Town of Rehoboth, Massachusetts

Energy Reduction Plan

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

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

November 2019

Table of Contents

I. Purpose and Acknowledgements

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

REHOBOTH BOARD of SELECTMEN
146 Peck Street
Rehoboth, MA 02769

November 18, 2019

To Whom It May Concern:

Please be advised that on November 18, 2019, the Select Board of the Town 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 Board voted unanimously to adopt the plan and the minutes of that meeting include the vote.

Best regards,

REHOBOTH BOARD of SELECTMEN
Gerald V. Schwall
Chairman

B. List of Contributors

The collaborative efforts of the Rehoboth Board of Selectmen Chair Gerald V. Schwall, Green Energy Committee Chair Carolyn P. Panofsky, the Office of the Town Administrator, the Office of the Town Planner, as well as MA Department of Energy Resources Green Community Regional Coordinator Lisa Sullivan, who were all vital in the production this Plan.

Much of the information in this Plan was derived from energy audits performed by Energy Source, led by Rich Finn. 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 Rehoboth is located in southeastern Massachusetts in western Bristol County. It is located 48 miles south of Boston and 11 miles east of Providence, Rhode Island. The town has an approximate land area of 46.5 square miles and is bordered by Attleboro and Norton on the north; Taunton and Dighton on the east; Swansea on the south; and Seekonk on the west. According to the 2010 U.S. Census, Rehoboth had a population of 11,608, having experienced a 14.1% increase in population since 2000.

The Town of Rehoboth was established in 1643. Originally known as Seacunck, it comprised an area much larger than the current Rehoboth. Over time, parts of the town split off to become the present day municipalities of Attleboro, North Attleborough, and Seekonk in Massachusetts and Cumberland and East Providence in Rhode Island. While the Town of Rehoboth was established in 1643 and is one of the oldest communities in the Commonwealth, it is probable that Native Americans first inhabited the area more than 10,000 years ago.

A permanent agricultural community developed in Rehoboth in the mid-seventeenth century that would be the town's hallmark. The nineteenth century saw the development of scattered industrial uses, including textile mills, which declined in the early twentieth century. The early twentieth century saw an increase in foreign immigration and the textile mills replaced by wood products businesses. Rehoboth continued to be a lightly-populated, agricultural community into the late twentieth century. The town's vast open space coupled with the completion of many major roadways (Route 6, Route 44, Interstate 195), made Rehoboth an ideal bedroom community for people who worked in nearby cities. As a result, Rehoboth transformed from a rural agricultural community to residential suburban community.

B. Summary of Municipal Energy Uses

- Total Number of Municipal Buildings: 10
- Total Number of Municipal Vehicles: 57
- Total Number of Street Lights: 15
- Total Number of Traffic Lights: 1
- Water & Sewer: None

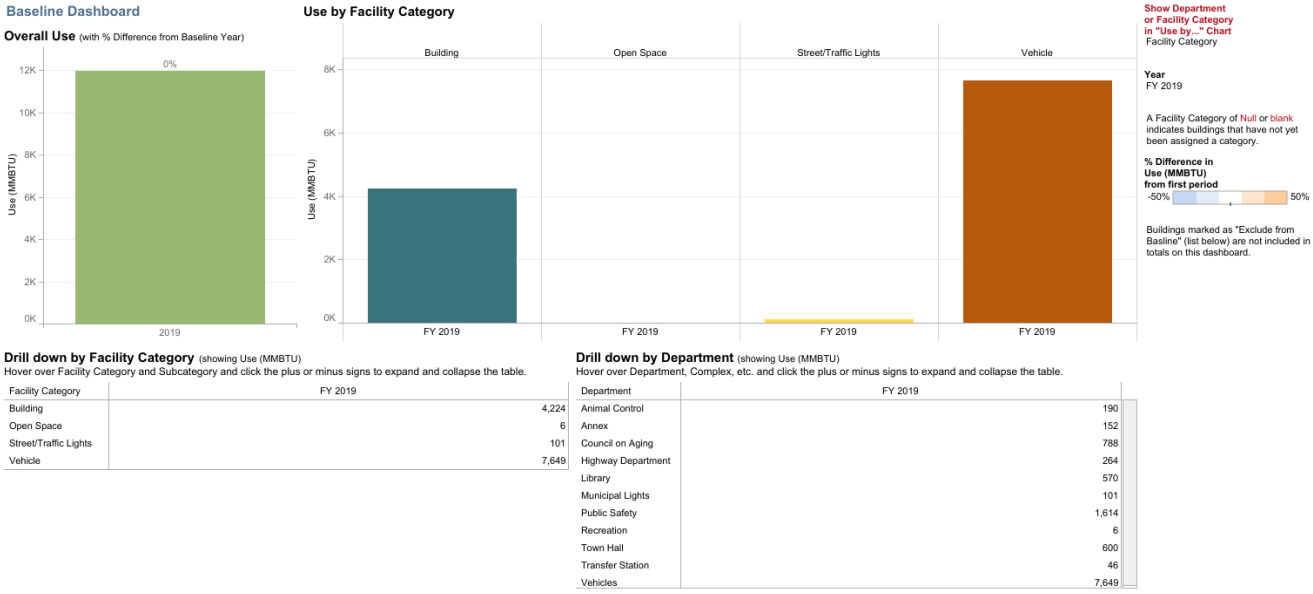
Table 1: Municipal Energy Use Summary

	Number	Ownership
Buildings	**10**	
Oil Heat	6	Municipality
Natural Gas Heat	0	
Propane Heat	3	Municipality
Biomass Heat	0	
Electricity	1	Municipality
Other Type Heat	0	
Vehicles	**57**	
Non-Exempt	2	Municipality
Exempt	55	Municipality
Street Lights	15	Municipality
Traffic Lights	2	Municipality
Water & Sewer	**0**	

C. Summary of Energy Use Baseline and Plans for Reductions

This Energy Reduction Plan commits Rehoboth to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2019 over five years. In the baseline year, the town used 11,980 MMBTUs of energy, which means the town must reduce usage by at least 2,396 MMBTUs over the following five-year period. Please note that two schools in Rehoboth (Palmer River Elementary School and Beckwith Middle School) have not been included in the town's baseline, due to the large amount of energy conservation measures that have already been implemented as a result of an ESCO agreement via the Dighton-Rehoboth Regional School District.

Figure 1: Municipal Energy Use Baseline Dashboard from MEI (FY2019)



Rehoboth has identified energy savings measures in each facility category to reduce energy use 25.9% 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	4,224	35.2%	1,881	15.7%
Vehicles	7,649	63.8%	1,229	10.2%
Street/Traffic Lights	101	0.8%	0	0%
Open Space	6	0.1%	0	0%
Total	**11,980**	**100%**	**3,110**	**25.9%**

III. Energy Use Baseline Inventory

A. Identification of the Inventory Tool Used: The Town of Rehoboth 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) 2019 will serve as the baseline year. FY2019 ran from July 1, 2018 to June 30, 2019. This will give the Town until June 30, 2024 (FY2020 - FY2024) to reach its 20% energy reduction goal.

C. Municipal Energy Consumption for the Baseline Year (FY2019): In the baseline year, the town used 11,980 MMBTUs of energy. Tables 3A and 3B presents energy use for each municipal facility in MMBTUs and native units.

- Buildings: Rehoboth's 10 buildings used 4,224 MMBTUs, approximately 35.2% of Rehoboth's total municipal energy use. The building with the largest energy use was the Public Safety Building-Police & Fire (382 MMBTUs), as shown in Figure 2.

- Street/Traffic Lights: There are 15 streetlights and 2 traffic lights in Rehoboth. These lights consumed just 101 MMBTUs, or 0.8% of the Town's energy use.

