Local Government Energy Audit:
Energy Audit Report

Marlboro Elementary School

100 School Road West

Marlboro, New Jersey 07746

Marlboro Township BoE

October 23, 2018

Report by:

TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Marlboro Elementary School.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey local school districts in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Marlboro Elementary School is a 74,219 square-foot, one-story facility comprised of classrooms offices, food preparation, dining areas, offices, maintenance and storage areas and a gymnasium. Gas fired boilers and a large domestic hot water tank are housed in a mechanical room. There are a number of roof top units (RTUs) and split system air-conditioning units as well as window AC units.

Lighting at Marlboro Elementary School consists of linear fluorescent 1-, 2-, 3- and 4-lamp fixtures with T8 or T12 lamps. A thorough description of the facility and our observations are in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 14 measures and recommends 12 measures which together represent an opportunity for Marlboro Elementary School to reduce annual energy costs by roughly $22,470 and annual greenhouse gas emissions by 179,344 lbs. CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 6.7 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Marlboro Elementary School's annual energy use by 11%.

Figure 1 – Previous 12 Month Utility Costs

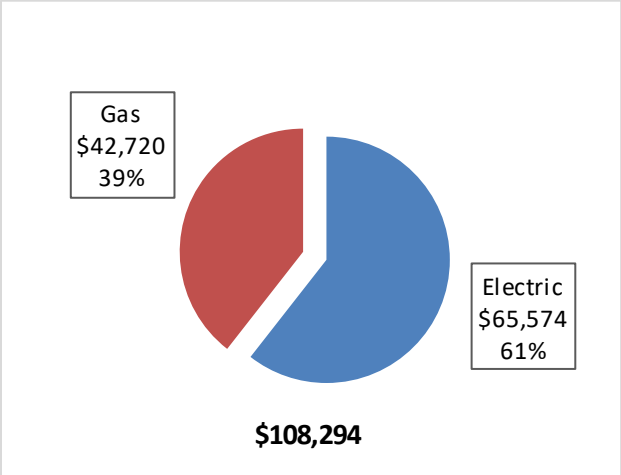
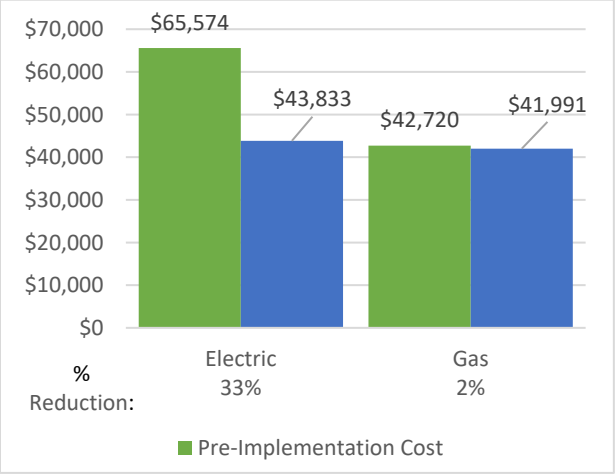


Figure 2 – Potential Post-Implementation Costs



A detailed description of Marlboro Elementary School's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**64,372**	**18.8**	**0.0**	**$8,217.89**	**$67,994.85**	**$12,525.00**	**$55,469.85**	**6.7**	**64,822**
ECM 1	Install LED Fixtures	Yes	1,658	0.2	0.0	$211.69	$3,905.99	$200.00	$3,705.99	17.5	1,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	250	0.1	0.0	$31.88	$327.50	$25.00	$302.50	9.5	251
ECM 3	Retrofit Fixtures with LED Lamps	Yes	62,464	18.5	0.0	$7,974.33	$63,761.37	$12,300.00	$51,461.37	6.5	62,901
Lighting Control Measures			**20,058**	**6.2**	**0.0**	**$2,560.69**	**$26,090.00**	**$2,820.00**	**$23,270.00**	**9.1**	**20,198**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	18,079	5.6	0.0	$2,308.05	$22,490.00	$2,820.00	$19,670.00	8.5	18,206
ECM 5	Install High/Low Lighitng Controls	Yes	1,979	0.6	0.0	$252.64	$3,600.00	$0.00	$3,600.00	14.2	1,993
Motor Upgrades			**4,116**	**1.2**	**0.0**	**$525.45**	**$7,145.24**	**$0.00**	**$7,145.24**	**13.6**	**4,145**
	Premium Efficiency Motors	No	4,116	1.2	0.0	$525.45	$7,145.24	$0.00	$7,145.24	13.6	4,145
Electric Unitary HVAC Measures			**48,897**	**5.9**	**0.0**	**$6,242.38**	**$43,110.24**	**$1,748.00**	**$41,362.24**	**6.6**	**49,239**
ECM 7	Install High Efficiency Heat Pumps	Yes	48,897	5.9	0.0	$6,242.38	$43,110.24	$1,748.00	$41,362.24	6.6	49,239
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**400.8**	**$4,358.98**	**$187,730.50**	**$0.00**	**$187,730.50**	**43.1**	**46,928**
	Install High Efficiency Hot Water Boilers	No	0	0.0	400.8	$4,358.98	$187,730.50	$0.00	$187,730.50	43.1	46,928
Domestic Water Heating Upgrade			**0**	**0.0**	**67.1**	**$729.41**	**$11,565.17**	**$400.00**	**$11,165.17**	**15.3**	**7,853**
ECM 8	Install High Efficiency Gas Water Heater	Yes	0	0.0	65.0	$706.94	$11,558.00	$400.00	$11,158.00	15.8	7,611
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	2.1	$22.47	$7.17	$0.00	$7.17	0.3	242
Food Service Equipment & Refrigeration Measures			**2,986**	**0.2**	**0.0**	**$381.20**	**$2,583.90**	**$75.00**	**$2,508.90**	**6.6**	**3,007**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	1,879	0.2	0.0	$239.83	$909.90	$0.00	$909.90	3.8	1,892
ECM 11	Refrigeration Controls	Yes	1,107	0.0	0.0	$141.37	$1,674.00	$75.00	$1,599.00	11.3	1,115
Plug Load Equipment Control - Vending Machine			**1,954**	**0.0**	**0.0**	**$249.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 12	Vending Machine Control	Yes	1,954	0.0	0.0	$249.50	$460.00	$0.00	$460.00	1.8	1,968
TOTAL FOR RECOMMENDED MEASURES			**170,301**	**35.5**	**67.1**	**$22,470.50**	**$168,208.36**	**$17,568.00**	**$150,640.36**	**6.7**	**179,344**
TOTAL FOR ALL MEASURES			**174,417**	**36.7**	**467.9**	**$27,354.93**	**$363,084.11**	**$17,568.00**	**$345,516.11**	**12.6**	**230,417**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium®). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to

control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

Domestic Hot Water upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

Food Service Equipment & Refrigeration measures generally involve improvements in the efficiency of cooking, food service, dishwashing, and food storage equipment. These measures may include more efficient convection ovens, steamers, ice machines, or refrigeration. These measures save energy by reducing the energy usage with more energy efficient equipment.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that are into plugged into electric outlets when not in use.

