Local Government Energy Audit:
Energy Audit Report

Pequannock Valley Middle School

493 Newark Pompton Turnpike

Pompton Plains, NJ 07444

Pequannock Township BOE

October 31, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

The goal of an LGEA report is to provide you with information on how your building 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 public schools in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Building Summary

Pequannock Valley Middle School is an 84,754 square foot building comprised of various space types including classrooms, offices, a gymnasium, a media center, a small commercial kitchen, and various mechanical and storage spaces.

Lighting at Pequannock Valley Middle School consists of aging and inefficient fluorescent and incandescent lighting. Heating is mainly supplied by two steam boilers and one hot water boiler. The steam boilers are at the end of their useful life, and in need of replacement. Cooling is supplied by a mixture of split system ACs, mini-split heat pumps, and packaged rooftop units, as well as some window air conditioners. A thorough description of the building and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated seven measures which together represent an opportunity for Pequannock Valley Middle School to reduce annual energy costs by $27,370 and annual greenhouse gas emissions by 226,980 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 4.9 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 Pequannock Valley Middle School's annual energy use by 9%.

Figure 1 – Previous 12 Month Utility Costs

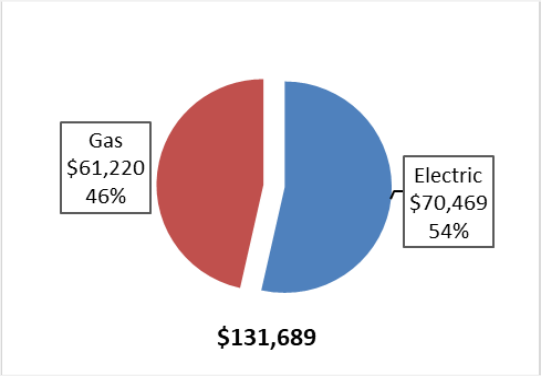
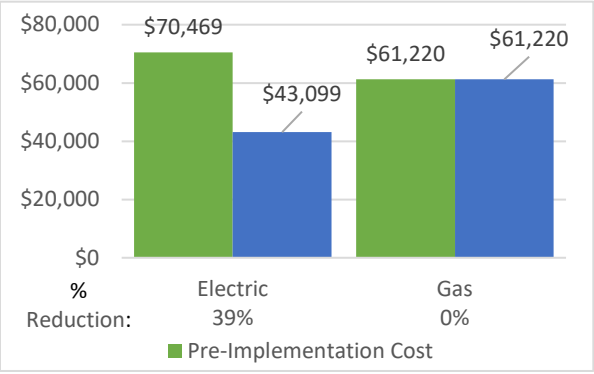


Figure 2 – Potential Post-Implementation Costs



A detailed description of Pequannock Valley Middle 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		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		236,846	52.5	0.0	$28,759.02	$188,200.49	$18,150.00	$170,050.49	5.9	238,502
ECM 1	Install LED Fixtures	45,140	9.3	0.0	$5,481.10	$70,778.40	$6,300.00	$64,478.40	11.8	45,455
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	174,971	39.4	0.0	$21,245.82	$107,332.33	$10,360.00	$96,972.33	4.6	176,194
ECM 3	Retrofit Fixtures with LED Lamps	15,889	3.8	0.0	$1,929.35	$9,444.43	$1,490.00	$7,954.43	4.1	16,000
ECM 4	Install LED Exit Signs	846	0.1	0.0	$102.75	$645.33	$0.00	$645.33	6.3	852
Lighting Control Measures		32,086	7.0	0.0	$3,896.04	$31,480.00	$3,710.00	$27,770.00	7.1	32,310
ECM 5	Install Occupancy Sensor Lighting Controls	27,855	6.2	0.0	$3,382.28	$27,660.00	$3,710.00	$23,950.00	7.1	28,050
ECM 6	Install High/Low Lighitng Controls	4,231	0.9	0.0	$513.77	$3,820.00	$0.00	$3,820.00	7.4	4,261
Plug Load Equipment Control - Vending Machine		1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623
ECM 7	Vending Machine Control	1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623
TOTAL FOR ALL MEASURES		270,544	59.6	0.0	$32,850.77	$219,910.49	$21,860.00	$198,050.49	6.0	272,435

* - 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.

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.

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

Energy Efficient Practices

TRC also identified 15 low cost (or no cost) energy efficient practices. A building'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 Pequannock Valley Middle School include:

- Reduce Air Leakage
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly

- Turn Off Unneeded Motors
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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 Pequannock Valley Middle School. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	107	kW DC STC
Electric Generation	80,512	kWh/yr
Displaced Cost	$7,000	/yr
Installed Cost	$417,300	

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 building 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 building 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 than 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. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 BUILDING INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Kathy Bechtel	Business Administrator	kathy.bechtel@pequannock.org	973-616-6030
Designated Representative			
Peter Riffel	Grounds Supervisor	peter.riffel@pequannock.org	973-479-6860
TRC Energy Services			
Alexander Klieverik	Auditor	aklieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On January 10 and 12, 2018, TRC Services performed an energy audit at Pequannock Valley Middle School located in Pompton Plains, New Jersey. TRC's team met with Kathy Bechtel, Business Administrator and Peter Riffel, Grounds Supervisor to review the building operations and help focus our investigation on specific energy-using systems.

Pequannock Valley Middle School is an 84,754 square foot building comprised of various space types including classrooms, offices, a gymnasium, a media center, a small commercial kitchen, and various mechanical and storage spaces.

The building was constructed in 1950. Over the last five years the building has replaced some of its existing T12 fluorescent fixtures with T8 fluorescent fixtures. The site is interested in a new heating system, but has been unable to fund the project.

2.3 Building Occupancy

The school building is open Monday through Friday and closed on weekends. The typical schedule is presented in the table below. The building is only used during the school year, with no community activities or camps during the summer. During a typical day, the building is occupied by 66 staff and 550 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Pequannock Valley Middle School	Weekday	6:00 AM to 4:00 PM
Pequannock Valley Middle School	Weekend	Closed

2.4 Building Envelope

The building is constructed of concrete block and structural steel with a brick facade. The building has sections of pitched roof with shingles, and flat roof areas covered with light-colored gravel; both are in good condition. The building has double-pane windows which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of aluminum and in good condition except that the door seals have worn out which increases the level of outside air infiltration.



2.5 On-Site Generation

Pequannock Valley Middle School does not have any on-site electric generation capacity.

