (1.5 GPM) to restrict the flow of water through faucets in the most classrooms and bathrooms that have high-flow aerators rated 2.0 GPM.

  Steam Trap Survey and Repairs: Contact the utility for a list of approved vendors to survey the approximately 50 to 80 steam traps in the building. National Grid will reimburse the town the cost of the steam trap survey and 50% of the cost of repairs under the Gas Efficiency Program.

- **Multi-Service Center**

  Kitchen Hood Controls: Install controls to the kitchen hood in the kitchen to reduce the time each exhaust fan is running at full load.

  Door Weather-Stripping: Install weather stripping to eight (8) doors to reduce unwanted air flow.

  High Efficiency Water Heater: Replace the standard efficiency water heater with a high efficiency water heater.

  Boiler Reset Controls: Install boiler controls for the existing boiler or newly installed hydronic boiler, which allow for scheduling and varying temperature set-points throughout the day.

Pipe/Valve/Tank Insulation: Install insulation on two (2) 3" control valves, one (1) 2.5' x 2.5' x 2.5' condensate tank, one (1) 8" gate valve, 5 linear feet of steam pipe, and 80 linear feet of condensate return piping that is uninsulated. Additionally, there is 4' of 3" steam pipe with existing insulation that has been compromised due to water exposure that needs to be replaced as well.

LED Lighting Controls: Add occupancy/motion controls.

Faucet Aerators: Install low-flow aerators (1.5 GPM) to restrict the flow of water through several faucets that have high-flow aerators rated 2.0 to 2.5 GPM.

Steam Trap Survey and Repairs: Contact the utility for a list of approved vendors to survey the approximately 60 to 80 steam traps in the building. National Grid will reimburse the town the cost of the steam trap survey and 50% of the cost of repairs under the Gas Efficiency Program.

- **Police Department**

Door Weather-Stripping: Install weather stripping to four (4) doors to reduce unwanted air flow.

High Efficiency Water Heater: Replace the standard efficiency water heater with a high efficiency water heater.

Pipe/Valve/Tank Insulation: Install insulation on 18 linear feet of steel pipe and 22 linear feet of copper pipe for heating output, 20 linear feet of steel piping for heating return, and 14 linear feet of copper piping for domestic hot water.

LED Lighting Controls: Add occupancy/motion controls.

Faucet Aerators: Install low flow aerators (1.5 GPM) to restrict the flow of water through faucets throughout the building that either have no aerators or aerators rated at 2.5 GPM.

Programmable Thermostats: Replace manual thermostats with programmable thermostats so setback temperatures may be controlled remotely for unoccupied, or nighttime durations.

- **Free Library**

Heat Pump Water Heater: Replace the two (2) standard efficiency electric resistance water heaters with two (2) high efficiency heat pump water heaters.

LED Lighting Controls: Add occupancy/motion controls.

Faucet Aerators: Install low-flow aerators (1.5 GPM) to restrict the flow of water through several faucets that have high-flow aerators rated 2.2 to 2.75 GPM.

Programmable Thermostats: Replace manual thermostats with programmable thermostats so setback temperatures may be controlled remotely for unoccupied, or nighttime durations.

- **Wastewater Treatment Facility**
  High Efficiency Condensing Boilers: Replace the three (3) standard efficiency hydronic boilers that hear the operations, dewatering, and filter blowing buildings with new high efficiency condensing boilers.

  VFDs on Hydronic Pumps: Install variable frequency drives (VFDs) on the hydronic pumps that circulate the hot water produced by the three (3) standard efficiency boilers in the three (3) buildings that currently have no controls.

  LED Lighting Upgrade: Replace the existing inefficient lighting with high efficiency LED bulbs.

- **Minot Forest Elementary School**
  At the end of the 2018-2019 school year, the Minot Forest Elementary School will close due to a combination of the school's structural problems and the community's budgetary constraints. The students who would have attended the Minot Forest Elementary School will instead attend the John W. Decas Elementary School.

B. Path to 20% Energy Use Reduction by the end of Fiscal Year 2023

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

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

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

- Building audits were provided by RISE Engineering in 2018 and provide an energy savings of 8,829 MMBTUs or 11.9%. The RISE Engineering audits are included in the Appendix.
- The closing of the Minot Forest Elementary School at the end of the 2018-2019 school year will result in the savings of 5,120 MMBTUs or 6.9%. The students who would have attended the Minot Forest Elementary School will instead attend the John W. Decas Elementary School.
- Vehicle policy and maintenance targeting overall vehicle usage would result in the savings 1,146 MMBTUs or 1.5%. The supporting documentation for these policy and maintenance measures are available in the Appendix.

