Local Government Energy Audit:
Energy Audit Report

Robertsville Elementary School

36 Menzel Lane

Morganville, New Jersey 07751

Marlboro Township BoE

October 23, 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 facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary 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 facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

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

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

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

1.1 Facility Summary

The Robertsville Elementary School is a 70,880 square foot facility comprised mainly of classrooms with a gymnasium, cafeteria, kitchen, and offices in a single-story building.

The building was originally constructed in 1968 and has since had three additions. In 1997, new classrooms were added followed by the addition of a faculty lounge, six new classrooms, additional restrooms, and updates to the nurse's office and a cafeteria in 1997. Then most recently in 2015 a new main office and security area were added.

Lighting at Robertsville Elementary School consists mainly of aging and inefficient T8 fluorescent lighting and HVAC equipment which is approaching the end of its useful life. The entire facility is heated; heating is supplied by natural gas fired boilers as well as some electric resistance heaters. Cooling is provided by a combination of package, split system, and window air conditioning (AC) units, only about 20% of the facility is mechanically cooled. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 11 measures and recommends 10 measures which together represent an opportunity for Robertsville Elementary School to reduce annual energy costs by roughly $14,439 and annual greenhouse gas emissions by 109,926 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 6.8 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 Robertsville Elementary School's annual energy use by 12%.

Figure 1 – Previous 12 Month Utility Costs

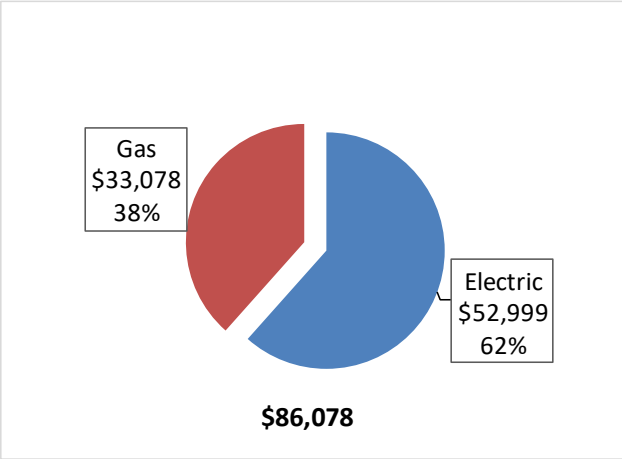
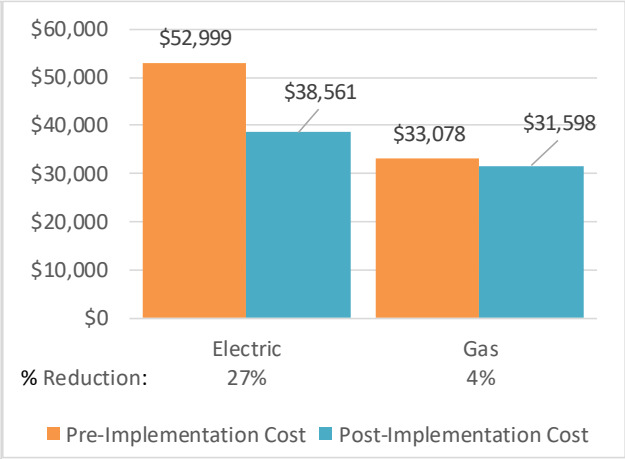


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	*Annual Natural Gas Savings (MMBtu)*	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			**74,090**	**26.5**	**0.0**	**0.0**	**$9,799.80**	**$82,876.87**	**$15,090.00**	**$67,786.87**	**6.9**	**74,608**
ECM 1	Install LED Fixtures	Yes	15,006	3.6	0.0	0.0	$1,984.82	$13,393.72	$3,400.00	$9,993.72	5.0	15,111
ECM 2	Retrofit Fixtures with LED Lamps	Yes	54,318	22.6	0.0	0.0	$7,184.66	$67,762.27	$11,690.00	$56,072.27	7.8	54,698
ECM 3	Install LED Exit Signs	Yes	4,765	0.3	0.0	0.0	$630.32	$1,720.88	$0.00	$1,720.88	2.7	4,799
Lighting Control Measures			**17,009**	**6.2**	**0.0**	**0.0**	**$2,249.76**	**$23,818.00**	**$2,931.00**	**$20,887.00**	**9.3**	**17,128**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	12,648	5.4	0.0	0.0	$1,672.99	$20,498.00	$2,295.00	$18,203.00	10.9	12,737
ECM 5	Install Daylight Dimming Controls	Yes	3,386	0.4	0.0	0.0	$447.89	$1,464.00	$636.00	$828.00	1.8	3,410
ECM 6	Install High/Low Lighitng Controls	Yes	974	0.4	0.0	0.0	$128.88	$1,856.00	$0.00	$1,856.00	14.4	981
Motor Upgrades			**440**	**0.2**	**0.0**	**0.0**	**$58.15**	**$1,842.12**	**$0.00**	**$1,842.12**	**31.7**	**443**
ECM 7	Premium Efficiency Motors	Yes	440	0.2	0.0	0.0	$58.15	$1,842.12	$0.00	$1,842.12	31.7	443
Variable Frequency Drive (VFD) Measures			**6,962**	**1.3**	**0.0**	**0.0**	**$920.80**	**$6,551.70**	**$0.00**	**$6,551.70**	**7.1**	**7,010**
ECM 8	Install VFDs on Hot Water Pumps	Yes	6,962	1.3	0.0	0.0	$920.80	$6,551.70	$0.00	$6,551.70	7.1	7,010
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**132.0**	**132.0**	**$1,480.29**	**$76,490.22**	**$6,427.20**	**$70,063.02**	**47.3**	**15,460**
	Install High Efficiency Hot Water Boilers	No	0	0.0	132.0	132.0	$1,480.29	$76,490.22	$6,427.20	$70,063.02	47.3	15,460
HVAC System Improvements			**8,709**	**0.0**	**0.0**	**0.0**	**$1,151.91**	**$1,359.42**	**$0.00**	**$1,359.42**	**1.2**	**8,770**
ECM 9	Implement Demand Control Ventilation	Yes	8,709	0.0	0.0	0.0	$1,151.91	$1,359.42	$0.00	$1,359.42	1.2	8,770
Plug Load Equipment Control - Vending Machine			**1,954**	**0.0**	**0.0**	**0.0**	**$258.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 10	Vending Machine Control	Yes	1,954	0.0	0.0	0.0	$258.50	$460.00	$0.00	$460.00	1.8	1,968
Recommened Measures TOTALS			**109,163**	**34**	**0**	**0**	**$14,438.92**	**$116,908.11**	**$18,021.00**	**$98,887.11**	**6.8**	**109,926**
TOTALS			109,163	34.1	132.0	132.0	$15,919.22	$193,398.32	$24,448.20	$168,950.12	10.6	125,386

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

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

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

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

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

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

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.

HVAC System Improvements generally involve the installation of automated controls to reduce heating and cooling demand during periods of reduced demand. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperature conditions. These measures save energy by reducing the demand on HVAC systems and the amount of time systems operate.