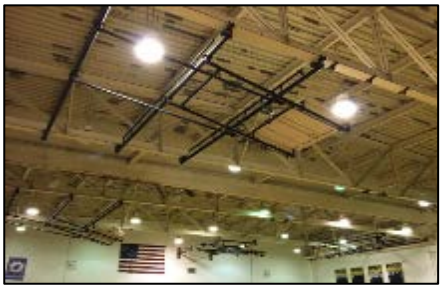
2.6 Energy-Using Systems

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

Lighting System

Lighting at the building is provided mostly by 40-Watt linear fluorescent T12 lamps with magnetic ballasts. Most of the fluorescent fixtures are 2-lamp, 4-foot long troffers with diffusers. Other lighting types at this building include incandescent lamps, compact fluorescent screw-in lamps, U-shaped fluorescent lamps, metal halide lamps, and a few LED fixtures.





A small area of the building has lighting that has been recently upgraded. There are six classrooms and one office which contain 4-foot, T5 fluorescent fixtures with 2 lamps and occupancy sensors for controls. Some hallways with inefficient T12 lighting have upgraded to newer 32-Watt fluorescent T8 lamps, though the majority of fixtures still use the older T12 technology. Lighting control in most spaces throughout the building is provided by manual wall switches.

The building's exterior lighting consists primarily of efficient LED fixtures that are controlled by photocells or timers. Some of the fixtures were observed to be on during the day.

Steam & Hot Water Heating System

The heating system for this building consists of two H.B. Smith steam boilers, and one Weil McLain hot water boiler serving different sections of the building. The steam boilers have an output capacity of 1,785 kBtu/h, and have a nominal combustion efficiency of 75%. The steam generated by the boiler is sent to a heat exchanger located in the DHW room. The condensate from the heat exchanger returns to the steam boilers via a vacuum system with two 1.5 HP pumps. Hot water from the heat exchanger is distributed at 180°F to most of the building from the cafeteria to classrooms from 119 through 130 and the second floor classrooms. The loop is configured in a constant flow distribution with two 6 HP pumps. Only one pump is required for distribution; the second pump acts as a stand-by. The steam boilers are in poor condition and at the end of their useful life.

The hot water boiler has an output capacity of 1,358 kBtu/h, and has a nominal combustion efficiency of 79%. Water is distributed at 180°F to part of the building from the guidance office to the woodshop, including the gymnasium and kitchen area. The loop is configured in a constant flow distribution with two 2 HP pumps.

Most classrooms and offices contain unit ventilators to heat the space. Most mechanical and storage spaces, including the woodshop, are served by unit heaters hanging from the ceiling.

Packaged Heating & Cooling System

There are two packaged units with direct expansion (DX) cooling and gas furnace heating located on the roof of the building. One unit serving the nurse's office is a Trane model YHC with a 3 ton cooling capacity and a heating output capacity of 64,000 Btu/h. The media center is served by a Trane packaged unit model YFD which has a cooling capacity of 12.5 tons, and a heating output capacity of 203,000 Btu/h. Both of these units were installed approximately ten years ago and are in good operating condition.


Direct Expansion Air Conditioning System (DX)

Cooling for the building is provided by a mixture of split-system air conditioners and heat pumps located on the roof, or by individual window air conditioners. There are seven split-system ACs serving the guidance area, teacher's lounge, music room 1, music room 2, the music room office, and the STEM lab. The guidance area is served by a 5 ton Trane unit, and the teacher's lounge is served by a 3 ton Lennox unit, Music Rooms 1 and 2 are served by two 4 ton Trane units, the music room office is served by a 2 ton Trane unit, and the STEM lab is served by two 4 ton Lennox units.



There are air-source heat pump units supplying heating and/or cooling to the science rooms, computer lab, and the IT room. Science rooms 1 and 2 are conditioned via two Fujitsu Halcyon ductless mini-split heat pumps. The heat pumps have a cooling capacity of 45,000 Btu/h, and a heating capacity of 48,000 Btu/h. The computer lab and IT room are served by two cooling-only mini-split air conditioners with a cooling capacity of 38,000 Btu/h. All the heat pump units are controlled by individual thermostats located in the designated spaces.



There are six individual window air conditioners located in various classrooms and offices throughout the building.



Domestic Hot Water Heating System

The domestic hot water for the building consists of two separate systems. Most of the building's domestic hot water is produced by the steam boilers. The boilers produce 180°F water, which is mixed down at a mechanical mixing valve to 120°F to distribute to the building. Two 1/12 HP recirculation pumps distribute water from the cafeteria to the media center, as well as to the second floor.




Part of the building including the guidance area, woodshop, gymnasium, and the kitchen area, is served by a Raypack hot water boiler with a 1,200 gallon storage tank. The boiler produces water at 130°F, and has an input capacity of 511,500 Btu/h with a combustion efficiency of 82%. One ½ HP pump is required for distribution.

There is also an electric water heater located in the custodial closet on the second floor which only serves the sink in that room.

Food Service Equipment

The building has a small commercial kitchen that is used to prepare lunch for the students and staff. The ovens, range tops and griddle are all gas fired. The warming trays and holding cabinets are all electric. The ovens, griddle, and electric holding cabinets are turned on at 7:00 AM when the kitchen staff arrives and turned off at 1:30 PM when lunch service stops. There is a dishwasher with an electric booster heater that provides 145°F rinse water.

Refrigeration

There are a variety of refrigerators at this building. Two science classrooms and a few offices contain compact residential refrigerators, the teacher's lounge contains a bottom-freezer refrigerator, and the kitchen contains three, glass-front refrigerated cases, two refrigerated chests, and a freezer chest.




The kitchen at this building has reach-in commercial refrigerators and freezers that are used to store food prepared for school lunches. The refrigerators are maintained at approximately 35°F, while the freezers are maintained at -1°F.




Building Plug Load

There are 245 computer work stations throughout the building. Ninety percent of the computers are desktop units with LCD monitors. There is no centralized PC power management software installed.




Other equipment adding significant plug load to the building include projectors and smartboards, photocopiers, desk printers, TVs (LCD & CRT), and stationary power tools located in the woodshop.

The building has one refrigerated beverage vending machine located in the teacher's lounge. There are no controls installed on the vending machine.

