RISE ENGINEERING™

Cape Light Compact

ELEMENTARY SCHOOL
Chilmark

Energy Audit Report

September 22, 2019

ABSTRACT

The intent of this assessment is to summarize the site's existing points of energy consumption and determine cost-effective measures that may be implemented and incentivized by the Cape Light Compact and National Grid

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Overview

Cape Light Compact has retained RISE Engineering to evaluate the energy consumption and potential energy conservation measures (ECMs) for commercial, industrial, and municipal customers. The intent of this review is to summarize the existing points of energy use, highlight any issues with regard to elevated energy consumption, and determine cost-effective measures that can be implemented by the customer. These measures will decrease the overall energy consumption at the site and provide a favorable payback to the customer throughout the life of equipment. All costs, savings, and incentives are representative of findings observed on site.

This report details potential ECMs associated with the Elementary School, located at 8 State Rd, Chilmark MA 02535

Contacts

Facility / Project Location			
Elementary School 8 State Rd. Chilmark, MA 02535 EPLUS #: 201235			
Program Administrator Representative(s)			
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RISE Engineering			
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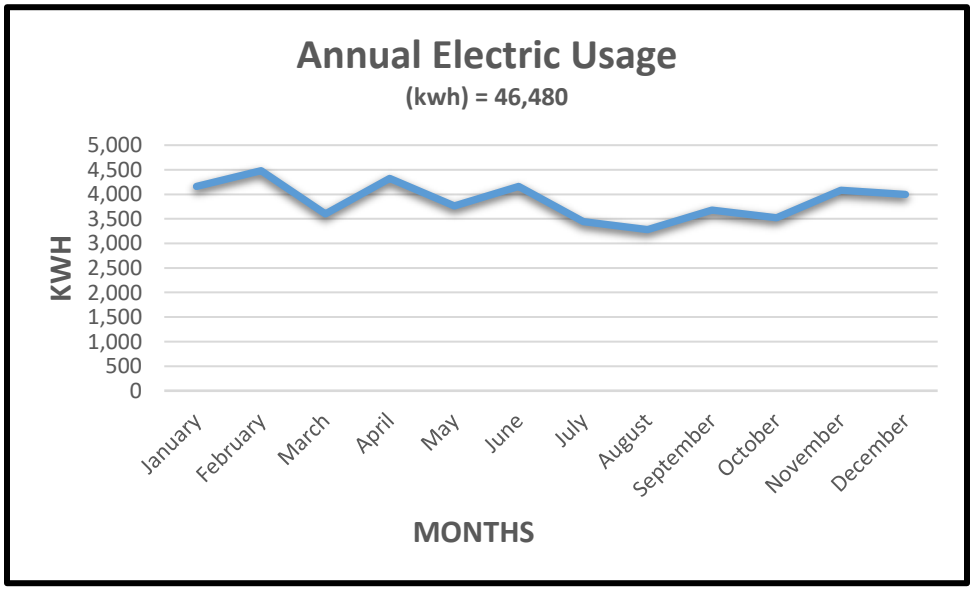
Site Contact(s)			
Timothy Carroll	Town Administrator	Town of Chilmark	(508) 645 - 2109 townadministrator@chilmarkma.gov

Energy Breakout

Electric Consumption [Account #:16438570018]		
Usage	Range	kWh
Annual	January 2018 to December 2018	46,480

Electric Consumption [Account #16438570018]						
Month	Days	Meter Read Date	Demand (kW)	Electric Use (kWh)	Cooling Load (kWh)	Equivalent kBtu (total)
January	31	1/15/2018	10.2	4,160	0	14,198
February	28	2/15/2018	11.0	4,480	0	15,290
March	31	3/15/2018	8.9	3,600	0	12,287
April	30	4/15/2018	10.6	4,320	0	14,744
May	31	5/15/2018	9.2	3,760	0	12,833
June	30	6/15/2018	10.2	4,160	0	14,198
July	31	7/15/2018	8.5	3,440	0	11,741
August	31	8/15/2018	8.1	3,280	0	11,195
September	30	9/15/2018	9.1	3,680	0	12,560
October	31	10/15/2018	8.7	3,520	0	12,014
November	30	11/15/2018	10.0	4,080	0	13,925
December	31	12/15/2018	9.8	4,000	0	13,652
Annual	365		9.5	46,480	-	158,636



Building Overview

Year of Construction: 1994

Number of Stories: 1

Structure Material: Wood

Building Type: Elementary School

Conditioned Floor Area: 10,000 sq. ft.

Building Systems Information

Space Conditioning	
Energy Source	**Percentage of Building**
Electric (Cooling)	0%
Oil (Heating)	100%

Heating System Equipment	
Equipment Type	Boiler (FHW)
Energy Source	Oil

DHW Equipment	
Equipment Type	65 Gallon Water Heater
Energy Source	Electric

Cooling System Equipment	
Equipment Type	N/A
Energy Source	N/A

Proposed Energy Conservation Measures

The following section summarizes energy conservation measures (ECMs) that were found as a result of the site assessment. All costs and incentives are strictly estimates and formal proposals are necessary to determine approved incentive amounts from the Cape Light Compact. Some measures may be eligible for prescriptive incentives that can be applied for using a variety of online applications. The table below depicts identified opportunities.