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

Energy Efficient Practices

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

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Install Plug Load Controls
- 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 Robertsville Elementary School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	145	kW DC STC
Electric Generation	172,749	kWh/yr
Displaced Cost	$15,030	/yr
Installed Cost	$377,000	

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

1.3 Implementation Planning

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

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

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

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

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

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

2.2 General Site Information

On March 6, 2018, performed an energy audit at Robertsville Elementary School located in Morganville, New Jersey. TRC's team met with the head custodian to review the facility operations and help focus our investigation on specific energy-using systems.

Robertsville Elementary School is a 70,880 square foot facility comprised mainly of classrooms with a gymnasium, cafeteria, kitchen, and offices in a single-story building.

The building was originally constructed in 1968 and has since had three additions. In 1997, new classrooms were added followed by the addition of a faculty lounge, six new classrooms, additional restrooms, and updates to the nurse's office and a cafeteria in 1997. Then most recently in 2015 a new main office and security area were added.

2.3 Building Occupancy

The school is open Monday through Friday 10 months a year, September through June with the gym being open on Saturdays November through February for basketball and some classrooms open on Sundays from 2:00 PM to 6:00 PM September through May for special education classes. The typical schedule is presented in the table below. There are occasional sports activities in the gymnasium on Saturdays during the summer, but for the majority of the summer period the building is closed. During a typical school day, the facility is occupied by approximately 75 staff and 550 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Robertsville Elementary School	Weekday	9:00 AM - 3:30 PM
Robertsville Elementary School	Weekend	Nov – Feb Sat basketball Sep – May Sun 2 pm – 6 pm

2.4 Building Envelope

The school building is constructed of concrete block, and structural steel with a brick facade. The building's roof was redone approximately four years ago and is a flat foam roof covered with light colored membrane. The building's three additions have double pane windows which are in good condition and show little sign of excessive infiltration. The original building still has single pane windows. The exterior doors are constructed of aluminum and glass.

Image 1 Building Envelope

2.5 On-Site Generation

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

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). The fixtures are a mix of 2-lamp, 3-lamp, or 4-lamp, 4-foot long troffers with diffusers. The majority of the fixtures are 2-lamp. The gymnasium is lit with 9-lamp CFL fixtures.

Image 2 Gymnasium Lighting

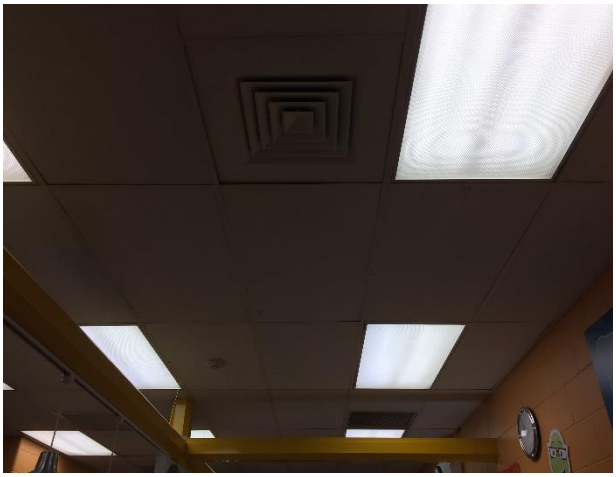


Image 3 Typical classroom lighting

Lighting control in most spaces is provided by manual wall switches. The lighting for the main office, VP office, security area, and two classrooms are controlled with occupancy sensors that are either wall or ceiling mounted depending on the space layout.

The building's exterior lighting is minimal and consists of a mix of CFLs, linear fluorescent T8s, high pressure sodium (HPS), and mercury vapor (MV) fixtures that are controlled by a timer.

Hot Water Heating System

The hot water system consists of two Superior 2,678 kBtu/hr input, forced draft boilers. The boilers have a nominal combustion efficiency of 80%. Each boiler has a 0.75 hp forced draft fan. The boilers are shut off when the outside air exceeds 65°F. The boilers provide hot water to the hallway fan coil units, and the in-room packaged AC units serving classrooms 37 & 37B as well as the 49 hot water unit ventilators throughout the building. The buildings occupied heating setpoint is 72°F and is setback to 65°F when unoccupied. The boilers operate year-round to provide domestic hot water.

Image 4 Boilers

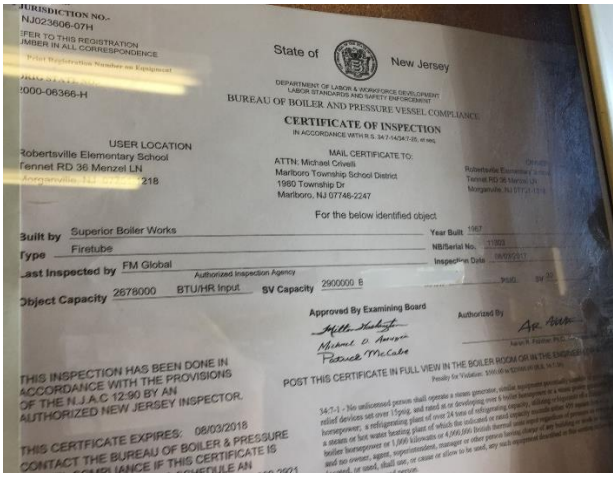


Image 5 Boiler certificate of inspection

The boilers, while over 50 years old, appear to be in okay condition and maintained.

Direct Expansion Air Conditioning System (DX)

Robertsville Elementary School is served by a variety of direct-expansion (DX) units including ductless split systems, window AC units, in-room packaged AC units, and rooftop packaged units. The majority of the split system AC units and packaged AC units are located on the roof and serve the faculty lounge, media center, tech closet, cafeteria, IT room, and the main office. These units range in size from 0.75 tons to 15 tons and provide mechanical cooling to approximately 20% of the facility. The 6-ton Trane packaged AC unit serving the main office also has 25 kW of electric resistance heating. The two 4-ton Airedale in-room packaged AC units serving classrooms 37 & 37B are equipped with hot water coils that are served by the boilers. Twelve of the classrooms have window AC units for cooling.

The units operate to maintain a space temperature setpoint of 72°F when occupied and 81°F when unoccupied.

Image 6 Packaged DX units serving Cafeteria

Image 7 Typical window AC unit

Image 8 In-classroom package unit w/HW coil

Image 9 Split System outdoor units (condensers)

Domestic Hot Water Heating System

This site does not have a dedicated domestic hot water heating system. Domestic hot water is indirectly provided by the heating boilers via a heat exchanger. Domestic hot water is stored in a 400-gallon tank.

Food Service & Laundry Equipment

The school's kitchen is used to prepare lunches daily for the students and staff. The kitchen equipment consists of an ice cream novelty freezer, three double door commercial refrigerators, reach-in milk cooler, gas convection oven with six electric range top burners, four convection ovens, a warmer, walk-in freezer, walk in cooler, and a dishwasher. The kitchen is occupied Monday through Friday from 8:00 AM to 2:00 PM September through June.

Refrigeration

The kitchen also has a walk-in cooler with a walk-in freezer located inside the cooler.

Building Plug Load

There are roughly 67 desktop computer work stations throughout the facility and 34 laptops. There is no centralized PC power management software installed. General office equipment and break room amenities contribute to the plug load. Classrooms are outfitted with projectors, starboards, and other audio visual aids. The facility has one refrigerated beverage vending machine and one non-refrigerated vending machine.

2.7 Water-Using Systems

There are 20 restrooms at this facility, a faculty lounge, and the kitchen both with sinks. A sampling of restrooms found that most of the fixtures were low flow.