3. Energy Conservation Measures

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

Table 4: Energy Conservation Measures for Wareham Municipal Energy Use

Measure		Status	Energy Data						Financial Data						Reference	
			Projected Annual Energy Savings													
Category/Building	Energy Conservation Measure	Status (Completed Year or Planned Year)	Electricity Savings (kWh)	Natural Gas Savings (Therms)	Oil Savings (Gallons)	Gasoline Savings (Gallons)	Diesel Savings (Gallons)	Propane Savings (Gallons)	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
John W. Decas Elementary School-B & C Wings	LED Lighting Upgrades & Controls	2019	42,505	0	-	-	-	-	$8,135	$89,349	-	$10,626	$78,723	7.8	-	RISE Engineering Audit, 2018
John W. Decas Elementary School-D & E Wings	LED Lighting Upgrades & Controls	2019	50,107	0	-	-	-	-	$9,590	$99,915	-	$12,527	$87,388	7.3	-	RISE Engineering Audit, 2018
John W. Decas Elementary School-A & Gym/Café Wings	LED Lighting Upgrades & Controls	2019	39,374	0	-	-	-	-	$7,536	$74,482	-	$9,843	$64,639	6.8	-	RISE Engineering Audit, 2018
John W. Decas Elementary School-Exterior LED LTG	LED Lighting Upgrades	2019	29,289	0	-	-	-	-	$5,606	$16,245	-	$7,322	$8,923	1.5	-	RISE Engineering Audit, 2018
John W. Decas Elementary School	Kitchen Hood Controls	2021	5,581	3,013	-	-	-	-	$4,111	$19,344	-	$4,520	$14,825	3.6	-	RISE Engineering Audit, 2018
John W. Decas Elementary School	Door Weather Stripping	2021	0	53	-	-	-	-	$54	$1,475	-	$0	$1,475	27.6	-	RISE Engineering Audit, 2018
John W. Decas Elementary School	Refrigeration Controllers	2021	3,757	0	-	-	-	-	$719	$10,526	-	$939	$9,587	13.3	-	RISE Engineering Audit, 2018
John W. Decas Elementary School	Faucet Aerators	2019	0	799	-	-	-	-	$807	$186	-	$186	$0	0.0	-	RISE Engineering Audit, 2018
John W. Decas Elementary School	Programmable Thermostats	2021	0	1,184	-	-	-	-	$1,196	$7,589	-	$925	$6,934	5.8	-	RISE Engineering Audit, 2018
John W. Decas Elementary School Totals			**170,613**	**5,049**	**-**	**-**	**-**	**-**	**$37,755**	**$319,381**	**-**	**$46,887**	**$272,493**	**6.1**	**-**	**RISE Engineering Audits, 2018**
Wareham High School-224-250 Wing	LED Lighting Upgrades & Controls	2019	59,525	0	-	-	-	-	$10,560	$91,185	-	$14,881	$76,304	5.8	-	RISE Engineering Audit, 2018
Wareham High School-209-221 Wing	LED Lighting Upgrades & Controls	2019	42,708	0	-	-	-	-	$7,576	$50,330	-	$10,677	$39,653	4.4	-	RISE Engineering Audit, 2018
Wareham High School-Café Wing	LED Lighting Upgrades & Controls	2019	58,612	0	-	-	-	-	$10,398	$98,240	-	$14,653	$83,587	6.1	-	RISE Engineering Audit, 2018
Wareham High School-Aud-Library Wing	LED Lighting Upgrades & Controls	2020	14,796	0	-	-	-	-	$2,625	$33,078	-	$3,699	$29,379	8.1	-	RISE Engineering Audit, 2018
Wareham High School-Gym Wing	LED Lighting Upgrades & Controls	2020	59,663	0	-	-	-	-	$10,584	$90,694	-	$14,916	$75,778	5.7	-	RISE Engineering Audit, 2018
Wareham High School-Exterior LED LTG	LED Lighting Upgrades	2020	88,200	0	-	-	-	-	$15,647	$38,371	-	$22,050	$16,321	1.0	-	RISE Engineering Audit, 2018
Wareham High School	Kitchen Hood Controls	2021	11,162	6,379	-	-	-	-	$8,423	$24,978	-	$9,569	$15,410	1.8	-	RISE Engineering Audit, 2018
Wareham High School	Door Weather Stripping	2021	0	195	-	-	-	-	$197	$2,242	-	$0	$2,242	11.4	-	RISE Engineering Audit, 2018
Wareham High School	High Efficiency Condensing Boiler	2022	0	7,995	-	-	-	-	$8,075	$342,200	-	$40,000	$302,200	23.1	-	RISE Engineering Audit, 2018
Wareham High School	High Efficiency Condensing Water Heater	2021	0	624	-	-	-	-	$630	$40,120	-	$1,600	$38,520	34.1	-	RISE Engineering Audit, 2018
Wareham High School	Refrigeration Controls	2021	3,757	0	-	-	-	-	$666	$10,526	-	$939	$9,587	14.4	-	RISE Engineering Audit, 2018

