Local Government Energy Audit:
Energy Audit Report

Asbury Park High School

Asbury Park Board of Education

1003 Sunset 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.

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

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

Asbury Park High School is a 171,260 square foot facility comprised of various space types within a single building. The high schools has stadium fieldhouse behind the building, along with lighted football and baseball fields. The school building has four floors, which includes classrooms, offices, gyms, locker rooms, an auditorium, cafeteria, and mechanical spaces. Lighting at Asbury Park High School consists primarily of fixtures with T8 linear fluorescent bulbs which are considered inefficient by today's lighting standards. The buildings also has fixtures containing compact fluorescent lamps (CFL) and high intensity discharge (HID) lamps.

The building is conditioned by 11 air handling units (AHU) located on the roof and in mechanical spaces. The AHUs receive chilled water and hot water from a Trane chiller plant on the roof. There are approximately 82 unit ventilators and fan coils units located throughout the building, which provide cooling and heating to classroom and office spaces.

Heat is supplied by four high efficiency PK MACH C2500 boilers, which were installed in 2016. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services evaluated 10 measures which together represent an opportunity for Asbury Park High School to reduce annual energy costs by roughly $23,135 and annual greenhouse gas emissions by 194,890 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 7.1 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Asbury Park High School's annual energy use by about 10% overall.

Figure 1 – Previous 12 Month Utility Costs

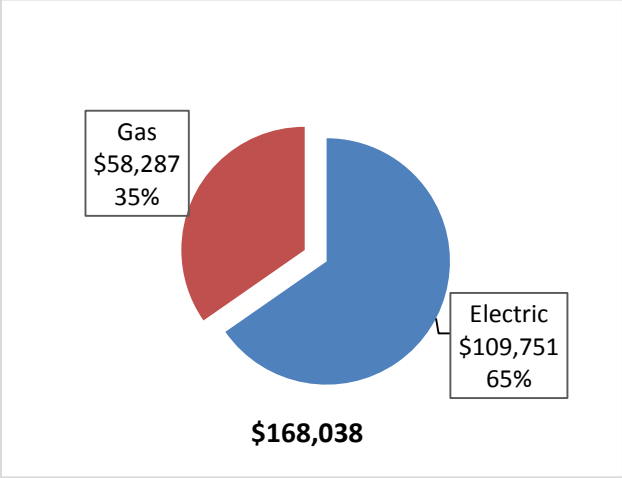
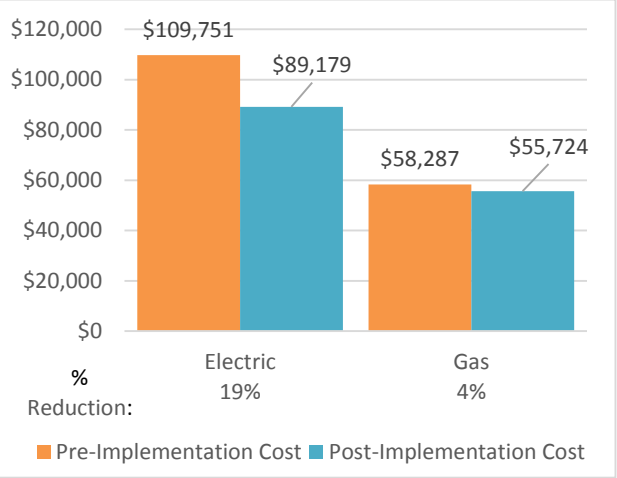


Figure 2 – Potential Post-Implementation Costs



A detailed description of Asbury Park High 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			**140,312**	**49.0**	**0.0**	**$17,352.96**	**$140,307.47**	**$19,060.00**	**$121,247.47**	**7.0**	**141,293**
ECM 1	Install LED Fixtures	Yes	49,394	21.5	0.0	$6,108.69	$65,101.32	$6,455.00	$58,646.32	9.6	49,739
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	217	0.3	0.0	$26.85	$936.00	$80.00	$856.00	31.9	219
ECM 3	Retrofit Fixtures with LED Lamps	Yes	88,727	27.1	0.0	$10,973.22	$71,258.61	$12,525.00	$58,733.61	5.4	89,347
ECM 4	Install LED Exit Signs	Yes	1,975	0.1	0.0	$244.19	$3,011.54	$0.00	$3,011.54	12.3	1,988
Lighting Control Measures			**20,719**	**6.3**	**0.0**	**$2,562.36**	**$36,836.00**	**$3,205.00**	**$33,631.00**	**13.1**	**20,864**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	20,032	6.1	0.0	$2,477.48	$34,676.00	$3,205.00	$31,471.00	12.7	20,172
ECM 6	Install High/Low Lighitng Controls	Yes	686	0.2	0.0	$84.88	$2,160.00	$0.00	$2,160.00	25.4	691
Electric Unitary HVAC Measures			**3,698**	**2.2**	**0.0**	**$457.36**	**$8,728.28**	**$547.50**	**$8,180.78**	**17.9**	**3,724**
ECM 7	Install High Efficiency Electric AC	Yes	3,698	2.2	0.0	$457.36	$8,728.28	$547.50	$8,180.78	17.9	3,724
HVAC System Improvements			**0**	**0.0**	**41.3**	**$453.06**	**$600.00**	**$0.00**	**$600.00**	**1.3**	**4,840**
ECM 8	Install DHW Tank Insulation	Yes	0	0.0	41.3	$453.06	$600.00	$0.00	$600.00	1.3	4,840
Domestic Water Heating Upgrade			**0**	**0.0**	**233.9**	**$2,110.28**	**$583.44**	**$0.00**	**$583.44**	**0.3**	**22,546**
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	192.6	$2,110.28	$583.44	$0.00	$583.44	0.3	22,546
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$199.34**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	Yes	1,612	0.0	0.0	$199.34	$230.00	$0.00	$230.00	1.2	1,623
TOTALS			**166,341**	**57.5**	**275.2**	**$23,135.37**	**$187,285.18**	**$22,812.50**	**$164,472.68**	**7.1**	**194,890**

* - 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.

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.

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 upgrade measures generally involve replacement of older inefficient domestic hot water systems with modern high efficiency water heating equipment, or adding devices that conserve water and reduce hot water energy usage. High efficiency hot water heating systems and water conservation devices can provide equivalent, or greater, hot water service compared to older systems with high flow fixtures 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/or reducing standby losses by cutting excessive use of hot water.

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 Asbury Park High School include:

- Close Doors and Windows
- 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
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	199	kW DC STC
Electric Generation	237,083	kWh/yr
Displaced Cost	$20,630	/yr
Installed Cost	$569,100	

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
- Pay for Performance - Existing Building (P4P)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy 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.

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
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 August 4, 2017, TRC performed an energy audit at Asbury Park High 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.

Asbury Park High School is a 171,260 square foot facility comprised of various space types within a single building. The high schools has stadium fieldhouse behind the building, along with lighted football and baseball fields. The school building has four floors, which includes classrooms, offices, a gym, locker rooms, an auditorium, cafeteria, and mechanical spaces. Lighting at Asbury Park High School consists primarily of fixtures with T8 linear fluorescent bulbs which are considered inefficient by today's lighting standards. The buildings also has fixtures containing compact fluorescent lamps (CFL) and high intensity discharge (HID) lamps.