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

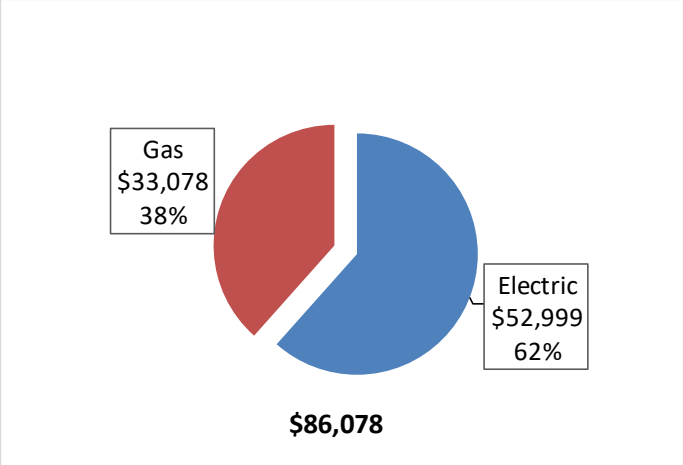
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Robertsville Elementary School		
Fuel	**Usage**	**Cost**
Electricity	400,693 kWh	$52,999
Natural Gas	29,505 Therms	$33,078
Total		**$86,078**

The current annual energy cost for this facility is $86,078 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 $0.132/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. *Electric use tends to remain high in the winter. This is likely partially due to the presence of electrical resistance heat.* The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

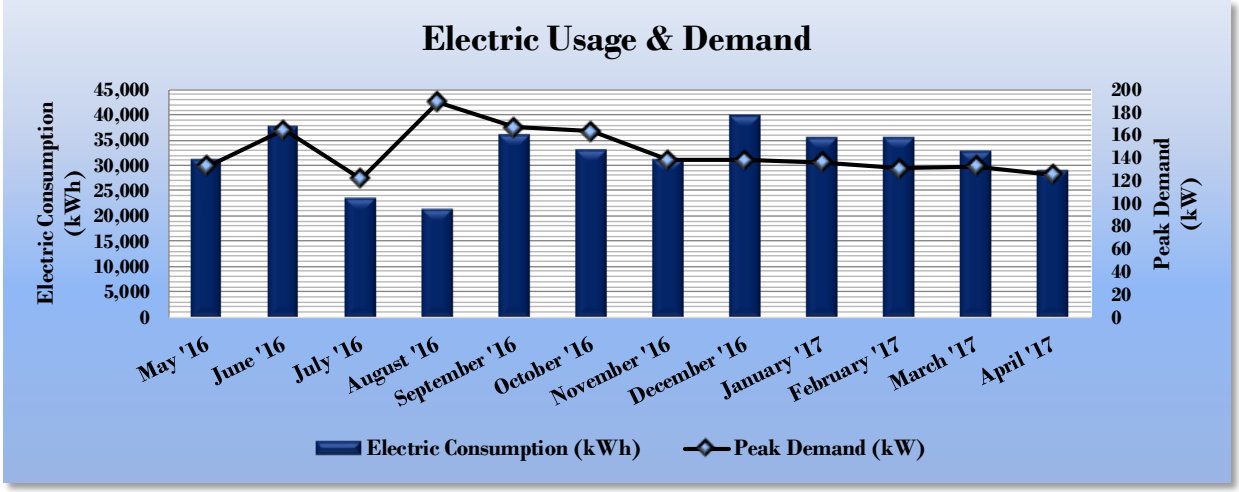


Figure 10 - Electric Usage & Demand

Electric Billing Data for Robertsville Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
5/31/16	30	31,200	133	$0	$3,928
6/30/16	29	37,760	165	$0	$4,908
7/31/16	30	23,680	122	$0	$3,249
8/31/16	30	21,600	189	$0	$2,845
9/30/16	29	36,160	167	$0	$4,858
10/31/16	30	33,120	163	$0	$4,473
11/30/16	29	31,200	138	$0	$4,119
12/31/16	30	39,840	138	$0	$5,026
1/31/17	30	35,520	136	$0	$4,690
2/28/17	27	35,680	131	$0	$4,732
3/31/17	30	32,800	133	$0	$4,438
4/30/17	29	28,960	125	$0	$3,991
Totals	**353**	**387,520**	**189**	**$0**	**$51,257**
Annual	**365**	**400,693**	**189**	**$0**	**$52,999**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.121/therm, which is the blended rate used throughout the analyses in this report. The gas use profile is consistent with sites where heating energy is the dominant factor in gas consumption. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

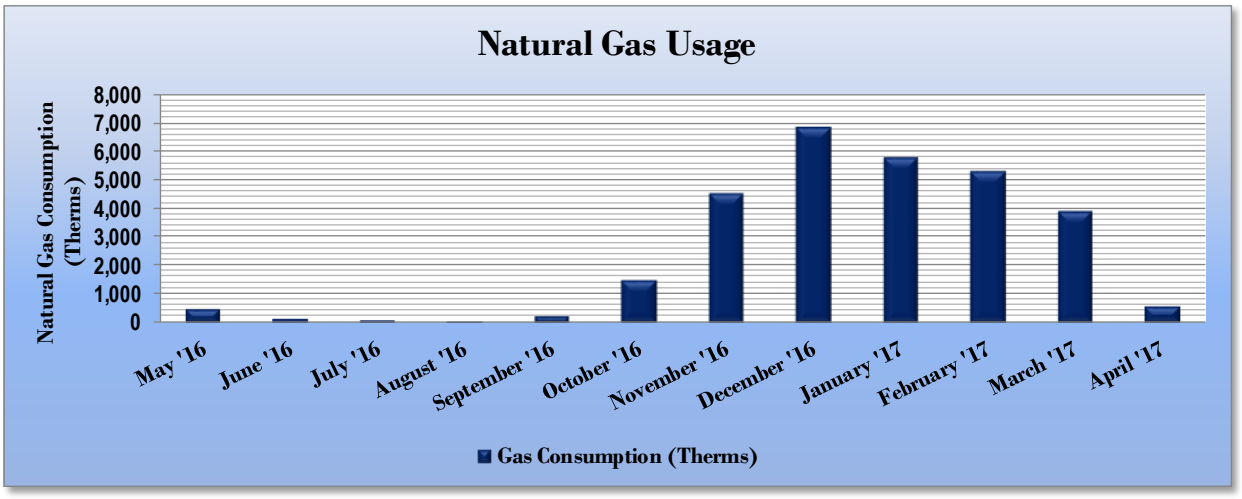


Figure 12 - Natural Gas Usage

Gas Billing Data for Robertsville Elementary School				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
6/10/16	30	468	$848	Yes
7/13/16	33	131	$570	No
8/10/16	28	104	$465	Yes
9/8/16	29	78	$525	No
10/7/16	29	248	$692	No
11/8/16	32	1,519	$1,920	No
12/9/16	31	4,530	$4,689	No
1/11/17	33	6,868	$6,837	No
2/10/17	30	5,778	$5,830	No
3/15/17	33	5,326	$5,559	No
4/11/17	27	3,894	$4,128	No
5/11/17	30	561	$1,016	No
Totals	**365**	**29,505**	**$33,078**	2
Annual	**365**	**29,505**	**$33,078**	

3.4 Benchmarking

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

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

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Robertsville Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	104.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	60.9	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		
	Robertsville Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	87.8	141.4
Site Energy Use Intensity (kBtu/ft^2)	55.7	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 63.

