Local Government Energy Audit:
Energy Audit Report

Dr. Martin Luther King, Jr. Middle School

Asbury Park Board of Education

1200 Bangs Ave

Asbury Park, New Jersey 07712

October 11, 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 saving 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 Martin Luther King Jr. Middle School.

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

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

1.1 Facility Summary

Martin Luther King Jr. Middle School is three-story 87,250 square foot building comprised of various space types. The building includes classrooms, offices, a gym, locker rooms, and mechanical spaces. There are additional classrooms in the STEM trailer behind the main building.

Lighting at Martin Luther King Jr. Middle School consists primarily of fixtures with T8 linear fluorescent bulbs. The buildings also has fixtures containing high intensity discharge (HID) lamps in the gym and for exterior lighting. Some lights in the parking area have been recently upgraded to LEDs.

The entire facility is heated, but only about five percent of the building is cooled. Unit ventilators with hot water coils and hot water radiators heat most areas of the main building. Two roof top air condition units provide cooling to the main office and media rooms. Spot cooling is provided by window or through wall AC units. The STEM trailer is heated and cooled by through-the-wall heat pumps. 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 10 measures which together represent an opportunity for Martin Luther King Jr. Middle School to reduce annual energy costs by about $35,399 and reduce its annual greenhouse gas emissions by about 331,814 lbs CO_2e. We estimate that if all measures are implemented as recommended, the project would pay for itself in energy savings alone in about 8.8 years. The breakdown of existing utility costs and the projected savings after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Martin Luther King Jr. Middle School's annual energy use by approximately 26% overall.

Figure 1 – Previous 12 Month Utility Costs

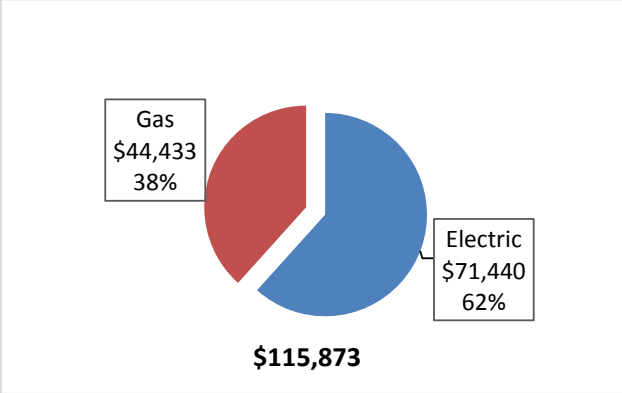
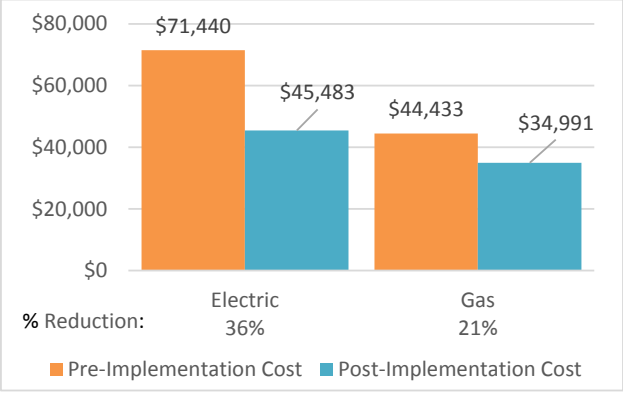


Figure 2 – Potential Post-Implementation Costs



A detailed description of Martin Luther King Jr. Middle School's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

	Energy Conservation Measure	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			**154,546**	**34.5**	**0.0**	**$18,108.91**	**$88,720.68**	**$17,845.00**	**$70,875.68**	**3.9**	**155,627**
ECM 1	Install LED Fixtures	Yes	48,443	7.0	0.0	$5,676.32	$14,668.21	$5,150.00	$9,518.21	1.7	48,782
ECM 2	Retrofit Fixtures with LED Lamps	Yes	106,103	27.5	0.0	$12,432.60	$74,052.48	$12,695.00	$61,357.48	4.9	106,845
Lighting Control Measures			**22,053**	**5.5**	**0.0**	**$2,584.07**	**$19,710.00**	**$2,555.00**	**$17,155.00**	**6.6**	**22,207**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	22,053	5.5	0.0	$2,584.07	$19,710.00	$2,555.00	$17,155.00	6.6	22,207
Motor Upgrades			**1,095**	**0.2**	**0.0**	**$128.30**	**$3,085.60**	**$0.00**	**$3,085.60**	**24.0**	**1,103**
ECM 4	Premium Efficiency Motors	Yes	1,095	0.2	0.0	$128.30	$3,085.60	$0.00	$3,085.60	24.0	1,103
Variable Frequency Drive (VFD) Measures			**18,069**	**1.8**	**0.0**	**$2,117.28**	**$7,213.60**	**$0.00**	**$7,213.60**	**3.4**	**18,196**
ECM 5	Install VFDs on Hot Water Pumps	Yes	18,069	1.8	0.0	$2,117.28	$7,213.60	$0.00	$7,213.60	3.4	18,196
Electric Unitary HVAC Measures			**15,490**	**9.2**	**0.0**	**$1,815.01**	**$53,463.17**	**$2,190.00**	**$51,273.17**	**28.2**	**15,598**
ECM 6	Install High Efficiency Electric AC	Yes	15,490	9.2	0.0	$1,815.01	$53,463.17	$2,190.00	$51,273.17	28.2	15,598
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**800.8**	**$8,141.26**	**$181,443.56**	**$20,900.00**	**$160,543.56**	**19.7**	**93,760**
ECM 7	Install High Efficiency Hot Water Boilers	Yes	0	0.0	800.8	$8,141.26	$181,443.56	$20,900.00	$160,543.56	19.7	93,760
HVAC System Improvements			**8,656**	**2.0**	**0.0**	**$1,014.22**	**$2,250.00**	**$750.00**	**$1,500.00**	**1.5**	**8,716**
ECM 8	Install Dual Enthalpy Outside Economizer Control	Yes	8,656	2.0	0.0	$1,014.22	$2,250.00	$750.00	$1,500.00	1.5	8,716
Domestic Water Heating Upgrade			**0**	**0.0**	**128.0**	**$1,301.09**	**$394.56**	**$0.00**	**$394.56**	**0.3**	**14,984**
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	128.0	$1,301.09	$394.56	$0.00	$394.56	0.3	14,984
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$188.87**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	Yes	1,612	0.0	0.0	$188.87	$230.00	$0.00	$230.00	1.2	1,623
TOTALS			**221,521**	**53.2**	**928.7**	**$35,399.02**	**$356,511.18**	**$44,240.00**	**$312,271.18**	**8.8**	**331,814**

* - 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.