The building is conditioned by 11 air handling units (AHU) located on the roof and in mechanical spaces. The AHUs receive chilled water and hot water from a Trane chiller plant on the roof. There are approximately 82 unit ventilators and fan coils units located throughout the building, which provide cooling and heating to classroom and office spaces. Heat is supplied by four high efficiency PK MACH C2500 boilers, which were installed in 2016. The chiller, the main boilers, and their associated distribution pumps have all been replaced within the last three years.

2.3 Building Occupancy

The building is open Monday through Friday; it does not have regularly scheduled weekend use. Asbury Park high School provides instruction during both the regular school year and the summer. The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 440 students and staff.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Asbury Park High School	Weekday	7:15AM - 4:15PM
Asbury Park High School	Weekend	Closed

2.4 Building Envelope

The building is constructed of concrete block and brick with a stone façade in some locations. The building has a flat roof covered with a white bitumen roof membrane that is in fair condition. The building has single pane windows with interior storm windows in some locations. Many of the windows are operable. The exterior doors are constructed of aluminum and glass.

Image 1: Asbury Park High School Front Exterior

2.5 On-Site Generation

Asbury Park High School does not have any on-site electric generation capacity currently installed.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided predominately 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 1, 3, and 4- lamp linear T8 fixtures. The buildings also has many compact fluorescent lamps (CFL) and a few scattered incandescent bulbs. Lighting control throughout the building is provided by manually operated wall switches.

Exterior lighting is mostly provided by fixtures with high intensity discharge (HID) lamps. These fixtures illuminate the building perimeter. Some exterior lighting has already been upgraded or retrofitted with LEDs. The bleachers and football and baseball fields behind the building are also lit by HID lamps. Exterior security lighting is controlled by photocells, while the spot lights for the athletic fields are manually controlled.

Image 2: Interior Lighting at APHS

Image 3: Exterior Lighting

Chilled Water System

The facility is cooled by a single chilled water plant. We could not access the chiller during our inspection, but based on its physical size, configuration, vintage, and the buildings load, we estimate it to be approximately 275 tons with multiple variable speed screw compressors. The air-cooled chiller is configured in a primary-only chilled water distribution loop with two 60 hp variable flow distribution pumps; controlled with VFDs. It is assumed that the chiller plant is locked out when the outside air temperature is below 45°F and turned off from mid-November through March.

The chiller plant supplies chilled water to air handlers and fan coils throughout the school.

The chiller and chilled water distributions pumps were replaced in 2016 and are in good working condition.

Image 4: Air-Cooled Chiller and Chilled Water Pumps

Hot Water Heating System

The hot water system consists of four PK Mach C-2500 MBH condensing boilers. These staged boilers have a nominal combustion efficiency of 94.2% and an output of 2,350 MBH each. The boilers are configured in a variable flow primary distribution loop with two 50-hp hot water pumps; controlled with variable frequency drives (VFDs). The boilers provide hot water to the air handlers and fan coil units throughout the building.

Staged boilers come on as needed to serve the building load. Based on historic fuel usage, it appears that only two boilers are needed to serve the building load under most conditions. The boilers operate in a lead/lag configuration.

The boilers are only three years old and in excellent operating condition.

Image 5: New High Efficiency Modular Boilers and Hot Water Pumps with VFDs

Chilled Water Air Conditioning System (CHW)

There are 11 air handling units that provide ventilation for the majority of school. Each AHU draws air from its own return air shaft and supplies air to its own air shaft. Eight of the AHU are located on the roof and three are located in mechanical spaces throughout the building. Most of the AHUs are constant volume, though four (AHU 1, -2, -5 and the ERU) are variable air volume.

There are approximately 82 unit ventilators and fan coil units throughout the school that provide conditioned air to classroom and office spaces. The units are located within in classrooms or above the ceiling. All have hot water coils and most also have cooling coils as well. Some units have recently been replaced and the school has plans to replace additional units. Most of the units appeared relatively new and in good condition.

The only areas without cooling are the school's two gyms.

Image 6: Classroom Unit Ventilator

Direct Expansion Air Conditioning System (DX)

Four 20-ton and one 7.5-ton split systems are used to condition specific areas throughout the building (e.g. the media center). The fans and evaporators are located in mechanical spaces near the areas they serve. The compressor and condensing unit are located outside mostly on the ground adjacent to the building (one is located on the roof of the boiler room). The units provides constant air volume. One was seen to also have a hot water coil.

Spot cooling throughout the building (classrooms and offices) is provided by 24 small window air conditioning units. These range in capacity from 9,000 to 24,000 Btu/hr.

The units are manually controlled by a thermostats located in each zone. The unit operates on demand to maintain a space temperature setpoint around 72°F (adjustable by staff).

Image 7: Air Conditioning Units

Building Energy Management System (BEMS)

The building is controlled by a combination of York ISN direct digital controllers and independent manual thermostats.

The boiler and chiller plants are controlled by on-board control systems.

Domestic Hot Water Heating System

The domestic water heating system for the main building consists of a single gas-fired hot water heater. The water heater is connected to a 350-gallon uninsulated storage tank. The DHW heater was replaced five years ago. A recirculation pump distributes domestic hot water to the entire building. The hot water recirculation pump operates continuously.

Image 8: Domestic Hot Water Heater and Storage Tank

A separate domestic hot water heating system for the field house behind the high school supplies the showers and sinks there. It consists of two high efficiency gas-fired condensing hot water heater. The water heaters are connected to a 250 gallon storage tanks. A recirculation pump distributes domestic hot water throughout the entire building. 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 gas fired. Generally, ovens and griddles are turned on when the kitchen staff arrive and turned off when lunch service stops.

Building Plug Load

There are roughly 283 computer work stations throughout the facility. The computers are desktop units with LCD monitors. There is no centralized PC power management software installed.

There are roughly 19 servers scattered throughout the facility. Some of them have cooling provided by dedicated split systems. The remaining use air provided by the main AHUs.

In addition to the typical class room TVs and copy room equipment, we observed multiple microwaves and standup refrigerators. Many of the TVs used in classrooms were older type CRT televisions. Replacing them with new flat panel displays, which often use less than half the energy of older models, could save additional electric energy.

Image 9: Building Plug Load Equipment

2.7 Water-Using Systems

There are approximately 18 restrooms at this facility. A sampling of restrooms found that most of the faucets were water-conserving low-flow rated devices and only a few of the faucets are rated for 2.2 gallons per minute (gpm) or higher. The toilets are rated at less than 2.5 gallons per flush (gpf) and the urinals are rated at less than 2 gpf. The few remaining high-flow fixtures in restrooms should be replaced to conserve hot water. The faucets in the kitchen area were also higher flow devices.