Energy Conservation Measures Savings Summary						
Measure Description	Annual Energy Cost Savings			Payback(s) with Incentive		
	Electric Savings (kWh)	Oil Savings (Gallons)	Total Annual Cost Savings	CLC Incentive	Net Customer Cost	Simple Payback (years)
Elementary School						
ECM 1: LED Lighting	4,464	0	$803.52	$4,464.00	$6,056.43	7.5
ECM 2: Faucet Aerators	2,163	0	$389.34	$72.00	$0.00	0.0
ECM 3: Heat Pump Hot Water Heater	1,516	0	$272.88	$1,516.00	$7,984.00	29.3
ECM 4: Heat Pump System	-17,580	2,205	$3,538.28	$5,195.82	$104,804.18	29.6
Total	**-9,437**	**2,205**	**$5,004.02**	**$11,247.82**	**$118,844.61**	**23.7**

(NOTE: all costs and incentives are using standard costs of $2.68/Gallon for deliverable fuel and $.18/kWh)

Summary

The existing building was built in 1994 and serves as an elementary school in the town of Chilmark. It is approximately 10,000 sq. ft. The elementary school is occupied for 180 days a year for at least 10 hours per day.

There is currently two (2) oil boilers on site. One of the boilers has been decommissioned and is currently not in operation. The other boiler is the primary source of heating for the elementary school. It was manufactured in 2005 and operates at 80% efficiency with 433MBH heating capacity. It distributes hot water heating with an energy efficient circulator pump with an electronically commutated motor (ECM).

The town has contacted a third-party engineering firm to conduct an in-depth analysis and is subject to future recommendations/alterations.

A programmable thermostat controls this unit with setback capability.

There are four (4) existing air handlers that are inoperable located in the attic flat that no longer provide heating to classroom areas.

There is an energy recovery ventilator (ERV) on site, as well as rooftop solar panels to aid in energy efficiency.

There is an existing 65 gallon electric water heater currently providing domestic hot water to elementary school faucets. This water heater is original to the building and has outlived its useful life expectancy.

The elementary school currently has fluorescent bulbs throughout.

It was also noted that the existing plumbing fixtures are of standard efficiency.

The existing insulation levels in the attic flat are sufficient with no opportunities for improvement.

After reviewing the site and possible measures, RISE noted that the site should replace their inefficient plumbing fixtures with low flow options, replace the existing inefficient lighting fixtures with LED replacmernts, and install an energy efficient hot water heater. It is also recommended that the elementary install a heat pump system to provide an energy efficient way of heating and cooling classroom areas.

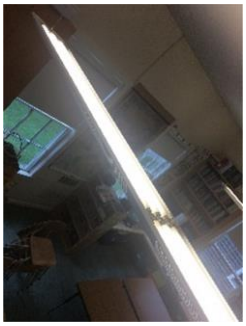
The following pages provide more detail on each of the proposed energy saving opportunities. In addition to describing the existing conditions, proposed solution, and intent of the upgrade, project economics are presented.

ECM 1: LED lighting

Existing Conditions: The existing lighting at the elementary school is comprised of inefficient fluorescent bulbs.

Energy Conservation Measure: It is recommended that the elementary school replace the existing fluorescent lighting with LED bulbs. LED lighting produces comparable lumens with less wattage producing considerable electric savings.

Existing Conditions



Existing Fluorescent bulbs

Proposed Energy Conservation Measure

Installation of LED bulbs

Summary of Savings and Project Economics - ECM 1: LED Lighting					
Project Energy Savings					
Electric Savings Impact		**Deliverable Fuel Savings Impact**		**Total Annual Cost Savings**	
kWh	**Cost Savings**	**Gallons**	**Cost Savings**		
4,464	$803.52	0	$0.00	$803.52	
Implementation Costs and Economics					
Total Project Cost	**CLC Incentive**	**Net Customer Cost**		**Simple Payback (years)**	
				Before Incentives	**After Incentive**
$10,520.43	$4,464.00	$6,056.43		13.1	7.5

ECM 2: Faucet Aerators

Existing Conditions: There are seven (7) faucets at the elementary school located at the kitchenette and restroom areas that are of standard efficiency.

Energy Conservation Measure: It is recommended that the existing faucet aerators be replaced with low flow aerators rated at 1 gallon per minute (GPM). Installing low flow faucet aerators will reduce the domestic hot water consumption attributed to the sinks.

