Local Government Energy Audit:
Energy Audit Report

Switlik Elementary School

75 West Veterans Hwy

Jackson, NJ 08527

Jackson Township BOE

June 25, 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.

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1 Executive Summary

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

Switlik Elementary School is a 72,077 square foot single story facility comprised of various spaces such as classrooms, offices, hallways, gymnasium, kitchen, storage closets and mechanical areas. The school is scheduled open from 9:00 AM to 3:00 PM during the week. On most Saturdays there are basketball activities in the school. On Sundays the school is closed.

The building is heated by a combination of gas fired boilers and furnaces located in rooftop packaged units. Cooling for the building is provided by direct expansion (DX) split system and packaged AC units. Some of the split system units include electric heating coils. Lighting is provided by linear T8 tube, compact fluorescent lamp (CFL) and incandescent lamp fixtures.

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 and recommends five measures which together represent an opportunity for Switlik Elementary School to reduce annual energy costs by roughly $24,419 and annual greenhouse gas emissions by 201,672 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 8.8 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 Switlik Elementary School's annual energy use by 15%.

Figure 1 – Previous 12 Month Utility Costs

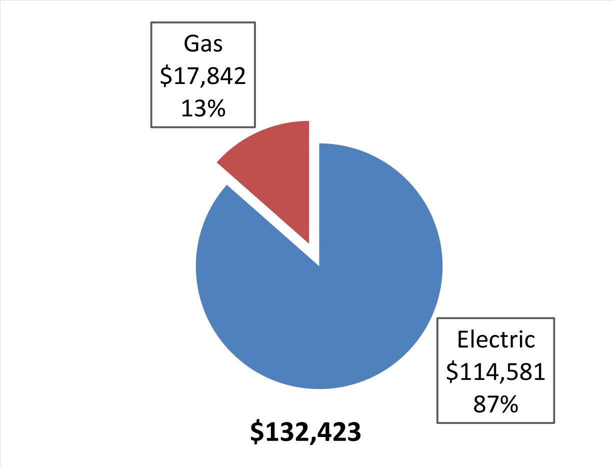
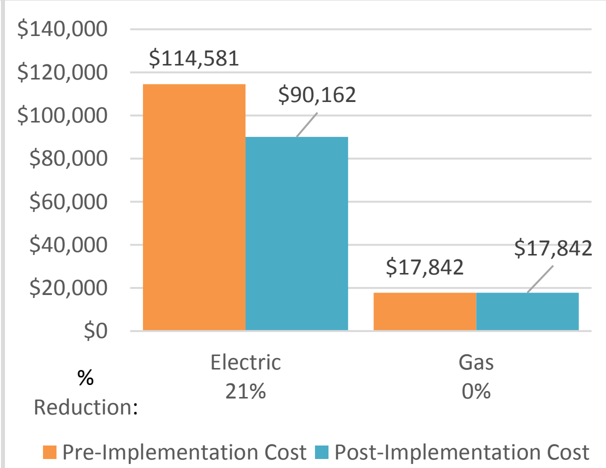


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**168,738**	**35.8**	**0.0**	**$20,574.37**	**$191,934.47**	**$19,545.00**	**$172,389.47**	**8.4**	**169,918**
ECM 1	Install LED Fixtures	Yes	58,809	9.1	0.0	$7,170.67	$118,934.17	$6,530.00	$112,404.17	15.7	59,221
ECM 2	Retrofit Fixtures with LED Lamps	Yes	109,929	26.7	0.0	$13,403.70	$73,000.30	$13,015.00	$59,985.30	4.5	110,697
Lighting Control Measures			**29,922**	**7.3**	**0.0**	**$3,648.36**	**$45,052.00**	**$2,795.00**	**$42,257.00**	**11.6**	**30,131**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	27,347	6.7	0.0	$3,334.42	$41,252.00	$2,795.00	$38,457.00	11.5	27,538
ECM 4	Install High/Low Lighitng Controls	Yes	2,575	0.6	0.0	$313.94	$3,800.00	$0.00	$3,800.00	12.1	2,593
Motor Upgrades			**641**	**0.2**	**0.0**	**$78.20**	**$3,335.58**	**$0.00**	**$3,335.58**	**42.7**	**646**
	Premium Efficiency Motors	No	641	0.2	0.0	$78.20	$3,335.58	$0.00	$3,335.58	42.7	646
Variable Frequency Drive (VFD) Measures			**7,480**	**2.0**	**0.0**	**$912.10**	**$16,888.76**	**$1,040.00**	**$15,848.76**	**17.4**	**7,533**
	Install VFDs on Constant Volume (CV) HVAC	No	5,397	1.8	0.0	$658.04	$11,816.62	$1,040.00	$10,776.62	16.4	5,435
	Install VFDs on Hot Water Pumps	No	2,084	0.3	0.0	$254.07	$5,072.13	$0.00	$5,072.13	20.0	2,098
Electric Unitary HVAC Measures			**80,181**	**43.0**	**0.0**	**$9,776.54**	**$328,346.25**	**$17,884.09**	**$310,462.16**	**31.8**	**80,742**
	Install High Efficiency Electric AC	No	80,181	43.0	0.0	$9,776.54	$328,346.25	$17,884.09	$310,462.16	31.8	80,742
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**57.2**	**$714.78**	**$26,159.48**	**$2,040.50**	**$24,118.98**	**33.7**	**6,701**
	Install High Efficiency Hot Water Boilers	No	0	0.0	57.2	$714.78	$26,159.48	$2,040.50	$24,118.98	33.7	6,701
Domestic Water Heating Upgrade			**0**	**0.0**	**10.6**	**$132.68**	**$4,449.00**	**$150.00**	**$4,299.00**	**32.4**	**1,244**
	Install High Efficiency Gas Water Heater	No	0	0.0	10.6	$132.68	$4,449.00	$150.00	$4,299.00	32.4	1,244
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$196.53**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 5	Vending Machine Control	Yes	1,612	0.0	0.0	$196.53	$230.00	$0.00	$230.00	1.2	1,623
TOTALS			**288,574**	**88.2**	**67.9**	**$36,033.56**	**$616,395.53**	**$43,454.59**	**$572,940.94**	**15.9**	**298,537**
TOTAL OF ALL RECOMMENDED MEASURES			**200,271**	**43**	**0**	**24,419**	**237,216**	**22,340**	**214,876**	**8.8**	**201,672**
TOTAL OF ALL NON-RECOMMENDED MEASURES			**88,303**	**45**	**68**	**11,614**	**379,179**	**21,115**	**358,064**	**30.8**	**96,865**

* - 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 measure save energy by reducing the power used by the lighting components due to improved electrical efficiency.