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

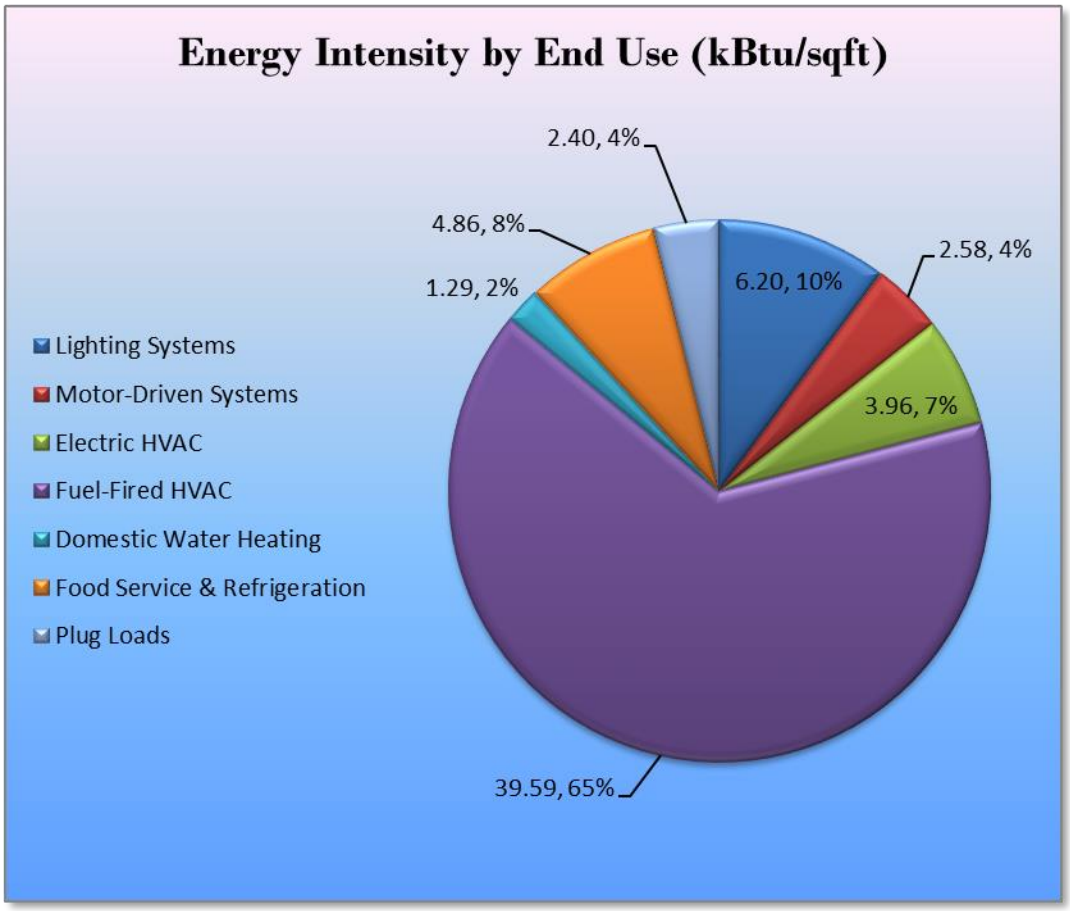
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**74,090**	**26.5**	**0.0**	**$9,799.80**	**$82,876.87**	**$15,090.00**	**$67,786.87**	**6.9**	**74,608**
ECM 1	Install LED Fixtures	15,006	3.6	0.0	$1,984.82	$13,393.72	$3,400.00	$9,993.72	5.0	15,111
ECM 2	Retrofit Fixtures with LED Lamps	54,318	22.6	0.0	$7,184.66	$67,762.27	$11,690.00	$56,072.27	7.8	54,698
ECM 3	Install LED Exit Signs	4,765	0.3	0.0	$630.32	$1,720.88	$0.00	$1,720.88	2.7	4,799
Lighting Control Measures		**17,009**	**6.2**	**0.0**	**$2,249.76**	**$23,818.00**	**$2,931.00**	**$20,887.00**	**9.3**	**17,128**
ECM 4	Install Occupancy Sensor Lighting Controls	12,648	5.4	0.0	$1,672.99	$20,498.00	$2,295.00	$18,203.00	10.9	12,737
ECM 5	Install Daylight Dimming Controls	3,386	0.4	0.0	$447.89	$1,464.00	$636.00	$828.00	1.8	3,410
ECM 6	Install High/Low Lighitng Controls	974	0.4	0.0	$128.88	$1,856.00	$0.00	$1,856.00	14.4	981
Motor Upgrades		**440**	**0.2**	**0.0**	**$58.15**	**$1,842.12**	**$0.00**	**$1,842.12**	**31.7**	**443**
ECM 7	Premium Efficiency Motors	440	0.2	0.0	$58.15	$1,842.12	$0.00	$1,842.12	31.7	443
Variable Frequency Drive (VFD) Measures		**6,962**	**1.3**	**0.0**	**$920.80**	**$6,551.70**	**$0.00**	**$6,551.70**	**7.1**	**7,010**
ECM 8	Install VFDs on Hot Water Pumps	6,962	1.3	0.0	$920.80	$6,551.70	$0.00	$6,551.70	7.1	7,010
HVAC System Improvements		**8,709**	**0.0**	**0.0**	**$1,151.91**	**$1,359.42**	**$0.00**	**$1,359.42**	**1.2**	**8,770**
ECM 9	Implement Demand Control Ventilation	8,709	0.0	0.0	$1,151.91	$1,359.42	$0.00	$1,359.42	1.2	8,770
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$258.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 10	Vending Machine Control	1,954	0.0	0.0	$258.50	$460.00	$0.00	$460.00	1.8	1,968
TOTALS		**109,163**	**34.1**	**0.0**	**$14,438.92**	**$116,908.11**	**$18,021.00**	**$98,887.11**	**6.8**	**109,926**

* - 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		**74,090**	**26.5**	**0.0**	**$9,799.80**	**$82,876.87**	**$15,090.00**	**$67,786.87**	**6.9**	**74,608**
ECM 1	Install LED Fixtures	15,006	3.6	0.0	$1,984.82	$13,393.72	$3,400.00	$9,993.72	5.0	15,111
ECM 2	Retrofit Fixtures with LED Lamps	54,318	22.6	0.0	$7,184.66	$67,762.27	$11,690.00	$56,072.27	7.8	54,698
ECM 3	Install LED Exit Signs	4,765	0.3	0.0	$630.32	$1,720.88	$0.00	$1,720.88	2.7	4,799

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	5,927	2.4	0.0	$783.97	$4,800.00	$2,400.00	$2,400.00	3.1	5,968
Exterior	9,079	1.2	0.0	$1,200.86	$8,593.72	$1,000.00	$7,593.72	6.3	9,142

Measure Description

We recommend replacing existing fixtures containing multiple pin base CFLs, such as the high bay fixtures in the gymnasium, and fixtures with HID 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 fluorescent tubes.