Energy Efficient Practices

TRC also identified eight low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Marlboro Elementary School include:

- Reduce Air Leakage
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance

For details on these energy efficient practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Marlboro Elementary School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	60	kW DC STC
Electric Generation	71,482	kWh/yr
Displaced Cost	$6,220	/yr
Installed Cost	$156,000	

For details on our evaluation and on-site generation potential, please refer to Section 6.

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program, you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives that SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Cindy Barr-Rague	Business Administration/Board Secretary	cbarr-rague@mtps.org	(732) 972-2000 Ext 2010
Michael Crivelli	Supervisor of Building & Grounds	mcrivelli@mtps.org	(732) 972-2122
TRC Energy Services			
Smruti Srinivasan	Auditor	Ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On March 28, 2018, TRC performed an energy audit at Marlboro Elementary School located in Marlboro, New Jersey. TRC's team met with Al Giezey to review the facility operations and help focus our investigation on specific energy-using systems.

The building was constructed in 1970. The original building had a square footprint with an open courtyard in the center. In 1992, an addition was building in the center for the courtyard housing what is now the media center. The gym was added as an extension to the rear of the building.

2.3 Building Occupancy

The school building is open Monday through Friday and as needed on the weekends.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Marlboro Elementary School	Weekday	7 AM - 3 PM
Marlboro Elementary School	Weekend	8 AM - 2 PM

2.4 Building Envelope

Marlboro Elementary School is a 74,219 square-foot, single-story facility comprised of classrooms offices, food preparation and dining areas, offices, maintenance and storage areas and a gymnasium. Gas fired boilers and a large domestic hot water tank are housed in a mechanical room. There are several roof top units (RTUs) and split system air-conditioning units as well as window AC units.

The building is constructed of concrete block with a brick veneer, and structural steel roof framing. The building has flat roof sections covered with rubber membrane or foam that is in fair condition. The original building has single pane windows and the media center has double pane windows. All windows have metal frames and are in fair condition.

Figure 1: Building Envelope

2.5 On-Site Generation

Marlboro Elementary School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). Most of the fixtures are 1-, 2-, 3- or 4-lamp, 4-foot long troffers with diffusers.

Lighting control in most spaces is provided by wall switches. The administrative areas of the building have wall mounted occupancy sensors.

The building's exterior lighting includes pole fixtures with high pressure sodium luminaires, a compact fluorescent (CFL) wall-pack, and CFL and linear fluorescent fixtures in a covered walkway. The covered walkway fixtures are controlled by a timer and the wall-pack and pole fixtures are controlled by photocells. The gym has 250-Watt pin-based CFL high-bay fixtures.



Figure 2: Lighting Systems

Hot Water Heating System

The hot water system consists of two Superior Model H 5,120 kBtu/hr. input scotch marine forced draft. The boilers have a nominal combustion efficiency of 80%. The boilers are configured in a constant flow distribution with two 15 HP hot water pumps supplying the unit heaters and radiators in the original building, and two 3 HP pumps supplying the fan coil units in the gym. The boilers operate in a lead/lag configuration. Only a single boiler is required to meet the facility heating demand. Boiler operation is rotated weekly.

The boilers are over 40 years old and may be nearing the end of their useful life.

Figure 3: Hot Water Heating Systems

Direct Expansion Air Conditioning System (DX)

There are 11 DX roof top units (RTUs) serving administrative offices, the media center, cafeteria, tech closets and maintenance office. The RTUs are equipped with economizers. The Principal's office has a mini-split system with a wall mounted evaporator and a roof mounted condenser. There are also window AC units and package terminal air conditioners serving other parts of the building.

The building has a Barber Coleman Network 8000 building energy management system (BEMS) that controls the HVAC systems. Occupied set points are 74°F heating and 68°F cooling. Unoccupied set points are 68°F heating and 74°F cooling.

Figure 4: DX Cooling Systems

Domestic Hot Water Heating System

The domestic hot water heating system for the facility is an indirect system that uses a pump to circulate heating hot water from the heating system boilers to a heat exchanger in a large domestic hot water tank. One small circulation pump circulates domestic hot water to the rest of the building. The teacher lounge rest room is served by a 4.1 kW tankless water heater for the lavatory.

Food Service Equipment

Most of the cooking is done using the four convection ovens. There is also a large electric food holding cabinet and a single tank conveyer dish washer.

Refrigeration

The kitchen has a walk-in refrigerator with a 0.25-ton compressor and a walk-in freezer with a 0.5-ton compressor that are used to store food prepared for school lunches. The kitchen also has a free standing commercial size refrigerator and display cooler.

Building Plug Load

There are roughly 71 computer work stations and 45 small to medium printers throughout the facility. Most of the computers are desktop units with LCD monitors. There is no centralized PC power management software installed. There are also roughly 73 projectors and 41 smart boards.

Other plug loads include staff refrigerators, coffee machines, toaster ovens, fans, microwaves, a pretzel warmer and a display warmer.

2.7 Water-Using Systems

A sampling of restrooms found that one faucet in the kitchen rest room was rated for 2.5 gallons per minute (gpm).

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are many factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

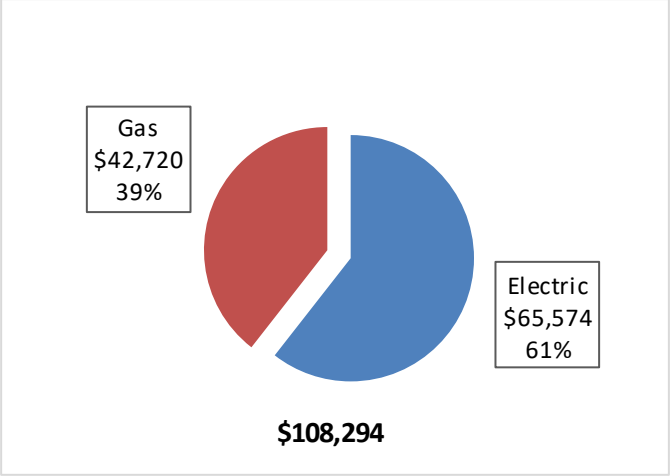
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Marlboro Elementary School		
Fuel	**Usage**	**Cost**
Electricity	513,655 kWh	$65,574
Natural Gas	39,279 Therms	$42,720
Total		**$108,294**

The current annual energy cost for this facility is $108,294 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.128/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below. The usage pattern is indicative of reduced summer operation as compared to other periods, although the building is cooled.