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

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

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

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

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

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

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

Energy Efficient Practices

TRC also identified 10 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 Switlik Elementary School include:

- Reduce Air Leakage
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- 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 Switlik 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	271	kW DC STC
Electric Generation	322,861	kWh/yr
Displaced Cost	$28,090	/yr
Installed Cost	$704,600	

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
- 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.

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 8.3 for additional information on the ESIP Program.

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

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

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Michelle Richardson	Business Administrator	mrichardson@jacksonsd.org	732-833-4600
John Blair	Energy Education Specialist	jblair@jacksonsd.org	732-833-4600 Extn: 4380
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.org	(732) 855-0033

2.2 General Site Information

On January 18, 2018, TRC performed an energy audit at Switlik Elementary School located in Jackson, New Jersey. TRC's team met with John Blair to review the facility operations and help focus our investigation on specific energy-using systems.

Switlik Elementary School is a 72,077 square foot single story facility comprised of various spaces such as classrooms, offices, hallways, gymnasium, kitchen, storage closets and mechanical areas. The school is scheduled open from 9:00 AM to 3:00 PM during the week. On most Saturdays there are basketball activities in the school. On Sundays the school is closed.

The building is heated by a combination of gas fired boilers and furnaces located in rooftop packaged units. Cooling for the building is provided by direct expansion (DX) split system and packaged AC units. Some of the split system units include electric heating coils. Lighting is provided by linear T8 tube, compact fluorescent lamp (CFL) and incandescent lamp fixtures. The District has 14 trailers that are not in the scope of this audit. If the District owns these trailers, we recommend that the lighting and HVAC are upgraded to more efficient equipment.

2.3 Building Occupancy

The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 150 full time staff (including teachers, administration and maintenance) and 871 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Switlik Elementary School	Weekday	9AM - 3PM
Switlik Elementary School	Weekend	Saturday : Basket Ball Sunday: No operation

2.4 Building Envelope

The building was originally constructed in 1948 and additions were made in subsequent years with the latest addition in 2005. The building is concrete block and steel with a masonry brick facade. The building has a flat roof with asphalt layering and found to be in good condition. The windows in the building are double pane and in good condition. The exterior doors are constructed of aluminum with aluminum framed glass. They were found to be in good condition.

2.5 On-Site Generation

Switlik Elementary School does not have any on-site electric generation systems currently installed.

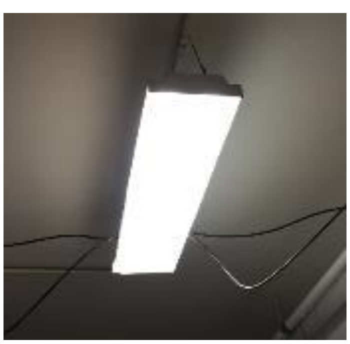
2.6 Energy-Using Systems

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 incandescent (40-Watt) and compact fluorescent lamps (26 and 42-Watt). Most of the fixtures contain two, three, or four 4-foot lamps. Spaces such as storage closets and restrooms are lit using 2-foot, 2-lamp fixtures.

Lighting control in most spaces is provided by manual wall switches. The building's exterior lighting consists of pole mounted fixtures (high-pressure sodium, 400-Watt), wall packs fixtures (high-pressure sodium, 100-Watt), canopy fixtures (compact fluorescent, 18-Watt) that are controlled by photocells and timers.



Hot Water Heating System

The main heating in the system in the school consists of one HB Smith gas-fired hot water boiler with an output capacity of 1166 MBh and an efficiency of 78%. Hot water from the boiler is circulated using two 1 hp constant speed motors to the unit vents in the classrooms, hallway radiators and air handling units. This boiler was installed in the year 2000 and has been evaluated for replacement.

Hot water is supplied at 180°F when the outside air temperature is below 50°F and the set point is reset to 155°F when the outside air is above 65°F. Space temperature in the older section of the building is controlled manually using programmable thermostats. Schedules and space temperatures in the other areas from the boiler and newer additions are controlled using Johnson Controls Metasys building automation system.



Direct Expansion Air Conditioning System (DX)

The space cooling in the classrooms and offices is provided by split system AC units with cooling capacities ranging from 3-5 tons. Most of these units are over 20 years old and have been evaluated for replacement. The additional wing is cooled using two split units from Trane with cooling capacities of 5-ton and 10-tons. These units were installed in the year 2004.

The gym is cooled using a rooftop DX unit that was installed in 2003.

Cooling in the older classrooms is controlled using manual thermostats and are not part of the building automation systems. Cooling for the rest of the building, including the newer sections, is controlled using a Johnson Controls Metasys system.


Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of two gas fired water heaters (AO Smith and Lochinvar) and one AO Smith electric water heater serving the restrooms, kitchen and the classroom sinks of the various sections. Tank capacities range from 40 gallons to 75 gallons. The Lochinvar gas fired unit was installed in 2005 and the other two units are approximately 17 years old. The gas fired AO Smith unit has been evaluated for replacement.



Food Service & Refrigeration

The kitchen functions from 8:00 AM to 2:00 PM everyday weekday from September through June. The kitchen equipment includes both electric and gas fired. Equipment includes ice-cream chests, milk coolers, food warmers, two gas fired convection heaters, commercial refrigerators, one cooking range with six burners and a walk-in refrigerator. Most of the kitchen equipment is brand new and was observed to be in very good condition. The walk-in refrigerator is about 20 years old.

Building Plug Load

There are 68 computer work stations throughout the facility. The office plug loads at the facility include printers, paper shredders, projectors and smart boards. A few private offices and the teacher's lounge have kitchenette plug loads such as the refrigerators, coffee machines and microwave ovens. The teacher's lounge also has one refrigerated and one non-refrigerated vending machine without controls. There is no centralized PC power management software installed.

2.7 Water-Using Systems

The restrooms faucets are rated for 2.2 gallons per minute (gpm) or lower, the toilets are rated at 1.6 gallons per flush (gpf) and the urinals are rated at 1 gpf.