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

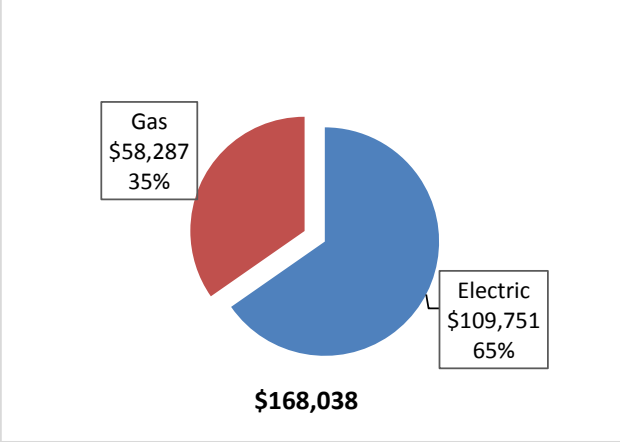
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Asbury Park High School		
Fuel	**Usage**	**Cost**
Electricity	887,423 kWh	$109,751
Natural Gas	53,184 Therms	$58,287
Total		**$168,038**

The current annual energy cost for this facility is $168,038 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 $0.124/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

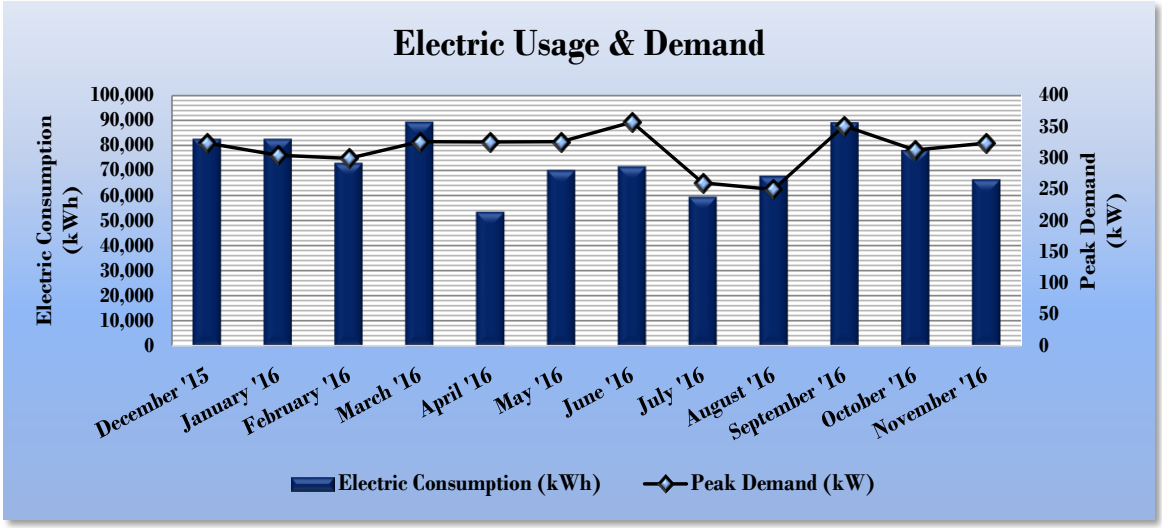


Figure 10 - Electric Usage & Demand

Electric Billing Data for Asbury Park High School				
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost
12/28/15	33	82,400	324	$9,593
1/27/16	30	82,400	305	$9,894
2/25/16	29	72,880	300	$8,943
3/25/16	29	89,200	326	$10,271
4/25/16	31	53,440	326	$7,064
5/24/16	29	70,080	326	$8,716
6/23/16	30	71,520	357	$8,877
7/25/16	32	59,440	261	$7,327
8/24/16	30	67,760	250	$8,425
9/23/16	30	89,040	352	$11,395
10/25/16	32	78,000	313	$9,897
11/22/16	28	66,400	324	$8,747
Totals	**363**	**882,560**	**357.4**	**$109,150**
Annual	**365**	**887,423**	**357.4**	**$109,751**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for a recent 12 month period was found to be $1.096/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

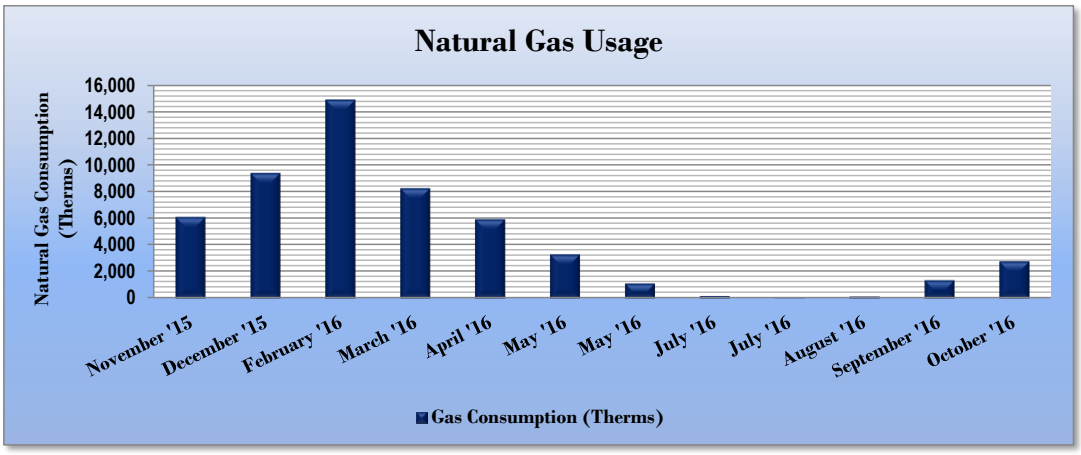


Figure 12 - Natural Gas Usage

Gas Billing Data for Asbury Park High School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
12/14/15	33	6,088	$6,215
1/15/16	32	9,385	$8,712
2/17/16	33	14,863	$12,712
3/17/16	29	8,236	$7,612
4/18/16	32	5,920	$5,883
5/16/16	28	3,281	$4,004
6/15/16	30	1,106	$2,427
7/18/16	33	181	$1,753
8/15/16	28	11	$1,621
9/13/16	29	139	$1,712
10/13/16	30	1,355	$2,114
11/11/16	29	2,766	$3,682
Totals	**366**	**53,330**	**$58,447**
Annual	**365**	**53,184**	**$58,287**

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		
	Asbury Park High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	88.1	141.4
Site Energy Use Intensity (kBtu/ft^2)	48.7	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		
	Asbury Park High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	76.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	44.1	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 92 out of 100.