- Vehicles: Rehoboth's 57 municipal vehicles used 63.8% of the baseline total, or 7,649 MMBTUs.

- Open Space: Rehoboth's open space facilities consume just 6 MMBTUs, or 0.1% of the town's energy use.

Table 3A: Municipal Energy Consumption for Baseline Year FY2019 (Native Fuel Units)

ERP Guidance Table 3a - Municipal Energy Consumption for 2019 (Native Fuel Units)

		2019					
		Electric (kWh)	Gas (therms)	Oil (gallons)	Gasoline (gallons)	Diesel (gallons)	Propane (gallons)
Null	Null	364,548	80,692				
	Total	**364,548**	**80,692**				
Building	Council on Aging	48,838					6,828
	Town Hall	53,152		2,994			
	Station #2 (North Rehoboth)	14,112		1,721			
	Highway Department	29,787		1,170			
	Transfer Station	13,545					
	Police Station/Fire Station #1 (..	115,079					5,036
	Animal Control	4,015		1,268			
	Station #3 (South Rehoboth)	24,910					4,291
	Annex	14,869		730			
	Blanding Public Library	26,108		3,459			
	Old Anawan School	719					
	Total	**345,134**		**11,342**			**16,155**
Open Space	Red McPhillips Baseball & Sof..	1,727					
	Total	**1,727**					
Street/Traffic Lights	Municipal Lights	29,618					
	Total	**29,618**					
Vehicle	Vehicles				41,507	18,002	
	Total				**41,507**	**18,002**	
Grand Total		**741,027**	**80,692**	**11,342**	**41,507**	**18,002**	**16,155**

Table 3B: Municipal Energy Consumption for Baseline Year FY2019 (MMBTU)

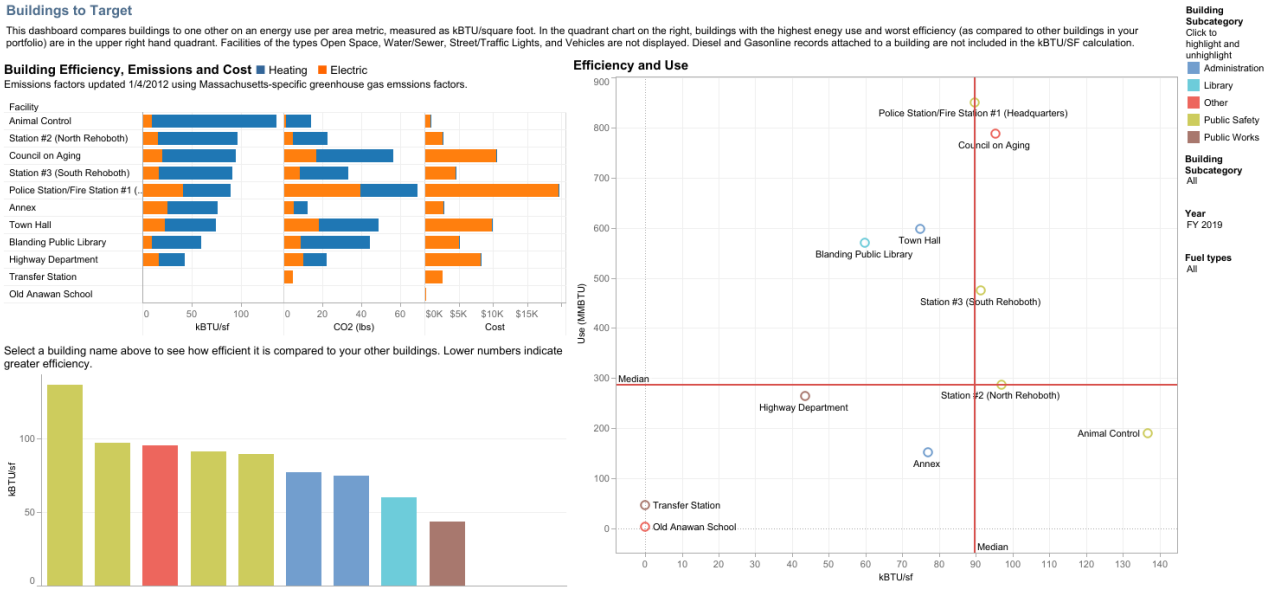
ERP Guidance Table 3b - Municipal Energy Consumption for 2019 (MMBTU)

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

		2019						
		Diesel	Electric	Gas	Gasoline	Oil	Propane	Total
Null	Null		1,244	8,069				**9,313**
	Total		**1,244**	**8,069**				**9,313**
Building	Council on Aging		167				621	**788**
	Town Hall		181			416		**598**
	Station #2 (North Rehoboth)		48			239		**287**
	Highway Department		102			163		**264**
	Transfer Station		46					**46**
	Police Station/Fire Station #1 (..		393				458	**851**
	Animal Control		14			176		**190**
	Station #3 (South Rehoboth)		85				390	**475**
	Annex		51			101		**152**
	Blanding Public Library		89			481		**570**
	Old Anawan School		2					**2**
	Total		**1,178**			**1,577**	**1,470**	**4,224**
Open Space	Red McPhillips Baseball & Sof..		6					**6**
	Total		**6**					**6**
Street/Traffic Lights	Municipal Lights		101					**101**
	Total		**101**					**101**
Vehicle	Vehicles	2,502			5,147			**7,649**
	Total	**2,502**			**5,147**			**7,649**
Grand Total		**2,502**	**2,528**	**8,069**	**5,147**	**1,577**	**1,470**	**21,293**

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 Public Safety Building-Police & Fire, for example, uses the most energy of any building in Rehoboth.



IV. Energy Reduction Plan

A. Narrative Summary

As shown below, the town has identified energy savings measures to reduce usage from FY2019 by 1,881 MMBTUs 25.9%. It is important to note that the schedule below can be modified to accommodate the changing goals and priorities of the community and that projects outside the scope of this Energy Reduction Plan may be eligible for grant funding as long as they are in a building that is listed in this Plan.

1. Overview of Plan Goals Years 1-3:

- **Install LED Lighting and Controls**
  It is recommended that high efficiency LED fixtures/kits are installed to replace the existing fluorescent lighting. This measure will reduce the energy consumption based on the decrease in lighting power output and the use of adaptive control technology. The scope of this work includes the following:
  - Supply and install new LED fixtures and/or kits
  - Supply and install lighting controls where applicable
  - Remove and recycle old fluorescent lamps and ballasts
  - Remove and recycle old fluorescent fixtures where applicable

  By installing LED lighting and controls at the Town Hall, Annex, Council on Aging, Animal Shelter, Highway Department, and Public Safety Building-Police & Fire, the town will save 91,917 kWh of electricity and $17,097 annually.

- **Weatherization Improvements**
  It is recommended that weatherization improvements are performed to tighten the building envelope and reduce heat loss. The scope of this work by building includes:
  <u>Annex:</u>
  - Open Blow Cellulose nominal 14”, plus an additional 1”-2” for settling for an R-value of 49.
  - Air Seal attic wall plates, wire penetrations, pipe penetrations etc. Air Seal small basement area. Friction Fit and foam 2” polyiso board in basement’s window.
  - Install 2 Thermal Domes over attic stairways.

  <u>Council on Aging:</u>
  - Repair add to and rebuild areas of the 2” polyiso board used to build a room around the HVAC System and pipes in this area of the attic.
  - Take down the drop ceiling (room by room or in some systematic fashion, as to not shut the building down) install plaster board or equivalent to transitions and areas that do not have any.
  - Open Blow Cellulose nominal 10”, plus an additional 1”-2” for settling, to bring the attic up to an R-value of 49.
  - Air Seal attic wall plates, wire penetrations, pipe penetrations and etc
  - Insulate and weather strip all hatches.