2.7 Water-Using Systems

There are ten restrooms at this building. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or lower, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf. The school also has a girls and boys locker room. The locker rooms each have 12 showerheads that are rated at 2.5 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 a number of 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

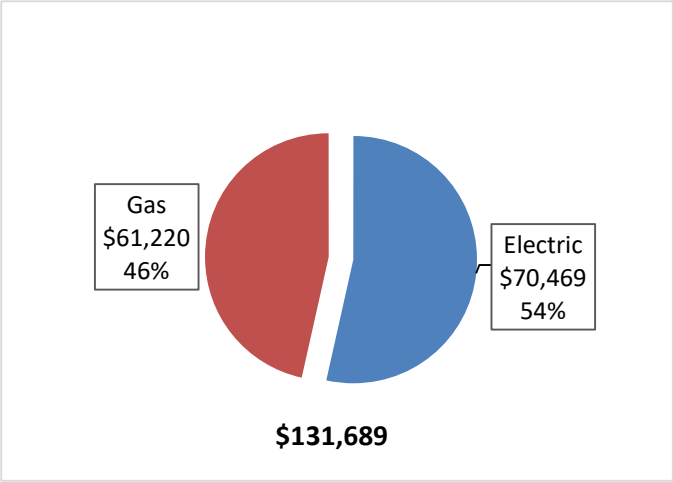
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the building was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Pequannock Valley Middle School		
Fuel	Usage	Cost
Electricity	580,350 kWh	$70,469
Natural Gas	70,325 Therms	$61,220
Total		$131,689

The current annual energy cost for this building is $131,689 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 $0.121/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.

Figure 9 - Electric Usage & Demand

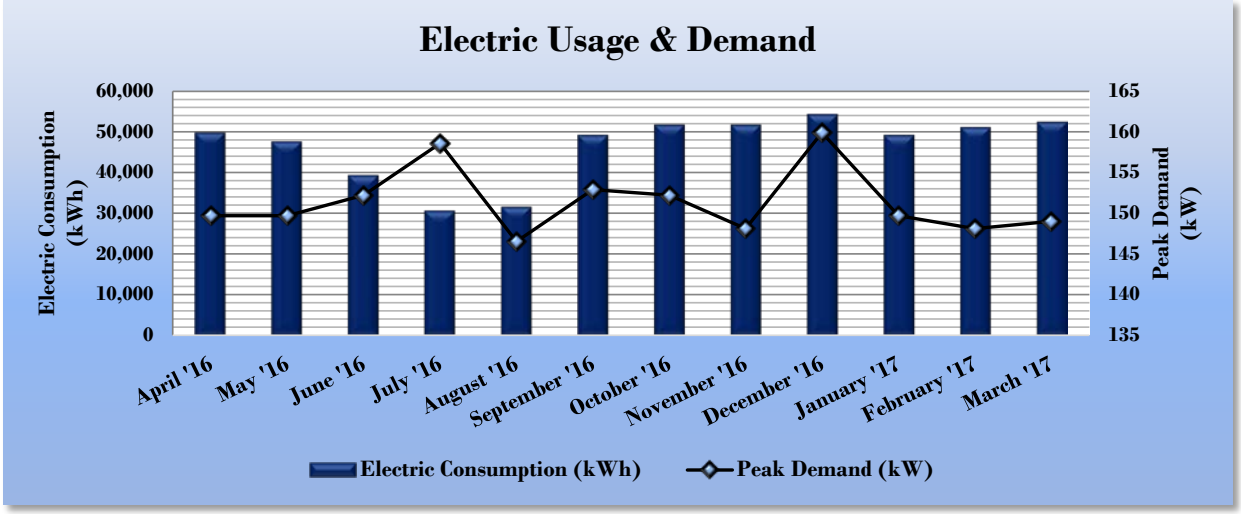


Figure 10 - Electric Usage & Demand

Electric Billing Data for Pequannock Valley Middle School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
5/9/16	27	49,920	150	$840	$5,801
6/9/16	30	47,680	150	$900	$5,645
7/11/16	31	39,360	152	$915	$4,984
8/9/16	28	30,720	159	$433	$3,623
9/7/16	28	31,680	147	$880	$3,196
10/6/16	28	49,280	153	$858	$6,064
11/7/16	31	51,840	152	$854	$6,320
12/8/16	30	51,840	148	$831	$6,297
1/10/17	32	54,400	160	$946	$6,690
2/7/17	27	49,280	150	$991	$6,245
3/9/17	29	51,200	148	$980	$6,476
4/10/17	31	52,480	149	$986	$6,618
Totals	352	559,680	159.9	$10,414	$67,959
Annual	365	580,350	159.9	$10,799	$70,469

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.871/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

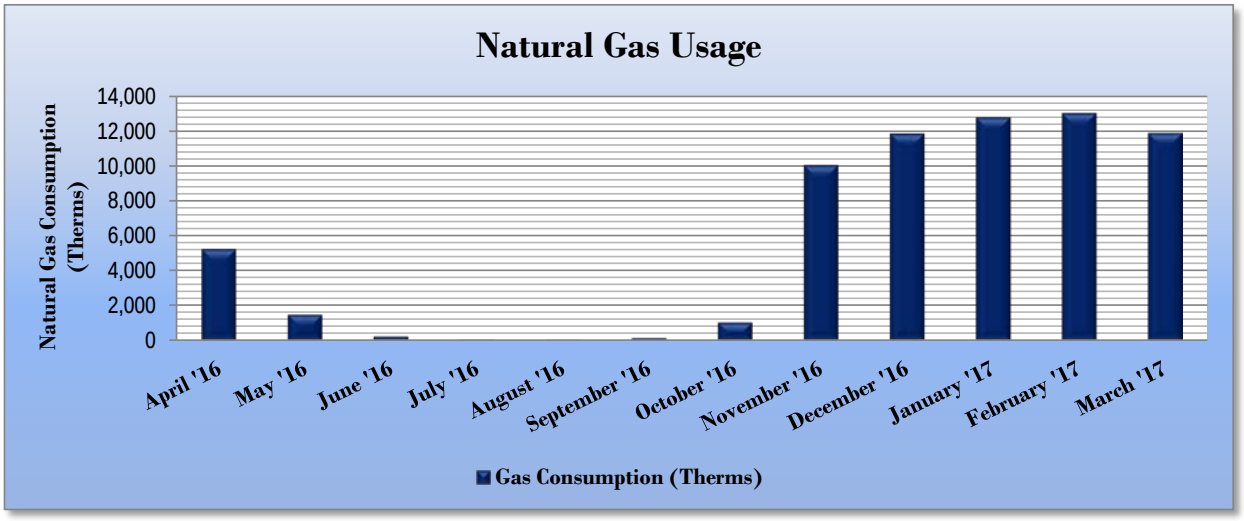


Figure 12 - Natural Gas Usage

Gas Billing Data for Pequannock Valley Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/27/16	28	5,239	$2,934
5/26/16	28	1,494	$916
6/27/16	31	238	$236
7/27/16	29	36	$127
8/25/16	28	32	$125
9/26/16	31	151	$190
10/25/16	28	1,041	$678
11/28/16	33	10,054	$8,660
12/27/16	28	11,850	$10,614
1/26/17	29	12,789	$11,707
2/27/17	31	13,018	$11,860
3/28/17	28	11,877	$10,994
Totals	352	67,820	$59,040
Annual	365	70,325	$61,220

3.4 Benchmarking

This building 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 building'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		
	Pequannock Valley Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	160.5	141.4
Site Energy Use Intensity (kBtu/ft^2)	106.3	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		
	Pequannock Valley Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	126.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	95.4	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% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This building has a current score of 46.