Wareham High School	VFD's on HW Circulation Pumps	2022	46,047	0	-	-	-	-	$8,169	$10,620	-	$3,600	$7,020	0.8	-	RISE Engineering Audit, 2018
Wareham High School	Faucet Aerators	2019	0	187	-	-	-	-	$189	$43	-	$43	$0	0.0	-	RISE Engineering Audit, 2018
Wareham High School	Programmable Thermostats	2021	0	3,200	-	-	-	-	$3,232	$21,240	-	$2,500	$18,740	5.8	-	RISE Engineering Audit, 2018
Wareham High School	High Efficiency RTUs	2023	26,129	0	-	-	-	-	$4,635	$278,480	-	$57,500	$220,980	19.8	-	RISE Engineering Audit, 2018
Wareham High School Totals			**410,599**	**18,580**		**-**	**-**	**-**	**$91,606**	**$1,132,347**	**-**	**$196,627**	**$935,720**	**8.1**	**-**	**RISE Engineering Audits, 2018**
Wareham Middle School-A & E Wings	LED Lighting Upgrades & Controls	2020	62,265	0	-	-	-	-	$10,566	$91,087	-	$15,566	$75,521	5.8	-	RISE Engineering Audit, 2018
Wareham Middle School-2nd Floor C Wing & Basement	LED Lighting Upgrades & Controls	2020	44,748	0	-	-	-	-	$7,594	$63,143	-	$11,187	$51,956	5.2	-	RISE Engineering Audit, 2018
Wareham Middle School-1st Floor-C & D Wings	LED Lighting Upgrades & Controls	2020	66,995	0	-	-	-	-	$11,369	$98,133	-	$16,749	$81,384	5.8	-	RISE Engineering Audit, 2018
Wareham Middle School-1st Floor-A & B Wings	LED Lighting Upgrades & Controls	2020	88,300	0	-	-	-	-	$14,985	$99,365	-	$22,075	$77,290	4.2	-	RISE Engineering Audit, 2018
Wareham Middle School-1st Floor E Wing	LED Lighting Upgrades & Controls	2021	43,233	0	-	-	-	-	$7,337	$55,424	-	$10,808	$44,616	4.9	-	RISE Engineering Audit, 2018
Wareham Middle School-Exterior LED LTG	LED Lighting Upgrades	2021	38,163	0	-	-	-	-	$6,476	$24,753	-	$9,541	$15,212	2.2	-	RISE Engineering Audit, 2018
Wareham Middle School	Kitchen Hood Controls	2021	6,581	3,488	-	-	-	-	$4,640	$19,344	-	$5,232	$14,112	3.0	-	RISE Engineering Audit, 2018
Wareham Middle School	Door Weather Stripping	2021	12	18	-	-	-	-	$20	$1,298	-	$0	$1,298	64.2	-	RISE Engineering Audit, 2018
Wareham Middle School	High Efficiency Condensing Boiler	2023	0	6,230	-	-	-	-	$6,292	$177,000	-	$20,000	$157,000	17.9	-	RISE Engineering Audit, 2018
Wareham Middle School	High Efficiency Condensing Water Heater	2021	0	1,310	-	-	-	-	$1,323	$40,120	-	$1,600	$38,520	26.1	-	RISE Engineering Audit, 2018
Wareham Middle School	Refrigeration Controllers	2021	6,643	0	-	-	-	-	$1,127	$21,051	-	$1,661	$19,390	17.2	-	RISE Engineering Audit, 2018
Wareham Middle School	Faucet Aerators	2019	0	187	-	-	-	-	$189	$28	-	$28	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Middle School Totals			**356,940**	**11,233**	-	**-**	**-**	**-**	**$71,918**	**$690,746**	**-**	**$114,447**	**$576,299**	**6.6**	**-**	**RISE Engineering Audit, 2018**
Wareham Town Hall	LED Lighting Controls	2021	6,032	0	-	-	-	-	$1,229	$12,853	-	$1,508	$11,345	6.0	-	RISE Engineering Audit, 2018
Wareham Town Hall	Heat Pump Water Heater	2022	3,515	0	-	-	-	-	$716	$3,506	-	$879	$2,627	2.7	-	RISE Engineering Audit, 2018
Wareham Town Hall	Boiler Reset Controls	2022	0	456	-	-	-	-	$461	$472	-	$225	$247	0.5	-	RISE Engineering Audit, 2018
Wareham Town Hall	Pipe/Valve/Tank Insulation	2021	0	1,664	-	-	-	-	$1,681	$7,080	-	$2,496	$4,584	2.7	-	RISE Engineering Audit, 2018
Wareham Town Hall	Faucet Aerators	2019	388	0	-	-	-	-	$79	$16	-	$16	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Town Hall	Steam Trap Survey and Repairs	2020	0	817	-	-	-	-	$825	$1,593	-	$1,593	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Town Hall Totals			**9,935**	**2,937**	-	**-**	**-**	**-**	**$4,991**	**$25,520**	**-**	**$6,717**	**$18,803**	**3.2**	**-**	**RISE Engineering Audits, 2018**
Wareham Multi-Service Center	LED Lighting Controls	2021	5,411	0	-	-	-	-	$1,123	$14,746	-	$1,353	$13,393	7.1	-	RISE Engineering Audit, 2018