  <u>Animal Shelter:</u>
  - Spray foam closed cell foam, nominal 5.5”, R49 to roof sheathing.
  - Paint all foamed areas with intumescent paint.

Fire Station #3:

Recreation Hall (main area, kitchen, bathrooms, etc.)

- Open Blow Cellulose nominal 9", plus an additional 1"-2" for settling for an addition R-value of 27+.
- Vent (2) bathroom fans to the roof.
- Use R38 fiberglass batts to dam walkways, recessed lights and miscellaneous area as needed.
- Air Seal as needed (wall plates, wire penetrations, pipe penetrations).

Main Garage Area

- Cut and repair temporary access to attic area.
- Open Blow Cellulose nominal 9", plus an additional 1"-2" for settling for an addition R-value of 27+.
- Use R38 fiberglass batts to dam walkways, recessed lights and miscellaneous area as needed.
- Air Seal as needed (wall plates, wire penetrations, pipe penetrations).

By making these weatherization improvements at the Annex, Council on Aging, Animal Shelter, and Fire Station #3, the town will save 3,120 kWh of electricity, 2,940 gallons of propane, and $3,740 annually.

- **Oil to Propane Condensing Boiler Conversion**

  It is recommended that new condensing boilers be installed at a few buildings in Rehoboth. Condensing boilers (average efficiency 94%) can obtain a much higher efficiency than the standard non-condensing boiler (average efficiency <80%). The scope of this work includes the following:
  - Supply and install condensing boilers
  - Removal and disposal of existing boilers and all necessary piping and components of the old system no longer required
  - Installation of direct venting system for combustion air and exhaust air
  - Install outside air controls for maximum efficiency
  - Commissioning and factory startup of new boiler systems

  By removing the oil tanks and accessories and installing new propane fired condensing boilers at the Town Hall, Annex, Blanding Library, Highway Department, and Fire Station #2, the town will save 11,477 gallons of oil and $8,689 annually.

- **Pipe Insulation**

  It is recommended that pipes, tanks, and valves are insulated with cellular insulation. By implementing this measure, the reduction in heat loss will accrue, which will lead to energy savings. The scope of work includes the following: The scope of this work includes the following:
  - Insulation of pipes, valves, fittings and tanks to meet the insulation requirements of the fluid temperature in the pipe
  - Utilize/install pipe covering/jacket to protect the insulation material as required in the work area

By installing pipe insulation at the Town Hall, Annex, Blanding Library, Highway Department, Fire Station #2, and Fire Station #3, the town will save 3,129 gallons of propane and $3,439 annually.

- **Install Wi-Fi Programmable Thermostats**
  It is recommended that new Wi-Fi programmable thermostats are installed to give facility personnel access to space temperature through their cellular phone or computer. The Wi-Fi thermostats have scheduling capabilities to allow for setbacks during unoccupied times.
    - Demo existing thermostat
    - Install new Wi-Fi programmable thermostat
    - Town IT department will need to supply appropriate network information for Wi-Fi access
    - Thermostat training will be provided

  By installing Wi-Fi programmable thermostats at the Town Hall, Blanding Library, Animal Shelter, Fire Station #2, and Fire Station #3, the town will save 3,544 gallons of propane and $3,895 annually.

- **Interior Storms**
  It is recommended that window inserts be added to the inside of the existing interior storm windows at the Blanding Library and the Public Safety Building-Police & Fire. The inserts are typically custom made using a compression fit with foam weather stripping gaskets to create a seal for insulating air. The window inserts gaskets compress around the frame creating a sealed pocket for insulating air and is like adding an additional glass pane's worth of R-Value. By implementing this measure, a reduction in heat loss/heat gain will occur which will lead to energy savings.

  By adding window inserts at the Blanding Library and the Public Safety Building-Police & Fire, the town will save 170 kWh of electricity, 3,030 gallons of propane and $3,362 annually.

- **Install Refrigeration Controls**
  It is recommended that refrigeration controls are installed to control the walk-in cooler and freezer at the Council on Aging. It is also recommended that the evaporator fan motors are replaced with Electronically Commutated Motors (ECMs). ECMs have a better motor efficiency compared to shaded pole motors (roughly 78%). In conjunction with the local controllers and their energy savings features, it will also allow for remote control, monitoring and alarming of the walk-in coolers/freezers. The scope of this work includes the following:
    - Supply and install CoolTrol refrigeration controls to cycle temperature and evaporator fans
    - Replace existing shaded pole motors with high efficiency EC motors in evaporators
    - Dew-point pulse control for anti-sweat door heaters
    - Electric defrost control for the two freezers
    - Start-up and testing of the new controls/motors
    - Installation to be performed by licensed electricians during business hours

  By installing refrigeration controls at the Council on Aging, the town will save 8,914 kWh of electricity and $1,658 annually.

2. Overview of Plan Goals Years 4-5:

- **Install New Condensing Furnace**
  It is recommended that a new condensing furnace (~97% efficient) is installed in the at the Animal Shelter. The scope of this work includes the following:
  - Supply and install new condensing furnace
  - Removal and disposal of existing furnace and all necessary piping and components of the old system no longer required
  - Commissioning and startup of new furnace system

  By installing a new condensing furnace at the Animal Shelter, the town will save 1,268 gallons of oil and $1,093 annually.

- **Install Variable Frequency Drives**
  It is recommended that Variable Frequency Drives (VFDs) be installed on three AHU units at the Council on Aging allowing for electrical savings. Based on real time load conditions, the fans will be able to modulate up/down accordingly. Some sequencing would be required between the cooling valve and VFD's, which would modulate accordingly to meet space temperature demands. The scope of this work includes the following:
  - Supply and install three Variable Frequency Drives (VFDs) in place of the existing motor starters
  - Programming, start-up and testing of the new VFDs
  - Integrate into Energy Management System (if applicable)
  - Warranty for one year

  By installing VFDs at the Council on Aging, the town will save 9,069 kWh of electricity and $1,687 annually.

- **Plug Load**
  For each of the window AC units a smart plug solution would be installed. The window AC units will plug into smart plugs at the receptacle and utilize a Wi-Fi connection for access control. Some energysaving capabilities of the system would include schedule-based setback and temperature-based remote control. In addition, staff would have greater control and visibility with the option to view plug load conditions in real time or trend data for measurement and verification.

  By installing smart plugs on each window AC unit at Town Hall, Blanding Library, Fire Station #2, and Fire Station #3, the town will save 8,400 kWh of electricity and $1,562 annually.

- **Town-Wide "Anti-Idling" Policy***
  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. Implementing such a policy can reduce vehicle fuel consumption by as much as 10%.[1] Facilities Manager William Pray will be responsible for implementing this energy conservation measure.

[1] https://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf

- **Monitor Tire Air Pressure & Use Fuel Efficient Tires***
  Maintaining appropriate air pressure in vehicle tires can decrease that vehicles fuel consumption by as much as 4%.[2] Facilities Manager William Pray will be responsible for implementing this energy conservation measure.

- **Use 100% Synthetic Oil***
  The use of 100% synthetic oils reduces fuel consumption, the number of annual oil change and labor costs. This can reduce vehicle fuel consumption by as much as 2%.[3] Facilities Manager William Pray will be responsible for implementing this energy conservation measure.