ECM 2: 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	51,546	22.2	0.0	$6,817.93	$66,439.95	$11,520.00	$54,919.95	8.1	51,906
Exterior	2,773	0.4	0.0	$366.72	$1,322.32	$170.00	$1,152.32	3.1	2,792

Measure Description

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

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

ECM 3: 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	4,765	0.3	0.0	$630.32	$1,720.88	$0.00	$1,720.88	2.7	4,799
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all incandescent or compact fluorescent 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 lighting control measures are summarized in Figure 18 below.

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**17,009**	**6.2**	**0.0**	**$2,249.76**	**$23,818.00**	**$2,931.00**	**$20,887.00**	**9.3**	**17,128**
ECM 4	Install Occupancy Sensor Lighting Controls	12,648	5.4	0.0	$1,672.99	$20,498.00	$2,295.00	$18,203.00	10.9	12,737
ECM 5	Install Daylight Dimming Controls	3,386	0.4	0.0	$447.89	$1,464.00	$636.00	$828.00	1.8	3,410
ECM 6	Install High/Low Lighitng Controls	974	0.4	0.0	$128.88	$1,856.00	$0.00	$1,856.00	14.4	981

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

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
12,648	5.4	0.0	$1,672.99	$20,498.00	$2,295.00	$18,203.00	10.9	12,737

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in restrooms, storage rooms, classrooms, offices areas, gymnasium, and in the cafeteria. 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 5: Install Daylight Dimming 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)
3,386	0.4	0.0	$447.89	$1,464.00	$636.00	$828.00	1.8	3,410

Measure Description

We recommend installing daylight dimming controls that use photosensors to reduce electric lighting for the building exterior and parking lot when ample daylight lighting is present. Photosensor controls are recommended for fixtures that are adjacent to windows that receive lots of sunlight. As sunlight level increases, fixture lighting is decreased or turned off. This measure reduces energy use in areas where sufficient lighting levels can be met by ambient daylight.

Optimum light levels and the method of dimming should be determined during lighting design. 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.

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)
974	0.4	0.0	$128.88	$1,856.00	$0.00	$1,856.00	14.4	981

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 and interior corridors.

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. In parking lots with significant ambient lighting this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylighting. Energy savings results from only providing full lighting levels when it is required.

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

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

4.1.3 Motor Upgrades

Our recommendations for motor upgrades are summarized in Figure 19 below.

Figure 19-Summary of Motor 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)
Motor Upgrades		**440**	**0.2**	**0.0**	**$58.15**	**$1,842.12**	**$0.00**	**$1,842.12**	**31.7**	**443**
ECM 7	Premium Efficiency Motors	440	0.2	0.0	$58.15	$1,842.12	$0.00	$1,842.12	31.7	443

ECM 7: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
440	0.2	0.0	$58.15	$1,842.12	$0.00	$1,842.12	31.7	443

Measure Description

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

This measure is required to install VFDs on the associated motors.

4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 20 below.

Figure 20 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**6,962**	**1.3**	**0.0**	**$920.80**	**$6,551.70**	**$0.00**	**$6,551.70**	**7.1**	**7,010**
ECM 8	Install VFDs on Hot Water Pumps	6,962	1.3	0.0	$920.80	$6,551.70	$0.00	$6,551.70	7.1	7,010

ECM 8: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
6,962	1.3	0.0	$920.80	$6,551.70	$0.00	$6,551.70	7.1	7,010

Measure Description

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

4.1.5 HVAC System Upgrades

Our recommendation for HVAC system improvement are summarized in Figure 21 below.

Figure 21 - Summary of HVAC System Improvement 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)
HVAC System Improvements		**8,709**	**0.0**	**0.0**	**$1,151.91**	**$1,359.42**	**$0.00**	**$1,359.42**	**1.2**	**8,770**
ECM 9	Implement Demand Control Ventilation	8,709	0.0	0.0	$1,151.91	$1,359.42	$0.00	$1,359.42	1.2	8,770

ECM 9: Implement Demand Control Ventilation (DCV)

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)
8,709	0.0	0.0	$1,151.91	$1,359.42	$0.00	$1,359.42	1.2	8,770

Measure Description

Demand control ventilation (DCV) monitors indoor air CO_2 content to measure room occupancy. This data is used to regulate the amount of outdoor provided to the space for ventilation. In order to ensure adequate air quality, standard ventilation systems often provide outside air based on a space's estimated maximum occupancy. However, during low occupancy periods, the space may be over ventilated. This wastes energy through excessive fan more usage and additional cost to heat and cool the excessive air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels, saving significant amounts of energy. DCV is most suited for facilities where occupancy levels vary significantly hour to hour and day to day. We recommend DCV at this site as a means of controlling the dedicated package units serving the cafeteria.

Energy savings associated with DCV are based on hours of operation, space occupancy, system air flow, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

4.1.6 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 22 below.

Figure 22-Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$258.50**	**$460.00**	**$0.00**	**$460.00**	**1.8**	**1,968**
ECM 10	Vending Machine Control	1,954	0.0	0.0	$258.50	$460.00	$0.00	$460.00	1.8	1,968

ECM 10: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,954	0.0	0.0	$258.50	$460.00	$0.00	$460.00	1.8	1,968

Measure Description

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

4.2 ECMs Evaluated But Not Recommended

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

Figure 23 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**132.0**	**$1,480.29**	**$76,490.22**	**$6,427.20**	**$70,063.02**	**47.3**	**15,460**
Install High Efficiency Hot Water Boilers	0	0.0	132.0	$1,480.29	$76,490.22	$6,427.20	$70,063.02	47.3	15,460
TOTALS	**0**	**0.0**	**132.0**	**$1,480.29**	**$76,490.22**	**$6,427.20**	**$70,063.02**	**47.3**	**15,460**

* - 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).

Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	132.0	$1,480.29	$76,490.22	$6,427.20	$70,063.02	47.3	15,460

Measure Description

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

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

Reasons for not Recommending

The simple payback for replacing the existing boilers at this site with new high efficiency boilers is over 47 years, and therefore not recommended at this time.

5 ENERGY EFFICIENT PRACTICES

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

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.

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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform 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.

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.

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 gallons per minute (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 facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

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

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before 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.

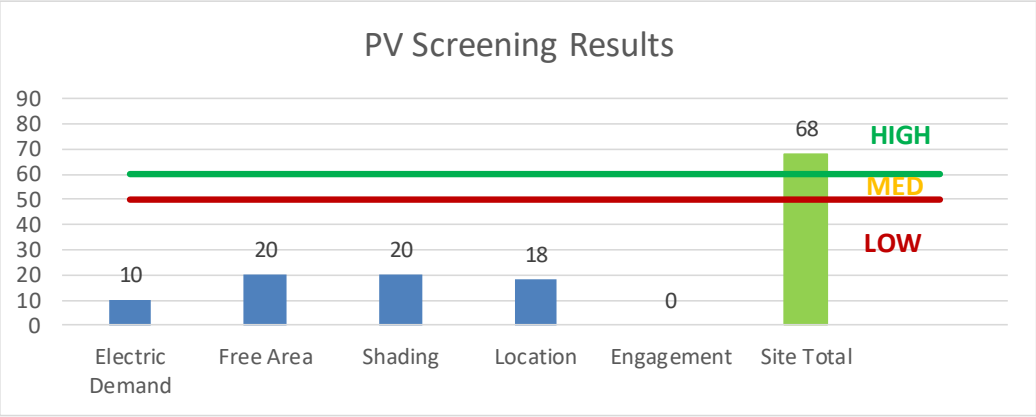
6.1 Photovoltaic

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 facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

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

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

Figure 24 - Photovoltaic Screening



Potential	High	
System Potential	145	kW DC STC
Electric Generation	172,749	kWh/yr
Displaced Cost	$15,030	/yr
Installed Cost	$377,000	

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.