Wareham Multi-Service Center	Kitchen Hood Controls	2021	2,232	603	-	-	-	-	$1,072	$19,344	-	$0	$19,344	18.0	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	Door Weather Stripping	2021	0	92	-	-	-	-	$93	$1,770	-	$0	$1,770	19.0	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	High Efficiency Condensing Water Heater	2022	0	230	-	-	-	-	$232	$5,310	-	$1,600	$3,710	7.7	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	Boiler Reset Controls	2022	0	572	-	-	-	-	$578	$472	-	$225	$247	0.4	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	Pipe/Valve/Tank Insulation	2021	0	1,381	-	-	-	-	$1,395	$5,664	-	$2,072	$3,593	2.6	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	Faucet Aerators	2019	0	572	-	-	-	-	$578	$24	-	$24	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center	Steam Trap Survey and Repairs	2020	0	794	-	-	-	-	$802	$1,593	-	$1,593	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Multi-Service Center Totals			**7,643**	**4,244**	-	**-**	**-**	**-**	**$5,873**	**$48,923**	**-**	**$6,866**	**$42,057**	**6.1**	**-**	**RISE Engineering Audit, 2018**
Wareham Free Library	LED Lighting Controls	2021	4,447	0	-	-	-	-	$892	$14,315	-	$1,112	$13,203	8.9	-	RISE Engineering Audit, 2018
Wareham Free Library	Heat Pump Water Heater	2022	3,954	0	-	-	-	-	$793	$3,506	-	$0	$3,506	3.4	-	RISE Engineering Audit, 2018
Wareham Free Library	Faucet Aerators	2019	679	0	-	-	-	-	$136	$28	-	$28	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Free Library	Programmable Thermostats	2021	0	480	-	-	-	-	$485	$3,186	-	$375	$2,811	5.8	-	RISE Engineering Audit, 2018
Wareham Free Library Totals			**9,080**	**480**	-	**-**	**-**	**-**	**$2,305**	**$21,035**	**-**	**$1,515**	**$19,520**	**6.2**	**-**	**RISE Engineering Audit, 2018**
Wareham Police Department	LED Lighting Controls	2021	2,870	0	-	-	-	-	$580	$4,613	-	$717	$3,896	5.1	-	RISE Engineering Audit, 2018
Wareham Police Department	Door Weather Stripping	2021	43	57	-	-	-	-	$66	$1,156	-	$0	$1,156	17.4	-	RISE Engineering Audit, 2018
Wareham Police Department	High Efficiency Condensing Water Heater	2022	0	54	-	-	-	-	$55	$4,130	-	$1,600	$2,530	8.3	-	RISE Engineering Audit, 2018
Wareham Police Department	Pipe/Valve/Tank Insulation	2021	0	224	-	-	-	-	$226	$4,484	-	$0	$4,484	19.8	-	RISE Engineering Audit, 2018
Wareham Police Department	Faucet Aerators	2019	0	34	-	-	-	-	$34	$8	-	$8	$0	0.0	-	RISE Engineering Audit, 2018
Wareham Police Department	Programmable Thermostats	2021	0	320	-	-	-	-	$323	$2,124	-	$250	$1,874	5.8	-	RISE Engineering Audit, 2018
Wareham Police Department Totals			**2,913**	**689**	-	**-**	**-**	**-**	**$1,284**	**$16,515**	**-**	**$2,575**	**$13,940**	**8.1**	**-**	**RISE Engineering Audit, 2018**
Boys & Girls Club/Donovan Center	LED Lighting Upgrades & Controls	2021	3,045	0	-	-	-	-	$640	$11,026	-	$761	$10,265	7.3	-	RISE Engineering Audit, 2018
Boys & Girls Club/ Donovan Center	Door Weather Stripping	2021	0	46	-	-	-	-	$46	$2,478	-	$0	$2,478	53.3	-	RISE Engineering Audit, 2018
Boys & Girls Club/Donovan Center	High Efficiency Condensing Water Heater	2022	0	216	-	-	-	-	$218	$5,310	-	$1,600	$3,710	7.9	-	RISE Engineering Audit, 2018
Boys & Girls Club/Donovan Center	Boiler Reset Controls	2022	0	491	-	-	-	-	$496	$472	-	$225	$247	0.5	-	RISE Engineering Audit, 2018
Boys & Girls Club/Donovan Center	Pipe/Valve/Tank Insulation	2021	0	3,505	-	-	-	-	$3,540	$10,502	-	$5,258	$5,245	1.5	-	RISE Engineering Audit, 2018