- **Replacement of Town Hall and Health Department Automobiles***
  The replacement of the Town Hall automobile, a 2003 Ford Crown Victoria (18 mpg) with a 2020 Chevrolet Bolt Electric Vehicle (118 mpg), would result in a savings of 235 gallons of gas per year, based on 5,000 vehicle miles traveled. The replacement of the Health Department automobile, a 2013 Ford Explorer (19 mpg) with a 2020 Chevrolet Bolt Electric Vehicle (118 mpg), would result in a savings of 442 gallons of gas per year, based on 10,000 vehicle miles traveled.[4]

  **Please note that these measures are subject to staffing levels, funding levels, and Board of Selectmen and/or Town Meeting approval.*

B. Path to 20% Energy Use Reduction by the end of Fiscal Year 2024

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

The Town Administrator's Office will be responsible both for oversight of the Energy Reduction Plan and for the implementation of energy conservation measures within the Town. The Town Administrator's Office will also 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 conducted by Energy Source in 2019 and provide 15.7% energy savings. The Energy Source Audit is included in Appendix A. Other measures including retrocommissioning all high energy use buildings, implementing behavioral vehicle measures (anti-idling policy, monitoring tire air pressure, and the use of 100% synthetic oil), and the replacement of two town-owned vehicles with electric vehicles, will provide an additional 10.2% energy savings.

[2] https://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf
[3] https://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf
[4] https://afdc.energy.gov/; https://www.fueleconomy.gov/

Criterion 3 Step 4: Complete Table 4 - ECMs

Click here to view a sample version of this table

Table 4
Energy Conservation Measures Data

ECMs			Status		Energy Data						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 (Completed with month/year or planned month/year)	Projected Annual Electricity Savings (kWh)	Projected Annual Natural Gas Savings (therms)	Projected Annual Oil Savings (gallons)	Projected Annual Propane Savings (gallons)	Projected Annual Gasoline Savings (gallons)	Projected Annual Diesel Savings (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
Town Hall	LED Lighhting	Interior Lighting	Planned	Years 1-3	20,620	0	0	0	0	0		$26,336		$7,915	$18,421		Energy Source Audit
Town Hall	Smart Thermostats	Building Control	Planned	Years 1-3	0	0	0	558	0	0		$4,564		$0	$4,564		Energy Source Audit
Town Hall	Plug Load Controllers for Window ACs	Building Control	Planned	Years 4-5	1,800	0	0	0	0	0		$2,282		$270	$2,012		Energy Source Audit
Town Hall	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 1-3	0	0	2,994	-3,641	0	0		$38,036		$0	$38,036		Energy Source Audit
Town Hall	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	647	0	0		$5,325		$0	$5,325		Energy Source Audit
Annex	LED Lighhting	Interior Lighting	Planned	Years 1-3	5,670	0	0	0	0	0		$4,825		$525	$4,300		Energy Source Audit
Annex	Weatherization	Weatherization	Planned	Years 1-3	470	0	0	307	0	0		$11,767		$0	$11,767		Energy Source Audit
Annex	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 1-3	0	0	730	-888	0	0		$15,975		$0	$15,975		Energy Source Audit
Annex	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	324	0	0		$3,043		$0	$3,043		Energy Source Audit
Blanding Library	Smart Thermostats	Building Control	Planned	Years 1-3	0	0	0	1,058	0	0		$7,607		$0	$7,607		Energy Source Audit
Blanding Library	Plug Load Controllers for Window ACs	Building Control	Planned	Years 4-5	3,000	0	0	0	0	0		$3,804		$450	$3,354		Energy Source Audit
Blanding Library	Interior Storms	Weatherization	Planned	Years 1-3	85	0	0	1,515	0	0		$15,214		$0	$15,214		Energy Source Audit
Blanding Library	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 1-3	0	0	3,459	-4,206	0	0		$38,036		$0	$38,036		Energy Source Audit
Blanding Library	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	647	0	0		$5,325		$0	$5,325		Energy Source Audit
Council on Aging	LED Lighhting	Interior Lighting	Planned	Years 1-3	24,335	0	0	0	0	0		$31,921		$6,540	$25,381		Energy Source Audit
Council on Aging	Weatherization	Weatherization	Planned	Years 1-3	2,378	0	0	1,232	0	0		$52,527		$0	$52,527		Energy Source Audit
Council on Aging	VFDs on AHU Supply Fans	Pump/Motor/Drive	Planned	Years 4-5	9,069	0	0	0	0	0		$15,214		$4,200	$11,014		Energy Source Audit
Council on Aging	Refrigeration Controls	Refrigeration	Planned	Years 1-3	8,914	0	0	0	0	0		$12,271		$3,209	$9,062		Energy Source Audit
Animal Shelter	LED Lighhting	Interior Lighting	Planned	Years 1-3	2,633	0	0	0	0	0		$1,946		$260	$1,686		Energy Source Audit
Animal Shelter	Weatherization	Weatherization	Planned	Years 1-3	0	0	0	690	0	0		$21,785		$0	$21,785		Energy Source Audit
Animal Shelter	Smart Thermostats	Building Control	Planned	Years 1-3	0	0	0	151	0	0		$761		$0	$761		Energy Source Audit
Animal Shelter	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 4-5	0	0	1,268	-1,542	0	0		$18,257		$0	$18,257		Energy Source Audit
Highway Department	LED Lighhting	Interior Lighting	Planned	Years 1-3	10,830	0	0	0	0	0		$10,511		$1,925	$8,586		Energy Source Audit
Highway Department	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 1-3	0	0	1,170	-1,423	0	0		$22,821		$0	$22,821		Energy Source Audit
Highway Department	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	432	0	0		$4,564		$0	$4,564		Energy Source Audit
Public Safety Building	LED Lighting	Interior Lighting	Planned	Years 1-3	27,829	0	0	0	0	0		$28,962		$8,880	$20,082		Energy Source Audit
Public Safety Building	Interior Storms	Weatherization	Planned	Years 1-3	85	0	0	1,515	0	0		$15,214		$0	$15,214		Energy Source Audit
Fire Station #2	Smart Thermostats	Building Control	Planned	Years 1-3	0	0	0	512	0	0		$4,564		$0	$4,564		Energy Source Audit
Fire Station #2	Plug Load Controllers for Window ACs	Building Control	Planned	Years 4-5	1,800	0	0	0	0	0		$2,282		$270	$2,012		Energy Source Audit
Fire Station #2	Oil to Propane Condensing Boiler Conversion	Fuel Conversion	Planned	Years 1-3	0	0	1,721	-2,093	0	0		$38,036		$0	$38,036		Energy Source Audit
Fire Station #2	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	647	0	0		$5,325		$0	$5,325		Energy Source Audit
Fire Station #3	Smart Thermostats	Building Control	Planned	Years 1-3	0	0	0	1,265	0	0		$4,564		$0	$4,564		Energy Source Audit
Fire Station #3	Plug Load Controllers for Window ACs	Building Control	Planned	Years 4-5	1,800	0	0	0	0	0		$2,282		$270	$2,012		Energy Source Audit
Fire Station #3	Weatherization	Weatherization	Planned	Years 1-3	272	0	0	647	0	0		$21,431		$0	$21,431		Energy Source Audit
Fire Station #3	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	0	432	0	0		$4,564		$0	$4,564		Energy Source Audit
Town-wide no idling policy for municipal vehciles	Anti-Idlling Policy*	Vehicles	Planned	Years 4-5	0	0	0	0	4,151	1,800							www.fuelconomy.gov
Monior Tire Air Pressure & Use Fuel Efficient Tires in municipal vehicles	Monior Tire Air Pressure & Use Fuel Efficient Tires*	Vehicles	Planned	Years 4-5	0	0	0	0	1,660	720							www.fuelconomy.gov
Use 100% Synthetic Oil in municipal vehicles	Use 100% Synthetic Oil*	Vehicles	Planned	Years 4-5	0	0	0	0	830	360							www.fuelconomy.gov
Replace Town Hall Car with Electric Vehicle	Vehicle Replacement*	Vehicles	Planned	Years 4-5	0	0	0	0	235	0							https://afdc.energy.gov, https://www.fueleconomy.gov
Replace Health Dept. Car with Elerctric Vehicle	Vehicle Replacement*	Vehicles	Planned	Years 4-5	0	0	0	0	442	0							https://afdc.energy.gov, https://www.fueleconomy.gov
measures are subject to staffing levels, funding levels, and Board of Selectmen and/or Town					**121,590**	**0**	**11,342**	**-1,214**	**7,318**	**2,880**	**0**	**501,941**	**0**	**34,714**	**467,227**		
TOTAL MMBtu SAVINGS			**3,189**		**414.86508**	**0**	**1576.538**	**-110.474**	**907.432**	**400.32**							