Figure 9 - Electric Usage & Demand

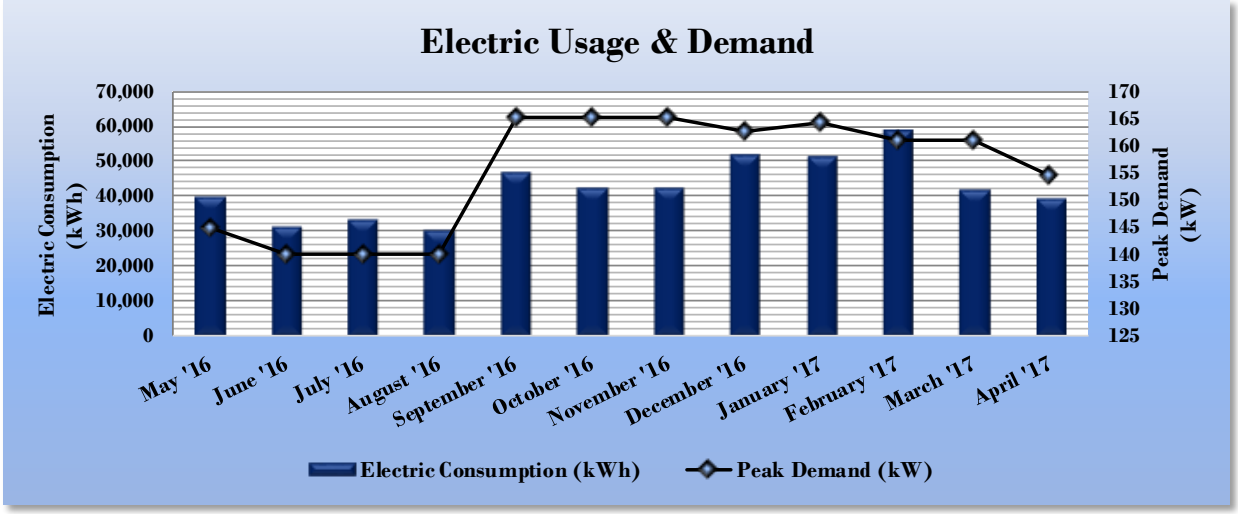


Figure 10 - Electric Usage & Demand

Electric Billing Data for Marlboro Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/3/16	28	40,160	145	$0	$4,987
7/6/16	33	31,160	140	$0	$4,267
8/31/16	56	33,280	140	$0	$4,360
9/30/16	30	30,400	140	$0	$4,082
10/31/16	31	46,880	165	$0	$4,974
11/4/16	4	42,560	165	$0	$5,501
12/4/16	30	42,560	165	$0	$5,512
1/4/17	31	52,000	163	$0	$6,496
2/4/17	31	51,520	164	$0	$6,622
3/7/17	31	59,200	161	$0	$7,479
4/4/17	28	41,760	161	$0	$5,610
5/4/17	30	39,360	155	$0	$5,324
Totals	**363**	**510,840**	**165.3**	**$0**	**$65,215**
Annual	**365**	**513,655**	**165.3**	**$0**	**$65,574**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.088/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. The usage profile is typical of a building using fossil fuel for heating in a temperate climate with minimal DHW usage.

Figure 11 - Natural Gas Usage

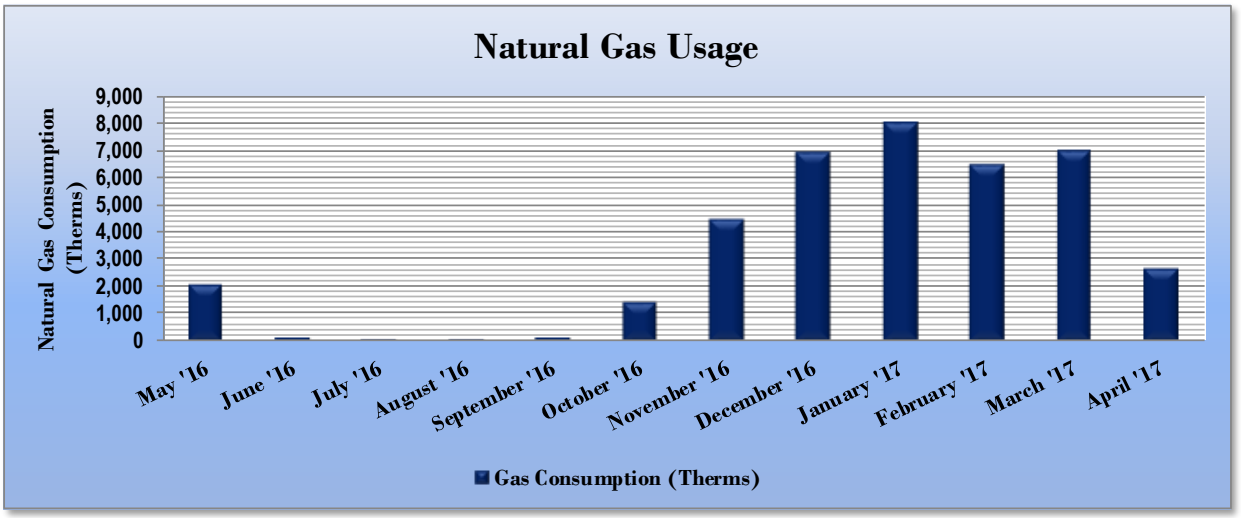


Figure 12 - Natural Gas Usage

Gas Billing Data for Marlboro Elementary School				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
5/31/16	32	2,072	$2,163	No
6/30/16	30	145	$575	No
8/1/16	32	75	$458	Yes
8/29/16	28	5	$460	No
9/27/16	29	173	$598	No
10/27/16	30	1,449	$1,625	No
11/29/16	33	4,489	$4,735	No
12/30/16	31	6,925	$6,976	No
1/31/17	32	8,036	$7,989	No
3/1/17	29	6,463	$7,207	No
3/31/17	30	7,004	$7,196	No
5/1/17	31	2,659	$2,973	No
Totals	**367**	**39,495**	**$42,954**	
Annual	**365**	**39,279**	**$42,720**	

3.4 Benchmarking

This facility was benchmarked using Portfolio Manager®, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager® analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Marlboro Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	129.7	141.4
Site Energy Use Intensity (kBtu/ft^2)	76.5	58.2

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, as shown in the table below:

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Marlboro Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	103.9	141.4
Site Energy Use Intensity (kBtu/ft^2)	67.7	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 34.