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

Domestic Hot Water System Upgrades generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems, or installing water conservation devices to reduce hot water demand. New high efficiency domestic hot water heating systems and “low flow” fixtures can provide equivalent, or greater, hot water performance 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 and reducing hot water usage 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 nine low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Martin Luther King Jr. Middle School include:

- Close Doors and Windows
- Reduce Motor (air compressor) Short Cycling
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater 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 Martin Luther King Jr. Middle School. Based on the configuration of the site and its loads there is a high potential for cost-effective installation a solar photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	132	kW DC STC
Electric Generation	157,261	kWh/yr
Displaced Cost	$13,680	/yr
Installed Cost	$343,200	

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

1.3 Implementation Planning

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

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

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

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

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

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Walter Sosa	Buildings and Grounds Supervisor	sosaw@asburypark.k12.nj.us	(732) 776-2663 x2851
Geoffrey Hastings	Business Administrator	hastingsg@asburypark.k12.nj.us	(732) 776-2606 x2426
TRC Energy Services			
Tom Page	Auditor	TPage@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 21, 2017, TRC performed an energy audit at Martin Luther King Jr. Middle School located in Asbury Park, New Jersey. TRC's team met with Walter Sosa to review the facility operations and help focus our investigation on specific energy-using systems.

Martin Luther King Jr. Middle School is three-story 87,250 square foot building comprised of various space types. The building includes classrooms, offices, a gym, locker rooms, and mechanical spaces. There are additional classrooms in the STEM trailer behind the main building.

Lighting at Martin Luther King Jr. Middle School consists primarily of fixtures with T8 linear fluorescent bulbs. The buildings also has fixtures containing high intensity discharge (HID) lamps in the gym and for exterior lighting. Some lights in the parking area have been recently upgraded to LEDs.

The entire facility is heated, but only about five percent of the building is cooled. Unit ventilators with hot water coils and hot water radiators heat most areas of the main building. Two roof top air condition units provide cooling to the main office and media rooms. Spot cooling is provided by window or through wall AC units. The STEM trailer is heated and cooled by through-the-wall heat pumps.

2.3 Building Occupancy

The building is open Monday through Friday; it does not have any regularly scheduled weekend occupancy. Asbury Park high School provides instruction during the regular school year and in the summer. The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 490 students and staff.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Martin Luther King Jr. Middle School	Weekday	7:30 AM - 4:00 PM
Martin Luther King Jr. Middle School	Weekend	Closed

2.4 Building Envelope

The building is constructed of concrete block with a façade of concrete and brick. The building has flat roofs. Approximately two-thirds of the roof is covered with a white bitumen roof membrane and the remaining part is covered with a black membrane. The roofs appear to be in fair condition. The building has double-paned pane windows. Many of the windows are operable. The exterior doors are constructed of aluminum and glass.

Image 1: MLK Middle School - Front Exterior

2.5 On-Site Generation

Martin Luther King Jr. Middle School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting is provided almost exclusively by 32-Watt linear fluorescent T8 lamps with electronic ballasts. Most of the fixtures are 2-lamp 4-foot long troffers with diffusers, though there are also multiple 1, 3, and 4- lamp T8 fixtures. The buildings also has metal halide lamps in the gym and a few scattered incandescent bulbs throughout. Lighting control throughout the building is provided by manually operated wall switches.

Exterior lighting is mostly provided mostly by fixtures with metal halide lamps. These fixtures illuminate the building perimeter. Some parking lot lights have recently been converted to LEDs. Exterior security lighting is controlled by time clocks or photocells.

Image 2: Classroom lighting

Hot Water (or Steam) Heating System

The steam system consists of two Cleaver Brooks 5,230 kBtu/hr output, forced draft hot water boilers. The combustion efficiency is not listed on boilers. We have estimated a nominal combustion efficiency of 78%. Each boiler has a 2-hp forced draft fan with discharge dampers to control the volume of combustion air. The boilers are configured in a constant flow primary distribution loop with two 7.5-hp hot water pumps. The boilers provide hot water to the unit ventilators and radiators throughout the building. Unit ventilators have pneumatic controls.

The boilers stage on as needed to server the building load. Based on historic fuel usage, it appears that only a single boiler is needed to serve the building load under most conditions. The boilers operate in a lead/lag configuration.

The boilers are very old (47 years) and at the end of their useful life.

Image 3: Main Boilers, Hot Water Pumps, and Air Compressor (for pneumatic controls)

Direct Expansion Air Conditioning System (DX)

Three cooling only direct-expansion (DX) packaged units are used to cool areas of the building. The units are estimated to provide about 10 tons of cooling each. Two units, located on the roof of the building, provide cooling to the main office and media room. Another split system unit is located above the ceiling and cools room 132. The units provides constant air volume with a single supply fan. The units utilize scroll compressors and a DX coils.

Spot cooling throughout the building (e.g. the fitness room) is provided by small window mounted or through the wall air conditioning units. These range in capacity from 6,000 to 18,000 Btu/hr each. All cooling is manually controlled by thermostats in each zone.

The STEM trailer behind the school is conditioned by wall-mounted heat pumps.

Image 4: Hot Water Heater

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of an A.O. Smith gas fired water heater with an input rating of 199 kBtu/hr and a nominal efficiency of 80%. The water heater has a 100 gallon storage tank. A recirculation pump distribute domestic hot water to the entire site. The recirculation pumps operate continuously.

Food Service & Laundry Equipment

The school has a small commercial kitchen that is used to prepare lunches for the students and staff. The ovens, range tops, and griddle are all electric. The kitchen area has a walk-in cooler and walk-in freezer.

Building Plug Load

There are roughly 636 computer work stations throughout the facility. The computers are desktop units with LCD monitors. There are three servers located near the fitness room. There is no centralized PC power management software installed. In addition to the typical classroom and office equipment, there are multiple microwaves and refrigerators.

Image 5: Building Plug Load

2.7 Water-Using Systems

We counted 15 restrooms at this facility. A sampling of restrooms found that most of the faucets were "low-flow" water conserving devices. A few of restrooms faucets had flow rates greater than 2.2 gallons per minute (gpm). Kitchen faucets were also high flow. The building's toilets and the urinals appeared to be all be low-flow devices with flow rates of 2 gallons per flush (gpf) or less.