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

1. Municipal Buildings

To better strategize for the long-term maintenance and management of municipal buildings, Rehoboth will work with 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

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 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 SeeClickFix creates additional real-time opportunities for efficiencies in operation and maintenance.

The Town of Rehoboth 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: Appendix A: Building Energy Audits – Energy Source

(Please see attached report)

Energy Reduction

Comprehensive Report

Rich Finn
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www.energysource.com

November 15, 2019

Dear Carolyn Panofsky,

Energy Source is pleased to present you with this energy conservation analysis. We trust you will find this to be a cost-effective means to reduce your energy costs and improve the comfort throughout your facilities by optimizing your lighting and HVAC systems. Other factors to consider as you evaluate this analysis are existing equipment related disruptions and maintenance costs are eliminated or minimized until the new equipment enters its end of life – typically several years.

In the attached analysis, you will find a detailed report recommending the following:

- LED Lighting
- Weatherization
- Oil to Propane Condensing Boiler Conversion
- Pipe Insulation
- Smart Thermostats
- Interior Storms
- Refrigeration Controls
- Convection Ovens
- Oil to Propane Condensing Furnace Conversion
- Variable Frequency Drives
- Plug Load

Energy Source will secure electric incentives from the utility company which will substantially reduce the net cost of this project. The utility incentives reflected in this proposal are estimated and are subject to change until projects are reviewed by the utility company. Some pricing in the report is budget-level and further walk throughs will be required to firm up pricing if the town decides to move forward with those measures.

I hope you find this proposal informative. If you have any questions, please do not hesitate to contact me.

Sincerely,

Rich Finn

Energy Source

Disclaimer

This report is not for general use and is the property of Energy Source.

All savings estimates, and rebates must be considered estimated until reviewed and approved by the utility companies designated within this report.

For any questions regarding this report, please contact Rich Finn, Operations Manager for Energy Source, Inc. at 781-267-8495. Any additional use of this report is prohibited unless permission is given in writing from Energy Source, Inc.

Executive Summary

Energy Source recently conducted an energy survey at the following Rehoboth buildings:

- Town Hall
- Annex TV Studio
- Blanding Library/Geoff Hall
- Council on Aging/Senior Center
- Animal Shelter
- Highway Department
- Public Safety Building – Police and Fire
- Fire Station #2
- Fire Station #3
- Palmer River Elementary School
- Beckwith Middle School

Our recommendations are known as Energy Conservation Measures which are outlined in separate write-ups.

The expected energy savings were determined based on current operating hours of equipment surveyed. Poorly performing equipment will reduce the effectiveness of employing these ECMs, and the cost to repair or replace that equipment is not covered in this estimate.

Energy Conservation Measures	Total Project Cost	Estimated Incentives	Estimated Customer Cost	Electricity Savings		#2 FO Savings		Propane Savings		Total Cost Savings	Payback Period (years)
				kWh	Cost	Gal	Cost	Gal	Cost		
LED Lighting	$305,473	$62,710	$242,763	149,823	$27,867	0	$0	0	$0	$27,867	8.7
Weatherization	$107,510	$0	$107,510	3,120	$580	0	$0	2,876	$3,161	$3,741	28.7
Oil to Propane Condensing Boiler Conversion	$152,904	$0	$152,904	0	$0	10,074	$22,153	-$12,251	-$13,464	$8,689	17.6
Pipe Insulation	$28,146	$0	$28,146	0	$0	0	$0	$3,129	$3,439	$3,439	8.2
Smart Thermostats	$22,060	$2,225	$19,835	0	$0	0	$0	$3,544	$3,895	$3,895	5.1
Interior Storms	$30,428	$0	$30,428	170	$32	0	$0	$3,030	$3,330	$3,362	9.1
Refrigeration Controls	$23,148	$8,280	$14,868	15,252	$2,837	0	$0	$0	$0	$2,837	5.2
Convection Ovens	$13,564	$2,000	$11,564	4,470	$831	0	$0	$0	$0	$831	13.9
Oil to Propane Condensing Furnace Conversion	$18,257	$0	$18,257	0	$0	1,268	$2,788	-$1,542	-$1,695	$1,093	16.7
VFDs on AHU Supply Fans	$15,214	$4,200	$11,014	9,069	$1,687	0	$0	$0	$0	$1,687	6.5
Plug Load Controllers for Window ACs	$10,650	$1,260	$9,390	8,400	$1,562	0	$0	$0	$0	$1,562	6.0
Total	**$727,354**	**$80,675**	**$646,679**	**190,304**	**$35,396**	**11,342**	**$24,941**	**-$1,214**	**-$1,334**	**$59,003**	**11.0**

ECM #1 - Install LED Lighting and Controls

Existing Conditions

This measure involves the installation of LED fixtures/kits and controls where applicable. Currently, the majority of town buildings are using fluorescent lighting technology.

Energy Conservation Measure Details

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

- Supply and install new LED fixtures and/or kits
- Supply and install lighting controls where applicable
- Remove and recycle old fluorescent lamps & ballasts
- Remove and recycle old fluorescent fixtures where applicable

By implementing this measure, the following annual energy savings and associated cost savings can be obtained:

Building	Electricity Savings	
	kWh	Cost
Town Hall	20,620	$3,835
Annex TV Studio	5,670	$1,055
Council on Aging/Senior Center	24,335	$4,526
Animal Shelter	2,633	$490
Highway Department	10,830	$2,014
Public Safety Building - Police and Fire	27,829	$5,176
Palmer River Elementary School	11,110	$2,066
Beckwith Middle School	46,796	$8,704
Total	**149,823**	**$27,867**

An estimated annual energy savings of 149,823 kWh can be realized from this measure, which will lead to an estimated annual total cost savings of $27,867.

Implementation

The implementation of this measure requires the purchase and installation of LED fixtures/kits to replace the flourescent lighting. Recycling of old lamps & ballasts is included in the project costs. The total implementation costs are displayed in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback (years)
Town Hall	$26,336	$7,915	$18,421	4.8
Annex TV Studio	$4,825	$525	$4,300	4.1
Council on Aging/Senior Center	$31,921	$6,540	$25,381	5.6
Animal Shelter	$1,946	$260	$1,686	3.4
Highway Department	$10,511	$1,925	$8,586	4.3
Public Safety Building - Police and Fire	$28,962	$8,880	$20,082	3.9
Palmer River Elementary School	$39,436	$0	$39,436	19.1
Beckwith Middle School	$161,536	$36,665	$124,871	14.3
Total	**$305,473**	**$62,710**	**$242,763**	**8.7**

It is estimated that approximately $62,710 can be obtained from utility incentives; therefore, the adjusted customer cost is $242,763. The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$242{,}763}{\$27{,}867} = 8.7\ years$$

ECM #2 – Weatherization Improvements

Existing Conditions

Several buildings in town are lacking proper building insulation. This leads to the loss of conditioned air and an associated increase in energy required to make up for that loss.