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

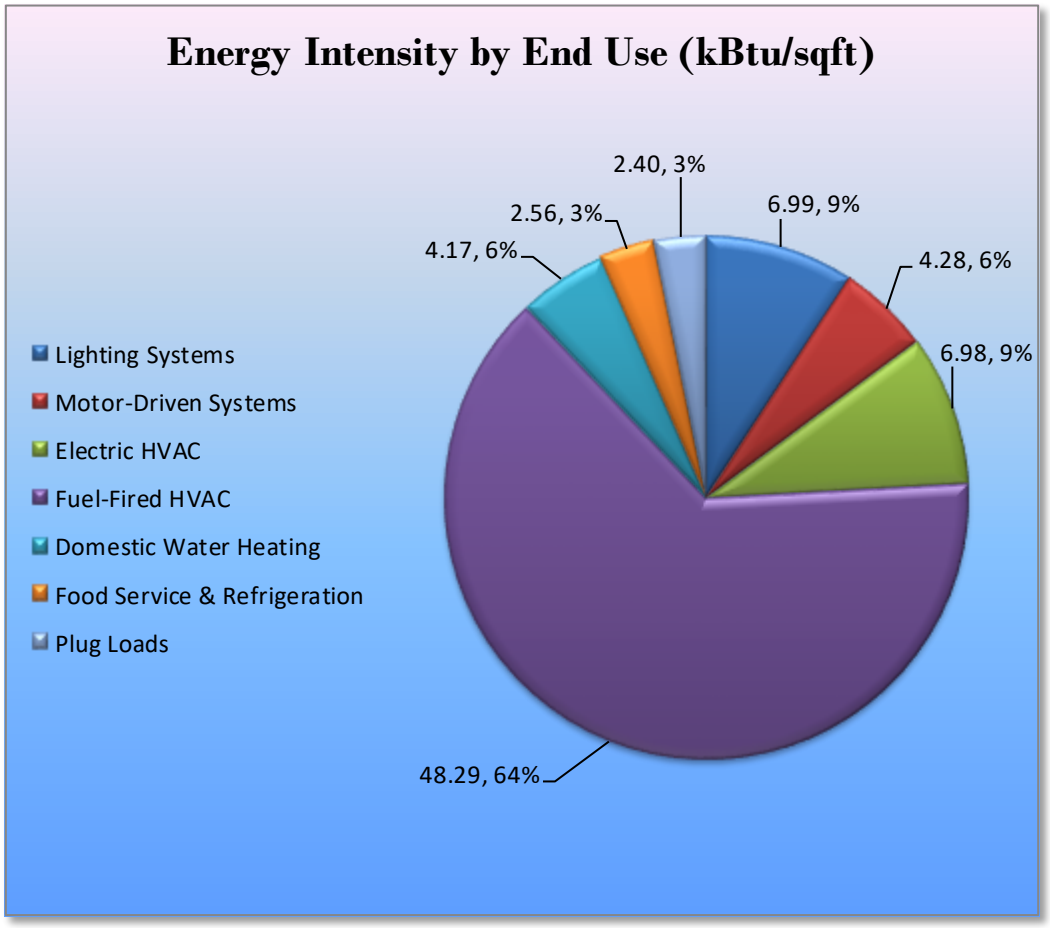
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 15 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Marlboro Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**64,372**	**18.8**	**0.0**	**$8,217.89**	**$67,994.85**	**$12,525.00**	**$55,469.85**	**6.7**	**64,822**
ECM 1	Install LED Fixtures	1,658	0.2	0.0	$211.69	$3,905.99	$200.00	$3,705.99	17.5	1,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	250	0.1	0.0	$31.88	$327.50	$25.00	$302.50	9.5	251
ECM 3	Retrofit Fixtures with LED Lamps	62,464	18.5	0.0	$7,974.33	$63,761.37	$12,300.00	$51,461.37	6.5	62,901
Lighting Control Measures		**20,058**	**6.2**	**0.0**	**$2,560.69**	**$26,090.00**	**$2,820.00**	**$23,270.00**	**9.1**	**20,198**
ECM 4	Install Occupancy Sensor Lighting Controls	18,079	5.6	0.0	$2,308.05	$22,490.00	$2,820.00	$19,670.00	8.5	18,206
ECM 5	Install High/Low Lighitng Controls	1,979	0.6	0.0	$252.64	$3,600.00	$0.00	$3,600.00	14.2	1,993
Variable Frequency Drive (VFD) Measures		**32,033**	**4.4**	**0.0**	**$4,089.42**	**$16,404.20**	**$0.00**	**$16,404.20**	**4.0**	**32,257**
ECM 6	Install VFDs on Hot Water Pumps	32,033	4.4	0.0	$4,089.42	$16,404.20	$0.00	$16,404.20	4.0	32,257
Electric Unitary HVAC Measures		**48,897**	**5.9**	**0.0**	**$6,242.38**	**$43,110.24**	**$1,748.00**	**$41,362.24**	**6.6**	**49,239**
ECM 7	Install High Efficiency Heat Pumps	48,897	5.9	0.0	$6,242.38	$43,110.24	$1,748.00	$41,362.24	6.6	49,239
Domestic Water Heating Upgrade		**0**	**0.0**	**67.1**	**$729.41**	**$11,565.17**	**$400.00**	**$11,165.17**	**15.3**	**7,853**
ECM 8	Install High Efficiency Gas Water Heater	0	0.0	65.0	$706.94	$11,558.00	$400.00	$11,158.00	15.8	7,611
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	2.1	$22.47	$7.17	$0.00	$7.17	0.3	242
Food Service Equipment & Refrigeration Measures		**2,986**	**0.2**	**0.0**	**$381.20**	**$2,583.90**	**$75.00**	**$2,508.90**	**6.6**	**3,007**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	1,879	0.2	0.0	$239.83	$909.90	$0.00	$909.90	3.8	1,892
ECM 11	Refrigeration Controls	1,107	0.0	0.0	$141.37	$1,674.00	$75.00	$1,599.00	11.3	1,115
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$249.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 12	Vending Machine Control	1,954	0.0	0.0	$249.50	$460.00	$0.00	$460.00	1.8	1,968
TOTAL FOR RECOMMENDED MEASURES		**170,301**	**35.5**	**67.1**	**$22,470.50**	**$168,208.36**	**$17,568.00**	**$150,640.36**	**6.7**	**179,344**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**64,372**	**18.8**	**0.0**	**$8,217.89**	**$67,994.85**	**$12,525.00**	**$55,469.85**	**6.7**	**64,822**
ECM 1	Install LED Fixtures	1,658	0.2	0.0	$211.69	$3,905.99	$200.00	$3,705.99	17.5	1,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	250	0.1	0.0	$31.88	$327.50	$25.00	$302.50	9.5	251
ECM 3	Retrofit Fixtures with LED Lamps	62,464	18.5	0.0	$7,974.33	$63,761.37	$12,300.00	$51,461.37	6.5	62,901

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	1,658	0.2	0.0	$211.69	$3,905.99	$200.00	$3,705.99	17.5	1,670

Measure Description

We recommend replacing existing fixtures with new high-performance LED light fixtures. LED fixtures are recommended to replace high bay fluorescent fixtures in the gym and stage area and are also recommended to replace the exterior pole mounted high pressure sodium sources This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are considerably longer than the lighting technologies they are replacing.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	250	0.1	0.0	$31.88	$327.50	$25.00	$302.50	9.5	251
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tube.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	57,456	17.7	0.0	$7,334.95	$61,305.37	$11,940.00	$49,365.37	6.7	57,858
Exterior	5,008	0.7	0.0	$639.37	$2,456.00	$360.00	$2,096.00	3.3	5,043

Measure Description

We recommend retrofitting existing incandescent, halogen, HID or other lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 18 below.

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**20,058**	**6.2**	**0.0**	**$2,560.69**	**$26,090.00**	**$2,820.00**	**$23,270.00**	**9.1**	**20,198**
ECM 4	Install Occupancy Sensor Lighting Controls	18,079	5.6	0.0	$2,308.05	$22,490.00	$2,820.00	$19,670.00	8.5	18,206
ECM 5	Install High/Low Lighitng Controls	1,979	0.6	0.0	$252.64	$3,600.00	$0.00	$3,600.00	14.2	1,993

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
18,079	5.6	0.0	$2,308.05	$22,490.00	$2,820.00	$19,670.00	8.5	18,206

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all classrooms and most other spaces where it was economically feasible. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. When considering purchase of new LED lighting for the gym and stage, consider models equipped with on board occupancy based controls. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 5: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,979	0.6	0.0	$252.64	$3,600.00	$0.00	$3,600.00	14.2	1,993

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. In Marlboro Elementary School, this type of lighting control was applied to interior corridors where it was economically feasible.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**32,033**	**4.4**	**0.0**	**$4,089.42**	**$16,404.20**	**$0.00**	**$16,404.20**	**4.0**	**32,257**
ECM 6	Install VFDs on Hot Water Pumps	32,033	4.4	0.0	$4,089.42	$16,404.20	$0.00	$16,404.20	4.0	32,257

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
32,033	4.4	0.0	$4,089.42	$16,404.20	$0.00	$16,404.20	4.0	32,257

Measure Description

We recommend installing a variable frequency drives (VFD) to control all four hot water pumps. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

Prior to procurement of the VFDs, we recommend the District verify that existing motors are inverter duty rated. If not, we recommend that proper replacement motors be procured to assure the VFD system functions correctly.