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

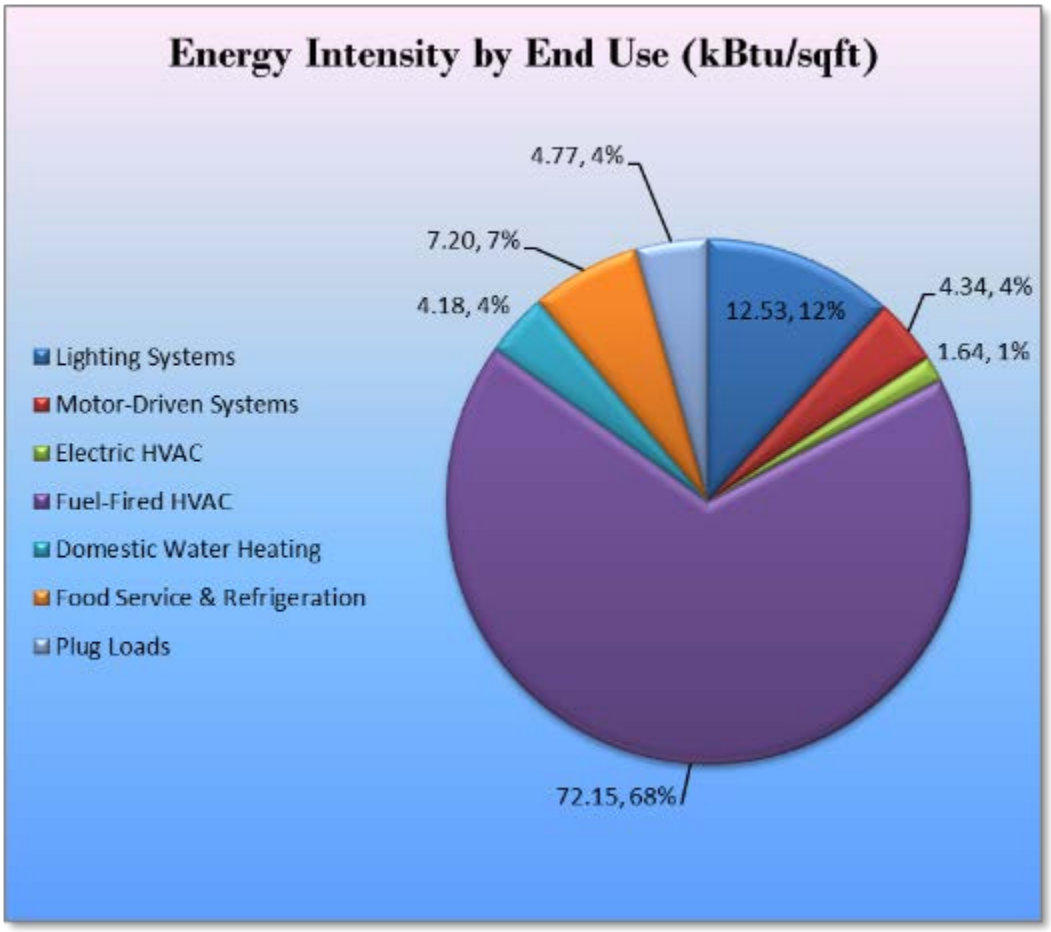
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/building-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager® account has been created online for your building 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 building. 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 Pequannock Valley Middle 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 building.

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		236,846	52.5	0.0	$28,759.02	$188,200.49	$18,150.00	$170,050.49	5.9	238,502
ECM 1	Install LED Fixtures	45,140	9.3	0.0	$5,481.10	$70,778.40	$6,300.00	$64,478.40	11.8	45,455
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	174,971	39.4	0.0	$21,245.82	$107,332.33	$10,360.00	$96,972.33	4.6	176,194
ECM 3	Retrofit Fixtures with LED Lamps	15,889	3.8	0.0	$1,929.35	$9,444.43	$1,490.00	$7,954.43	4.1	16,000
ECM 4	Install LED Exit Signs	846	0.1	0.0	$102.75	$645.33	$0.00	$645.33	6.3	852
Lighting Control Measures		32,086	7.0	0.0	$3,896.04	$31,480.00	$3,710.00	$27,770.00	7.1	32,310
ECM 5	Install Occupancy Sensor Lighting Controls	27,855	6.2	0.0	$3,382.28	$27,660.00	$3,710.00	$23,950.00	7.1	28,050
ECM 6	Install High/Low Lighitng Controls	4,231	0.9	0.0	$513.77	$3,820.00	$0.00	$3,820.00	7.4	4,261
Plug Load Equipment Control - Vending Machine		1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623
ECM 7	Vending Machine Control	1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623
TOTAL FOR ALL MEASURES		270,544	59.6	0.0	$32,850.77	$219,910.49	$21,860.00	$198,050.49	6.0	272,435

* - 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		236,846	52.5	0.0	$28,759.02	$188,200.49	$18,150.00	$170,050.49	5.9	238,502
ECM 1	Install LED Fixtures	45,140	9.3	0.0	$5,481.10	$70,778.40	$6,300.00	$64,478.40	11.8	45,455
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	174,971	39.4	0.0	$21,245.82	$107,332.33	$10,360.00	$96,972.33	4.6	176,194
ECM 3	Retrofit Fixtures with LED Lamps	15,889	3.8	0.0	$1,929.35	$9,444.43	$1,490.00	$7,954.43	4.1	16,000
ECM 4	Install LED Exit Signs	846	0.1	0.0	$102.75	$645.33	$0.00	$645.33	6.3	852

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	45,140	9.3	0.0	$5,481.10	$70,778.40	$6,300.00	$64,478.40	11.8	45,455
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing existing fixtures metal halide lamps with new high performance LED light fixtures. 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 more than twice that of metal halide lamps.

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	174,971	39.4	0.0	$21,245.82	$107,332.33	$10,360.00	$96,972.33	4.6	176,194
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 fluorescent tubes.

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	15,506	3.7	0.0	$1,882.81	$9,336.93	$1,490.00	$7,846.93	4.2	15,614
Exterior	383	0.1	0.0	$46.54	$107.50	$0.00	$107.50	2.3	386

Measure Description

We recommend retrofitting existing incandescent, 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.