Energy Conservation Measure Details

It is recommended that weatherization improvements are performed to tighten the building envelope and reduce heat loss. An overview of our recommendations by building are shown below:

Town Hall Annex/TV Station:

Town to clean attic area of miscellaneous storage, prior to work commencement (noted old filing cabinets and etc., in attic space during inspection). There are a few inches of very old blown in material, this material has little to no R-value. We propose adding 14" of open blow cellulose to the attic area(s) to bring the building up to R49. Our understanding is this building is in the process of having a roof installed. We are assuming at the time of this quotation that soffit vents and a ridge vent will be installed during the new roof install. If venting is needed, then it will be quoted at that time.

- Open Blow Cellulose nominal 14", plus an additional 1"-2" for settling for an R-value of 49.
- Air Seal attic wall plates, wire penetrations, pipe penetrations etc. Air Seal small basement area. Friction Fit and foam 2" polyiso board in basement's window.
- Install 2 Thermal Domes over attic stairways.

Council on Aging/Senior Center:

There is no doubt we will have to work with the Manager of this facility, as the entire drop ceiling needs to be removed and reinstalled so that plasterboard or equivalent can be installed in all transitions and areas that simply have no sheathing or plaster board. Without the installation of this material, we cannot add anymore insulation in the attic area as we are concerned that there is not enough structural strength to hold any additional weight of insulation. We do not believe there are any structural integrity issues in the building; however, there are transitions

and areas under the ceiling joists that simply have no board to hold up insulation. The current insulation is frictionally held between the ceiling joists in many areas.
There is HVAC equipment and water pipes in the attic area. It appears that 2" Rigid Board was used to build walls and a ceiling to bring this equipment and these pipes into the Thermal Barrier. This needs attention and repair and or replacement in many areas. The attic currently has 6" of fiberglass installed. We are estimating this to be an R-value of 17. It is not properly installed in some places and in other places it is missing. We propose adding to the areas that are missing, replacing pieces that are moved out of place or not installed correctly and adding an open blow cellulose of 10" (R33) to bring the attic space up to R49. This may not be achievable in the area underneath the HVAC System.

- Repair add to and rebuild areas of the 2" polyiso board used to build a room around the HVAC System and pipes in this area of the attic.
- Take down the drop ceiling (room by room or in some systematic fashion, as to not shut the building down) install plaster board or equivalent to transitions and areas that do not have any.
- Open Blow Cellulose nominal 10", plus an additional 1"-2" for settling, to bring the attic up to an R-value of 49.
- Air Seal attic wall plates, wire penetrations, pipe penetrations and etc.
- Insulate and weather strip all hatches.

Animal Shelter:

This is an older block building with little to no insulation in the ceiling/roof.

- Spray foam closed cell foam, nominal 5.5", R49 to roof sheathing.
- Paint all foamed areas with intumescent paint.

Fire Station 3:

Town to clean attic area of Holiday Decorations and miscellaneous items prior to work commencement. It appears that the Recreation Area (Main Hall, Kitchen, Bathrooms and etc.) was built at the same time as the Main Garage Area. We did not have access to the Main Garage Area (a temporary access will have to be cut to explore this area). For purposes of this quotation, we have assumed this area (Main Garage) has been treated the same way as the

Recreation Area. This quotation will have to be confirmed upon entry to the Main Garage Area. We propose adding 9" of open blow cellulose to the attic area(s) to bring the building up to R49. We have assumed the old 9" of fiberglass has an R-value of 22. Open Blow Cellulose nominal 14", plus an additional 1"-2" for settling for an R-value of 49.

RECREATION HALL (main area, kitchen, bathrooms and etc.)

(attic area is roughly 2,200sq.ft.)

- Open Blow Cellulose nominal 9", plus an additional 1"-2" for settling for an addition R-value of 27+.
- Vent (2) bathroom fans to the roof.
- Use R38 fiberglass batts to dam walkways, recessed lights and miscellaneous area as needed.
- Air Seal as needed (wall plates, wire penetrations, pipe penetrations).

MAIN GARAGE AREA

- Cut and repair temporary access to attic area.
- Open Blow Cellulose nominal 9", plus an additional 1"-2" for settling for an addition R-value of 27+.
- Use R38 fiberglass batts to dam walkways, recessed lights and miscellaneous area as needed.
- Air Seal as needed (wall plates, wire penetrations, pipe penetrations).

Below are the estimated savings associated with these improvements:

Building	Electricity Savings		Propane Savings		Total Cost Savings
	kWh	Cost	Gal	Cost	
Annex	470	$87	307	$337	$424
Senior Center	2,378	442	1,232	$1,354	$1,796
Animal Shelter	0	$0	690	$758	$758
Fire Station 3	272	$51	711	$711	$762
Total	**3,120**	**$580**	**2,940**	**$3,160**	**$3,740**

Implementation

The implementation of this measure requires the purchase and the installation of the materials associated with the work described above. The total project cost for each facility is shown below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Annex	$11,767	$0	$11,767	27.7
Senior Center	$52,527	$0	$52,527	29.2
Animal Shelter	$21,785	$0	$21,785	28.7
Fire Station 3	$21,431	$0	$21,431	28.1
Total	**$107,510**	**$0**	**$107,510**	**28.7**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$107{,}510}{\$3{,}740} = 28.7\ years$$

ECM #3 – Oil to Propane Condensing Boiler Conversion

Existing Conditions

This measure involves the removal of all oil tanks and accessories and the installation of new propane fired condensing boilers. Currently, the hot water at the buildings is being supplied from non-condensing boilers and is delivered to baseboards, unit ventilators (UVs) and air handler units (AHUs) depending on the building end devices.

Energy Conservation Measure Details

It is recommended that new condensing boilers be installed at a few buildings in Rehoboth. Condensing boilers (average efficiency 94%) can obtain a much higher efficiency than the standard non-condensing boiler (average efficiency <80%). The scope of this work includes the following:

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

Below are the estimated savings associated with these improvements:

Building	Oil		Propane Savings		Total Cost Savings
	Gal	Cost	Gal	Cost	
Town Hall	2,994	$6,584	-3,641	-$4,001	$2,583
Annex TV Studio	730	$1,605	-888	-$976	$629
Blanding Library/Geoff Hall	3,459	$7,606	-4,206	-$4,622	$2,984
Highway Department	2,573	$2,573	-1,423	-$1,564	$1,009
Fire Station #2	1,721	$3,784	-2,093	-$2,300	$1,484
Total	**11,477**	**$22,152**	**-12,251**	**-$13,463**	**$8,689**

Implementation

The implementation of this measure requires the purchase and installation of condensing boilers and any necessary piping and venting. The total estimated project costs and incentives are shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Town Hall	$38,036	$0	$38,036	14.7
Annex TV Studio	$15,975	$0	$15,975	25.4
Blanding Library/Geoff Hall	$38,036	$0	$38,036	12.7
Highway Department	$22,821	$0	$22,821	22.6
Fire Station #2	$38,036	$0	$38,036	25.6
Total	**$152,904**	**$0**	**$152,904**	**17.6**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$152{,}904}{\$8{,}689} = 17.6\ years$$

ECM #4 – Pipe Insulation

Existing Conditions

This measure involves the insulation of pipes, valve & fittings, and tanks. Below is a description of each insulation measure that is being proposed.