4.1.4 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 20 below.

Figure 20 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**48,897**	**5.9**	**0.0**	**$6,242.38**	**$43,110.24**	**$1,748.00**	**$41,362.24**	**6.6**	**49,239**
ECM 7	Install High Efficiency Heat Pumps	48,897	5.9	0.0	$6,242.38	$43,110.24	$1,748.00	$41,362.24	6.6	49,239

ECM 7: Install High Efficiency Heat Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
48,897	5.9	0.0	$6,242.38	$43,110.24	$1,748.00	$41,362.24	6.6	49,239

Measure Description

We recommend replacing standard efficiency heat pumps with high efficiency heat pumps for the Media Center. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system and a higher HPSF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older units versus the new high efficiency units, the average heating and cooling loads, and the estimated annual operating hours.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 21 below.

Figure 21 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**67.1**	**$729.41**	**$11,565.17**	**$400.00**	**$11,165.17**	**15.3**	**7,853**
ECM 8	Install High Efficiency Gas Water Heater	0	0.0	65.0	$706.94	$11,558.00	$400.00	$11,158.00	15.8	7,611
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	2.1	$22.47	$7.17	$0.00	$7.17	0.3	242

ECM 8: Install High Efficiency Gas-Fired Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	65.0	$706.94	$11,558.00	$400.00	$11,158.00	15.8	7,611

Measure Description

We recommend replacing the existing indirect tank water heater with high efficiency tank water heaters. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature.

Replacing the heat exchanger / tank DHW system involves determining the worst case DHW requirements as part of an engineering analysis to select the right number and capacity of water heaters. The replacement equipment should be condensing water heaters. Separating the space heat and DHW systems will allow deactivation of the boilers during mild weather when the only need is for DHW.

ECM 9: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	2.1	$22.47	$7.17	$0.00	$7.17	0.3	242

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators and low-flow showerheads can reduce hot water usage, relative to standard showerheads and aerators, which saves energy. Pre-rinse spray valves (PRSVs)—often used in commercial and institutional kitchens—are designed to remove food waste from dishes prior to dishwashing. Replacing standard pre-rinse spray valves with low flow PRSVs will reduce hot water usage and save energy.

Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.6 Food Service Equipment & Refrigeration Measures

Our recommendations for food service and refrigeration measures summarized in Figure 22 below.

Figure 22 - Summary of Food Service Equipment & Refrigeration ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service Equipment & Refrigeration Measures		**2,986**	**0.2**	**0.0**	**$381.20**	**$2,583.90**	**$75.00**	**$2,508.90**	**6.6**	**3,007**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	1,879	0.2	0.0	$239.83	$909.90	$0.00	$909.90	3.8	1,892
ECM 11	Refrigeration Controls	1,107	0.0	0.0	$141.37	$1,674.00	$75.00	$1,599.00	11.3	1,115

ECM 10: Refrigerator/Freezer Case Electrically Commutated Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,879	0.2	0.0	$239.83	$909.90	$0.00	$909.90	3.8	1,892

Measure Description

We recommend replacing shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in existing walk-in coolers and freezers. These fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By employing variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and utilize DC power, losses due to friction and phase shifting are eliminated. Savings for this measure accounts for the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 11: Walk-In Cooler and Freezer Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,107	0.0	0.0	$141.37	$1,674.00	$75.00	$1,599.00	11.3	1,115

Measure Description

We recommend the installation of additional controls to optimize the operation of walk-in coolers and freezers.

Many walk-in coolers and freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is accomplished by measuring the ambient humidity and temperature of the store, comparing that to the dewpoint, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, reducing annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in coolers and freezers have evaporator fans which run continuously. The measure adds a control system feature to automatically shut off evaporator fans when the cooler's thermostat is not calling for cooling.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

4.1.7 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control are summarized in Figure 23 below.

Figure 23-Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$249.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 12	Vending Machine Control	1,954	0.0	0.0	$249.50	$460.00	$0.00	$460.00	1.8	1,968

ECM 12: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,954	0.0	0.0	$249.50	$460.00	$0.00	$460.00	1.8	1,968

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

4.2 ECMs Evaluated But Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

Figure 24 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades	**4,116**	**1.2**	**0.0**	**$525.45**	**$7,145.24**	**$0.00**	**$7,145.24**	**13.6**	**4,145**
Premium Efficiency Motors	4,116	1.2	0.0	$525.45	$7,145.24	$0.00	$7,145.24	13.6	4,145
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**400.8**	**$4,358.98**	**$187,730.50**	**$0.00**	**$187,730.50**	**43.1**	**46,928**
Install High Efficiency Hot Water Boilers	0	0.0	400.8	$4,358.98	$187,730.50	$0.00	$187,730.50	43.1	46,928
TOTALS	**4,116**	**1**	**401**	**4,884**	**194,876**	**0**	**194,876**	**28**	**51,072**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
4,116	1.2	0.0	$525.45	$7,145.24	$0.00	$7,145.24	13.6	4,145

Measure Description

We evaluated replacing standard efficiency motors with NEMA Premium® efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

Reasons for not Recommending

We evaluated replacing the heating hot water pump motors but the pay backs were excessive. When it becomes necessary to replace these motors, we recommend using premium efficiency motors. The incremental cost will be covered over a short period due to the high usage these motors get.

If the motors must be replaced as part of the VFD control project, the combined measure payback is approximately five years, significantly less than the expected useful life of the replacement equipment.

Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	400.8	$4,358.98	$187,730.50	$0.00	$187,730.50	43.1	46,928

Measure Description

We typically evaluate replacing older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are only evaluated when it is likely that the return water temperature would be less than 130°F during most of the operating hours. As a result, condensing hydronic boilers are not recommended for this site.

Reasons for not Recommending

This measure is not recommended due to the long simple payback of replacing the existing boilers with a plant of the same capacity. However, if the overall boiler plant capacity could be reduced this measure may be cost effective. Modular boilers with input ratings of 1,000 to 2,000 kBtu/hr. are readily available. Configuring a boiler plant around several modular boilers provides several advantages.

The first is that the overall system operates better at low load conditions since only one or two modular boilers are operating at full load rather than one large boiler operating inefficiently at low load. A typical modular boiler plant for a school of this size will generally use three to five boilers which provides better redundancy than a plant with two large boilers. Finally, three to five modular boilers will often take less space than two old large boilers. Along with this measure, replacing the present indirect domestic water heating, a recommended measure, may be necessary as well because of the capacities of individual modular boilers.