ECM 4: Install LED Exit Signs

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	846	0.1	0.0	$102.75	$645.33	$0.00	$645.33	6.3	852
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all incandescent Exit signs with LED Exit signs. LED Exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

Our recommendations for upgrades to existing lighting controls 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		32,086	7.0	0.0	$3,896.04	$31,480.00	$3,710.00	$27,770.00	7.1	32,310
ECM 4	Install Occupancy Sensor Lighting Controls	27,855	6.2	0.0	$3,382.28	$27,660.00	$3,710.00	$23,950.00	7.1	28,050
ECM 5	Install High/Low Lighitng Controls	4,231	0.9	0.0	$513.77	$3,820.00	$0.00	$3,820.00	7.4	4,261

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 5: 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)
27,855	6.2	0.0	$3,382.28	$27,660.00	$3,710.00	$23,950.00	7.1	28,050

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in many restrooms, storage rooms, classrooms, offices areas, and mechanical spaces. 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. 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 6: 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)
4,231	0.9	0.0	$513.77	$3,820.00	$0.00	$3,820.00	7.4	4,261

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. Typical areas for such lighting control are stairwells, interior corridors, and parking lots.

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 of time. Energy savings results from providing full lighting levels only when it is required, as well as lower maintenance cost from reduced lamp operation.

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.

4.1.3 Plug Load Equipment Control - Vending Machines

Our recommendation for upgrades to plug load equipment control – vending machines fixtures is summarized in Figure 19 below.

Figure 19 – 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		1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623
ECM 7	Vending Machine Control	1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623

ECM 7: 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)
1,612	0.0	0.0	$195.72	$230.00	$0.00	$230.00	1.2	1,623

Measure Description

Vending machines operate continuously, even during non-business hours. We recommend installing 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.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a building'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 building. 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 Proper Lighting Maintenance

In order 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.

Ensure Lighting Controls Are Operating Properly

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

Turn Off Unneeded Motors

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Reducing run hours for these motors can result in significant energy savings. Whenever possible, use automatic devices such as twist timers or occupancy sensors to ensure that motors are turned off when not needed.

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

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 building'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.

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Perform Proper 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 in order to sustain efficiency and equipment life.

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between

the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

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 building, 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 building. Before making a decision 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.

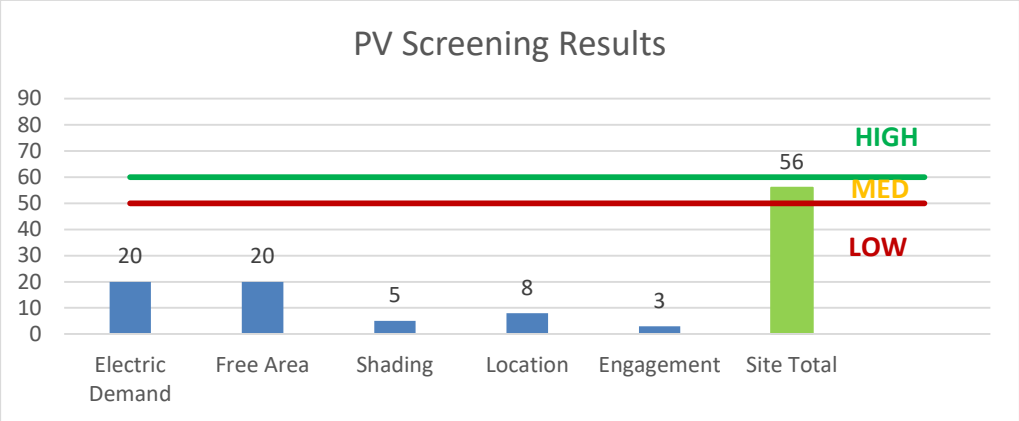
6.1 Photovoltaic

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 building'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 building's electric demand, size and location of free area, and shading elements shows that the building has a Medium potential for installing a PV array.

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

Figure 20 - Photovoltaic Screening



Potential	Medium	
System Potential	107	kW DC STC
Electric Generation	80,512	kWh/yr
Displaced Cost	$7,000	/yr
Installed Cost	$417,300	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program 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 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.

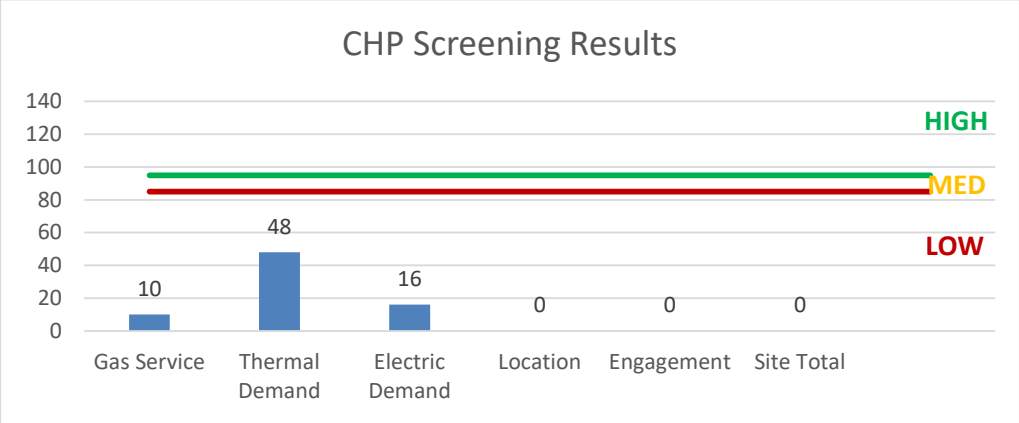
CHP systems are typically used to produce a portion of the electric power used onsite by a building, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the building'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 building has a Low potential for installing a cost-effective CHP system.

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 building 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 21 - 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 building is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing 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 building 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 building's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a building'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.

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 21 for a list of the eligible programs identified for each recommended ECM.

Figure 22 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
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 LED Exit Signs			X			
ECM 5	Install Occupancy Sensor Lighting Controls	X		X			
ECM 6	Install High/Low Lighitng Controls			X			
ECM 7	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 building 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 building. 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 building 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 an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You 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. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to 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.