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

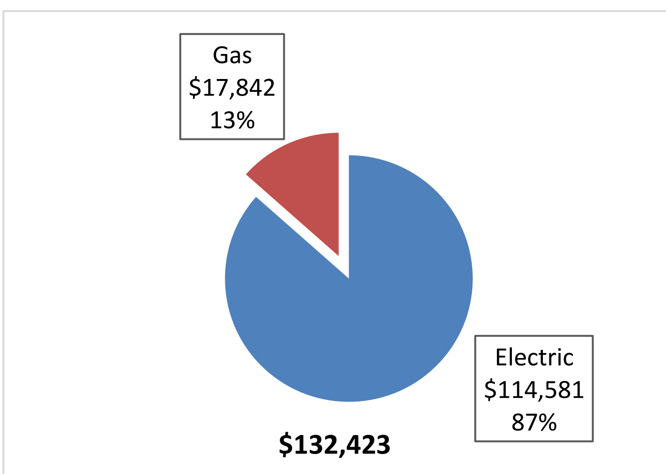
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Switlik Elementary School		
Fuel	**Usage**	**Cost**
Electricity	939,720 kWh	$114,581
Natural Gas	14,286 Therms	$17,842
Total		**$132,423**

The current annual energy cost for this facility is $132,423 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 $0.122/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The third party electric supply is provided by Constellation New Energy. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

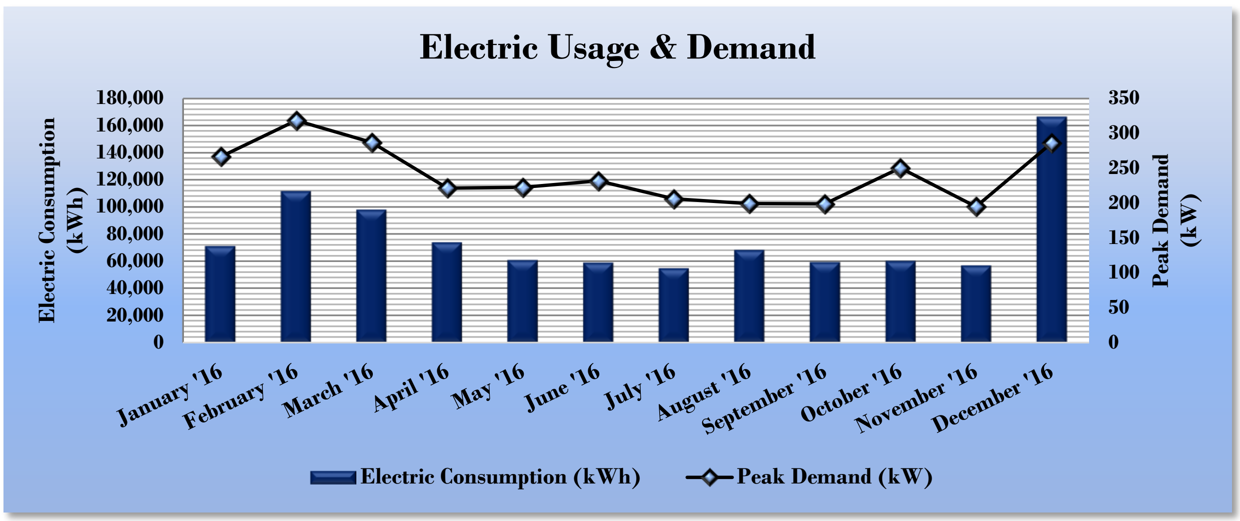


Figure 10 - Electric Usage & Demand

Electric Billing Data for Switlik Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/31/16	30	71,160	267		$8,494
2/28/16	28	111,600	319		$12,773
3/31/16	32	97,920	287		$17,230
4/30/16	30	73,800	222		$7,467
5/31/16	31	60,720	223		$7,088
6/30/16	30	58,920	232		$7,101
7/31/16	31	54,720	206		$7,980
8/31/16	31	68,280	199		$7,445
9/30/16	30	59,400	199		$7,357
10/31/16	31	60,120	250		$7,520
11/30/16	30	56,880	195		$8,027
12/31/16	31	166,200	286		$16,098
Totals	**365**	**939,720**	**318.5**	**$0**	**$114,581**
Annual	**365**	**939,720**	**318.5**	**$0**	**$114,581**

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.249/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

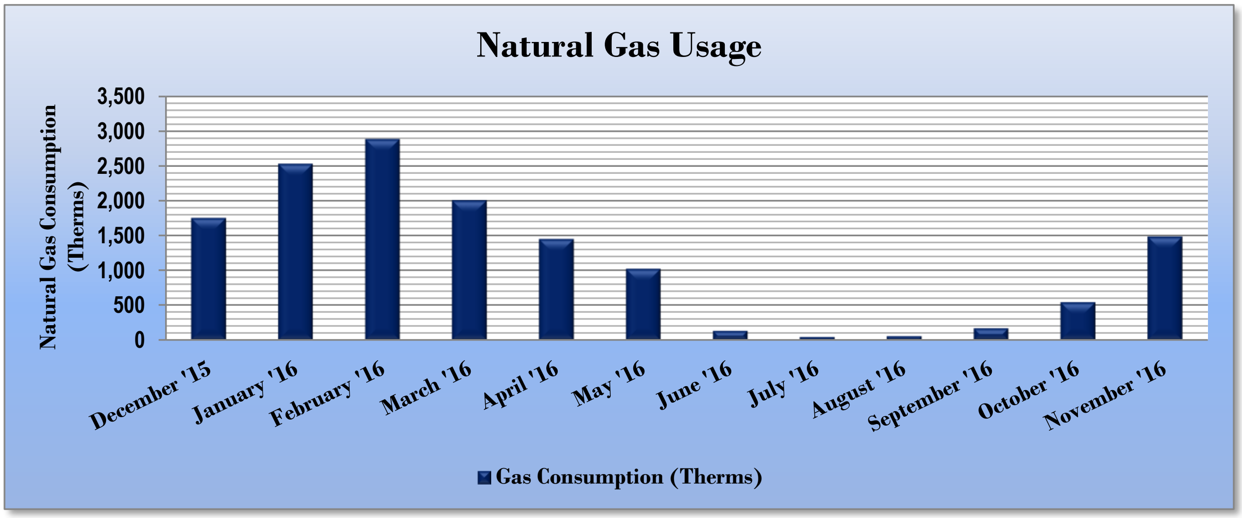


Figure 12 - Natural Gas Usage

Gas Billing Data for Switlik Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
1/8/16	30	1,749	$2,041
2/4/16	27	2,528	$2,851
3/4/16	29	2,881	$3,218
4/6/16	33	2,003	$2,305
5/4/16	28	1,448	$1,728
6/8/16	35	1,022	$1,286
7/8/16	30	130	$357
8/8/16	31	43	$268
9/1/16	24	54	$279
10/3/16	32	168	$403
11/4/16	32	541	$872
12/2/16	28	1,483	$1,942
Totals	**359**	**14,051**	**$17,549**
Annual	**365**	**14,286**	**$17,842**

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		
	Switlik Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	160.5	141.4
Site Energy Use Intensity (kBtu/ft^2)	64.3	58.2

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Switlik Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	130.7	141.4
Site Energy Use Intensity (kBtu/ft^2)	54.8	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 31.