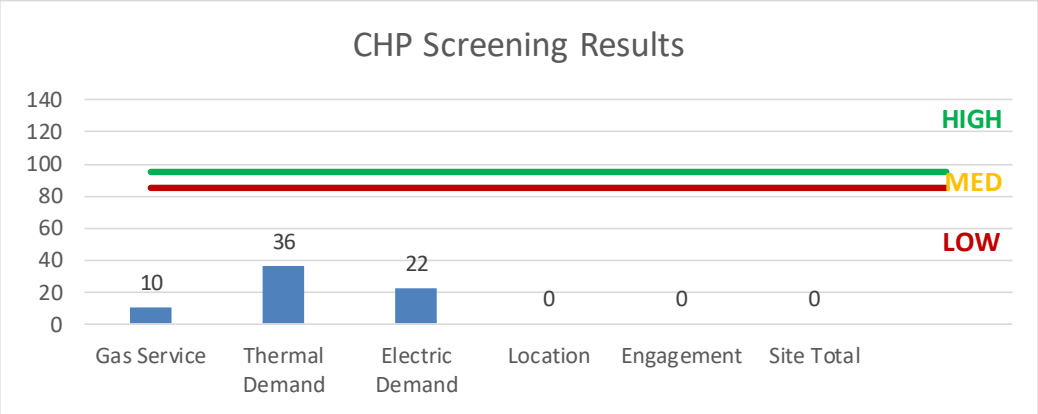
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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 facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

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

Low and infrequent thermal load are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

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

Figure 25 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

Typically an electric customer needs to 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 facility because the payments can significantly offset annual electric costs.

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

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

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

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

In our opinion, this site is not a good candidate for DR.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 26 for a list of the eligible programs identified for each recommended ECM.

Figure 26 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	Direct Install
ECM 1	Install LED Fixtures	X	X
ECM 2	Retrofit Fixtures with LED Lamps	X	X
ECM 3	Install LED Exit Signs		X
ECM 4	Install Occupancy Sensor Lighting Controls	X	X
ECM 5	Install Daylight Dimming Controls	X	X
ECM 6	Install High/Low Lighitng Controls		X
ECM 7	Premium Efficiency Motors		X
ECM 8	Install VFDs on Hot Water Pumps		X
ECM 9	Implement Demand Control Ventilation		X
ECM 10	Vending Machine Control		X

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

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

How to Participate

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

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

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

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
outside security office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	595	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	595	0.04	39	0.0	$5.19	$117.00	$20.00	18.67
Boiler Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	595	0.19	203	0.0	$26.88	$526.50	$90.00	16.24
Attic	4	Incandescent: 60W - 1L	Wall Switch	60	1,000	Relamp	Yes	4	LED Screw-In Lamps: 1L - LED screw-in	Occupancy Sensor	9	700	0.14	247	0.0	$32.67	$331.01	$20.00	9.52
Cafeteria	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.45	791	0.0	$104.66	$1,097.20	$200.00	8.57
Cafeteria	45	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	45	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	1.23	2,590	0.0	$342.52	$3,442.50	$555.00	8.43
Kitchen	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.96	2,026	0.0	$267.96	$2,172.67	$435.00	6.48
Kitchen	2	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	500	Relamp	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	350	0.05	45	0.0	$5.96	$269.07	$40.00	38.42
Kitchen Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	595	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	417	0.08	86	0.0	$11.32	$266.40	$30.00	20.88
Kitchen Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.02	53	0.0	$7.03	$58.50	$10.00	6.90
Therapy	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	500	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	350	0.12	108	0.0	$14.27	$341.60	$45.00	20.78
Therapy Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	417	0.05	57	0.0	$7.55	$233.00	$20.00	28.22
Therapy Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.05	134	0.0	$17.76	$233.00	$20.00	11.99
Entrance Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.05	134	0.0	$17.76	$233.00	$20.00	11.99
Front of Entrance Vestibule	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.11	269	0.0	$35.52	$350.00	$40.00	8.73
Gym	16	Compact Fluorescent: High Bay CFL (42W) - 9L	Wall Switch	378	1,400	Relamp	Yes	16	LED - Fixtures: High-Bay	Occupancy Sensor	113	980	3.13	7,692	0.0	$1,017.48	$4,800.00	$2,960.00	1.81
Gym Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	0.0	#REF!	#REF!	$0.00	#REF!
Gym Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	58	980	0.07	171	0.0	$22.62	$401.40	$30.00	16.42
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	29	980	0.10	234	0.0	$30.96	$233.00	$40.00	6.23
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.08	201	0.0	$26.64	$291.50	$30.00	9.82
Main Office	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,250	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,250	0.24	499	0.0	$65.94	#VALUE!	$30.00	#VALUE!
Main Office kitchen	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	-0.09	-195	0.0	-$25.74	$409.50	$70.00	-13.19
Main Office Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.51	$58.50	$10.00	19.32
Main Office Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.06	153	0.0	$20.23	$58.50	$10.00	2.40
Main Office Conference Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.30	733	0.0	$96.98	$387.00	$20.00	3.78
Main Office Conference Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29		-0.07	#VALUE!	0.0	#VALUE!	#VALUE!	$115.00	#VALUE!

	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
Main Office Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	595	0.02	23	0.0	$2.99	$58.50	$10.00	16.24
VP Office	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,250	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	17	1,250	0.08	165	0.0	$21.86	$48.20	$10.00	1.75
Security Vestibule	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,250	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	29	1,250	0.11	190	0.0	$25.08	$234.00	$40.00	7.74
Classroom 1	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.53	1,311	0.0	$173.34	$234.00	$40.00	1.12
Classroom 3	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 4	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 5	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 6	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 7	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 8	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 9	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Nurse's Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	44	980	0.19	462	0.0	$61.17	$1,398.00	$185.00	19.83
Nurse's Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44		-0.10	#VALUE!	0.0	#VALUE!	#VALUE!	$155.00	#VALUE!
Nurse's Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.51	$58.50	$15.00	17.33
Nurse's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	595	0.02	23	0.0	$2.99	$58.50	$10.00	16.24
Nurse's Exam	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	58	1,400	0.11	274	0.0	$36.20	$95.13	$10.00	2.35
CR1 Hallway	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	29	980	0.46	1,132	0.0	$149.79	$233.00	$40.00	1.29
Classroom 10	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	0.45	1,105	0.0	$146.17	$1,242.00	$120.00	7.68
Classroom 11	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 11 & 10 Closet	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	350	0.13	110	0.0	$14.56	$1,147.50	$185.00	66.09
Classroom 10 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	595	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	9		-0.02	#VALUE!	0.0	#VALUE!	#VALUE!	$115.00	#VALUE!
Classroom 11 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	595	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	595	0.01	9	0.0	$1.22	$31.90	$5.00	22.02
Classroom 10 & 11 Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	29	500	0.06	55	0.0	$7.23	$58.50	$5.00	7.40
Classroom 11 & 10 Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.18	434	0.0	$57.37	$233.00	$20.00	3.71
Connector Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	0.18	436	0.0	$57.60	$408.50	$50.00	6.22