Proposed Energy Conservation Measure

Installation of seven (7) Energy Efficient Faucet Aerators

Summary of Savings and Project Economics - ECM 2: Faucet Aerators					
Project Energy Savings					
Electric Savings Impact		**Deliverable Fuel Savings Impact**		**Total Annual Cost Savings**	
kWh	**Cost Savings**	**Gallons**	**Cost Savings**		
2,163	$389.34	0	$0.00	$389.34	
Implementation Costs and Economics					
Total Project Cost	**CLC Incentive**	**Net Customer Cost**		**Simple Payback (years)**	
				Before Incentives	**After Incentive**
$72.00	$72.00	$0.00		0.2	0.0

ECM 3: Heat Pump Hot Water Heater

Existing Conditions: The existing 65 gallon electric water heater at the elementary school is inefficient. It is approaching the end of its useful life expectancy and should be replaced with an energy efficient substitute.

Energy Conservation Measure: It is recommended that the elementary school replace the existing unit with an electric heat pump hot water heater. They use electricity to move the heat from the ambient air to the domestic hot water. This process of moving the heat has a couple byproducts of cooling and dehumidifying the ambient air.

Existing Conditions

Existing 65 Gallon electric water heater

Proposed Energy Conservation Measure

Installation of energy efficient heat pump hot water heater

Summary of Savings and Project Economics - ECM 3: Heat Pump Water Heater					
Project Energy Savings					
Electric Savings Impact		**Deliverable Fuel Savings Impact**		**Total Annual Cost Savings**	
kWh	**Cost Savings**	**Gallons**	**Cost Savings**		
1,516	$272.88	0	$0.00	$272.88	
Implementation Costs and Economics					
Total Project Cost	**CLC Incentive**	**Net Customer Cost**		**Simple Payback (years)**	
				Before Incentives	**After Incentive**
$9,500.00	$1,516.00	$7,984.00		34.8	29.3

ECM 4: Heat Pump System

Existing Conditions: There are four (4) air handlers with heat pumps that are currently operable but need replacing. The town has contacted a third party engineering firm to conduct an in-depth analysis and is subject to future recommendations/alterations.

Energy Conservation Measure: It is recommended that the existing heat pump units be replaced with energy efficient substitutes and insulated properly. Installing energy efficient heat pumps will result in considerable deliverable fuel savings during the winter months by not being dependent on oil to provide space heating. If the existing heat pumps are not replaced with comparable units, the elementary school oil consumption will increase by an estimated 2,501 gallons annually.

Existing Conditions

Existing Oil Boiler

Proposed Energy Conservation Measure

Installation of Heat Pump System

Summary of Savings and Project Economics - ECM 4: Heat Pump System					
Project Energy Savings					
Electric Savings Impact		**Deliverable Fuel (Oil) Savings Impact**		**Total Annual Cost Savings**	
kWh	**Cost Savings**	**Gallons**	**Cost Savings**		
-17,580	($3,164.40)	2,501	$6,702.68	$3,538.28	
Implementation Costs and Economics					
Total Project Cost	**CLC Incentive**	**Net Customer Cost**		**Simple Payback (years)**	
				Before Incentives	**After Incentive**
$110,000.00	$5,195.82	$104,804.18		31	29.6

Additional Notes:

Building Insulation - It was noted during the assessment review that the town would like to remove the existing attic insulation and install spray foam insulation on the roof slope.

It is in our best opinion that the existing 12" of fiberglass batt insulation is adequate and in good condition. Removing the existing insulation and spray foaming the roof slope would not be cost effective and would not produce considerable energy savings.

Furthermore, spray foaming the roofline could produce unwanted moisture problems due to lack of ventilation.

It is our recommendation that the elementary school leave the existing insulation in place, and properly insulate equipment at the time of the installment.

Best Practices

The following are a list of best practices and preventative maintenance (PM) considerations that may be implemented. Although these may not qualify for energy efficiency incentives, they should be considered to ensure that existing equipment, building systems, and scheduling are all functioning properly.

Best Practice #1: Thermostat Set-points – Periodic checks of thermostat set-points, setbacks, and programmed schedules should occur on a regular basis to guarantee that systems are functioning as intended.

Best Practice #2: Mechanical System Servicing – Annual servicing of mechanical equipment is recommended to ensure they are operating safely and at maximum efficiency.

Next Steps

It is recommended that you consider moving forward with the cost effective ECMs identified in this report. These measures represent a valuable opportunity to reduce on-site energy consumption and costs while leveraging available efficiency incentives to decrease the overall implementation costs.

Three easy steps to participate:

- **Step #1:** Review your report with your Energy Specialist and elect which measures to move forward with.
- **Step #2:** Sign the proposal(s) and schedule the installation of energy efficiency improvements to ensure immediate meaningful energy savings.
- **Step #3:** Recognize sustainable energy savings on a monthly basis!

Please be sure to contact Alexander Dwyer at RISE engineering to take advantage of these opportunities. I can be reached by email at ADwyer@RISEEngineering.com or by calling (508) 737-2670.