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

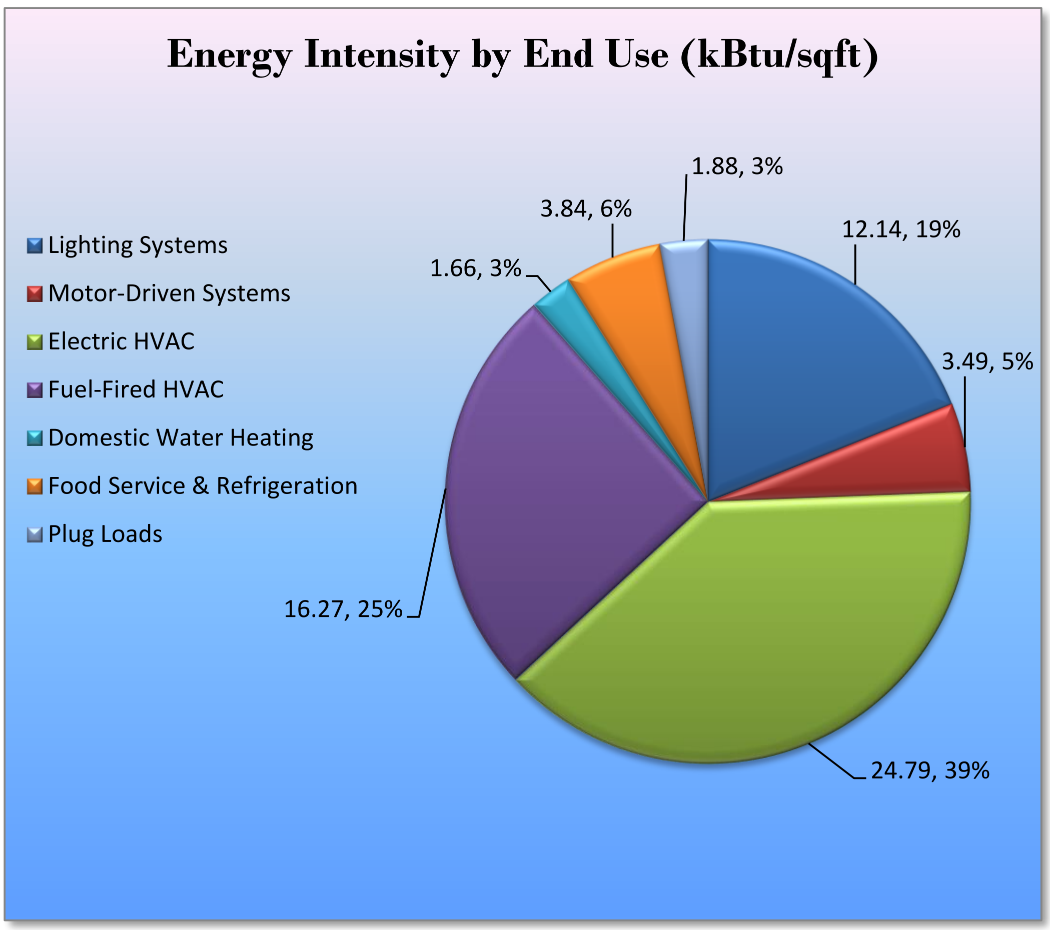
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 Switlik 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		**168,738**	**35.8**	**0.0**	**$20,574.37**	**$191,934.47**	**$19,545.00**	**$172,389.47**	**8.4**	**169,918**
ECM 1	Install LED Fixtures	58,809	9.1	0.0	$7,170.67	$118,934.17	$6,530.00	$112,404.17	15.7	59,221
ECM 2	Retrofit Fixtures with LED Lamps	109,929	26.7	0.0	$13,403.70	$73,000.30	$13,015.00	$59,985.30	4.5	110,697
Lighting Control Measures		**29,922**	**7.3**	**0.0**	**$3,648.36**	**$45,052.00**	**$2,795.00**	**$42,257.00**	**11.6**	**30,131**
ECM 3	Install Occupancy Sensor Lighting Controls	27,347	6.7	0.0	$3,334.42	$41,252.00	$2,795.00	$38,457.00	11.5	27,538
ECM 4	Install High/Low Lighitng Controls	2,575	0.6	0.0	$313.94	$3,800.00	$0.00	$3,800.00	12.1	2,593
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$196.53**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 5	Vending Machine Control	1,612	0.0	0.0	$196.53	$230.00	$0.00	$230.00	1.2	1,623
TOTALS		**200,271**	**43.1**	**0.0**	**$24,419.26**	**$237,216.47**	**$22,340.00**	**$214,876.47**	**8.8**	**201,672**

* - 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		**168,738**	**35.8**	**0.0**	**$20,574.37**	**$191,934.47**	**$19,545.00**	**$172,389.47**	**8.4**	**169,918**
ECM 1	Install LED Fixtures	58,809	9.1	0.0	$7,170.67	$118,934.17	$6,530.00	$112,404.17	15.7	59,221
ECM 2	Retrofit Fixtures with LED Lamps	109,929	26.7	0.0	$13,403.70	$73,000.30	$13,015.00	$59,985.30	4.5	110,697

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	12,539	3.0	0.0	$1,528.95	$67,375.00	$3,730.00	$63,645.00	41.6	12,627
Exterior	46,270	6.0	0.0	$5,641.73	$51,559.17	$2,800.00	$48,759.17	8.6	46,593

Measure Description

We recommend replacing some of the existing fixtures containing HID and compact fluorescent 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. Target fixtures for replacement include the exterior pole and wall mounted high pressure sodium fixtures and the existing gym and cafeteria lighting. Controls have been recommended for these interior fixtures in a following section.