- **Pipe Insulation –** un-insulated pipes in the heating systems are leading to unnecessary distribution losses and wasted energy. There is a mix of uninsulated steam, condensate, and heating hot water pipes throughout the respective boiler rooms assessed in Rehoboth, MA.
- **Valve & Fitting Insulation –** valves and fittings are difficult components of a mechanical system to insulate and as a result are frequently left un-insulated. These un-insulated or poorly insulated components have the same temperature fluids passing through them as the pipes that are more likely to be insulated; un-insulated components of the distribution system lead to unnecessary distribution losses and wasted energy.
- **Tank Insulation –** tanks are difficult components of a mechanical system to insulate and as a result are frequently left un-insulated. Un-insulated or poorly insulated tanks or equipment have the same temperature fluids passing through them as the pipes that are more likely to be insulated; un-insulated components of the distribution system lead to unnecessary distribution losses and wasted energy.

Energy Conservation Measure Details

It is recommended that the tank, and valve is insulated with cellular insulation. By implementing this measure, the reduction in heat loss will accrue, which will lead to energy savings. The scope of work includes the following:

- Insulation of pipes, valves, fittings and tanks to meet the insulation requirements of the fluid temperature in the pipe
- Utilize/install pipe covering/jacket to protect the insulation material as required in the work area.

Below are the estimated savings associated with these improvements:

Building	Propane Savings	
	Gal	Cost
Town Hall	647	$711
Annex TV Studio	324	$356
Blanding Library/Geoff Hall	647	$711
Highway Department	432	$475
Fire Station #2	647	$711
Fire Station #3	432	$475
Total	**3,129**	**$3,439**

Implementation

The implementation of this measure requires the insulation of a pipes, valves, fittings and tanks. The total material and labor cost of each building is shown below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback (years)
Town Hall	$5,325	$0	$5,325	7.5
Annex TV Studio	$3,043	$0	$3,043	8.5
Blanding Library/Geoff Hall	$5,325	$0	$5,325	7.5
Highway Department	$4,564	$0	$4,564	9.6
Fire Station #2	$5,325	$0	$5,325	7.5
Fire Station #3	$4,564	$0	$4,564	9.6
Total	**$28,146**	**$0**	**$28,146**	**8.2**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$28{,}146}{\$3{,}439} = 8.2\ years$$

ECM #5 - Install Wi-Fi Programmable Thermostats

Existing Conditions

This measure involves the installation of Wi-Fi thermostats at the Town Hall, Library, Animal Shelter, and Fire Stations #2 & #3 buildings. Currently, the facilities have standalone thermostats which do not include temperature setback.

Energy Conservation Measure Details

It is recommended that new Wi-Fi programmable thermostats are installed to give facility personnel access to space temperature through their cellular phone or computer. The Wi-Fi thermostats have scheduling capabilities to allow for setbacks during unoccupied times.

- Demo existing thermostat
- Install new Wi-fi programmable thermostat
- Town IT department will need to supply appropriate network information for Wi-Fi access
- Thermostat training will be provided

Below are the estimated savings associated with these improvements:

Building	Propane Savings	
	Gal	Cost
Town Hall	558	$613
Blanding Library/Geoff Hall	1,058	$1,163
Animal Shelter	151	$166
Fire Station #2	512	$563
Fire Station #3	1,265	$1,390
Total	**3,544**	**$3,895**

Implementation

The implementation of this measure requires the purchase and installation of new Wi-Fi thermostats.

Project costs are summarized below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Town Hall	$4,564	$0	$4,564	7.4
Blanding Library/Geoff Hall	$7,607	$0	$7,607	6.5
Animal Shelter	$761	$0	$761	4.6
Fire Station #2	$4,564	$0	$4,564	8.1
Fire Station #3	$4,564	$0	$4,564	3.3
Total	**$22,060**	**$0**	**$22,060**	**5.7**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$22{,}060}{\$3{,}895} = 5.7\ years$$

ECM #6 – Interior Storms

Existing Conditions

This measure involves the installation of window inserts at the Library and Public Safety Building. Currently, both facilities have single pane windows which are allowing for a lot of air filtration. In, addition the Public Safety Building currently has casement windows showing severe signs of broken seal and air leakage. The Library is an historical building with windows that are very large and have multiple grills showing severe signs of broken seals as well.

Energy Conservation Measure Details

It is recommended to add window inserts inside of the existing interior storm windows. The inserts are typically custom made using a compression fit with foam weather stripping gaskets to create a seal for insulating air. The window inserts gaskets compress around the frame creating a sealed pocket for insulating air and is like adding an additional glass pane's worth of R-Value. By implementing this measure, a reduction in heat loss/heat gain will occur which will lead to energy savings.

Below are the estimated savings associated with these improvements:

Building	Energy Savings		
	kWh	Gal	Cost
Blanding Library/Geoff Hall	85	1,681	$1,665
Public Safety Building - Police and Fire	85	1,681	$1,665
Total	**170**	**$3,362**	**$3,330**

Implementation

The implementation of this measure requires window frame measurements with exact dimensions for a custom fabricate of each panel. The total estimated project cost and incentive is shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback (years)
Blanding Library/Geoff Hall	$15,214	$0	$15,214	6.0
Public Safety Building - Police and Fire	$15,214	$0	$15,214	6.0
Total	**$30,428**	**$0**	**$30,428**	**9.1**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$30{,}428}{\$3{,}362} = 9.1\ years$$

ECM #7 - Install Refrigeration Controls

Existing Conditions

This measure involves the installation of refrigeration controls to control door heaters, evaporator fans, and electric defrost circuits. Currently, the Senior Center and Beckwith Middle School has evaporator fan motors which circulate/transfer cool energy from the cooling coils to the walk-in coolers/freezers. The evaporator fans are equipped with shaded pole motors which have a full load efficiency of around 30% efficient. The existing evaporator fan motors and the anti-sweat door heaters run 24/7. In addition, the coolers/freezers have electric defrosts that cycle several times per day.

Energy Conservation Measure Details

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

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

The table below shows the proposed measures and annual energy savings for each building:

Building	Cooling Unit	# Evap Fans	Proposed Measures			Annual Energy Savings	
			EC Motors	Door Heater Control	Electric Defrost Control	kWh	Cost
Beckwith Middle School	Walk-In Cooler	2	Yes	Yes	Yes	6,338	$1,179
	Walk-In Freezer	2					
Senior Center	Walk-In Cooler	2	Yes	Yes	Yes	8,914	$1,658
	Walk-In Freezer	1					
Total		**7**				**15,252**	**$2,837**

Implementation

The implementation of this measure requires the purchase and installation of refrigeration controls to control walk-in coolers/freezers, door heaters, electric defrost circuits, and evaporator fans. This measure also consists of replacing shaded pole evaporator fan motors with Electronically Commutated Magnetic Motors (ECMs). The total estimated project cost and incentive is shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Beckwith Middle School	$10,877	$5,071	$5,806	4.9
Senior Center	$12,271	$3,209	$9,062	5.5
Total	**$23,148**	**$8,280**	**$14,868**	**5.2**