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

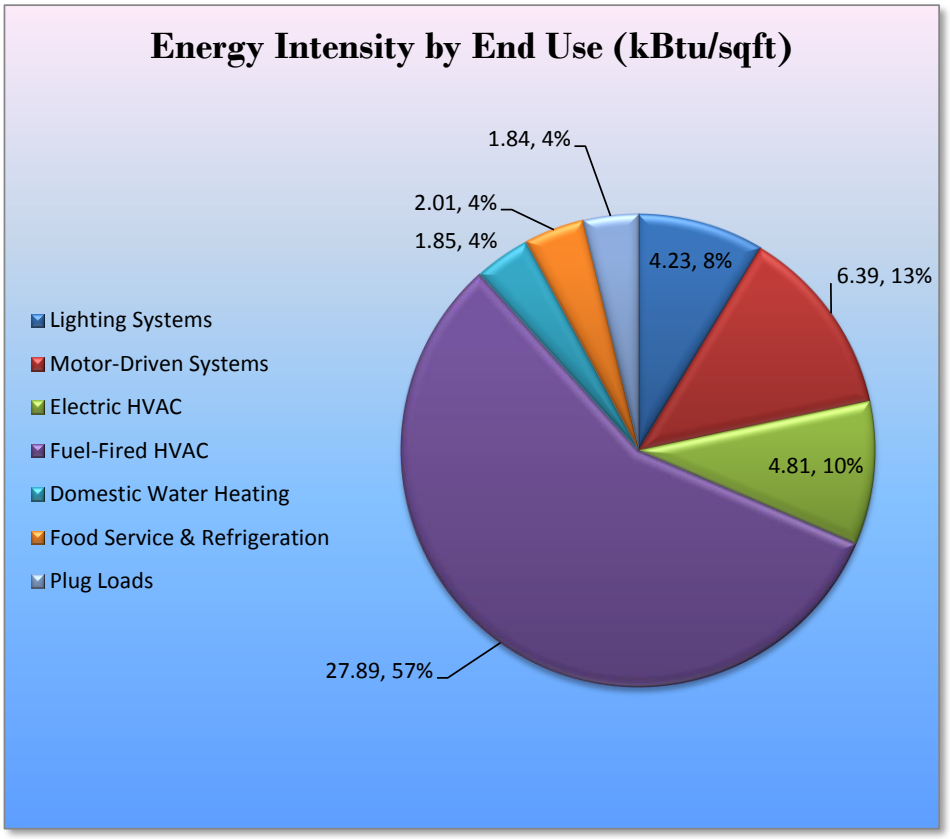
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 (kBtu/ft² and %)



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 Asbury Park High 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		**140,312**	**49.0**	**0.0**	**$17,352.96**	**$140,307.47**	**$19,060.00**	**$121,247.47**	**7.0**	**141,293**
ECM 1	Install LED Fixtures	49,394	21.5	0.0	$6,108.69	$65,101.32	$6,455.00	$58,646.32	9.6	49,739
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	217	0.3	0.0	$26.85	$936.00	$80.00	$856.00	31.9	219
ECM 3	Retrofit Fixtures with LED Lamps	88,727	27.1	0.0	$10,973.22	$71,258.61	$12,525.00	$58,733.61	5.4	89,347
ECM 4	Install LED Exit Signs	1,975	0.1	0.0	$244.19	$3,011.54	$0.00	$3,011.54	12.3	1,988
Lighting Control Measures		**20,719**	**6.3**	**0.0**	**$2,562.36**	**$36,836.00**	**$3,205.00**	**$33,631.00**	**13.1**	**20,864**
ECM 5	Install Occupancy Sensor Lighting Controls	20,032	6.1	0.0	$2,477.48	$34,676.00	$3,205.00	$31,471.00	12.7	20,172
ECM 6	Install High/Low Lighitng Controls	686	0.2	0.0	$84.88	$2,160.00	$0.00	$2,160.00	25.4	691
Electric Unitary HVAC Measures		**3,698**	**2.2**	**0.0**	**$457.36**	**$8,728.28**	**$547.50**	**$8,180.78**	**17.9**	**3,724**
ECM 7	Install High Efficiency Electric AC	3,698	2.2	0.0	$457.36	$8,728.28	$547.50	$8,180.78	17.9	3,724
HVAC System Improvements		**0**	**0.0**	**41.3**	**$453.06**	**$600.00**	**$0.00**	**$600.00**	**1.3**	**4,840**
ECM 8	Install DHW Tank Insulation	0	0.0	41.3	$453.06	$600.00	$0.00	$600.00	1.3	4,840
Domestic Water Heating Upgrade		**0**	**0.0**	**192.6**	**$2,110.28**	**$583.44**	**$0.00**	**$583.44**	**0.3**	**22,546**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	192.6	$2,110.28	$583.44	$0.00	$583.44	0.3	22,546
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$199.34**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	1,612	0.0	0.0	$199.34	$230.00	$0.00	$230.00	1.2	1,623
TOTALS		**166,341**	**57.5**	**233.9**	**$23,135.37**	**$187,285.18**	**$22,812.50**	**$164,472.68**	**7.1**	**194,890**

* - 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		**140,312**	**49.0**	**0.0**	**$17,352.96**	**$140,307.47**	**$19,060.00**	**$121,247.47**	**7.0**	**141,293**
ECM 1	Install LED Fixtures	49,394	21.5	0.0	$6,108.69	$65,101.32	$6,455.00	$58,646.32	9.6	49,739
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	217	0.3	0.0	$26.85	$936.00	$80.00	$856.00	31.9	219
ECM 3	Retrofit Fixtures with LED Lamps	88,727	27.1	0.0	$10,973.22	$71,258.61	$12,525.00	$58,733.61	5.4	89,347
ECM 4	Install LED Exit Signs	1,975	0.1	0.0	$244.19	$3,011.54	$0.00	$3,011.54	12.3	1,988

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	4,497	1.0	0.0	$556.13	$2,817.28	$2,400.00	$417.28	0.8	4,528
Exterior	44,897	20.5	0.0	$5,552.57	$62,284.04	$4,055.00	$58,229.04	10.5	45,211

Measure Description

We recommend replacing existing fixtures containing HID lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	217	0.3	0.0	$26.85	$936.00	$80.00	$856.00	31.9	219
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T12 fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	86,188	26.8	0.0	$10,659.14	$71,208.61	$12,475.00	$58,733.61	5.5	86,790
Exterior	2,540	0.3	0.0	$314.08	$50.00	$50.00	$0.00	0.0	2,557

Measure Description

We recommend retrofitting most of the existing incandescent, halogen, and fluorescent lights throughout the school 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 ten times longer than many incandescent lamps.

ECM 4: Install LED Exit Signs

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	1,975	0.1	0.0	$244.19	$3,011.54	$0.00	$3,011.54	12.3	1,988
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

Most of the exit sign in the building are LEDs, but a few of the older less efficient lighted signs remain. We recommend replacing all incandescent or compact fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. Replacing signs with LED models only saves a few watts per sign, but the energy usage adds up over time because exit signs are always on. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

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

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**20,719**	**6.3**	**0.0**	**$2,562.36**	**$36,836.00**	**$3,205.00**	**$33,631.00**	**13.1**	**20,864**
ECM 5	Install Occupancy Sensor Lighting Controls	20,032	6.1	0.0	$2,477.48	$34,676.00	$3,205.00	$31,471.00	12.7	20,172
ECM 6	Install High/Low Lighitng Controls	686	0.2	0.0	$84.88	$2,160.00	$0.00	$2,160.00	25.4	691

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

ECM 5: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
20,032	6.1	0.0	$2,477.48	$34,676.00	$3,205.00	$31,471.00	12.7	20,172

Measure Description

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

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

ECM 6: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
686	0.2	0.0	$84.88	$2,160.00	$0.00	$2,160.00	25.4	691

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. We recommend this type of lighting control for the school's stairwells so that a minimum amount of lighting is available at all times for safety reasons, but lighting instantly comes to full brightness whenever the space is occupied.

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

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

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

4.1.3 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 19 below.