As the existing boilers are approaching the end of their useful life it is recommended that a reconfiguration of the boiler plant be evaluated.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Perform Regular Lighting Maintenance

To sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20% - 60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6 – 12 months.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

Clean Evaporator/Condenser Coils on AC Systems

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

Perform Regular Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up to sustain efficiency and equipment life.

6 On-Site Generation Measures

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before deciding to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

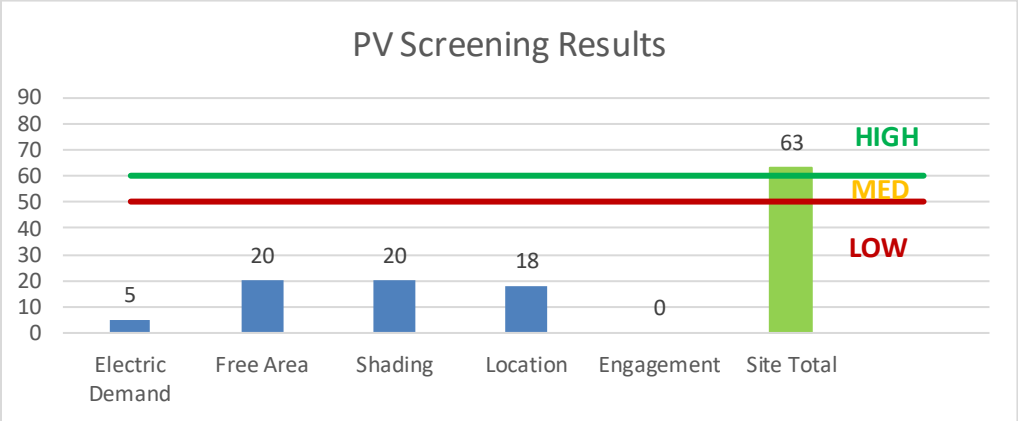
6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a **High** potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof the building may be feasible. If Marlboro Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 25 - Photovoltaic Screening



Potential	High	
System Potential	60	kW DC STC
Electric Generation	71,482	kWh/yr
Displaced Cost	$6,220	/yr
Installed Cost	$156,000	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ**: http://www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

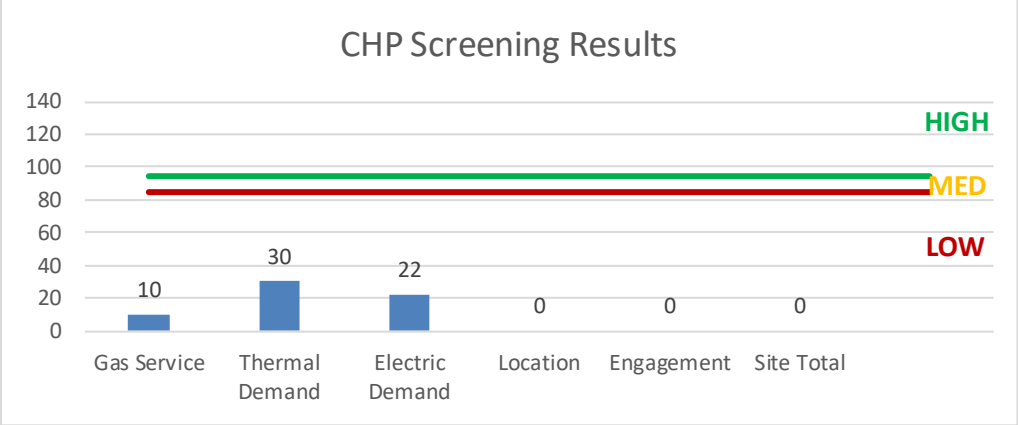
A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a **Low** potential for installing a cost-effective CHP system.

If Marlboro Elementary School is interested in pursuing the installation of CHP, we recommended a more detailed feasibility study be conducted.

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

Figure 26 - Combined Heat and Power Screening



7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically, an electric customer needs to can reduce their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

In our opinion, the facility does not lend itself to DR.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 27 for a list of the eligible programs identified for each recommended ECM.

Figure 27 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	Direct Install
ECM 1	Install LED Fixtures	x	x
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x	x
ECM 3	Retrofit Fixtures with LED Lamps	x	x
ECM 4	Install Occupancy Sensor Lighting Controls	x	x
ECM 5	Install High/Low Lighitng Controls		x
ECM 6	Install VFDs on Hot Water Pumps		x
ECM 7	Install High Efficiency Heat Pumps	x	x
ECM 8	Install High Efficiency Gas Water Heater	x	x
ECM 9	Install Low-Flow Domestic Hot Water Devices		x
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors		x
ECM 11	Refrigeration Controls		x
ECM 12	Vending Machine Control		x

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey's largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity's annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: www.njcleanenergy.com/ci.

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: www.njcleanenergy.com/SSB.

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

The program pays up to **70%** of the total installed cost of eligible measures, up to $125,000 per project. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

To participate in the Direct Install program, you will need to contact the participating contractor who the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number which enables it to generate New Jersey SRECs. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SREC's to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

(1) Use an Energy Services Company or "ESCO."
(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
(3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third-party (i.e. non-utility) energy supplier.

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility is purchasing electricity from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third-party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third-party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility is purchasing natural gas from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mainten shop	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.38	1,239	0.0	$158.12	$1,476.00	$230.00	7.88
Meter room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
custodian hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.19	623	0.0	$79.55	$609.50	$70.00	6.78
transport	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.11	356	0.0	$45.46	$504.00	$75.00	9.44
Cust. Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.08	267	0.0	$34.09	$445.50	$65.00	11.16
Recruitng	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.22	712	0.0	$90.92	$738.00	$115.00	6.85
custodain	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.05	178	0.0	$22.73	$233.00	$40.00	8.49
boiler room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.09	282	0.0	$35.98	$234.00	$40.00	5.39
boielr room	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,856	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,856	0.03	112	0.0	$14.31	$107.70	$15.00	6.48
kitchen	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.71	2,315	0.0	$295.49	$2,331.00	$365.00	6.65
kitchen spotlight	5	Halogen Incandescent: Downlight	Wall Switch	75	1,856	Relamp	Yes	5	LED - Fixtures: High-Bay	Occupancy Sensor	11	1,299	0.22	717	0.0	$91.47	$770.00	$35.00	8.04
kitchen offfice	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,856	0.03	106	0.0	$13.49	$75.20	$15.00	4.46
locker room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.05	178	0.0	$22.73	$233.00	$40.00	8.49
locker room RR	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,856	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,856	0.01	29	0.0	$3.68	$31.90	$5.00	7.31
locker room storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.22	712	0.0	$90.92	$738.00	$80.00	7.24
custodian closet	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.09	282	0.0	$35.98	$234.00	$40.00	5.39
custodian closet	1	Linear Fluorescent - T12: 2' T12 (20W) - 1L	Wall Switch	25	1,856	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,856	0.01	35	0.0	$4.50	$93.50	$5.00	19.68
custodian closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.04	141	0.0	$17.99	$117.00	$20.00	5.39
MRR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
cafeteria	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	1.15	3,761	0.0	$480.11	$3,093.20	$585.00	5.22
cafeteria	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.62	2,003	0.0	$255.71	$1,668.00	$295.00	5.37
door 16 entrance	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.04	141	0.0	$17.99	$117.00	$20.00	5.39
office 39	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.29	940	0.0	$120.03	$840.80	$155.00	5.71
gym and cafeteria hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.27	890	0.0	$113.65	$985.00	$100.00	7.79
gym	15	Compact Fluorescent: 42W - 6L	Wall Switch	252	1,856	Fixture Replacement	Yes	15	LED - Fixtures: Downlight Pendant	Occupancy Sensor	108	1,299	1.73	5,649	0.0	$721.15	$9,300.00	$525.00	12.17