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. SRECs 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 SRECs 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 description 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 building's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your building is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your building 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 building is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your building 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
2nd Floor Hallway & Stairwell	33	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	33	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	1.46	7,104	0.0	$862.59	$4,941.00	$330.00	5.35
2nd Floor Hallway & Stairwell	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Center Stairwell	2	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	2,765	None	No	2	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	2,765	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Center Stairwell	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Center Stairwell	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	0.04	215	0.0	$26.14	$117.00	$10.00	4.09
End Stairwell	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
End Stairwell	2	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	2	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.07	321	0.0	$39.00	$107.51	$10.00	2.50
Far End Stairwell	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Far End Stairwell	2	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	2	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.07	321	0.0	$39.00	$107.51	$10.00	2.50
Hallway 119-130	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,765	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	0.77	3,713	0.0	$450.81	$1,638.00	$280.00	3.01
Hallway 119-130	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway 119-130	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.03	161	0.0	$19.50	$53.75	$5.00	2.50
Hallway 119-130	1	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	2,765	None	No	1	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	2,765	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Media Center Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,765	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	0.08	398	0.0	$48.30	$375.50	$30.00	7.15
Center Hallway	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,765	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,936	0.43	2,101	0.0	$255.06	$1,056.20	$180.00	3.44
Center Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 200	16	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.71	3,114	0.0	$378.14	$2,142.00	$195.00	5.15
CR 200	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 202	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
Child Study Office	7	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.31	1,134	0.0	$137.64	$1,089.00	$105.00	7.15
Child Study Office RR	2	Compact Fluorescent: Screw-In: (13W) 1L	Wall Switch	13	730	None	No	2	Compact Fluorescent: Screw-In: (13W) 1L	Wall Switch	13	730	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 204	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 207	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 206	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 209	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36

	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
CR 208	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
Book Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.18	861	0.0	$104.56	$593.67	$75.00	4.96
Boys RR	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.18	861	0.0	$104.56	$738.00	$75.00	6.34
Custodial Storage	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 211	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.24	1,070	0.0	$129.86	$702.00	$120.00	4.48
CR 213	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.24	1,070	0.0	$129.86	$702.00	$120.00	4.48
Office	6	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	1,540	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.12	329	0.0	$40.00	$351.00	$60.00	7.28
CR 215	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.24	1,070	0.0	$129.86	$702.00	$120.00	4.48
CR 210	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.37	1,604	0.0	$194.80	$1,053.00	$180.00	4.48
CR 212	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.24	1,070	0.0	$129.86	$702.00	$120.00	4.48
CR 217	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,500	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,500	0.24	1,070	0.0	$129.86	$702.00	$120.00	4.48
Mechanical Room (Heat Exchanger)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,765	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,765	0.04	210	0.0	$25.48	$117.00	$20.00	3.81
Hot Water Boiler Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	511	0.27	341	0.0	$41.41	$972.00	$95.00	21.18
Hot Water Boiler Room	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	$17.13	$107.56	$0.00	6.28
Custodial Room 1	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.03	161	0.0	$19.50	$53.75	$5.00	2.50
Custodial Room 2	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.03	161	0.0	$19.50	$53.75	$5.00	2.50
Steam Boiler Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	730	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.02	28	0.0	$3.36	$58.50	$10.00	14.42
Steam Boiler Room	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Occupancy Sensor	10	511	0.03	45	0.0	$5.44	$53.75	$5.00	8.96
Girls RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.18	861	0.0	$104.56	$593.67	$75.00	4.96
CR 113	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.62	2,725	0.0	$330.87	$1,908.00	$175.00	5.24
Elevator Equipment Room	1	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	730	None	No	1	LED Screw-In Lamps: Screw-In: (9.5W) 1L	Wall Switch	10	730	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage 112	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.08	99	0.0	$12.03	$234.00	$20.00	17.79
CR 115	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.62	2,725	0.0	$330.87	$1,908.00	$175.00	5.24
CR 112	18	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	1.14	4,996	0.0	$606.70	$2,637.00	$305.00	3.84
CR 117	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.62	2,725	0.0	$330.87	$1,908.00	$175.00	5.24

	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
CR 119	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.62	2,725	0.0	$330.87	$1,908.00	$175.00	5.24
CR 114	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.62	2,725	0.0	$330.87	$1,908.00	$175.00	5.24
Guidance Conf. Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	0.25	1,228	0.0	$149.11	$796.00	$95.00	4.70
Security Office	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,080	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.08	282	0.0	$34.27	$161.83	$20.00	4.14
Main Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,080	Relamp & Reballast	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.38	1,386	0.0	$168.26	$1,059.00	$125.00	5.55
Main Office	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,080	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.36	1,296	0.0	$157.31	$917.33	$115.00	5.10
Main Office	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.02	69	0.0	$8.42	$63.20	$0.00	7.50
Main Office	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.04	162	0.0	$19.66	$387.00	$10.00	19.17
Main Office	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,080	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Occupancy Sensor	10	1,456	0.03	128	0.0	$15.50	$323.75	$5.00	20.57
Main Office Men's RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.18	861	0.0	$104.56	$593.67	$75.00	4.96
CR 106	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 108	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
Custodial Room	7	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.31	1,507	0.0	$182.97	$1,089.00	$105.00	5.38
Custodial Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.36	1,722	0.0	$209.11	$917.33	$115.00	3.84
Custodial Room	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Blue Room (Faculty)	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,765	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,765	0.02	92	0.0	$11.20	$63.20	$0.00	5.64
Blue Room (Faculty)	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,765	0.04	188	0.0	$22.78	$117.00	$10.00	4.70
Blue Room (Faculty)	8	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	0.51	2,456	0.0	$298.22	$1,322.00	$155.00	3.91
Blue Room (Faculty)	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AV/IT Room	5	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.22	1,076	0.0	$130.70	$855.00	$85.00	5.89
CR 110	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
Storage	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	50	0.0	$6.01	$117.00	$10.00	17.79
Media Center	4	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.04	564	0.0	$68.50	$430.22	$0.00	6.28
Media Center	41	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	41	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	2.59	12,587	0.0	$1,528.40	$6,471.50	$755.00	3.74
Media Center	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.04	215	0.0	$26.14	$117.00	$10.00	4.09

	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
Media Center	9	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.80	3,875	0.0	$470.50	$1,726.50	$215.00	3.21
Media Center	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,765	0.03	161	0.0	$19.50	$53.75	$5.00	2.50
Media Center	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Men's Faculty RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	50	0.0	$6.01	$117.00	$10.00	17.79
Nurse's Office	14	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.62	2,267	0.0	$275.29	$2,178.00	$210.00	7.15
Nurse's Office	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.03	93	0.0	$11.33	$117.00	$0.00	10.33
Women's Faculty RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.08	99	0.0	$12.03	$234.00	$20.00	17.79
CR 124	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.76	3,331	0.0	$404.46	$1,848.00	$215.00	4.04
CR 126	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 126	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 125	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.76	3,331	0.0	$404.46	$1,848.00	$215.00	4.04
CR 125	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 127	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.76	3,331	0.0	$404.46	$1,848.00	$215.00	4.04
CR 127	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 128	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.76	3,331	0.0	$404.46	$1,848.00	$215.00	4.04
CR 128	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 129	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.76	3,331	0.0	$404.46	$1,848.00	$215.00	4.04
CR 129	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
Men's Faculty RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	730	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	730	0.11	140	0.0	$17.02	$263.00	$30.00	13.69
Transportation Office	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	None	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 130	11	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,500	Relamp & Reballast	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.70	3,053	0.0	$370.76	$1,716.50	$200.00	4.09
CR 130	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.04	170	0.0	$20.60	$117.00	$10.00	5.19
CR 130	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47
CR 131	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.53	2,336	0.0	$283.61	$1,674.00	$155.00	5.36
CR 131	1	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	730	0.03	42	0.0	$5.15	$53.75	$5.00	9.47