Image 6: Kitchen Sinks

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

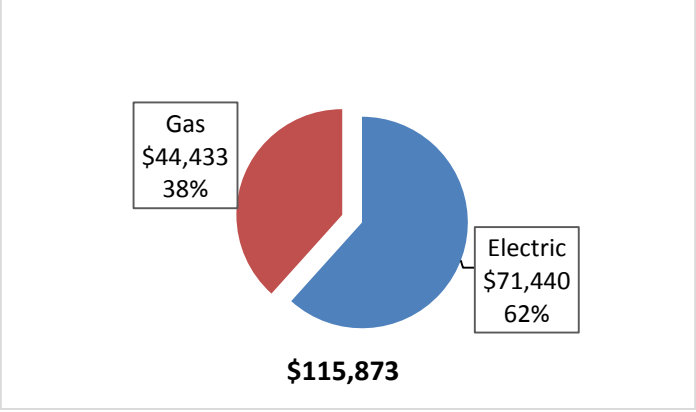
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Martin Luther King Jr. Middle School		
Fuel	**Usage**	**Cost**
Electricity	609,685 kWh	$71,440
Natural Gas	43,704 Therms	$44,433
Total		**$115,873**

The current annual energy cost for this facility is $115,873 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 a recent 12 month period was found to be $0.117/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

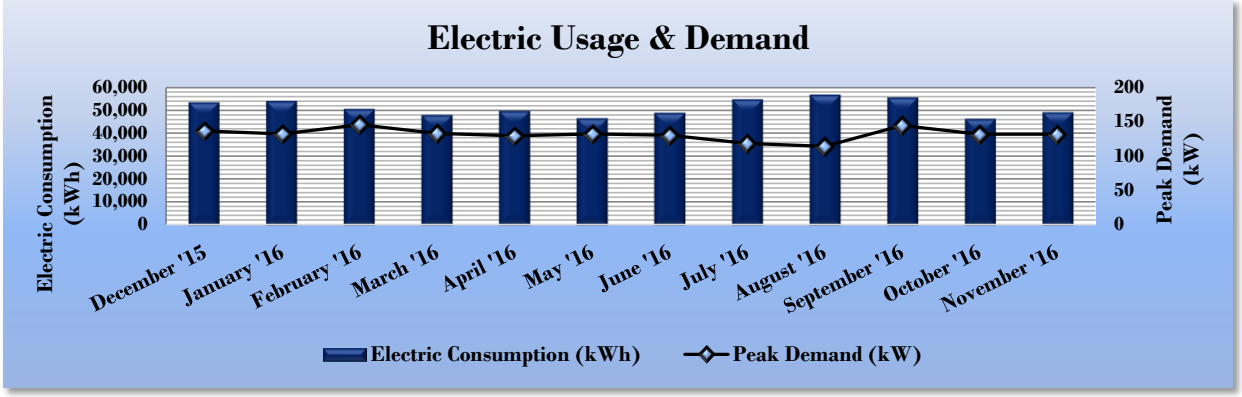


Figure 10 - Electric Usage & Demand

Electric Billing Data for Martin Luther King Jr. Middle School				
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost
12/28/15	34	53,027	137	$5,960
1/27/16	30	53,622	132	$5,996
2/24/16	28	50,219	146	$5,738
3/25/16	30	47,631	133	$5,412
4/25/16	31	49,420	129	$5,580
5/24/16	29	46,222	132	$5,285
6/23/16	30	48,625	130	$5,637
7/25/16	32	54,425	119	$7,320
8/24/16	30	56,423	114	$6,529
9/23/16	30	55,223	144	$6,609
10/24/16	31	46,026	132	$5,543
11/23/16	30	48,822	132	$5,832
Totals	**365**	**609,685**	**145.8**	**$71,440**
Annual	**365**	**609,685**	**145.8**	**$71,440**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost over a recent 12 month period was found to be $1.017/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

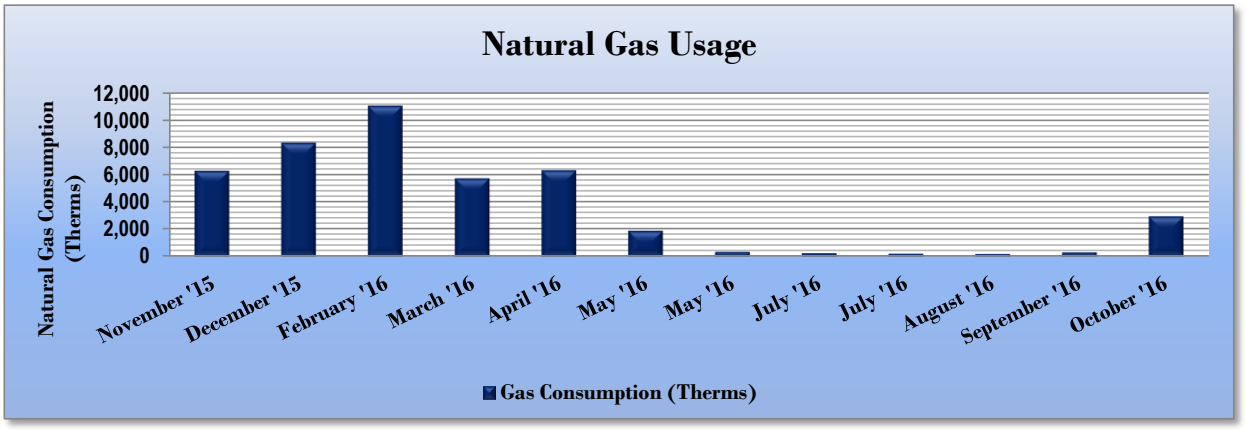


Figure 12 - Natural Gas Usage

Gas Billing Data for Martin Luther King Jr. Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
12/14/15	33	6,281	$5,784
1/15/16	32	8,358	$7,442
2/17/16	33	11,073	$9,610
3/17/16	29	5,730	$5,344
4/18/16	32	6,327	$5,820
5/16/16	28	1,888	$2,276
6/15/16	30	327	$1,029
7/18/16	33	232	$953
8/15/16	28	190	$919
9/13/16	29	178	$909
10/13/16	30	298	$1,091
11/11/16	29	2,941	$3,379
Totals	**366**	**43,824**	**$44,555**
Annual	**365**	**43,704**	**$44,433**

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		
	Martin Luther King Jr. Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	127.5	141.4
Site Energy Use Intensity (kBtu/ft^2)	73.9	58.2

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Martin Luther King Jr. Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	89.1	141.4
Site Energy Use Intensity (kBtu/ft^2)	54.6	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 is estimated to have a current ENERGY STAR® score of 80.