Figure 19 - 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		**3,698**	**2.2**	**0.0**	**$457.36**	**$8,728.28**	**$547.50**	**$8,180.78**	**17.9**	**3,724**
ECM 7	Install High Efficiency Electric AC	3,698	2.2	0.0	$457.36	$8,728.28	$547.50	$8,180.78	17.9	3,724

ECM 7: Install High Efficiency Air Conditioning Units

Measure Description

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

We found one older inefficient AC condensing unit (manufactured by Inter-City Products) on the ground in front of the building. It is 24 years old and was estimated to have a cooling capacity of about 7.5 tons. We estimate that a newer high efficiency unit of similar size would reduce the amount of energy needed to cool the space it serves by about 29%.

4.1.4 HVAC System Upgrades

Our recommendation for HVAC system improvement are summarized in Figure 20 below.

Figure 20 - 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		**0**	**0.0**	**41.3**	**$453.06**	**$600.00**	**$0.00**	**$600.00**	**1.3**	**4,840**
ECM 8	Install Pipe Insulation	0	0.0	41.3	$453.06	$600.00	$0.00	$600.00	1.3	4,840

ECM 8: Install Pipe Insulation

Measure Description

We recommend installing insulation on domestic hot water storage tank. The school's main DHW tank was found to have a surface temperature of 125°F, which means it is radiating away significant heat energy to the surrounding space. System losses are dependent on water system temperature, the size of the tank, and the level of insulation of the piping. Significant energy savings can be achieved when insulation is added to reduce standing tank losses.

This measure saves energy by reducing heat losses from the heating distribution system.

4.1.5 Domestic Hot Water Heating System Upgrades

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

Figure 21 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**192.6**	**$2,110.28**	**$583.44**	**$0.00**	**$583.44**	**0.3**	**22,546**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	192.6	$2,110.28	$583.44	$0.00	$583.44	0.3	22,546

ECM 9: Install Low-Flow DHW Devices

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, 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. They reduce overall water usage but increase the pressure to make rinsing easier. Adding pre-rinse spray valves to kitchen faucets will reduce hot water usage used during dishwashing and cleanup activities, which will save energy.

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

4.1.6 Plug Load Equipment Control - Vending Machines

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

Figure 22-Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$199.34**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 10	Vending Machine Control	1,612	0.0	0.0	$199.34	$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	$199.34	$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.

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.

Replace Computer Monitors

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 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 4.1.5 for any 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.

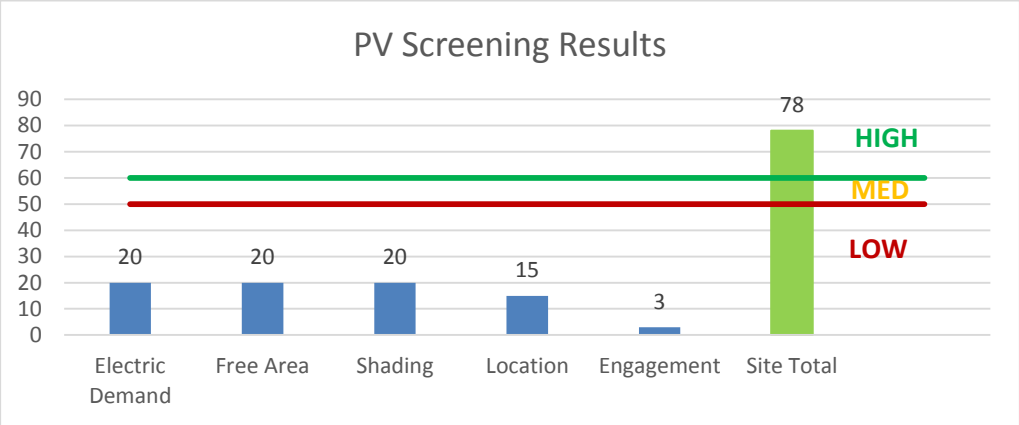
6.1 Photovoltaic

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 installing a PV array.

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

Figure 23 - Photovoltaic Screening



Potential	High	
System Potential	199	kW DC STC
Electric Generation	237,083	kWh/yr
Displaced Cost	$20,630	/yr
Installed Cost	$569,100	

Image 10: Aerial view of APHS rooftop showing potential areas for solar development

The image above shows an aerial view of the high school's rooftop with potential areas where arrays of solar PV panels might be placed to generate a portion of the building's electric needs. The roof of the building is flat with very little shading. The building's roof has many rooftop units and exhaust fans, but there appears to be up to 18,500 ft^2 of usable roof space which might be developed. An array that size could reduce utility electric purchases by more than one-quarter. There may be opportunities for ground-based arrays as well in unused spaces behind the building as well.

Good incentives are available for solar development through the SREC (Solar Renewable Energy Certificate) Registration Program (SRP). Solar projects must register their projects in the SREC Registration Program 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 8.4 for additional information.

In order to determine feasibility and potential costs, savings, and incentives, we recommend that the school have the property assessed for solar power generation by a qualified solar technician. 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 non-continuous 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.

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

Figure 24 - 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 Fluorescent Fixtures with LED Lamps and Drivers	x			x
ECM 3	Retrofit Fixtures with LED Lamps	x			x
ECM 4	Install LED Exit Signs				x
ECM 5	Install Occupancy Sensor Lighting Controls	x			x
ECM 6	Install High/Low Lighitng Controls				x
ECM 7	Install High Efficiency Electric AC	x			x
ECM 8	Install DHW Tank Insulation				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 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

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
Class Rm 101	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.27	822	0.0	$101.71	$855.00	$135.00	7.08
Class Rm 104	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	0.14	434	0.0	$53.71	$555.40	$95.00	8.57
Class Rm 102	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.25	740	0.0	$91.54	$796.50	$125.00	7.34
File Rm 103	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,200	0.10	376	0.0	$46.46	$225.60	$45.00	3.89
Class Rm 106	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.19	576	0.0	$71.20	$679.50	$105.00	8.07
Class Rm 108	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.16	493	0.0	$61.03	$621.00	$95.00	8.62
Electrical Closet x 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.04	30	0.0	$3.75	$117.00	$20.00	25.83
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22
Girls Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,450	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,450	0.01	45	0.0	$5.58	$48.20	$10.00	6.85
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,450	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,450	0.01	38	0.0	$4.70	$31.90	$5.00	5.72
Guidance Office	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.38	1,151	0.0	$142.40	$1,359.00	$210.00	8.07
Sm Offices x4	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.22	844	0.0	$104.38	$738.00	$115.00	5.97
1st Floor Hall (Right)	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.33	1,410	0.0	$174.36	$1,512.00	$120.00	7.98
1st Floor Hall (Left)	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.33	1,410	0.0	$174.36	$1,512.00	$120.00	7.98
1st Floor Front Corr	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.44	1,880	0.0	$232.49	$1,746.00	$160.00	6.82
1st Floor Front Corr	4	Compact Fluorescent: 13W CFL pin base	Wall Switch	13	2,450	Relamp	Yes	4	LED Screw-In Lamps: LED Lamp Pin base	Occupancy Sensor	4	1,715	0.03	115	0.0	$14.22	$330.00	$0.00	23.21
1st Floor Front Corr	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,715	0.04	185	0.0	$22.84	$377.70	$15.00	15.88
Front Entrance	27	Compact Fluorescent: 13W CFL pin base	Wall Switch	13	2,450	Relamp	No	27	LED Screw-In Lamps: LED Lamp Pin base	Wall Switch	4	2,450	0.16	685	0.0	$84.67	$405.00	$0.00	4.78
Admin Conf Rm	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.25	740	0.0	$91.54	$796.50	$125.00	7.34
Admin Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.05	235	0.0	$29.06	$387.00	$20.00	12.63
Admin Closet	1	Incandescent: 60W	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	9	500	0.03	29	0.0	$3.63	$5.00	$5.00	0.00
Sm Offices x7	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.19	739	0.0	$91.33	$679.50	$105.00	6.29
Break Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,715	0.02	65	0.0	$8.05	$58.50	$10.00	6.03
Principles Office Out	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.22	844	0.0	$104.38	$738.00	$115.00	5.97
Principles Office In	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.08	317	0.0	$39.14	$445.50	$65.00	9.72