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
gym office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.11	356	0.0	$45.46	$504.00	$75.00	9.44
boys locker room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.11	356	0.0	$45.46	$504.00	$75.00	9.44
girls locker room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.16	534	0.0	$68.19	$621.00	$95.00	7.71
door 17 vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.04	141	0.0	$17.99	$117.00	$20.00	5.39
stage	3	Compact Fluorescent: 42 W 1-L	Wall Switch	42	1,856	Fixture Replacement	Yes	3	LED - Fixtures: High-Bay	Occupancy Sensor	29	1,299	0.04	137	0.0	$17.51	$8,275.60	$35.00	470.53
elec closet	2	Incandescent: 40W-1L	Wall Switch	40	1,856	LED Retrofit	No	2	LED Screw-In Lamps: LED screw in	Wall Switch	6	1,856	0.04	145	0.0	$18.53	$150.00	$10.00	7.55
elec closet	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,856	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.08	252	0.0	$32.16	$234.00	$20.00	6.65
room 38 hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.39	1,268	0.0	$161.89	$1,053.00	$180.00	5.39
CR 38, 37, 36	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	1.30	4,231	0.0	$540.12	$3,378.60	$645.00	5.06
fac lounge	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.58	1,880	0.0	$240.05	$1,681.60	$310.00	5.71
fac lounge	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,299	0.08	249	0.0	$31.81	$459.60	$35.00	13.35
WRR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
MRR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
cust room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.11	356	0.0	$45.46	$350.00	$60.00	6.38
elce closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.04	141	0.0	$17.99	$117.00	$20.00	5.39
CR 35, 33, 34, 31, 32, 29, 39, 28, 27, 19	90	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	90	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	4.33	14,103	0.0	$1,800.41	$10,992.00	$2,115.00	4.93
copy room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.05	178	0.0	$22.73	$233.00	$40.00	8.49
CR 35 hallway	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.37	1,198	0.0	$152.90	$994.50	$170.00	5.39
GRR+MRR	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,299	0.05	166	0.0	$21.20	$242.40	$20.00	10.49
GRR+MRR	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.22	712	0.0	$90.92	$1,008.00	$150.00	9.44
janitor closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
prime hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.19	623	0.0	$79.55	$609.50	$70.00	6.78
art room	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.62	2,003	0.0	$255.71	$1,668.00	$295.00	5.37
CR 21	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.29	940	0.0	$120.03	$840.80	$155.00	5.71
CR 22, 26, 23, 25	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.49	1,602	0.0	$204.57	$1,982.40	$320.00	8.13

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Fac RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
CR 24	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.29	940	0.0	$120.03	$840.80	$155.00	5.71
CR 24 hall	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.25	801	0.0	$102.28	$726.50	$90.00	6.22
CR 18 hall	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.55	1,780	0.0	$227.30	$1,770.00	$200.00	6.91
CR 18,16, 17, 14, 15, 12, 13 ,10	72	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	72	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	3.46	11,282	0.0	$1,440.33	$9,009.60	$1,720.00	5.06
CR 12	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.58	1,880	0.0	$240.05	$1,411.60	$275.00	4.73
CR 12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
CR (9,8)	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	1.15	3,761	0.0	$480.11	$2,823.20	$550.00	4.73
closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.04	141	0.0	$17.99	$117.00	$20.00	5.39
RR x 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,856	0.07	239	0.0	$30.52	$190.27	$40.00	4.92
storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.06	211	0.0	$26.98	$175.50	$30.00	5.39
CR 7,6,5,4,3,2,1	63	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	63	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	3.03	9,872	0.0	$1,260.29	$7,883.40	$1,505.00	5.06
storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.17	564	0.0	$71.95	$468.00	$80.00	5.39
Office (IT)	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,299	0.14	470	0.0	$60.01	$401.40	$80.00	5.36
nurse's office	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.29	935	0.0	$119.33	$796.40	$140.00	5.50
nurses' office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,856	0.06	211	0.0	$26.98	$150.40	$30.00	4.46
nurses' room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.12	401	0.0	$51.14	$495.60	$80.00	8.13
RR	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,299	0.05	178	0.0	$22.73	$233.00	$40.00	8.49
conference room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.06	211	0.0	$26.98	$175.50	$30.00	5.39
CR hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,299	0.38	1,246	0.0	$159.11	$1,219.00	$140.00	6.78
janitor's closet	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,856	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,856	0.01	29	0.0	$3.68	$31.90	$5.00	7.31
Main office suite	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,856	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,856	0.30	986	0.0	$125.91	$819.00	$140.00	5.39
copy room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,529	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,529	0.04	116	0.0	$14.81	$117.00	$20.00	6.55
kitchenette	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,529	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,529	0.04	98	0.0	$12.57	$95.13	$20.00	5.98
tech closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,856	0.04	120	0.0	$15.26	$95.13	$20.00	4.92