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

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	108,482	26.5	0.0	$13,227.31	$71,280.20	$12,995.00	$58,285.20	4.4	109,241
Exterior	1,447	0.2	0.0	$176.39	$1,720.10	$20.00	$1,700.10	9.6	1,457

Measure Description

We recommend retrofitting existing incandescent, CFL and linear T8 tubes lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

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

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**29,922**	**7.3**	**0.0**	**$3,648.36**	**$45,052.00**	**$2,795.00**	**$42,257.00**	**11.6**	**30,131**
ECM 3	Install Occupancy Sensor Lighting Controls	27,347	6.7	0.0	$3,334.42	$41,252.00	$2,795.00	$38,457.00	11.5	27,538
ECM 4	Install High/Low Lighitng Controls	2,575	0.6	0.0	$313.94	$3,800.00	$0.00	$3,800.00	12.1	2,593

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 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
27,347	6.7	0.0	$3,334.42	$41,252.00	$2,795.00	$38,457.00	11.5	27,538

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in many restrooms, storage rooms, classrooms, gymnasium and office areas. 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 4: 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)
2,575	0.6	0.0	$313.94	$3,800.00	$0.00	$3,800.00	12.1	2,593

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces such as the hallways that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

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.

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 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control measures are summarized in Figure 19 below.

Figure 19 – Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$196.53**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 5	Vending Machine Control	1,612	0.0	0.0	$196.53	$230.00	$0.00	$230.00	1.2	1,623

ECM 5: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,612	0.0	0.0	$196.53	$230.00	$0.00	$230.00	1.2	1,623

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 at the end of this section, below the measure description sections.

Figure 20 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades	**641**	**0.2**	**0.0**	**$78.20**	**$3,335.58**	**$0.00**	**$3,335.58**	**42.7**	**646**
Premium Efficiency Motors	641	0.2	0.0	$78.20	$3,335.58	$0.00	$3,335.58	42.7	646
Variable Frequency Drive (VFD) Measures	**7,480**	**2.0**	**0.0**	**$912.10**	**$16,888.76**	**$1,040.00**	**$15,848.76**	**17.4**	**7,533**
Install VFDs on Constant Volume (CV) HVAC	5,397	1.8	0.0	$658.04	$11,816.62	$1,040.00	$10,776.62	16.4	5,435
Install VFDs on Hot Water Pumps	2,084	0.3	0.0	$254.07	$5,072.13	$0.00	$5,072.13	20.0	2,098
Electric Unitary HVAC Measures	**80,181**	**43.0**	**0.0**	**$9,776.54**	**$328,346.25**	**$17,884.09**	**$310,462.16**	**31.8**	**80,742**
Install High Efficiency Electric AC	80,181	43.0	0.0	$9,776.54	$328,346.25	$17,884.09	$310,462.16	31.8	80,742
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**57.2**	**$714.78**	**$26,159.48**	**$2,040.50**	**$24,118.98**	**33.7**	**6,701**
Install High Efficiency Hot Water Boilers	0	0.0	57.2	$714.78	$26,159.48	$2,040.50	$24,118.98	33.7	6,701
Domestic Water Heating Upgrade	**0**	**0.0**	**10.6**	**$132.68**	**$4,449.00**	**$150.00**	**$4,299.00**	**32.4**	**1,244**
Install High Efficiency Gas Water Heater	0	0.0	10.6	$132.68	$4,449.00	$150.00	$4,299.00	32.4	1,244
TOTALS	**88,303**	**45.2**	**67.9**	**$11,614.30**	**$379,179.06**	**$21,114.59**	**$358,064.47**	**30.8**	**96,865**

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

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

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
641	0.2	0.0	$78.20	$3,335.58	$0.00	$3,335.58	42.7	646

Measure Description

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

Install VFDs on Constant Volume (CV) HVAC

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)
5,397	1.8	0.0	$658.04	$11,816.62	$1,040.00	$10,776.62	16.4	5,435

Measure Description

We evaluated installing variable frequency drives (VFDs) to control supply fan motor speeds to convert the constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one. Zone thermostats will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

VAV systems should not be controlled such that the supply air temperature is raised at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low, e.g. 55°F, until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing will have to be determined during the final project design. The control system should be programmed to maintain the minimum air flow whenever the compressor is operating.

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)
2,084	0.3	0.0	$254.07	$5,072.13	$0.00	$5,072.13	20.0	2,098

Measure Description

We evaluated installing variable frequency drives (VFD) to control the two 1 hp 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.

Install High Efficiency Air Conditioning Units

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)
80,181	43.0	0.0	$9,776.54	$328,346.25	$17,884.09	$310,462.16	31.8	80,742

Measure Description

We evaluated replacing standard efficiency packaged air conditioning and split AC units with high efficiency units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

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	57.2	$714.78	$26,159.48	$2,040.50	$24,118.98	33.7	6,701

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.

Install High Efficiency Gas Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	10.6	$132.68	$4,449.00	$150.00	$4,299.00	32.4	1,244

Measure Description

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

Reasons for not Recommending

The equipment addressed by the measures above is approaching the end of its useful life, and was therefore evaluated for replacement. The payback periods for investments in the replacement equipment is longer than the expected useful life of the proposed replacement equipment. The measures are therefore not cost effective on the basis of energy savings alone. As the District plans for replacement of this equipment, we suggest consideration be given to replacement with a higher efficiency equivalents of the respective units.

5 Energy Efficient Practices

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

Reduce Air Leakage

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

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

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.

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 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 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.

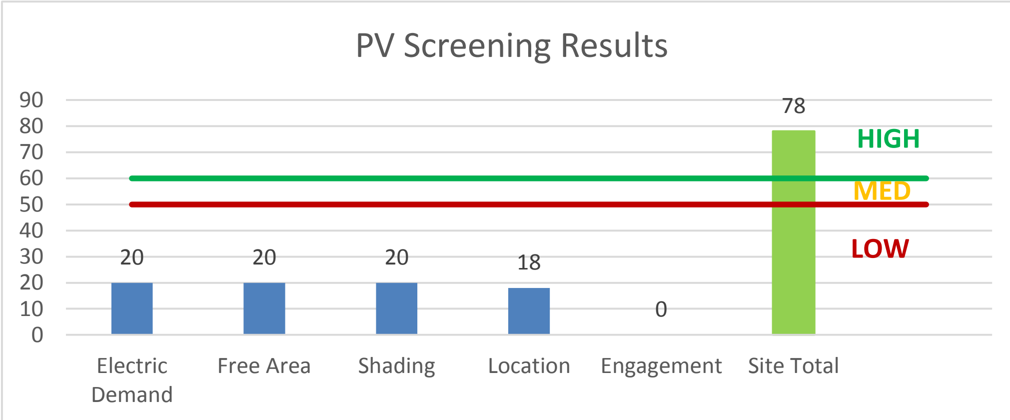
6.1 Photovoltaic

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 the site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If Switlik Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening



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 8.2 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.