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

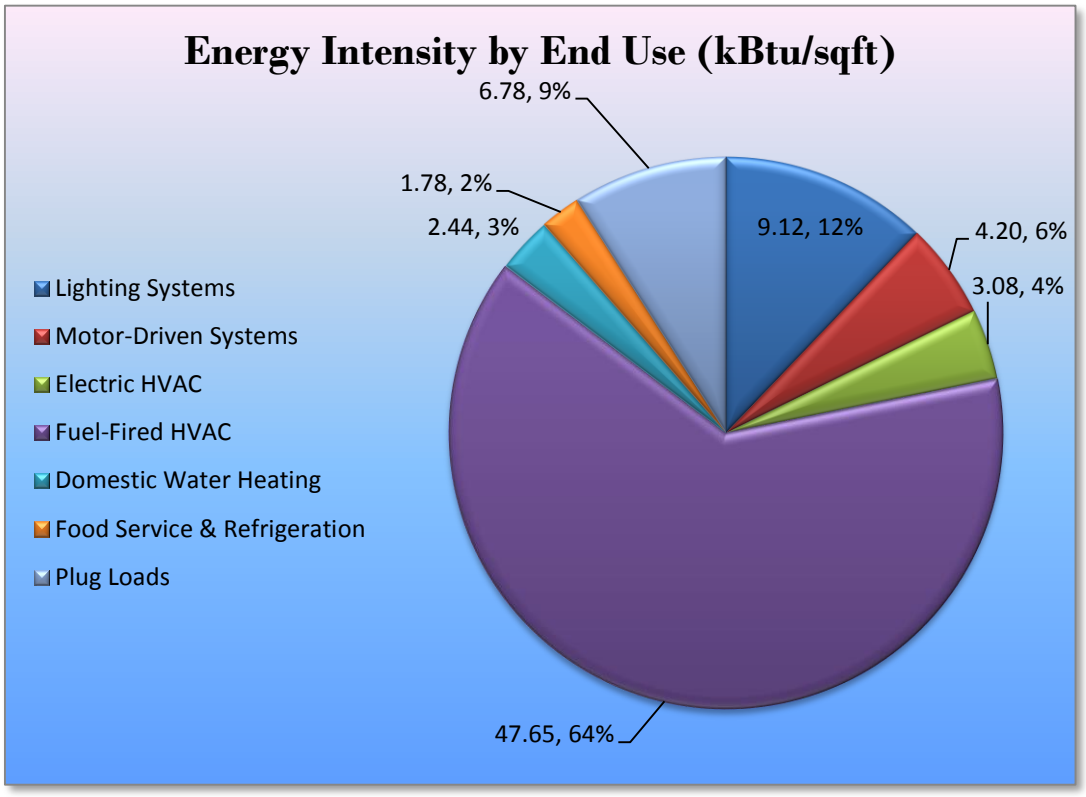
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the 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		**154,546**	**34.5**	**0.0**	**$18,108.91**	**$88,720.68**	**$17,845.00**	**$70,875.68**	**3.9**	**155,627**
ECM 1	Install LED Fixtures	48,443	7.0	0.0	$5,676.32	$14,668.21	$5,150.00	$9,518.21	1.7	48,782
ECM 2	Retrofit Fixtures with LED Lamps	106,103	27.5	0.0	$12,432.60	$74,052.48	$12,695.00	$61,357.48	4.9	106,845
Lighting Control Measures		**22,053**	**5.5**	**0.0**	**$2,584.07**	**$19,710.00**	**$2,555.00**	**$17,155.00**	**6.6**	**22,207**
ECM 3	Install Occupancy Sensor Lighting Controls	22,053	5.5	0.0	$2,584.07	$19,710.00	$2,555.00	$17,155.00	6.6	22,207
Motor Upgrades		**1,095**	**0.2**	**0.0**	**$128.30**	**$3,085.60**	**$0.00**	**$3,085.60**	**24.0**	**1,103**
ECM 4	Premium Efficiency Motors	1,095	0.2	0.0	$128.30	$3,085.60	$0.00	$3,085.60	24.0	1,103
Variable Frequency Drive (VFD) Measures		**18,069**	**1.8**	**0.0**	**$2,117.28**	**$7,213.60**	**$0.00**	**$7,213.60**	**3.4**	**18,196**
ECM 5	Install VFDs on Hot Water Pumps	18,069	1.8	0.0	$2,117.28	$7,213.60	$0.00	$7,213.60	3.4	18,196
Electric Unitary HVAC Measures		**15,490**	**9.2**	**0.0**	**$1,815.01**	**$53,463.17**	**$2,190.00**	**$51,273.17**	**28.2**	**15,598**
ECM 6	Install High Efficiency Electric AC	15,490	9.2	0.0	$1,815.01	$53,463.17	$2,190.00	$51,273.17	28.2	15,598
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**800.8**	**$8,141.26**	**$181,443.56**	**$20,900.00**	**$160,543.56**	**19.7**	**93,760**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	800.8	$8,141.26	$181,443.56	$20,900.00	$160,543.56	19.7	93,760
HVAC System Improvements		**8,656**	**2.0**	**0.0**	**$1,014.22**	**$2,250.00**	**$750.00**	**$1,500.00**	**1.5**	**8,716**
ECM 8	Install Dual Enthalpy Outside Economizer Control	8,656	2.0	0.0	$1,014.22	$2,250.00	$750.00	$1,500.00	1.5	8,716
Domestic Water Heating Upgrade		**0**	**0.0**	**128.0**	**$1,301.09**	**$394.56**	**$0.00**	**$394.56**	**0.3**	**14,984**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	128.0	$1,301.09	$394.56	$0.00	$394.56	0.3	14,984
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$188.87**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	1,612	0.0	0.0	$188.87	$230.00	$0.00	$230.00	1.2	1,623
TOTALS		**221,521**	**53.2**	**928.7**	**$35,399.02**	**$356,511.18**	**$44,240.00**	**$312,271.18**	**8.8**	**331,814**

* - 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		**154,546**	**34.5**	**0.0**	**$18,108.91**	**$88,720.68**	**$17,845.00**	**$70,875.68**	**3.9**	**155,627**
ECM 1	Install LED Fixtures	48,443	7.0	0.0	$5,676.32	$14,668.21	$5,150.00	$9,518.21	1.7	48,782
ECM 2	Retrofit Fixtures with LED Lamps	106,103	27.5	0.0	$12,432.60	$74,052.48	$12,695.00	$61,357.48	4.9	106,845

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	9,911	2.5	0.0	$1,161.34	$4,924.44	$2,700.00	$2,224.44	1.9	9,980
Exterior	38,532	4.5	0.0	$4,514.98	$9,743.77	$2,450.00	$7,293.77	1.6	38,801

Measure Description

We recommend replacing existing fixtures containing HID lamps with new high performance LED light fixtures. We recommend upgrading interior HID fixtures in the gym and all exterior HID fixtures to LED fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps and may last twice as long as many HID lamps while generally providing better quality lighting as well.