	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
Storage Room	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	511	0.36	455	0.0	$55.21	$1,206.00	$115.00	19.76
Compter Room 104	8	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	0.51	2,456	0.0	$298.22	$1,322.00	$155.00	3.91
STEM Lab	16	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	1.01	4,912	0.0	$596.45	$2,374.00	$275.00	3.52
CR 102	12	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,500	Relamp & Reballast	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	1.07	4,671	0.0	$567.21	$2,212.00	$275.00	3.41
Wood Shop	42	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	1.86	8,175	0.0	$992.62	$5,994.00	$560.00	5.47
Wood Shop	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wood Shop Office	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,080	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.13	462	0.0	$56.09	$533.00	$65.00	8.34
Custodial Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	730	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	730	0.05	70	0.0	$8.51	$131.50	$15.00	13.69
Art Room 138	16	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	1.01	4,912	0.0	$596.45	$2,374.00	$275.00	3.52
Art Room Office	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,080	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.36	1,296	0.0	$157.31	$917.33	$115.00	5.10
Computer Lab 136	16	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	1.01	4,912	0.0	$596.45	$2,374.00	$275.00	3.52
Computer Lab 136	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,765	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,936	0.03	155	0.0	$18.88	$117.00	$0.00	6.20
Music Room 135	13	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	0.82	3,991	0.0	$484.62	$1,979.50	$230.00	3.61
Music Room 135	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.09	431	0.0	$52.28	$234.00	$20.00	4.09
Music Room 135	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.09	431	0.0	$52.28	$234.00	$20.00	4.09
Music Room Office 1	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.08	282	0.0	$34.27	$234.00	$20.00	6.24
Music Room Office 2	6	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,080	Relamp & Reballast	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.38	1,386	0.0	$168.26	$1,059.00	$125.00	5.55
Music Room 133	24	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	1.07	5,166	0.0	$627.34	$3,348.00	$310.00	4.84
Music Room 133	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,765	0.08	375	0.0	$45.56	$234.00	$20.00	4.70
Music Room 133	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,765	0.11	531	0.0	$64.48	$263.00	$30.00	3.61
Science Room 132	18	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	1.14	5,526	0.0	$671.01	$2,907.00	$340.00	3.83
Science Room 132	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	0.13	614	0.0	$74.56	$263.00	$30.00	3.13
Science Room 134	18	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,936	1.14	5,526	0.0	$671.01	$2,907.00	$340.00	3.83
Gym	30	Metal Halide: (1) 400W Lamp	Wall Switch	458	2,765	Fixture Replacement	Yes	30	LED - Fixtures: High-Bay	Occupancy Sensor	120	1,936	7.35	35,677	0.0	$4,332.06	$57,156.00	$5,550.00	11.91
Gym	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	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
Boy's Locker Storage	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.08	99	0.0	$12.03	$234.00	$20.00	17.79
Boy's Locker Room	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boy's Locker Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,765	0.04	188	0.0	$22.78	$117.00	$10.00	4.70
Boy's Locker Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,936	0.53	2,583	0.0	$313.67	$1,241.00	$155.00	3.46
Boy's Locker Room	7	Incandescent: Screw-In: (60W) 1L	Wall Switch	60	2,765	Relamp	Yes	7	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Occupancy Sensor	10	1,936	0.24	1,187	0.0	$144.19	$646.27	$70.00	4.00
Boy's Locker Room Office	1	Compact Fluorescent: Screw-In: (13W) 2L	Wall Switch	26	2,080	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 2L	Wall Switch	19	2,080	0.00	17	0.0	$2.03	$53.75	$0.00	26.44
Boy's Locker Room Office	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,080	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.05	200	0.0	$24.25	$131.50	$15.00	4.80
Boys Locker Entry	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys Locker Entry	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,765	0.08	375	0.0	$45.56	$161.83	$20.00	3.11
Faculty Lounge	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,600	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,820	0.36	1,619	0.0	$196.63	$1,206.00	$115.00	5.55
Kitchen	21	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,600	Relamp & Reballast	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,820	0.93	4,251	0.0	$516.16	$2,997.00	$280.00	5.26
Kitchen	7	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	2,600	None	Yes	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,820	0.06	251	0.0	$30.50	$270.00	$35.00	7.71
Kitchen Storage	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	50	0.0	$6.01	$117.00	$10.00	17.79
Kitchen Cafeteria Hallway	8	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,765	Relamp & Reballast	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,936	0.19	912	0.0	$110.73	$1,054.00	$40.00	9.16
Kitchen Cafeteria Hallway	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	0.09	431	0.0	$52.28	$504.00	$20.00	9.26
Cafeteria	12	Metal Halide: (1) 400W Lamp	Wall Switch	458	2,765	Fixture Replacement	Yes	12	LED - Fixtures: High-Bay	Occupancy Sensor	120	1,936	2.94	14,271	0.0	$1,732.82	$20,762.40	$1,870.00	10.90
Cafeteria	4	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Guidance Area	8	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,080	Relamp & Reballast	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.71	2,591	0.0	$314.61	$1,564.67	$195.00	4.35
Guidance Area	9	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,080	Relamp & Reballast	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.80	2,915	0.0	$353.94	$1,726.50	$215.00	4.27
Guidance Area	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,456	0.03	117	0.0	$14.20	$117.00	$0.00	8.24
Entry Area	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,765	Relamp & Reballast	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,765	0.03	124	0.0	$15.06	$117.00	$0.00	7.77
Lobby	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	5	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	No	5	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,765	0.39	1,876	0.0	$227.80	$809.17	$100.00	3.11
Cafeteria/Gym Hallway	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,765	Relamp & Reballast	Yes	1	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,936	0.09	431	0.0	$52.28	$161.83	$20.00	2.71
Cafeteria/Gym Hallway	52	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,765	Relamp & Reballast	Yes	52	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,936	1.22	5,928	0.0	$719.77	$6,096.00	$260.00	8.11