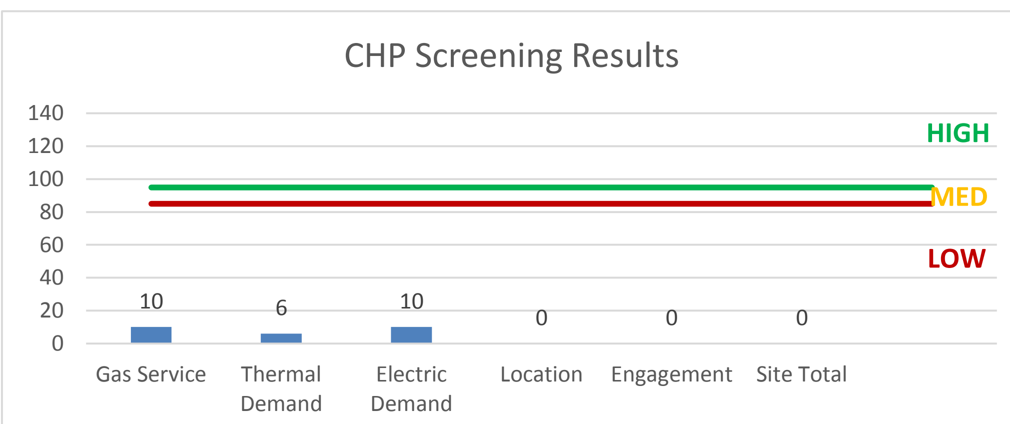
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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 and lack of space near the existing boilers are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

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

Figure 22 - 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.

This building is already participating in the district wide demand response program.

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

Figure 23 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive
ECM 1	Install LED Fixtures	x
ECM 2	Retrofit Fixtures with LED Lamps	x
ECM 3	Install Occupancy Sensor Lighting Controls	x
ECM 4	Install High/Low Lighitng Controls	
ECM 5	Vending Machine Control	

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.

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 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.

8.3 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
Boiler room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.09	357	0.0	$43.53	$234.00	$40.00	4.46
Boiler eoom entrance	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.04	179	0.0	$21.77	$117.00	$20.00	4.46
Gym storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	364	0.11	100	0.0	$12.16	$350.00	$60.00	23.84
Gym	24	Compact Fluorescent: 8 Lamps	Wall Switch	144	2,352	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	70	1,646	1.49	6,167	0.0	$751.94	$65,254.80	$3,705.00	81.85
103 - district storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$233.00	$40.00	7.02
102-storage	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	520	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	364	0.03	25	0.0	$3.08	$212.40	$40.00	56.03
101- Coach's office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.12	508	0.0	$61.89	$495.60	$80.00	6.72
101 - Coach's office restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.04	169	0.0	$20.63	$191.20	$15.00	8.54
101 - Coach's office restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$48.20	$10.00	5.49
Gym hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,646	0.22	902	0.0	$110.02	$668.00	$80.00	5.34
Gym hall	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	12	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,646	0.17	685	0.0	$83.51	$978.40	$120.00	10.28
Gym entrance	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,646	0.16	677	0.0	$82.52	$551.00	$60.00	5.95
Gym hallway	5	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	5	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,646	0.07	285	0.0	$34.79	$441.00	$50.00	11.24
Gym hallway	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	6	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,646	0.08	342	0.0	$41.75	$489.20	$60.00	10.28
Gym hallway	5	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	5	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,646	0.07	285	0.0	$34.79	$441.00	$50.00	11.24
Gym halllway Girls' restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.21	846	0.0	$103.14	$646.00	$110.00	5.20
Gym hallway Boys' restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.21	846	0.0	$103.14	$646.00	$110.00	5.20
Classroom 12 hallway	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,646	0.36	1,466	0.0	$178.78	$1,560.50	$130.00	8.00
Classroom 12	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.33	1,353	0.0	$165.03	$972.00	$155.00	4.95
CR 12 - storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	364	0.03	25	0.0	$3.04	$174.50	$10.00	54.10
Classroom 10	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 11	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 8	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 9	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 6	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34

	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 7	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 4	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 5	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 2	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 3	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Classroom 1	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.57	2,369	0.0	$288.80	$1,498.50	$245.00	4.34
Janitor closet J-1	1	Compact Fluorescent: 1 Lamp	Wall Switch	42	520	Relamp	No	1	LED Screw-In Lamps: 1 Lamp	Wall Switch	29	520	0.01	8	0.0	$0.92	$53.75	$0.00	58.51
Girls' restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.12	508	0.0	$61.89	$495.60	$80.00	6.72
Boys' restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.12	508	0.0	$61.89	$495.60	$80.00	6.72
VO office secretary	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.08	338	0.0	$41.26	$445.50	$65.00	9.22
VP Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$233.00	$40.00	7.02
Front vestibule	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.02	89	0.0	$10.88	$58.50	$10.00	4.46
Entrance hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.06	268	0.0	$32.65	$175.50	$30.00	4.46
Health office entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,352	0.03	134	0.0	$16.33	$75.20	$15.00	3.69
Health office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.15	606	0.0	$73.87	$380.53	$80.00	4.07
Health office restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$164.20	$10.00	22.16
Health office restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$164.20	$10.00	22.16
Health office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.11	454	0.0	$55.41	$285.40	$60.00	4.07
Health office closet	1	Incandescent: 1 Lamp	Wall Switch	40	520	Relamp	No	1	LED Screw-In Lamps: 1 Lamp	Wall Switch	6	520	0.02	20	0.0	$2.48	$53.75	$5.00	19.67
Copy section	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.02	89	0.0	$10.88	$58.50	$10.00	4.46
Main office	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.22	909	0.0	$110.81	$570.80	$120.00	4.07
Main office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.07	303	0.0	$36.94	$190.27	$40.00	4.07
Main office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.07	303	0.0	$36.94	$190.27	$40.00	4.07
Main office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,352	0.15	606	0.0	$73.87	$380.53	$80.00	4.07
Main office conference room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.08	338	0.0	$41.26	$445.50	$65.00	9.22