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	105,474	27.5	0.0	$12,358.95	$73,837.46	$12,695.00	$61,142.46	4.9	106,212
Exterior	629	0.1	0.0	$73.65	$215.01	$0.00	$215.01	2.9	633

Measure Description

We recommend retrofitting existing fluorescent and incandescent fixtures 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 of fluorescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 17 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		**22,053**	**5.5**	**0.0**	**$2,584.07**	**$19,710.00**	**$2,555.00**	**$17,155.00**	**6.6**	**22,207**
ECM 3	Install Occupancy Sensor Lighting Controls	22,053	5.5	0.0	$2,584.07	$19,710.00	$2,555.00	$17,155.00	6.6	22,207

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)
22,053	5.5	0.0	$2,584.07	$19,710.00	$2,555.00	$17,155.00	6.6	22,207

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, offices areas, locker rooms and the gym. 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.

4.1.3 Motor Upgrades

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

Figure 19-Summary of Motor Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**1,095**	**0.2**	**0.0**	**$128.30**	**$3,085.60**	**$0.00**	**$3,085.60**	**24.0**	**1,103**
ECM 4	Premium Efficiency Motors	1,095	0.2	0.0	$128.30	$3,085.60	$0.00	$3,085.60	24.0	1,103

ECM 4: 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)
1,095	0.2	0.0	$128.30	$3,085.60	$0.00	$3,085.60	24.0	1,103

Measure Description

We recommend replacing standard efficiency motors that power the heating hot water pumps with NEMA Premium® efficiency motors. We recommend replacing the motors that power building's two hot water pumps and the Quincy compressor used to power the pneumatic control system with high efficiency models.

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.

4.1.4 Variable Frequency Drive Measures

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

Figure 20 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**18,069**	**1.8**	**0.0**	**$2,117.28**	**$7,213.60**	**$0.00**	**$7,213.60**	**3.4**	**18,196**
ECM 5	Install VFDs on Hot Water Pumps	18,069	1.8	0.0	$2,117.28	$7,213.60	$0.00	$7,213.60	3.4	18,196

ECM 5: 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)
18,069	1.8	0.0	$2,117.28	$7,213.60	$0.00	$7,213.60	3.4	18,196

Measure Description

We recommend installing variable frequency drives (VFDs) to control the 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.

If the system contains 3-way valves, they will need to be replaced with 2-way valves to achieve the estimated savings. The cost associated with replacing 3-way valves is not currently included in the project economics.

4.1.5 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 21 below.

Figure 21 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**15,490**	**9.2**	**0.0**	**$1,815.01**	**$53,463.17**	**$2,190.00**	**$51,273.17**	**28.2**	**15,598**
ECM 6	Install High Efficiency Electric AC	15,490	9.2	0.0	$1,815.01	$53,463.17	$2,190.00	$51,273.17	28.2	15,598

ECM 6: 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)
15,490	9.2	0.0	$1,815.01	$53,463.17	$2,190.00	$51,273.17	28.2	15,598

Measure Description

We recommend replacing the building's 3 standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The units are estimated to be about 25 years old, which is beyond the rated useful lifetime for such equipment.

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.

4.1.6 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 22 below.

Figure 22 - Summary of Gas-Fired Heating Replacement ECMs

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	*Annual Natural Gas Savings (MMBtu)*	*Annual N/A Savings (MMBtu)*	*Annual N/A Savings (MMBtu)*	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**845.7**	**0.0**	**0.0**	**845.7**	**$8,598.53**	**$181,443.56**	**$20,900.00**	**$160,543.56**	**18.7**	**99,026**
ECM 1	Install High Efficiency Hot Water Boilers	Yes	0	0.0	845.7	0.0	0.0	845.7	$8,598.53	$181,443.56	$20,900.00	$160,543.56	18.7	99,026

ECM 7: 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	845.7	$8,598.53	$181,443.56	$20,900.00	$160,543.56	18.7	99,026

Measure Description

We recommend 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. Condensing hydronic boilers should be further investigated to see if they are a good fit for this site.

4.1.7 HVAC System Upgrades

Our recommendation for HVAC system improvement are summarized in Figure 23 below.

Figure 23 - Summary of HVAC System Improvement ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**8,656**	**2.0**	**0.0**	**$1,014.22**	**$2,250.00**	**$750.00**	**$1,500.00**	**1.5**	**8,716**
ECM 8	Install Dual Enthalpy Outside Economizer Control	8,656	2.0	0.0	$1,014.22	$2,250.00	$750.00	$1,500.00	1.5	8,716

ECM 8: Install Dual-Enthalpy Economizers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
8,656	2.0	0.0	$1,014.22	$2,250.00	$750.00	$1,500.00	1.5	8,716

Measure Description

Dual enthalpy economizers are used to control a ventilation system's outside air intake in order to reduce a facility's total cooling load. A dual-enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling instead of running the air handling system's compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

When installing new high efficiency air conditioning units, we recommend choosing new high efficiency models that contain dual enthalpy economizer controls.

4.1.8 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 24 below.

Figure 24 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**128.0**	**$1,301.09**	**$394.56**	**$0.00**	**$394.56**	**0.3**	**14,984**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	128.0	$1,301.09	$394.56	$0.00	$394.56	0.3	14,984

ECM 9: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	128.0	$1,301.09	$394.56	$0.00	$394.56	0.3	14,984

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general.

Faucet aerators can reduce hot water usage in restrooms, relative to standard aerators, which saves energy. Pre-rinse spray valves (PRSVs)—often used in commercial and institutional kitchens—are designed to remove food waste from dishes prior to dishwashing. Adding pre-rinse spray valves to kitchen faucets will reduce hot water usage and save energy.

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

4.1.9 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 25 below.