	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
Cafeteria/Gym Hallway	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cafeteria/Gym Hallway	2	Linear Fluorescent - T12: 2' T12 (20W) - 2L	Wall Switch	50	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,936	0.05	242	0.0	$29.42	$414.00	$20.00	13.39
Cafeteria/Gym Hallway	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,765	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,936	0.06	311	0.0	$37.76	$234.00	$0.00	6.20
End Block	31	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	31	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,936	1.38	6,673	0.0	$810.31	$4,227.00	$310.00	4.83
End Block	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,765	Relamp & Reballast	Yes	1	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,936	0.06	307	0.0	$37.28	$131.50	$15.00	3.13
End Block	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
End Block	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	$17.13	$107.56	$0.00	6.28
Gym Boys RR	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.13	646	0.0	$78.42	$621.00	$65.00	7.09
Gym Girls RR	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,765	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,936	0.13	646	0.0	$78.42	$621.00	$65.00	7.09
Building Lights	11	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	20	2,200	None	No	11	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	20	2,200	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building Lights	3	Compact Fluorescent: CFl: Screw-In: (18W) - 1L	Wall Switch	18	2,200	None	No	3	Compact Fluorescent: CFl: Screw-In: (18W) - 1L	Wall Switch	18	2,200	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building Lights	1	Incandescent: Inc: Screw-In: (60W) - 2L	Wall Switch	120	2,200	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 2L	Wall Switch	19	2,200	0.07	256	0.0	$31.03	$53.75	$0.00	1.73
Building Lights	1	Incandescent: Inc: Screw-In: (60W) - 1L	Wall Switch	60	2,200	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9.5W) - 1L	Wall Switch	10	2,200	0.03	128	0.0	$15.51	$53.75	$0.00	3.46

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
DHW / Heat Exchanger Room	Vacuum System 1	2	Process Pump	1.0	82.5%	No	1,131	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
DHW / Heat Exchanger Room	Sump Pumps	2	Process Pump	1.5	84.0%	No	1,131	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
DHW / Heat Exchanger Room	Heating System Distribution 50% of Bulding	1	Heating Hot Water Pump	5.0	88.0%	No	2,745	No	88.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
DHW / Heat Exchanger Room	Heating System Distribution 50% of Bulding	1	Heating Hot Water Pump	5.0	88.0%	No	2,745	No	88.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
DHW / Heat Exchanger Room	DHW Distribution	1	Process Pump	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
HW Boiler Room	Heating System Distribution 50% of Bulding	1	Heating Hot Water Pump	2.0	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
HW Boiler Room	Heating System Distribution 50% of Bulding	1	Heating Hot Water Pump	2.0	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
HW Boiler Room	Boiler Blower Motor	1	Process Blower	5.0	89.5%	No	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Steam Boiler Room	Compressor	1	Air Compressor	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Steam Boiler Room	Vacuum System 2	2	Process Pump	1.5	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Steam Boiler Room	Vacuum System 3	2	Process Pump	1.5	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Wood Shop / Robitics Room	1	Supply Fan	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Whole Building	23	Exhaust Fan	0.8	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic Space	Whole Building	7	Supply Fan	1.0	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic Space	Attic Space	1	Ventilation Fan	1.0	84.0%	No	250	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Room	Music Room 1 & 2	2	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
Storage Room	Storage Room	2	Supply Fan	0.3	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Hallways	4	Supply Fan	0.3	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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	Guidance Area	1	Split-System AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Teachers Lounge	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Music Room 1 & 2	2	Split-System AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Science Room 1 & 2	2	Ductless Mini-Split HP	3.75	48.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Music Room Office	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Computer Lab	1	Ductless Mini-Split AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	STEM Lab / Computer Lab	2	Split-System AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Nurse's Office	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	IT Room	1	Ductless Mini-Split AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Media Center	1	Packaged AC	12.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Whole Building	4	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Whole Building	2	Window AC	0.75		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
HW Boiler Room	1st floor from Guidance Office to Wood Shop	1	Non-Condensing Hot Water Boiler	1,358.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Steam Boiler Room	1st & 2nd floor from Cafeteria to Media Center & Room 114 to 131	1	Natural Draft Steam Boiler	1,785.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Steam Boiler Room	1st & 2nd floor from Cafeteria to Media Center & Room 114 to 131	1	Natural Draft Steam Boiler	1,785.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Nurse's Office	1	Furnace	64.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Media Center	1	Furnace	203.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
Mechanical Room	1st Floor from Guidance to Wood Shop	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodial Closet	Slop Sink	1	Storage Tank Water Heater (≤ 50 Gal)	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	High Efficiency Equipement?	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 Area	2	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Area	2	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Area	1	Gas Rack Oven (Double)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Area	1	Insulated Food Holding Cabinet (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Area	1	Gas Griddle (4 Feet Width)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Whole Building	245	Desktop Computer	150.0	Yes
Whole Building	6	Photocopier	600.0	Yes
Whole Building	16	Desk Printer	40.0	Yes
Whole Building	5	LCD TV	119.0	Yes
Whole Building	12	Tube TV	120.0	Yes
Whole Building	42	Projector	100.0	Yes
Whole Building	38	Smartboard	100.0	Yes
Whole Building	3	Laptops	45.0	Yes
Whole Building	5	Microwave	800.0	Yes
Whole Building	3	Shredder	150.0	Yes
Wood Shop	9	Misc. Equipment	500.0	No
Kitchen	14	Refrigerators	218.0	Yes
Kitchen	1	Chest Freezer	127.0	Yes
Kitchen	1	Chest Refrigerator	156.0	Yes

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
Faculty Lounge	1	Refrigerated	Yes	0.00	1,612	0.0	$195.72	$230.00	$0.00	1.18

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Pequannock Valley Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 84,754
Built: 1950

For Year Ending: February 28, 2017
Date Generated: March 23, 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
Pequannock Valley Middle School 493 Newark Pomtpon Turnpike Pompton Plains, New Jersey 07444	Pequannock Township Board of Education 538 Newark Pompton Turnpike Pompton Plains, NJ 07444 973-616-6030	Kateryna Bechtel 538 Newark Pompton Turnpike Pompton Plains, NJ 07444 973-616-6030 Ext. 7201 kathy.bechtel@pequannock.org

Property ID: 6254754

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
97.7 kBtu/ft²

Source EUI
149.7 kBtu/ft²

Annual Energy by Fuel		
Natural Gas (kBtu)	6,369,052 (77%)	
Electric - Grid (kBtu)	1,912,176 (23%)	

National Median Comparison	
National Median Site EUI (kBtu/ft²)	94.7
National Median Source EUI (kBtu/ft²)	145.2
% Diff from National Median Source EUI	3%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	550

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)

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