	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
Main office closet	1	Compact Fluorescent: 1 Lamp	Wall Switch	42	520	Relamp	No	1	LED Screw-In Lamps: 1 Lamp	Wall Switch	29	520	0.01	8	0.0	$0.92	$53.75	$0.00	58.51
Main office closet	1	Incandescent: 1 Lamp	Wall Switch	40	520	Relamp	No	1	LED Screw-In Lamps: 1 Lamp	Wall Switch	6	520	0.02	20	0.0	$2.48	$53.75	$5.00	19.67
Main office closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	520	0.02	20	0.0	$2.41	$58.50	$10.00	20.16
Main office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.02	89	0.0	$10.88	$58.50	$10.00	4.46
Main office small office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$233.00	$40.00	7.02
Main office closet	1	Incandescent: 1 Lamp	Wall Switch	40	520	Relamp	No	1	LED Screw-In Lamps: 1 Lamp	Wall Switch	6	520	0.02	20	0.0	$2.48	$53.75	$5.00	19.67
Principal office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.14	596	0.0	$72.62	$555.40	$95.00	6.34
Computer lab hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,646	0.16	677	0.0	$82.52	$551.00	$60.00	5.95
Computer lab	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.44	1,805	0.0	$220.04	$1,206.00	$195.00	4.59
Library	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.82	3,375	0.0	$411.52	$1,887.27	$375.00	3.67
Library	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.03	114	0.0	$13.92	$96.40	$55.00	2.97
CR 21 hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,646	0.38	1,588	0.0	$193.66	$961.07	$160.00	4.14
Classroom 20	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 19	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 18	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 17	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 16	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 21	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 22	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 23	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 24	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 25	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.58	2,382	0.0	$290.49	$1,411.60	$275.00	3.91
Classroom 25	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.72	2,978	0.0	$363.11	$1,697.00	$335.00	3.75
Girls' restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.12	508	0.0	$61.89	$495.60	$80.00	6.72
Boys' restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,352	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,646	0.12	508	0.0	$61.89	$495.60	$80.00	6.72

	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
Speech office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,646	0.14	596	0.0	$72.62	$555.40	$95.00	6.34
CR 23 hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,646	0.24	993	0.0	$121.04	$675.67	$100.00	4.76
Faculty room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$387.00	$55.00	12.07
Faculty room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$117.00	$55.00	2.25
Faculty room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.05	226	0.0	$27.51	$117.00	$55.00	2.25
Boiler room hall	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,646	0.58	2,382	0.0	$290.49	$1,941.60	$240.00	5.86
Classroom 27	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.55	2,256	0.0	$275.05	$1,440.00	$235.00	4.38
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$164.20	$10.00	22.16
Classroom 29	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.55	2,256	0.0	$275.05	$1,440.00	$235.00	4.38
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$164.20	$10.00	22.16
Classroom 31	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.55	2,256	0.0	$275.05	$1,440.00	$235.00	4.38
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,646	0.01	57	0.0	$6.96	$164.20	$10.00	22.16
Classroom 26	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 28	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 30	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 32	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 33	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 34	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
Classroom 35	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	0.41	1,692	0.0	$206.29	$1,147.50	$185.00	4.67
J2 - closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	520	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	520	0.07	67	0.0	$8.17	$190.27	$40.00	18.40
Responsibility hall	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,352	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,646	0.24	993	0.0	$121.04	$675.67	$100.00	4.76
Girls' restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,352	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,352	0.02	95	0.0	$11.54	$71.80	$10.00	5.35
Boys' restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,352	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,352	0.02	95	0.0	$11.54	$71.80	$10.00	5.35
Cafeteria	13	Metal Halide: (1) 250W Lamp	Wall Switch	295	2,352	Fixture Replacement	Yes	13	LED - Fixtures: Ceiling Mount	Occupancy Sensor	75	1,646	2.07	8,527	0.0	$1,039.69	$5,790.20	$585.00	5.01
Kitchen	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.39	1,607	0.0	$195.90	$1,053.00	$180.00	4.46

	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
Kitchen storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.02	89	0.0	$10.88	$58.50	$10.00	4.46
Stage	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,352	0.19	803	0.0	$97.95	$526.50	$90.00	4.46
Pole fixture	26	High-Pressure Sodium: (1) 400W Lamp	Daylight Dimming	465	4,380	Fixture Replacement	No	26	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	120	4,380	5.88	45,182	0.0	$5,509.07	$50,777.82	$2,600.00	8.75
Canopy	14	Compact Fluorescent: 2 Lamps	Daylight Dimming	36	4,380	Relamp	No	14	LED Screw-In Lamps: 2 Lamps	Daylight Dimming	25	4,380	0.10	762	0.0	$92.86	$1,505.08	$0.00	16.21
Wall packs	2	High-Pressure Sodium: (1) 100W Lamp	Daylight Dimming	138	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	30	4,380	0.14	1,088	0.0	$132.66	$781.35	$200.00	4.38
Trailers 1-13	208	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	208	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	5.69	23,460	0.0	$2,860.54	$15,678.00	$2,535.00	4.59
Trailers 1-13	13	Incandescent: 1 Lamp	Wall Switch	40	2,352	Relamp	Yes	13	LED Screw-In Lamps: 1 Lamp	Occupancy Sensor	6	1,646	0.31	1,259	0.0	$153.49	$20,302.79	$65.00	131.85
Trailer 14	56	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,352	Relamp	Yes	56	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,646	1.53	6,316	0.0	$770.15	$3,546.00	$595.00	3.83
Trailer 14 - CR storage	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,352	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,352	0.02	87	0.0	$10.55	$96.40	$20.00	7.24
Trailer 14 - Restroom	4	Incandescent: 1 Lamp	Wall Switch	40	2,352	Relamp	Yes	4	LED Screw-In Lamps: 1 Lamp	Occupancy Sensor	6	1,646	0.09	387	0.0	$47.23	$331.01	$20.00	6.59
All school and trailers	27	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	27	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trailer	4	Incandescent: 1 Lamp	Wall Switch	40	4,380	Relamp	No	4	LED Screw-In Lamps: 1 Lamp	Wall Switch	6	4,380	0.09	685	0.0	$83.53	$215.01	$20.00	2.33