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Principles Office In	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,200	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,540	0.01	55	0.0	$6.84	$35.90	$40.00	-0.60
Class Rm 113	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.16	493	0.0	$61.03	$621.00	$95.00	8.62
Health Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.14	528	0.0	$65.24	$562.50	$85.00	7.32
Health Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,200	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,540	0.01	55	0.0	$6.84	$35.90	$40.00	-0.60
Class Rm 115	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.22	658	0.0	$81.37	$738.00	$115.00	7.66
Mail Rm 116	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,200	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,540	0.29	1,114	0.0	$137.80	$840.80	$155.00	4.98
Sm Offices x2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.11	422	0.0	$52.19	$504.00	$75.00	8.22
Class Rm 117	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.22	658	0.0	$81.37	$738.00	$115.00	7.66
End Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.05	235	0.0	$29.06	$387.00	$20.00	12.63
Class Rm 118	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.27	822	0.0	$101.71	$855.00	$135.00	7.08
Exit Sign	16	Exit Signs: Fluorescent	None	13	8,760	Fixture Replacement	No	16	LED Exit Signs: 2 W Lamp	None	6	8,760	0.07	1,128	0.0	$139.54	$1,720.88	$0.00	12.33
Exit Sign	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
End Corridor	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.41	1,762	0.0	$217.96	$1,417.50	$150.00	5.82
End Corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,715	0.01	62	0.0	$7.61	$35.90	$5.00	4.06
End Corridor	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.03	117	0.0	$14.53	$58.50	$10.00	3.34
Media Center	41	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	41	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	1.12	3,372	0.0	$417.02	$3,208.50	$515.00	6.46
Media Center	29	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,715	Relamp	Yes	29	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,201	0.42	1,250	0.0	$154.56	$1,581.10	$215.00	8.84
Media Center Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,715	0.06	195	0.0	$24.15	$175.50	$30.00	6.03
Media Center Rest x2	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,715	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,715	0.02	53	0.0	$6.59	$63.80	$10.00	8.17
AV Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,715	0.09	260	0.0	$32.20	$234.00	$40.00	6.03
Supply Closet	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	500	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	500	0.01	8	0.0	$0.96	$31.90	$5.00	28.02
Copy Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,715	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,715	0.10	293	0.0	$36.22	$225.60	$45.00	4.99
IT Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.16	633	0.0	$78.29	$621.00	$95.00	6.72
HVAC Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,715	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.04	130	0.0	$16.10	$117.00	$20.00	6.03
Libarian Office A & B	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,225	0.05	168	0.0	$20.76	$387.00	$20.00	17.68

	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 S-1	25	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	25	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	1.20	3,619	0.0	$447.59	$2,918.33	$570.00	5.25
Shop Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.16	633	0.0	$78.29	$621.00	$95.00	6.72
Shop Supply Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.09	76	0.0	$9.39	$234.00	$40.00	20.67
Closet	1	Compact Fluorescent: 13W CFL screw base	Wall Switch	13	500	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	4	500	0.01	5	0.0	$0.64	$5.00	$0.00	7.81
Mens Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.02	93	0.0	$11.50	$58.50	$10.00	4.22
Mens Room	1	Incandescent: 100W	Wall Switch	100	2,450	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	15	2,450	0.06	239	0.0	$29.62	$53.75	$5.00	1.65
Womans Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.02	93	0.0	$11.50	$58.50	$10.00	4.22
Womans Room	1	Incandescent: 100W	Wall Switch	100	2,450	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	15	2,450	0.06	239	0.0	$29.62	$53.75	$5.00	1.65
Band Room 120	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.82	2,467	0.0	$305.14	$2,565.00	$405.00	7.08
Band Storage Rm 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	800	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.04	61	0.0	$7.51	$117.00	$20.00	12.92
Band Storage Rm 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	800	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.02	30	0.0	$3.75	$58.50	$10.00	12.92
Band Storage Rm 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	800	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.02	30	0.0	$3.75	$58.50	$10.00	12.92
Class Rm 122	35	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	35	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	1.68	5,067	0.0	$626.62	$4,139.67	$805.00	5.32
Class Rm 122	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.03	82	0.0	$10.17	$328.50	$45.00	27.87
Dark Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.06	114	0.0	$14.08	$150.40	$30.00	8.55
Class Rm 123	36	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	36	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	1.73	5,211	0.0	$644.52	$4,234.80	$825.00	5.29
Class Rm 123 Supply	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,715	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,201	0.04	123	0.0	$15.26	$345.20	$50.00	19.35
Class Rm 123 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,225	0.05	168	0.0	$20.76	$233.00	$40.00	9.30
Auditorium	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.02	93	0.0	$11.50	$58.50	$10.00	4.22
Auditorium	15	Compact Fluorescent: 13W CFL pin base	Wall Switch	13	2,450	Relamp	No	15	LED Screw-In Lamps: LED Lamp Pin base	Wall Switch	4	2,450	0.09	380	0.0	$47.04	$225.00	$0.00	4.78
Auditorium	4	Metal Halide: (1) 175W Lamp	Wall Switch	215	2,450	Fixture Replacement	No	4	LED - Fixtures: Low-Bay	Wall Switch	50	2,450	0.43	1,860	0.0	$229.98	$704.32	$600.00	0.45
Gym	24	Linear Fluorescent - T5: 4' T5 (28W) - 3L	Wall Switch	90	2,450	Relamp	Yes	12	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	1,715	0.94	4,027	0.0	$498.01	$2,690.68	$500.00	4.40
Athletic Director Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.02	83	0.0	$10.33	$58.50	$10.00	4.70
Boiler Rm	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	22	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.48	835	0.0	$103.26	$1,287.00	$220.00	10.33
Boiler Rm	2	Compact Fluorescent: 13W CFL screw base	Wall Switch	13	1,000	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	4	1,000	0.01	21	0.0	$2.56	$10.00	$0.00	3.91