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
RR	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,856	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,856	0.01	29	0.0	$3.68	$31.90	$5.00	7.31
Secure waiting area	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,856	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,856	0.06	211	0.0	$26.98	$175.50	$30.00	5.39
secure vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,529	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,529	0.04	116	0.0	$14.81	$117.00	$20.00	6.55
guidance office	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,529	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,529	0.04	113	0.0	$14.36	$192.80	$40.00	10.64
VP office	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,529	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,529	0.04	113	0.0	$14.36	$192.80	$40.00	10.64
Prince office	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,529	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,529	0.06	169	0.0	$21.55	$289.20	$60.00	10.64
prince hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,529	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,529	0.02	58	0.0	$7.41	$58.50	$10.00	6.55
GRR+MRR	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,856	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,856	0.11	359	0.0	$45.79	$285.40	$60.00	4.92
BRR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,856	0.02	70	0.0	$8.99	$58.50	$10.00	5.39
entrance vestibule	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,856	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,856	0.09	282	0.0	$35.98	$234.00	$40.00	5.39
center hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,529	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,070	0.34	903	0.0	$115.32	$865.93	$140.00	6.29
child study office	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.62	2,003	0.0	$255.71	$1,668.00	$295.00	5.37
cnter hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,299	0.25	801	0.0	$102.28	$651.20	$90.00	5.49
room 40	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,856	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,856	0.13	423	0.0	$53.96	$300.80	$60.00	4.46
room 41	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,529	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,070	0.16	440	0.0	$56.16	$570.80	$95.00	8.47
media center	38	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	38	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	1.56	5,074	0.0	$647.80	$3,937.60	$710.00	4.98
tech closet	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,856	0.13	423	0.0	$53.96	$300.80	$60.00	4.46
reading room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,856	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,299	0.08	267	0.0	$34.09	$266.40	$50.00	6.35
elec closet	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,856	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,856	0.02	62	0.0	$7.90	$63.20	$0.00	8.00
wallpack	1	Compact Fluorescent: 42W 1L	Daylight Dimming	42	4,015	Relamp	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	29	4,015	0.01	58	0.0	$7.43	$50.00	$0.00	6.73
pole with 2 fixtures	2	High-Pressure Sodium: (1) 250W Lamp	Daylight Dimming	295	4,015	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	89	4,015	0.27	1,907	0.0	$243.44	$3,905.99	$200.00	15.22
canopy	6	Compact Fluorescent: 26W 1L	Wall Switch	26	4,015	Relamp	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	18	4,015	0.03	216	0.0	$27.59	$300.00	$0.00	10.87
canopy walkway	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,015	Relamp	No	36	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,015	0.78	5,485	0.0	$700.27	$2,106.00	$360.00	2.49
various	27	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	27	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Whole Building	2	Heating Hot Water Pump	15.0	86.1%	No	2,520	Yes	92.4%	Yes	2	4.54	29,565	0.0	$3,774.40	$14,171.74	$0.00	3.75
Boiler Room	Whole Building	2	Heating Hot Water Pump	3.0	86.5%	No	2,520	Yes	89.5%	Yes	2	0.84	5,777	0.0	$737.54	$7,624.98	$0.00	10.34
Boiler Room	Whole Building	1	Process Pump	1.0	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building	1	Process Pump	0.3	65.0%	No	4,380	No	65.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance	Maintence garage	2	Supply Fan	0.0	59.0%	No	2,745	No	59.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gym	Gym	2	Supply Fan	3.0	85.0%	No	2,745	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
RTU	Main Office	1	Supply Fan	1.0	85.0%	No	2,745	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof central addtiion	Media Center	4	Supply Fan	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof central addtiion	Media Center	1	Supply Fan	0.3	59.0%	No	2,745	No	59.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Unknown	1	Supply Fan	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Maintenance Office	1	Supply Fan	0.2	59.0%	No	2,745	No	59.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Tech Closets	1	Supply Fan	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cafeteria	2	Supply Fan	3.0	83.0%	No	2,745	Yes	89.5%	No		0.22	806	0.0	$102.94	$1,752.72	$0.00	17.03

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof SE	Principle's Office	1	Ductless Mini-Split HP	3.00	36.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof SE	Main Office	1	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof central addtiion	Media Center	4	Packaged Air-Source HP	3.87	64.00	Yes	4	Packaged Air-Source HP	4.00	64.00	16.00	2.80	No	5.06	41,317	0.0	$5,274.62	$36,303.36	$1,472.00	6.60
Roof central addtiion	Media Center	1	Packaged Air-Source HP	2.80	48.00	Yes	1	Packaged Air-Source HP	3.00	48.00	16.00	2.80	No	0.84	7,581	0.0	$967.76	$6,806.88	$276.00	6.75
Roof	Unknown	1	Packaged AC	3.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Maintenance Office	1	Packaged AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Tech Closets	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cafeteria	2	Packaged AC	15.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR38	CR38	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR36	CR36	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR12	CR12	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR28	CR28	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
IT room	IT Room	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Nurse's Office	Nurse's Office	1	Ductless Mini-Split HP	2.00	27.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooms 40,41	Rooms 40,41	2	Packaged Terminal HP	2.00	10.50	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library Tech Closet	Library Tech Closet	1	Packaged Terminal HP	1.00	11.60	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
IT room	IT Room	1	Electric Resistance Heat		0.44	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	Legacy Building, Gym and DHW	2	Non-Condensing Hot Water Boiler	5,120.00	Yes	2	Condensing Hot Water Boiler	5,120.00	93.00%	Ec	0.00	0	400.8	$4,358.98	$187,730.50	$0.00	43.07

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Restroom	Faculty Rest Room	1	Tankless Water Heater	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler	Whole School	1	Indirect System	Yes	2	Storage Tank Water Heater (> 50 Gal)	Natural Gas	95.00%	Et	0.00	0	65.0	$706.94	$11,558.00	$400.00	15.78

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen Rest Room	1	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	2.1	$22.47	$7.17	$0.00	0.32

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	Yes	No	Yes	0.09	1,081	0.0	$137.97	$1,977.30	$75.00	13.79
Kitchen	1	Medium Temp Freezer (0F to 30F)	Yes	No	Yes	0.18	2,162	0.0	$275.95	$2,280.60	$75.00	7.99

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Staff Lounge	1	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Novelty Cooler Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Cooler Description	Install Automatic Shutoff Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	1	Ice Cream Chest	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cafeteria	1	Display Cooler	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions									Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	*Manufacturer*	*Model Number*	High Efficiency Equipement?	*Number of Steamer Pans*	*Total kW*	*Total Annual kWh*	*Total Annual MMBtu*	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	4	Electric Convection Oven (Full Size)	Blodgett		No		13.1	28,544	0.0	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Lockwood		No		1.0	2,184	0.0	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions							Proposed Conditions	Energy Impact & Financial Analysis								
Location	Quantity	Dishwasher Type	*Manufacturer*	*Model Number*	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	*Total Net Cost*	*Payback w/o Incentives in Years*	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Insinger	Admiral 66-1	Natural Gas	Electric	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	71	Deskstop	100.0	Yes
Classrooms	39	Small Printers	13.0	No
Classrooms	73	Projectors	175.0	No
Breakrooms	4	Refrigerators	246.0	No
Breakrooms	3	Coffee Machine	900.0	No
Breakrooms	3	Toasteroven	1,500.0	No
Media Center	1	Television, LED, 50%	150.0	No
Classrooms	72	Fan	50.0	No
Classrooms	41	Smart Board	246.0	No
Breakrooms	3	Microwave	800.0	No
Various	6	Printer Med	80.0	No
Offices	4	Printer Large	150.0	Yes
Cafeteria	1	Pretzel Warmer	100.0	No
Cafeteria	1	Display Warmer	150.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Common space	1	Refrigerated	Yes	0.00	1,612	0.0	$205.77	$230.00	$0.00	1.12
Common space	1	Non-Refrigerated	Yes	0.00	343	0.0	$43.73	$230.00	$0.00	5.26

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Marlboro Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 74,129
Built: 1970

For Year Ending: April 30, 2017
Date Generated: April 06, 2018

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Marlboro Elementary School 100 School Road West Marlboro, New Jersey 07746	Marlboro Township Board of Education 1980 Township Drive Marlboro, NJ 07746 (732) 972-2000	Cindy Barr-Rague 1980 Township Drive Marlboro, NJ 07746 (732) 972-2000 Ext. 2010 cbarr-rague@mtps.org

Property ID: 6277898

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
78.4 kBtu/ft²

Source EUI
135.1 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	3,934,408	(68%)
Electric - Grid (kBtu)	1,874,116	(32%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	68.4
National Median Source EUI (kBtu/ft²)	117.9
% Diff from National Median Source EUI	15%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	417

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

___ _____

(___)___-_____

_____

Professional Engineer Stamp
(if applicable)