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	Boiler	2	Heating Hot Water Pump	1.0	78.5%	No	2,745	Yes	85.5%	Yes	2	0.34	2,372	0.0	$289.22	$6,565.59	$0.00	22.70
Roof	Packaged unit serving new wing	1	Supply Fan	0.2	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	PAC - gym	2	Supply Fan	5.0	87.5%	No	2,745	Yes	89.5%	Yes	2	1.45	4,471	0.0	$545.21	$8,393.82	$800.00	13.93
Courtyard	PAC - york classrooms	2	Supply Fan	1.0	85.5%	No	2,745	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Courtyard	PAC - york classrooms	2	Exhaust Fan	0.5	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms - 20,21,22,23,24,25,26,28,29,30,31,32,33,34,35,27,1,2,3,4,5,6,7,8,9,10,11,12,16,17,18,19	32	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust fans	15	Exhaust Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallways and entrances	Hallways and entrances	11	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	PAC - gym	2	Exhaust Fan	1.5	86.5%	No	2,745	No	86.5%	Yes	2	0.42	1,278	0.0	$155.87	$5,264.92	$240.00	32.24

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	Addition new wing	1	Split-System AC	10.00		Yes	1	Split-System AC	10.00		11.50		No	0.81	1,580	0.0	$192.70	$11,637.70	$730.00	56.60
Roof	Addition new wing	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	0.48	929	0.0	$113.22	$7,481.10	$460.00	62.01
Roof	Addition new wing	1	Packaged AC	3.00		Yes	1	Packaged AC	3.00		14.00		No	0.21	349	0.0	$42.55	$6,806.88	$276.00	153.48
Courtyard	CR 10	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Courtyard	KG	3	Split-System AC	3.50		Yes	3	Split-System AC	3.50		14.00		No	1.01	1,950	0.0	$237.77	$15,710.31	$966.00	62.01
Courtyard	Serving classrooms (4) on the side of CR10 of the hallway	2	Packaged AC	6.00		Yes	2	Packaged AC	6.00		11.50		No	3.95	6,671	0.0	$813.42	$21,385.27	$876.00	25.21
Grounds	Classroom	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Grounds	Classroom	1	Split-System AC	4.00		Yes	1	Split-System AC	4.00		14.00		No	1.29	2,498	0.0	$304.56	$5,984.88	$368.00	18.44
Grounds	Classroom	3	Split-System AC	3.00		Yes	3	Split-System AC	3.00		14.00		No	3.82	7,403	0.0	$902.64	$13,465.98	$828.00	14.00
Grounds	CR and VP office	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Grounds	Nurse's office of guidance	1	Split-System AC	3.00		Yes	1	Split-System AC	3.00		14.00		No	1.27	2,468	0.0	$300.88	$4,488.66	$276.00	14.00
Grounds	Offices	1	Packaged AC	6.33		Yes	1	Packaged AC	6.33		11.50		No	0.43	729	0.0	$88.92	$11,280.73	$462.09	121.67
Grounds	Principals's office	1	Split-System AC	4.00		Yes	1	Split-System AC	4.00		14.00		No	1.29	2,498	0.0	$304.56	$5,984.88	$368.00	18.44
Grounds	Computer lab	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Grounds	Classroom	1	Packaged AC	6.00		Yes	1	Packaged AC	6.00		11.50		No	1.98	3,336	0.0	$406.71	$10,692.63	$438.00	25.21
Grounds	Classroom	3	Split-System AC	3.00		Yes	3	Split-System AC	3.00		14.00		No	3.82	7,403	0.0	$902.64	$13,465.98	$828.00	14.00
Grounds	Classroom 18	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Grounds near trailers	Classroom	5	Split-System AC	4.00		Yes	5	Split-System AC	4.00		14.00		No	6.44	12,489	0.0	$1,522.81	$29,924.40	$1,840.00	18.44
Grounds near trailers	Classroom	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.12	2,176	0.0	$265.31	$7,481.10	$460.00	26.46
Grounds near trailers	1st grade classroom	7	Split-System AC	3.00		Yes	7	Split-System AC	3.00		14.00		No	2.01	3,900	0.0	$475.53	$31,420.62	$1,932.00	62.01

		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
Ground	Teachers lounge	1	Split-System AC	4.00		Yes	1	Split-System AC	4.00		14.00		No	1.29	2,498	0.0	$304.56	$5,984.88	$368.00	18.44
Roof	Gym	2	Packaged AC	26.00		Yes	2	Packaged AC	26.00		10.50		No	6.18	10,426	0.0	$1,271.24	$87,744.75	$4,108.00	65.79
Grounds	Classrooms - older section	12	Electric Resistance Heat		51.18	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	All school	1	Non-Condensing Hot Water Boiler	1,166.00	Yes	1	Non-Condensing Hot Water Boiler	1,166.00	85.00%	Et	0.00	0	57.2	$714.78	$26,159.48	$2,040.50	33.74
Roof	Gym	2	Furnace	200.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Addition new wing	1	Furnace	96.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Gym closet	Restrooms (additional wing)	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen	1	Storage Tank Water Heater (> 50 Gal)	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	EF	0.00	0	10.6	$132.68	$4,449.00	$150.00	32.40
Speech room	CR 23 hallway bathroom	1	Storage Tank Water Heater (≤ 50 Gal)	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

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	2	Freezer Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Refrigerator Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	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	2	Insulated Food Holding Cabinet (1/2 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Gas Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Switlik ES	68	Computer	150.0	Yes
Switlik ES	37	Laptop	45.0	Yes
Switlik ES	6	Printer - Small	20.0	Yes
Switlik ES	5	Printer - Medium	60.0	Yes
Switlik ES	4	Printer - Large	200.0	Yes
Switlik ES	3	Paper Shredder	150.0	Yes
Switlik ES	23	Projector	200.0	Yes
Switlik ES	6	Microwave	1,000.0	Yes
Switlik ES	4	Refrigerator - Small	60.0	Yes
Switlik ES	2	Refrigerator - Large	220.0	Yes
Switlik ES	1	Coffee machine	400.0	Yes
Switlik ES	26	Smart Board	5.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Teachers' lounge	1	Refrigerated	Yes	0.00	1,612	0.0	$196.53	$230.00	$0.00	1.17

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Switlik Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 72,077
Built: 1948

For Year Ending: December 31, 2016
Date Generated: March 28, 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
Switlik Elementary School 75 West Veterans Highway Jackson, New Jersey 08527	Jackson Township BOE 151 Don Connor Boulevard Jackson, NJ 08527 (732) 833-4600	Michelle Richardson 151 Don Connor Boulevard Jackson, NJ 08527 (732) 833-4600 sstewart@trcsolutions.com

Property ID: 2552311

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
67 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	1,513,622 (31%)
Electric - Grid (kBtu)	3,312,230 (69%)

Source EUI
166.3 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	56.4
National Median Source EUI (kBtu/ft²)	140.2
% Diff from National Median Source EUI	19%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	448

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)