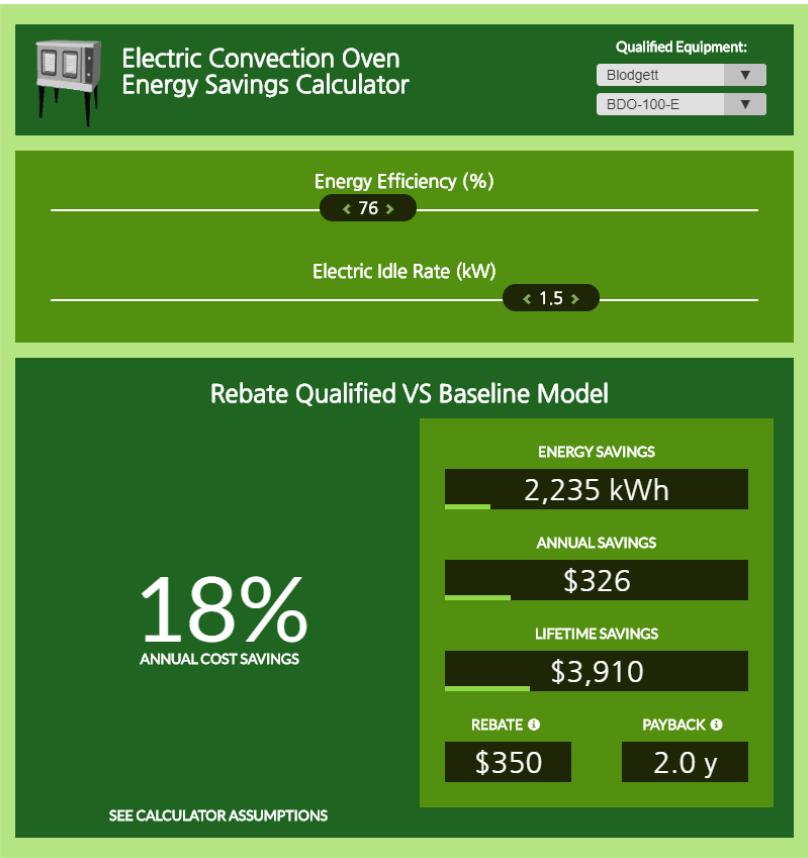
The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$14{,}868}{\$2{,}837} = 5.2\ years$$

ECM #8 – New Convection Ovens

This measure involves the purchase and installation of (2) electric convection ovens at the Beckwith Middle School to replace the existing older units. The proposed ovens are Energy Star certified and are each expected to save approximately 4,470 kWh annually.

Below is a comparison of a baseline convection oven model vs a proposed Energy Star certified option:



A savings summary is shown below:

Energy Conservation Measures	Electricity Savings	
	kWh	Cost
New Convection Ovens	4,470	$831

The total estimated project cost and incentive is shown in the table below:

Energy Conservation Measures	Total Project Cost	Preapproved Utility Incentives	Customer Cost	Payback Period (years)
New Convection Ovens	$13,564	$2,000	$11,564	13.9

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$13{,}564}{\$831} = 13.9\ years$$

ECM #9 - Install New Condensing Furnace

Existing Conditions

This measure involves the installation of a new condensing furnace at the Animal Shelter. The current furnace is an older unit and is a good candidate for replacement.

Energy Conservation Measure Details

It is recommended that a new condensing furnace (~97% efficient) is installed in the at the Animal Shelter. The scope of this work includes the following:

- Supply and install new condensing furnace
- Removal and disposal of existing furnace and all necessary piping and components of the old system no longer required
- Commissioning and startup of new furnace system

The annual energy cost savings summary is shown below:

Building	Oil		Propane Savings		Total Cost Savings
	Gal	Cost	Gal	Cost	
Animal Shelter	1,268	$2,788	-1,542	-$1,695	$1,093
Total	**1,268**	**$2,788**	**-1,542**	**-$1,695**	**$1,093**

Implementation

The implementation of this measure requires the purchase and installation of the condensing furnace and any necessary piping and venting. The total estimated project cost and incentive is shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Animal Shelter	$18,257	$0	$18,257	16.7
Total	**$18,257**	**$0**	**$18,257**	**16.7**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$18{,}257}{\$1{,}093} = 16.7\ years$$

ECM #10- Install Variable Frequency Drives

Existing Conditions

This measure involves the installation of Variable Frequency Drives (VFDs) on AHU Supply Fans that serve the Senior Center. The supply fans currently run at 100% but there is an opportunity to reduce fan speed/air flow at times of reduced heating loads.

Energy Conservation Measure Details

It is recommended that Variable Frequency Drives (VFDs) be installed on three AHU units at the Senior Center allowing for electrical savings. Based on real time load conditions, the fans will be able to modulate up/down accordingly. Some sequencing would be required between the cooling valve and VFD's, which would modulate accordingly to meet space temperature demands.

The scope of this work includes the following:

- Supply and install three Variable Frequency Drives (VFDs) in place of the existing motor starters
- Programming, start-up and testing of the new VFDs
- Integrate into Energy Management System (if applicable)
- Warranty for one year

The table below shows the annual energy cost savings for this measure:

Building	Electric Savings	
	kWh	Cost
Council on Aging/Senior Center	9,069	$1,687
Total	**9,069**	**$1,687**

Implementation

The implementation of this measure requires the purchase and installation of three VFDs and startup/commissioning. The total estimated project cost and incentive is shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback Period (years)
Council on Aging/Senior Center	$15,214	$4,200	$11,014	6.5
Total	**$15,214**	**$4,200**	**$11,014**	**6.5**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$11{,}014}{\$1{,}687} = 6.5\ years$$

ECM #11 – Plug Load

Existing Condition

This measure involves the addition of smart plug load controls for window AC units at Town Hall, Library, Fire Stations #2 and #3. Currently, the window AC units have stand-alone thermostat temperature control.

Energy Conservation Measure Details

For each of the window AC units a smart plug solution would be installed. The window AC units will plug into smart plugs at the receptacle and utilize a Wi-Fi connection for access control. Some energy-saving capabilities of the system would include schedule-based setback and temperature-based remote control. In addition, staff would have greater control and visibility with the option to view plug load conditions in real time or trend data for measurement and verification.

The table below shows the annual energy cost savings for this measure:

Building	Energy Savings	
	kWh	Cost
Town Hall	1,800	$335
Blanding Library/Geoff Hall	3,000	$558
Fire Station #2	1,800	$335
Fire Station #3	1,800	$335
Total	**8,400**	**$1,562**

Implementation

The implementation of this measure requires the purchase and installation of plug load controls. The total estimated project cost and incentive is shown in the table below:

Building	Total Project Cost	Estimated Utility Incentives	Customer Cost	Payback (years)
Town Hall	$2,282	$270	$2,012	6.0
Blanding Library/Geoff Hall	$3,804	$450	$3,354	6.0
Fire Station #2	$2,282	$270	$2,012	6.0
Fire Station #3	$2,282	$270	$2,012	6.0
Total	**$10,650**	**$1,260**	**$9,390**	**6.0**

The simple payback is calculated as follows:

$$Payback\ Period = \frac{Customer\ Cost}{Cost\ Savings} = \frac{\$9{,}390}{\$1{,}562} = 6.0\ years$$

Installation and Warranty Information

If you decide to proceed with this proposal, Energy Source will be responsible for the following tasks:

- Develop final equipment specifications and equipment layout
- Processing and filing application for utility incentives
- Material ordering and receiving
- Dismantling and removing existing systems from premises
- Construction
- Final walk-through with you

Installation

All installation staff will agree to submit to a CORI check before proceeding with project.

The removal and disposal of asbestos and toxic materials if present are the owner's responsibility and should be determined before proceeding with the project.

Warranty

Included with your project is a one-year warranty on all labor and materials provided by Energy Source. At the end of the first-year materials remain covered by standard warranties provided by their manufacturers. Warranty periods begin when the installation is completed. The owner has a one-month period following the completion of the installation to accept or reject work performed by Energy Source, after which time we will assume that the work has been accepted.

Due to the fluctuation in commodities this proposal is valid for a period of 30 days from the date shown at the top of this proposal, after which time we will be happy to provide an adjusted quote if necessary.