Figure 25-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**	**$188.87**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	1,612	0.0	0.0	$188.87	$230.00	$0.00	$230.00	1.2	1,623

ECM 10: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,612	0.0	0.0	$188.87	$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.

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.

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Reduce Motor (air compressor) Short Cycling

Frequent stopping and starting of motors subjects rotors and other parts to substantial stress. This can result in component wear, reducing efficiency, and increasing maintenance costs. Adjust the load on the motor to limit the amount of unnecessary stopping and starting to improve motor performance.

We observed during our inspection that compressor in the boiler room was cycling on and off frequently. The compressed air system that controls the HVAC equipment may have significant leaks which is causing the system to frequently cycle. This wastes energy. The compressed air system should be surveyed, leaks identified, and sealed.

Alternatively, the school may want to consider eventual replacement of all pneumatic controls on HVAC equipment with modern direct digital controls (DDC). DDC provide improved control of equipment and are much more energy efficient. If all pneumatic controls were replaced with DDC, then the compressed air system and the compressor could be eliminated.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

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

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).

Refer to Section 4.1.8 for low-flow ECM recommendations.

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.

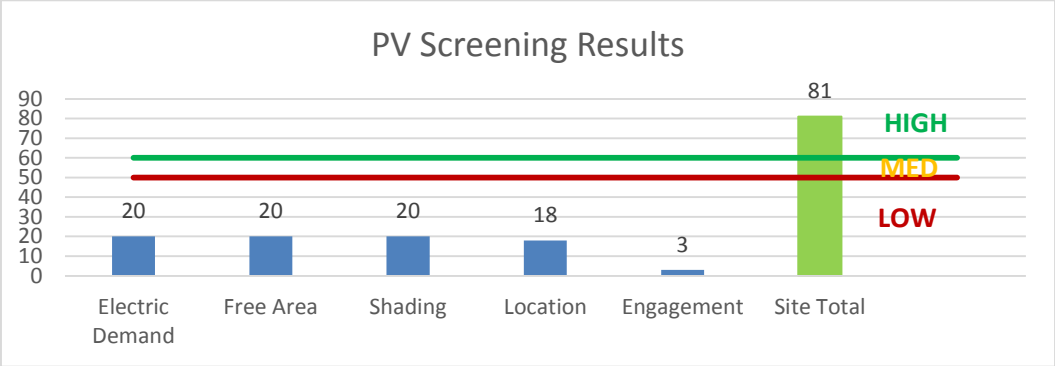
6.1 Photovoltaic

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 cost-effective installation of a solar 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. We estimate that the school's rooftop has about 30,000 ft2 of potentially usable unshaded roof space available. So, a rooftop PV array with up to 132 kW of generating capacity may be technically feasible and cost-effective. If Martin Luther King Jr. Middle School is interested in pursuing the installation of solar PV array, we recommended a full feasibility study be conducted.

Figure 26 - Photovoltaic Screening



Potential	High	
System Potential	132	kW DC STC
Electric Generation	157,261	kWh/yr
Displaced Cost	$13,680	/yr
Installed Cost	$343,200	

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

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

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

6.2 Combined Heat and Power

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

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

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

Low and infrequent thermal load are the most significant factors contributing to the low 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/.

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.

Based on our preliminary assessment this building may not have sufficient kW demand to be eligible for participation in a DR program.

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.

8 PROJECT FUNDING / INCENTIVES

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

Figure 27 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Install LED Fixtures	x		x	
ECM 2	Retrofit Fixtures with LED Lamps	x		x	
ECM 3	Install Occupancy Sensor Lighting Controls	x		x	
ECM 4	Premium Efficiency Motors			x	
ECM 5	Install VFDs on Hot Water Pumps	x		x	
ECM 6	Install High Efficiency Electric AC	x		x	
ECM 7	Install High Efficiency Hot Water Boilers	x		x	
ECM 8	Install Dual Enthalpy Outside Economizer Control			x	
ECM 9	Install Low-Flow Domestic Hot Water Devices			x	
ECM 10	Vending Machine Control			x	

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

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

How to Participate

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

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

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

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

8.5 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (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 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 the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

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
Lobby	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.09	346	0.0	$40.55	$234.00	$40.00	4.78
Boiler Rm	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.17	304	0.0	$35.57	$468.00	$80.00	10.91
Fitness Rm	33	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	33	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.90	3,608	0.0	$422.78	$2,740.50	$435.00	5.45
Fitness Storage	11	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	600	Relamp	No	11	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	600	0.13	133	0.0	$15.56	$394.90	$55.00	21.84
1st Floor Hall	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.32	1,298	0.0	$152.08	$877.50	$150.00	4.78
Paper Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,140	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,140	0.09	173	0.0	$20.28	$234.00	$40.00	9.57
Paper Storage	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,140	Relamp	No	14	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,140	0.16	321	0.0	$37.64	$502.60	$70.00	11.49
Storage Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.18	$35.90	$5.00	26.21
Ladies Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.03	138	0.0	$16.13	$107.70	$15.00	5.75
Office Rm 138	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,280	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,596	0.34	1,347	0.0	$157.86	$935.93	$175.00	4.82
Class Rm 128	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,280	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,596	0.57	2,296	0.0	$269.04	$1,592.80	$280.00	4.88
Class Rm 126	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,280	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,596	0.66	2,624	0.0	$307.48	$1,743.20	$310.00	4.66
Band Room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.66	2,624	0.0	$307.48	$1,944.00	$310.00	5.31
Band Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.02	92	0.0	$10.75	$71.80	$10.00	5.75
Band Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,140	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,140	0.13	260	0.0	$30.42	$351.00	$60.00	9.57
Staff Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.02	92	0.0	$10.75	$71.80	$10.00	5.75
Kitchen Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.04	173	0.0	$20.28	$117.00	$20.00	4.78
Kitchen	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	28	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.61	1,700	0.0	$199.22	$1,638.00	$280.00	6.82
Kitchen Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	91	0.0	$10.67	$117.00	$20.00	9.09
Kitchen Office 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.06	260	0.0	$30.42	$175.50	$30.00	4.78
Teacher's Lounge	9	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,280	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,280	0.09	378	0.0	$44.24	$433.80	$90.00	7.77
Cafeteria	65	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	65	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	1.78	7,107	0.0	$832.75	$5,422.50	$860.00	5.48
Exit	24	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	24	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Stage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.05	184	0.0	$21.51	$143.60	$20.00	5.75
Costodial Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.02	20	0.0	$2.36	$71.80	$10.00	26.21