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm - Files	2	Compact Fluorescent: 13W CFL screw base	Wall Switch	13	500	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	4	500	0.01	10	0.0	$1.28	$10.00	$0.00	7.81
Boiler Rm - Switch Gear	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.11	95	0.0	$11.73	$292.50	$50.00	20.67
Custodial Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,200	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,540	0.03	111	0.0	$13.67	$341.80	$10.00	24.27
ERV Rm	2	Compact Fluorescent: 13W CFL screw base	Wall Switch	13	400	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	4	400	0.01	8	0.0	$1.02	$10.00	$0.00	9.77
ERV Rm	2	Linear Fluorescent - T8: 6' T8 (70W) - 2L	Wall Switch	140	400	Relamp	No	2	LED - Linear Tubes: (2) 6' Lamps	Wall Switch	36	400	0.14	96	0.0	$11.83	$314.42	$0.00	26.57
Weight Rm	12	Metal Halide: (1) 100W Lamp	Wall Switch	128	2,450	Fixture Replacement	No	12	LED - Fixtures: Low-Bay	Wall Switch	50	2,450	0.61	2,637	0.0	$326.15	$2,112.96	$1,800.00	0.96
Atheletic Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.05	211	0.0	$26.10	$387.00	$20.00	14.06
Stairwell 2 & 3	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,715	0.33	1,410	0.0	$174.36	$1,782.00	$120.00	9.53
Stairwell 2 & 3	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,715	0.11	492	0.0	$60.91	$287.20	$40.00	4.06
Class Rm 401	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	1.09	3,290	0.0	$406.85	$3,150.00	$505.00	6.50
Small Stage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22
Cafeteria	44	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	44	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	1.20	3,619	0.0	$447.54	$3,654.00	$580.00	6.87
Cafeteria	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.05	164	0.0	$20.34	$117.00	$55.00	3.05
Faculty Dining Rm 405	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.22	940	0.0	$116.24	$738.00	$115.00	5.36
4th Floor Back Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.16	705	0.0	$87.18	$621.00	$60.00	6.43
Kitchen Supply Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,715	0.09	260	0.0	$32.20	$234.00	$40.00	6.03
Kitchen	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,715	0.32	976	0.0	$120.74	$877.50	$150.00	6.03
Elevator Lobby 2n & 3rd	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.13	558	0.0	$68.99	$351.00	$60.00	4.22
Elevator Lobby 2n & 3rd	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22
Stairwell 1 & 4	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,715	0.33	1,410	0.0	$174.36	$1,782.00	$120.00	9.53
Class Rm 220 & 303	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.55	1,645	0.0	$203.43	$1,710.00	$270.00	7.08
Class Rm 219,218,206, 204,306	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	1.09	3,290	0.0	$406.85	$3,150.00	$505.00	6.50
Office 221	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.08	317	0.0	$39.14	$445.50	$65.00	9.72
Class Rm 217, 215, 216, 313, 314, 305, 304	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.98	2,961	0.0	$366.17	$2,916.00	$465.00	6.69
Electric Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	245	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	245	0.06	28	0.0	$3.45	$175.50	$30.00	42.18

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Office 211B	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,200	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,540	0.38	1,486	0.0	$183.73	$3,731.07	$545.00	17.34
Office 211C	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,200	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,540	0.24	929	0.0	$114.83	$745.67	$135.00	5.32
Exit Sign	12	Exit Signs: Fluorescent	None	13	8,760	Fixture Replacement	No	12	LED Exit Signs: 2 W Lamp	None	6	8,760	0.06	846	0.0	$104.65	$1,290.66	$0.00	12.33
Exit Sign	20	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	20	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Computer Class 209	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	0.38	1,158	0.0	$143.23	$1,031.07	$195.00	5.84
Class Rm 207	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.16	493	0.0	$61.03	$621.00	$95.00	8.62
Computer Class 205	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,715	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,201	0.43	1,303	0.0	$161.13	$1,126.20	$215.00	5.66
Computer Class 203	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.33	987	0.0	$122.06	$972.00	$155.00	6.69
Computer Class 201	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.41	1,234	0.0	$152.57	$1,147.50	$185.00	6.31
Computer Class 202	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.41	1,234	0.0	$152.57	$1,147.50	$185.00	6.31
Hall Display Case	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,450	0.03	148	0.0	$18.29	$107.70	$15.00	5.07
2nd Fl Corr	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.60	2,585	0.0	$319.67	$2,637.00	$220.00	7.56
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22
Girls Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,450	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,450	0.01	38	0.0	$4.70	$31.90	$5.00	5.72
Server Rm	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	$4.69	$117.00	$20.00	20.67
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22
Boys Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,450	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,450	0.01	38	0.0	$4.70	$31.90	$5.00	5.72
Auditorium Balcony	34	Compact Fluorescent: 13W CFL pin base	Wall Switch	13	2,450	Relamp	No	34	LED Screw-In Lamps: LED Lamp Pin base	Wall Switch	4	2,450	0.20	862	0.0	$106.63	$510.00	$0.00	4.78
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.04	167	0.0	$20.65	$117.00	$20.00	4.70
Office Restroom	2	Compact Fluorescent: 13W CFL pin base	Wall Switch	13	2,200	Relamp	No	2	LED Screw-In Lamps: LED Lamp Pin base	Wall Switch	4	2,200	0.01	46	0.0	$5.63	$30.00	$0.00	5.33
Class 318, 309	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.55	1,645	0.0	$203.43	$1,710.00	$270.00	7.08
Class 317, 316, 308	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.66	1,974	0.0	$244.11	$1,944.00	$310.00	6.69
Supply Rm & Office 319	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,540	0.16	633	0.0	$78.29	$621.00	$95.00	6.72
Class 315	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.11	329	0.0	$40.69	$504.00	$75.00	10.54
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.04	186	0.0	$23.00	$117.00	$20.00	4.22

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
3rd Fl Faculty Lounge	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.05	235	0.0	$29.06	$387.00	$20.00	12.63
3rd Fl Faculty Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,450	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,450	0.01	45	0.0	$5.58	$48.20	$10.00	6.85
Lab Rm 311, 312, 301	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.98	4,230	0.0	$523.09	$2,916.00	$465.00	4.69
Ante Rm 310	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,450	0.09	372	0.0	$46.00	$234.00	$40.00	4.22
Class Rm 307	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,715	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,201	0.38	1,151	0.0	$142.40	$1,089.00	$175.00	6.42
3rd Fl Corr	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.60	2,585	0.0	$319.67	$2,637.00	$220.00	7.56
Faculty Lounge	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,450	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,715	0.05	235	0.0	$29.06	$387.00	$55.00	11.42
Womens Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,450	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,450	0.01	45	0.0	$5.58	$48.20	$10.00	6.85
Girls Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,450	0.03	148	0.0	$18.29	$107.70	$15.00	5.07
3rd Fl Display Cases	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,450	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,450	0.02	99	0.0	$12.20	$71.80	$10.00	5.07
Office Conf Rm	10	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,200	Relamp	Yes	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,540	0.14	534	0.0	$66.02	$752.00	$135.00	9.35
Small Office	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,200	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.02	83	0.0	$10.33	$58.50	$10.00	4.70
Press Box	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	400	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.31	217	0.0	$26.85	$936.00	$80.00	31.88
Press Box Roof	4	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,330	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	80	4,330	0.56	4,282	0.0	$529.62	$1,562.71	$400.00	2.20
Bleachers	6	Metal Halide: (1) 250W Lamp	Wall Switch	295	600	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	80	600	0.85	890	0.0	$110.08	$2,344.06	$600.00	15.84
Football Field lighting	60	Metal Halide: (1) 400W Lamp	Wall Switch	458	600	Fixture Replacement	No	60	LED - Fixtures: Outdoor Post-Mount	Wall Switch	150	600	12.11	12,751	0.0	$1,576.99	$34,398.00	$300.00	21.62
Baseball Field Lighting	14	Metal Halide: (1) 400W Lamp	Wall Switch	458	600	Fixture Replacement	No	14	LED - Fixtures: Outdoor Post-Mount	Wall Switch	150	600	2.83	2,975	0.0	$367.96	$8,026.20	$70.00	21.62
Front Bleacher Entrance	8	Metal Halide: (1) 250W Lamp	Wall Switch	295	600	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	80	600	1.13	1,187	0.0	$146.78	$3,125.42	$800.00	15.84
Restroom x2	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.44	921	0.0	$113.87	$1,206.00	$160.00	9.19
Boys Locker Rm	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.71	1,496	0.0	$185.04	$2,331.00	$260.00	11.19
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.06	137	0.0	$16.90	$175.50	$30.00	8.61
Boys Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.09	182	0.0	$22.53	$234.00	$40.00	8.61
Electric Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.04	30	0.0	$3.75	$117.00	$20.00	25.83
Janitor Closet	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	$2.82	$58.50	$10.00	17.22
Coaches Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.33	691	0.0	$85.40	$972.00	$155.00	9.57