Boys & Girls Club/Donovan Center	Faucet Aerators	2019	0	119	-	-	-	-	$120	$28	-	$28	$0	0.0	-	RISE Engineering Audit, 2018
Boys & Girls Club/Donovan Center	Steam Trap Survey and Repairs	2020	0	876	-	-	-	-	$885	$1,593	-	$1,593	$0	0.0	-	RISE Engineering Audit, 2018
Boys & Girls Club/Donovan Center Totals			**3,045**	**5,253**	-	**-**	**-**	**-**	**$5,946**	**$31,409**	**-**	**$9,464**	**$21,945**	**3.1**	**-**	**RISE Engineering Audit, 2018**
Wastewater Pollution Control Facility	LED Lighting Upgrades & Controls	2021	49,721	0	-	-	-	-	$8,438	$58,649	-	$12,430	$46,219	4.3	-	RISE Engineering Audit, 2018
Wastewater Pollution Control Facility	High Efficiency Condensing Boiler	2023	0	4,251	-	-	-	-	$4,294	$164,020	-	$22,500	$141,520	20.8	-	RISE Engineering Audit, 2018
Wastewater Pollution Control Facility	VFD's on HW Circulation Pumps	2022	22,782	0	-	-	-	-	$3,866	$34,220	-	$6,800	$27,420	6.7	-	RISE Engineering Audit, 2018
Wastewater Pollution Control Facility Totals			**72,503**	**4,251**	-	-	-	-	**$16,597**	**$256,889**	-	**$41,730**	**$215,159**	**9.9**	-	**RISE Engineering Audit, 2018**
Minot Forest Elementary School	Facility Closure	2019	244,049	42,877	-	-	-	-	N/A	N/A	-	N/A	N/A	N/A	-	Town of Wareham & Wareham Public Schools
Minot Forest Elementary School Totals			**244,049**	**42,877**	-	-	-	-	**N/A**	**N/A**	-	**N/A**	**N/A**	**N/A**	-	**Town of Wareham & Wareham Public Schools**
Totals			**1,287,320**	**95,593**	0	**0**	**0**	**0**	**$238,276**	**$2,542,764**	**-**	**$426,828**	**$2,115,936**	**-**	**-**	**-**
Total MMBTUs Saved			**4,389**	**9,559**	0	**0**	**0**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

1. Municipal Buildings (including schools)

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

2. Vehicles (including schools)

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

3. Perpetuating Energy Efficiency

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

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

V: Appendices

- Building Energy Audits – RISE Engineering
- SRPEDD Vehicle Calculations
- MMBTU Conversion Chart