	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
Classroom 16 Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	0.08	203	0.0	$26.87	$467.00	$60.00	15.14
Classroom 16 Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	0.15	368	0.0	$48.72	$350.00	$40.00	6.36
Classroom 12	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	58	980	0.17	407	0.0	$53.88	$745.67	$50.00	12.91
Classroom 15	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	980	0.19	473	0.0	$62.52	$650.53	$115.00	8.57
Classroom 16	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	980	0.19	473	0.0	$62.52	$650.53	$115.00	8.57
Classroom 13	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	44	980	0.65	1,601	0.0	$211.72	$570.80	$115.00	2.15
Classroom 14	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.49	1,208	0.0	$159.84	$1,172.40	$215.00	5.99
Classroom 17	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.49	1,208	0.0	$159.84	$1,172.40	$215.00	5.99
Classroom 18	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.49	1,208	0.0	$159.84	$1,172.40	$215.00	5.99
Classroom 19	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.25	610	0.0	$80.62	$1,172.40	$215.00	11.87
Classroom 20	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.94	2,303	0.0	$304.61	$871.60	$155.00	2.35
Classroom 20 Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	29		-0.20	#VALUE!	0.0	#VALUE!	#VALUE!	$305.00	#VALUE!
Girls Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	33	1,400	0.02	47	0.0	$6.18	$63.20	$10.00	8.61
Boys Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,400	0.02	47	0.0	$6.18	$63.20	$0.00	10.23
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	29	980	0.11	267	0.0	$35.29	$58.50	$0.00	1.66
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.08	201	0.0	$26.64	$291.50	$30.00	9.82
Faculty Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29		0.00	#VALUE!	0.0	#VALUE!	#VALUE!	$30.00	#VALUE!
Faculty Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.51	$58.50	$10.00	19.32
Classroom 19 Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.14	353	0.0	$46.64	$58.50	$10.00	1.04
Media Center	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	58	980	0.72	1,757	0.0	$232.46	$650.53	$40.00	2.63
Media Center	8	Compact Fluorescent: CFL Recessed Can (42W) - 1L	Wall Switch	42	1,400	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	29	980	0.07	176	0.0	$23.34	$861.28	$255.00	25.97
Media Center Chandeliers	6	Compact Fluorescent: Chandeliers (42W) - 6L	Wall Switch	252	1,400	Relamp	Yes	8	LED Screw-In Lamps: 1L - LED pin base	Occupancy Sensor	29	980	0.88	2,173	0.0	$287.40	$2,800.14	$35.00	9.62
Media Center Stacks	48	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	6	LED Screw-In Lamps: screw-in LED bulb	Occupancy Sensor	29	980	1.87	4,595	0.0	$607.81	$1,971.00	$210.00	2.90
Outside Media Center	3	High-Pressure Sodium: (1) 150W Lamp	Timer	188	4,380	Relamp	Yes	48	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	56	2,190	-0.87	-3,977	0.0	-$526.06	$19,502.50	$585.00	-35.96
Tech Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Fixture Replacement	Yes	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	29	350	0.09	72	0.0	$9.51	$291.50	$435.00	-15.08

	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 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.04	102	0.0	$13.44	$291.50	$30.00	19.46
Media Center Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.54	1,332	0.0	$176.20	$233.00	$20.00	1.21
Media Center Copy Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	-0.06	-158	0.0	-$20.91	$1,167.00	$140.00	-49.11
Classroom 22	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	44	980	0.92	2,249	0.0	$297.42	$495.60	$30.00	1.57
Classroom 23	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.66	1,611	0.0	$213.12	$1,473.20	$275.00	5.62
Classroom 25	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.66	1,611	0.0	$213.12	$1,473.20	$275.00	5.62
Classroom 24	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.17	413	0.0	$54.69	$1,473.20	$275.00	21.91
Classroom 26	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	29	980	0.63	1,535	0.0	$203.07	$738.00	$155.00	2.87
Classroom 27	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.49	1,208	0.0	$159.84	$1,323.00	$215.00	6.93
Classroom 28	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.49	1,208	0.0	$159.84	$1,323.00	$215.00	6.93
Classroom 29	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.49	1,208	0.0	$159.84	$1,323.00	$215.00	6.93
Classroom 31	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.49	1,208	0.0	$159.84	$1,323.00	$215.00	6.93
Classroom 30	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.37	909	0.0	$120.23	$1,323.00	$215.00	9.22
Classroom 32	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 33	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 35	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Art Room	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.49	1,207	0.0	$159.61	$1,147.50	$185.00	6.03
Art Room Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	595	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	17		-0.11	#VALUE!	0.0	#VALUE!	#VALUE!	$205.00	#VALUE!
Tech Closet	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	500	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	500	0.05	47	0.0	$6.24	$48.20	$10.00	6.13
Spare Room 36	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	58	980	0.14	355	0.0	$46.89	$401.40	$30.00	7.92
Classroom 37B	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,250	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	29	1,250	0.20	409	0.0	$54.16	$175.50	$60.00	2.13
Classroom 37	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,250	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,250	0.25	552	0.0	$72.98	$351.00	$60.00	3.99
Classroom 38	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.44	1,077	0.0	$142.47	$526.50	$90.00	3.06
Classroom 39	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 40	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23

	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
Classroom 41	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 37 Hallway	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.25	608	0.0	$80.39	$993.50	$185.00	10.06
Classroom 42	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	980	0.46	1,138	0.0	$150.49	$1,183.50	$110.00	7.13
Classroom 46	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Classroom 47	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.41	1,007	0.0	$133.20	$1,147.50	$185.00	7.23
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	-0.08	-191	0.0	-$25.24	$993.50	$185.00	-32.04
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.08	201	0.0	$26.64	$291.50	$30.00	9.82
Storage	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	350	0.41	357	0.0	$47.24	$445.50	$30.00	8.80
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	350	0.02	14	0.0	$1.88	$759.50	$145.00	327.11
Custodian Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	980	0.15	368	0.0	$48.72	$350.00	$40.00	6.36
Custodian Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	350	0.01	13	0.0	$1.71	$408.50	$70.00	197.81
Custodian Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29		0.01	#VALUE!	0.0	#VALUE!	#VALUE!	$20.00	#VALUE!
Receiving	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.02	53	0.0	$7.03	$58.50	$10.00	6.90
IT Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	44	1,400	0.03	80	0.0	$10.54	$75.20	$10.00	6.19
Classroom 43	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,400	0.03	80	0.0	$10.54	$75.20	$15.00	5.71
Classroom 43	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,400	0.95	2,326	0.0	$307.61	$75.20	$15.00	0.20
Classroom 43 Hallway	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	29	980	0.44	1,074	0.0	$142.08	$1,052.00	$275.00	5.47
Classroom 44	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	44	980	0.17	413	0.0	$54.69	$2,013.20	$160.00	33.89
Faculty Lounge	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,400	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	980	0.57	1,405	0.0	$185.78	$871.60	$155.00	3.86
Faculty Lounge Restroom 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	595	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	9	417	-0.03	-34	0.0	-$4.47	$382.80	$215.00	-37.53
Faculty Lounge Restroom 1	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	1	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	33		0.03	#VALUE!	0.0	#VALUE!	#VALUE!	$5.00	#VALUE!
Faculty Lounge Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	29	595	0.02	23	0.0	$2.99	$58.50	$0.00	19.59
Faculty Lounge Entrance	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	33	980	0.07	162	0.0	$21.49	$179.20	$10.00	7.87
Office	1	Incandescent: (40W) - 1L	Wall Switch	40	1,400	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	6	980	0.02	51	0.0	$6.73	$107.51	$0.00	15.98
Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,400	Relamp	Yes	1	LED Screw-In Lamps: 1L - LED screw-in	Occupancy Sensor	58	980	0.35	852	0.0	$112.74	$365.13	$5.00	3.19