	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
Coaches Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.08	173	0.0	$21.35	$175.50	$65.00	5.18
Girls Locker Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.05	115	0.0	$14.23	$927.00	$20.00	63.72
Girls Locker Rm	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.30	633	0.0	$78.29	$643.50	$110.00	6.81
Girls Locker Rm	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.05	115	0.0	$14.23	$117.00	$20.00	6.81
Girls Locker Rm	2	Incandescent: 60W	Wall Switch	60	1,200	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	9	1,200	0.07	141	0.0	$17.41	$10.00	$10.00	0.00
Locker Rm Rear Doors	13	Metal Halide: (1) 175W Lamp	Wall Switch	215	4,330	Fixture Replacement	No	13	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	80	4,330	1.15	8,739	0.0	$1,080.79	$5,078.80	$1,300.00	3.50
Back of Stadium	7	High-Pressure Sodium: (1) 100W Lamp	Wall Switch	138	4,330	Fixture Replacement	No	7	LED - Fixtures: Outdoor Porch Wall Mount	Wall Switch	35	4,330	0.47	3,590	0.0	$444.02	$2,386.37	$35.00	5.30
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.13	114	0.0	$14.08	$351.00	$60.00	20.67
School Perimeter	5	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,330	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	80	4,330	0.70	5,353	0.0	$662.02	$1,953.39	$500.00	2.20
School Perimeter	10	High-Pressure Sodium: (1) 100W Lamp	Wall Switch	138	4,330	Fixture Replacement	No	10	LED - Fixtures: Outdoor Porch Wall Mount	Wall Switch	35	4,330	0.68	5,129	0.0	$634.31	$3,409.10	$50.00	5.30
School Perimeter	10	Incandescent: 60W	Wall Switch	60	4,330	Relamp	No	10	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	9	4,330	0.33	2,540	0.0	$314.08	$50.00	$50.00	0.00

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Various	HVAC Unit 1.5 tons	25	Supply Fan	0.3	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	HVAC Unit 2 tons	16	Supply Fan	0.8	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	HVAC Unit 3 tons	7	Supply Fan	1.5	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	HVAC Unit 4.5 tons	5	Supply Fan	1.5	84.0%	No	2,400	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	HVAC Unit 6 tons	29	Supply Fan	1.5	86.5%	No	2,400	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Room	Trane TWE240	1	Supply Fan	7.5	91.7%	No	2,400	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Room	AHU 1 - Trane CSAA	1	Supply Fan	10.0	91.7%	Yes	2,400	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Space	RenewAire ERV	2	Supply Fan	5.0	89.5%	Yes	2,400	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	6	Exhaust Fan	0.3	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	1	Exhaust Fan	0.8	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Exhaust Fans	7	Exhaust Fan	0.3	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Heating Hot Water	1	Heating Hot Water Pump	50.0	94.5%	Yes	1,348	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Heating Hot Water	1	Heating Hot Water Pump	50.0	94.5%	Yes	0	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Chilled Water	1	Chilled Water Pump	60.0	93.6%	Yes	1,225	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Chilled Water	1	Chilled Water Pump	60.0	93.6%	Yes	0	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	1	Exhaust Fan	1.0	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	1	Exhaust Fan	0.5	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	16	Exhaust Fan	0.5	82.5%	No	2,400	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU-2	2	Supply Fan	7.5	88.5%	Yes	2,400	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU-5 / Cafeteria	2	Supply Fan	5.0	89.5%	Yes	2,400	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		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
Roof	AHU-3	2	Supply Fan	5.0	88.5%	No	2,400	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU-4	2	Supply Fan	5.0	89.5%	No	2,400	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU-6	2	Supply Fan	5.0	87.5%	No	2,400	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU # IA1,2,3	3	Supply Fan	0.5	82.5%	No	2,400	No	82.5%	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
Mech Room	Trane TWE240	1	Split-System AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Media Center Condensing Unit	1	Split-System AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	McQuay	1	Split-System AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	Carrier 38AH	1	Split-System AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	ICP	1	Split-System AC	7.50		Yes	1	Split-System AC	7.50		11.50		No	2.19	3,698	0.0	$457.36	$8,728.28	$547.50	17.89
Windows	Classrooms & Offices	12	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Windows	Classrooms & Offices	5	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Windows	Classrooms & Offices	7	Window AC	0.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric Chiller Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	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
Room	School	1	Air-Cooled Screw Chiller	275.00	No							0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	School	4	Condensing Hot Water Boiler	2,500.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Pipe Insulation Recommendations

		Recommendation Inputs		Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	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	DHW Tank	6	36.00	0.00	0	41.3	$453.06	$600.00	$0.00	1.32

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	School	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	41.3	$0.00	$0.00	$0.00	0.00
Stadium	Stadium	2	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
Kitchen	4	Pre-Rinse Spray Valve	5.00	1.15	0.00	0	165.0	$1,808.33	$497.40	$0.00	0.28
Restrooms	12	Faucet Aerator (Lavatory)	3.00	1.00	0.00	0	27.6	$301.95	$86.04	$0.00	0.28

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	5	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	2	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Ice Making Head (<450 lbs/day), Batch	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	4	Gas Convection Oven (Half Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Griddle (4 Feet Width)	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?
Various	283	Desktop Computers	120.0	Yes
Various	283	Computer Monitors	28.0	Yes
Various	5	Sm. Printers	13.0	Yes
Various	6	Lg. Copiers	380.0	Yes
Various	4	TVs (~27' ea.)	150.0	No
Various	8	Sm. Microwaves	800.0	No
Various	19	Servers	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
APHS	1	Refrigerated	Yes	0.00	1,612	0.0	$199.34	$230.00	$0.00	1.15

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

92

ENERGY STAR® Score[1]

Asbury Park High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 171,260
Built: 1927

For Year Ending: October 31, 2016
Date Generated: October 27, 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
Asbury Park High School 1003 Sunset 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: 6048136

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
48.8 kBtu/ft²

Source EUI
88.2 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	3,024,585 (36%)
Natural Gas (kBtu)	5,333,231 (64%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	83.2
National Median Source EUI (kBtu/ft²)	150.2
% Diff from National Median Source EUI	-41%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	619

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)