	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
Boys Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.02	92	0.0	$10.75	$71.80	$10.00	5.75
Girls Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.02	92	0.0	$10.75	$71.80	$10.00	5.75
Restroom Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.01	46	0.0	$5.38	$35.90	$5.00	5.75
Athletic Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,600	0.05	129	0.0	$15.09	$143.60	$20.00	8.19
Athletic Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.02	20	0.0	$2.36	$71.80	$10.00	26.21
Athletic Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	800	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	800	0.01	12	0.0	$1.46	$31.90	$5.00	18.48
Boys Locker	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.57	2,296	0.0	$269.04	$1,768.50	$280.00	5.53
Athletic Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	600	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	600	0.07	72	0.0	$8.49	$215.40	$30.00	21.84
Gym Stairwell	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,280	Relamp	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,280	0.03	126	0.0	$14.75	$144.60	$30.00	7.77
Gym Stairwell	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.04	173	0.0	$20.28	$117.00	$20.00	4.78
Athletic Office Upper	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.09	243	0.0	$28.46	$234.00	$40.00	6.82
Upstairs Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,280	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,280	0.02	71	0.0	$8.30	$63.80	$10.00	6.49
Upstairs Locker	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,596	0.17	687	0.0	$80.56	$700.80	$95.00	7.52
Upstairs Locker	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.02	87	0.0	$10.14	$58.50	$10.00	4.78
Upstairs Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,280	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,280	0.02	71	0.0	$8.30	$63.80	$10.00	6.49
Showers	6	Incandescent: 60W	Wall Switch	60	2,280	Relamp	No	6	LED Screw-In Lamps: 60W LED replacement	Wall Switch	20	2,280	0.16	629	0.0	$73.74	$322.52	$30.00	3.97
Gym	18	Metal Halide: (1) 250W Lamp	Wall Switch	295	2,280	Fixture Replacement	Yes	18	LED - Fixtures: High-Bay	Occupancy Sensor	85	1,596	2.78	11,115	0.0	$1,302.36	$6,004.44	$2,840.00	2.43
Gym	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.49	1,968	0.0	$230.61	$1,053.00	$215.00	3.63
Library 125A	45	U-Bend Fluorescent - T8: U T8 (32W) - 3L	Wall Switch	92	2,280	Relamp	No	45	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,280	1.43	5,723	0.0	$670.53	$3,384.00	$675.00	4.04
Library Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,140	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,140	0.06	130	0.0	$15.21	$175.50	$30.00	9.57
Small Office 1	2	U-Bend Fluorescent - T8: U T8 (32W) - 1L	Wall Switch	39	1,600	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,600	0.03	90	0.0	$10.56	$71.80	$10.00	5.85
Storage Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,140	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,140	0.01	23	0.0	$2.69	$35.90	$5.00	11.49
Small Office 2	2	U-Bend Fluorescent - T8: U T8 (32W) - 3L	Wall Switch	92	1,600	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,600	0.06	178	0.0	$20.91	$150.40	$30.00	5.76
Small Office 3	2	U-Bend Fluorescent - T8: U T8 (32W) - 3L	Wall Switch	92	1,600	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,600	0.06	178	0.0	$20.91	$150.40	$30.00	5.76
Class Rm 121	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01

	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
Womans Rm	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Electric Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.02	15	0.0	$1.78	$58.50	$10.00	27.27
Storage Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.02	23	0.0	$2.67	$58.50	$10.00	18.18
Boys Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.11	433	0.0	$50.69	$292.50	$50.00	4.78
Room 111	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Room 111 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	600	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	600	0.01	12	0.0	$1.41	$35.90	$5.00	21.84
Class Rm 109	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.16	656	0.0	$76.87	$621.00	$95.00	6.84
Class Rm 107	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.16	656	0.0	$76.87	$621.00	$95.00	6.84
Class Rm 106	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 104	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 105	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 103	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 102	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 100	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Nurses Office 108	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.15	606	0.0	$70.97	$409.50	$70.00	4.78
Nurses Office 108	3	Incandescent: 60W	Wall Switch	60	2,280	Relamp	No	3	LED Screw-In Lamps: 60W LED replacement	Wall Switch	20	2,280	0.08	315	0.0	$36.87	$161.26	$15.00	3.97
Nurses Exam Rm 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.04	121	0.0	$14.23	$117.00	$20.00	6.82
Nurses Exam Rm 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.02	61	0.0	$7.11	$58.50	$10.00	6.82
7th Grade Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.04	173	0.0	$20.28	$117.00	$20.00	4.78
6th Grade Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.04	173	0.0	$20.28	$117.00	$20.00	4.78
Counselor's Office	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.15	606	0.0	$70.97	$409.50	$70.00	4.78
Conf Rm	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.13	519	0.0	$60.83	$351.00	$60.00	4.78
Principles Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.09	243	0.0	$28.46	$234.00	$40.00	6.82
Vice Principles Office 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.09	243	0.0	$28.46	$234.00	$40.00	6.82
Restroom 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.36	$35.90	$5.00	13.10

	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
Restroom 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.36	$35.90	$5.00	13.10
Vice Principles Office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.09	243	0.0	$28.46	$234.00	$40.00	6.82
Main Office	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.35	1,384	0.0	$162.22	$936.00	$160.00	4.78
ISS Trailer	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.26	1,038	0.0	$121.66	$702.00	$120.00	4.78
Police Substation	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.26	1,038	0.0	$121.66	$702.00	$120.00	4.78
Class Rm 325	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 323	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.16	656	0.0	$76.87	$621.00	$95.00	6.84
Class Rm 314	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 321	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.16	656	0.0	$76.87	$621.00	$95.00	6.84
Class Rm 312	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 319	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Restrooom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.36	$35.90	$5.00	13.10
Maop Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.22	$58.50	$10.00	21.81
3rd Floor Hall	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	22	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.48	1,904	0.0	$223.05	$1,287.00	$220.00	4.78
Class Rm 310	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 308	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 308 Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.02	87	0.0	$10.14	$58.50	$10.00	4.78
Class Rm 309	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 307	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 304	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 305	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 303	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 302	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 300	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 301	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01