	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
Office Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	29		-0.03	#VALUE!	0.0	#VALUE!	#VALUE!	$135.00	#VALUE!
Office Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.51	$58.50	$10.00	19.32
Room 45	1	Incandescent: (40W) - 1L	Wall Switch	40	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	6	1,400	0.02	55	0.0	$7.24	$53.75	$10.00	6.04
Room 45	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED Screw-In Lamps: 1L - LED pin base	Wall Switch	29	1,400	0.22	552	0.0	$73.04	$58.50	$5.00	0.73
Room 45 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	595	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29		-0.04	#VALUE!	0.0	#VALUE!	#VALUE!	$95.00	#VALUE!
Room 45 Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.51	$58.50	$10.00	19.32
Room 45 Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,400	0.10	253	0.0	$33.43	$58.50	$10.00	1.45
Exit Signs	16	Exit Signs: Incandescent	None	40	8,760	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	6	8,760	0.41	6,266	0.0	$828.80	$438.67	$30.00	0.49
Entrance Canopy	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Timer	62	4,380	Fixture Replacement	No	16	LED Exit Signs: 2 W Lamp	Timer	29	4,380	0.35	2,660	0.0	$351.78	$936.00	$0.00	2.66
Entrance Canopy	2	Compact Fluorescent: CFl (42W) - 2L	Timer	84	4,380	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Daylight Dimming	58	2,190	-0.19	-1,491	0.0	-$197.21	$1,836.10	$880.00	-4.85
Security Entrance	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Timer	22	4,380	Relamp	Yes	2	LED Screw-In Lamps: 2L - Screw-in LED	Daylight Dimming	9	2,190	0.02	179	0.0	$23.65	$179.80	$0.00	7.60
Wall Packs	4	High-Pressure Sodium: (1) 250W Lamp	Timer	295	4,380	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Daylight Dimming	89	2,190	0.72	5,495	0.0	$726.87	$897.35	$10.00	1.22
Canopy Outdoor	1	Mercury Vapor: (1) 250W Lamp	Timer	290	4,380	Fixture Replacement	Yes	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	87	2,190	0.08	584	0.0	$77.28	$8,061.97	$580.00	96.81
Wall packs	2	Compact Fluorescent: CFL Wall Pack (42W) - 1L	Timer	42	4,380	Fixture Replacement	Yes	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	29	2,190	0.05	350	0.0	$46.30	$169.75	$145.00	0.53
Parking Lot	2	High-Pressure Sodium: (1) 400W Lamp	Timer	465	4,380	Relamp	Yes	2	LED Screw-In Lamps: 1L - LED screw-in	Daylight Dimming	140	2,190	0.52	3,982	0.0	$526.66	$4,155.99	$0.00	7.89

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Boilers	2	Combustion Air Fan	0.8	80.0%	No	1,920	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Original Bldg	2	Heating Hot Water Pump	5.0	86.0%	No	1,920	Yes	89.5%	Yes	2	1.43	7,401	0.0	$978.95	$8,393.82	$0.00	8.57
Boiler Room	1997 addition	2	Heating Hot Water Pump	3.0	85.5%	No	1,920	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	1996 addition	2	Heating Hot Water Pump	3.0	85.5%	No	1,920	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	Gym	1	Supply Fan	3.0	85.5%	No	1,920	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Unit Ventilators	49	Ventilation Fan	0.3	65.0%	No	1,920	No	65.0%	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	Main Office	1	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office	1	Electric Resistance Heat		25.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	VP Office	1	Packaged Air-Source HP	0.75	10.90	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cafeteria	2	Packaged AC	15.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Teachers Lounge	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Tech Closet	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	two classrooms + one office	3	Split-System AC	0.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Classrooms 10	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classrooms 11	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Grounds	Media Center	3	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 27	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 35	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 37B	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 37	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 39	1	Window AC	0.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
IT Room	IT Room	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 43	2	Window AC	0.67		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 44	1	Window AC	0.67		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom	Classroom 47	1	Window AC	0.67		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
boiler room	entire building	2	Non-Condensing Hot Water Boiler	2,142.40	Yes	2	Non-Condensing Hot Water Boiler	2,142.40	85.00%	Et	0.00	0	132.0	$1,480.29	$76,490.22	$6,427.20	47.33

Demand Control Ventilation Recommendations

		Recommendation Inputs				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	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	Cafeteria	1	30.00	240.00		0.00	8,709	0.0	$1,151.91	$1,359.42	$0.00	1.18

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
Boiler Room	Entire facility	1	Indirect System	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Refrigerator Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Freezer Chest	No	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	1	Gas Convection Oven (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Electric Griddle (≤2 Feet Width)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	4	Electric Convection Oven (Half Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (1/2 Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Door Type (High Temp)	Natural Gas	N/A	No	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?
Classrooms	67	Desktop computers	270.0	
Classrooms	34	Laptops	75.0	
Classrooms	3	Small Printer/Copier	50.0	
Offices	3	Medium Printer/Copier	100.0	
Copy Room	3	Large Printer/Copier	150.0	
Classrooms	43	Projectors	350.0	
Faculty Lounge & Kitchen	5	Microwaves	1,500.0	
Faculty Lounge & Kitchen	1	Small Refrigerator	126.0	
Faculty Lounge & Kitchen	1	Medium Refrigerator	226.0	
Faculty Lounge & Kitchen	4	Large Refrigerator	509.0	
Faculty Lounge	1	Coffee Machine	900.0	
Faculty Lounge	2	Toaster	1,000.0	
Faculty Lounge	1	Toaster Oven	1,500.0	
Classrooms	3	50" LED TV	220.0	
Classrooms	66	Standing Fans	200.0	
Classrooms	44	Smart Boards	200.0	
Cafeteria	2	cash registers	50.0	

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
Hallway	1	Refrigerated	Yes	0.00	1,612	0.0	$213.20	$230.00	$0.00	1.08
Hallway	1	Non-Refrigerated	Yes	0.00	343	0.0	$45.30	$230.00	$0.00	5.08

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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63

ENERGY STAR® Score[1]

Robertsville Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 70,880
Built: 1968

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

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Robertsville Elementary School 36 Menel Lane Morganville, New Jersey 07751	Marlboro Township Board of Education 1980 Township Drive Marlboro, NJ 07746 (732) 972-2000	Cindy Barr-Rague 1980 Township Drive Marlboro, NJ 07746 (732) 972-2000 Ext. 2010 cbarr-rague@mtps.org

Property ID: 6277822

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
60.9 kBtu/ft²

Source EUI
102.9 kBtu/ft²

Annual Energy by Fuel		
Electric - Grid (kBtu)	1,322,218 (31%)
Natural Gas (kBtu)	2,991,151 (69%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	69
National Median Source EUI (kBtu/ft²)	116.7
% Diff from National Median Source EUI	-12%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	306

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)