	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
Class Rm 305	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Class Rm 305	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.41	1,640	0.0	$192.17	$1,147.50	$185.00	5.01
Classes 200-204, 210, 216, 218, 220	135	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	135	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	3.69	14,761	0.0	$1,729.56	$10,327.50	$1,665.00	5.01
Classes 205, 207, 217, 219	120	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	120	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	3.28	13,120	0.0	$1,537.39	$9,180.00	$1,480.00	5.01
Classes 206 & 208	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.33	1,312	0.0	$153.74	$1,242.00	$190.00	6.84
Restrooom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.36	$35.90	$5.00	13.10
Restrooom	1	Incandescent: 60W	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 60W LED replacement	Wall Switch	20	1,000	0.03	46	0.0	$5.39	$53.75	$5.00	9.05
Office Rm 212	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,280	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,280	0.01	42	0.0	$4.92	$48.20	$10.00	7.77
2nd Fl Hall	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	No	23	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,280	0.50	1,990	0.0	$233.19	$1,345.50	$230.00	4.78
Boys Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.07	275	0.0	$32.26	$215.40	$30.00	5.75
Girls Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,280	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,280	0.07	275	0.0	$32.26	$215.40	$30.00	5.75
Dean's Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.13	364	0.0	$42.69	$351.00	$60.00	6.82
Restrooom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.36	$35.90	$5.00	13.10
Mop Closet x 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$4.45	$117.00	$20.00	21.81
Class Rm 221	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.27	1,093	0.0	$128.12	$855.00	$135.00	5.62
Flag Pole	1	Metal Halide: (1) 250W Lamp	None	295	4,880	Fixture Replacement	No	1	LED - Fixtures: Architectural Flood/Spot Luminaire	None	85	4,880	0.14	1,179	0.0	$138.09	$367.52	$50.00	2.30
Front Door	4	Compact Fluorescent: 2 x 17W CFL	None	34	4,880	Relamp	No	4	LED Screw-In Lamps: Pin Based LED	None	6	4,880	0.07	629	0.0	$73.65	$215.01	$0.00	2.92
Roof Line	17	Metal Halide: (1) 400W Lamp	None	458	4,880	Fixture Replacement	No	17	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	120	4,880	3.77	32,247	0.0	$3,778.48	$6,641.51	$1,700.00	1.31
Trailer Entances	4	Metal Halide: (1) 70W Lamp	None	95	4,880	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	25	4,880	0.18	1,571	0.0	$184.12	$1,562.71	$400.00	6.31
Parking Lot	8	LED - Fixtures: Outdoor Post-Mount	None	35	4,880	None	No	8	LED - Fixtures: Outdoor Post-Mount	None	35	4,880	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Entrance	3	Metal Halide: (1) 250W Lamp	None	295	4,880	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	85	4,880	0.41	3,536	0.0	$414.28	$1,172.03	$300.00	2.10
STEM Trailer	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,280	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,596	0.33	1,312	0.0	$153.74	$972.00	$155.00	5.31

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
Various	Class Room UVs	49	Supply Fan	0.1	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Exhaust Fans	41	Exhaust Fan	0.3	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Rm	Heating Hot Water Pump	1	Heating Hot Water Pump	7.5	88.5%	No	3,391	Yes	91.0%	Yes	1	1.01	9,467	0.0	$1,109.28	$4,738.24	$0.00	4.27
Boiler Rm	Heating Hot Water Pump	1	Heating Hot Water Pump	7.5	89.5%	No	3,391	Yes	91.7%	Yes	1	0.99	9,343	0.0	$1,094.81	$4,760.59	$0.00	4.35
Boiler Rm	Foreced Draft Fan	2	Combustion Air Fan	2.0	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AC Units	3	Supply Fan	5.0	87.5%	No	2,745	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Rm	Pneumatic Controls	1	Air Compressor	5.0	87.5%	No	4,957	Yes	89.5%	No		0.05	354	0.0	$41.50	$800.37	$0.00	19.29
Roof	Corridors	3	Exhaust Fan	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gyms, Rm 311, Rm 313	6	Exhaust Fan	0.8	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Office Area, Locker Rm, Corridor	2	Exhaust Fan	0.5	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Various	3	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Home Ec, Rm 229	2	Exhaust Fan	0.2	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Kitchen Office	2	Exhaust Fan	0.0	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen Hood	1	Kitchen Hood Exhaust Fan	0.5	80.0%	No	200	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Fitness Room	Fitness Room	4	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rm 130	Rm 130	1	Through-The-Wall AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Various	12	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trailers	Trailers	2	Through-The-Wall HP	2.00	2.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Various	3	Packaged AC	10.00		Yes	3	Packaged AC	10.00		11.50		Yes	11.13	24,145	0.0	$2,829.24	$55,713.17	$2,940.00	18.65

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	School	2	Non-Condensing Hot Water Boiler	5,230.00	Yes	4	Condensing Hot Water Boiler	2,375.00	95.00%	Et	0.00	0	800.8	$8,141.26	$181,443.56	$20,900.00	19.72

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	School	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Athletic Restroom	3	Faucet Aerator (Lavatory)	3.00	1.00	0.00	0	6.7	$68.60	$21.51	$0.00	0.31
Kitchen	3	Pre-Rinse Spray Valve	5.00	1.15	0.00	0	121.2	$1,232.49	$373.05	$0.00	0.30

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Electric Combination Oven/Steam Cooker (<15 Pans)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Electric Griddle (3 Feet Width)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Electric Convection Oven (Half Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	6	Insulated Food Holding Cabinet (1/2 Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Electric Steamer	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Kitchen	2	Small Drink Cooler	100.0	No
Kitchen	2	Reach-in Milk Cooler	500.0	No
Kitchen	1	Ice Maker	500.0	No
Kitchen	2	Walk-in Refrigerator	2,094.0	No
Various	636	Desktop Computers	120.0	Yes
Various	636	Computer Monitors	28.0	Yes
Various	14	Sm. Printers	13.0	Yes
Various	1	Lg. Copiers	380.0	Yes
Various	4	Sm. Microwaves	800.0	No
Various	4	Refrigerator	500.0	Yes
Fitness Room	3	Server	120.0	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 Louge	1	Refrigerated	Yes	0.00	1,612	0.0	$188.87	$230.00	$0.00	1.22

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Martin Luther King Jr. Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 87,250
Built: 1971

For Year Ending: October 31, 2016
Date Generated: October 13, 2017

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
Martin Luther King Jr. Middle School 1200 Bangs Avenue Asbury Park, New Jersey 07712	Asbury Park Board of Education 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426	Geoffrey Hastings 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426 hastingsg@asburypark.k12.nj.us

Property ID: 6049330

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
73.8 kBtu/ft²

Source EUI
127.3 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	4,354,364 (68%)
Electric - Grid (kBtu)	2,080,380 (32%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	101.1
National Median Source EUI (kBtu/ft²)	174.4
% Diff from National Median Source EUI	-27%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	462

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)