BETHLEHEM TOWNSHIP SCHOOL DISTRICT
ETHEL HOPPOCK MIDDLE SCHOOL
ENERGY ASSESSMENT

FOR
NEW JERSEY
BOARD OF PUBLIC UTILITIES

NOVEMBER 2012

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CHA PROJECT NO. 24735

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REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±20%, and are based on data obtained from the owner, data obtained during site observations, professional experience, historical data, and standard engineering practice. Cost data does not include soft costs such as engineering fees, legal fees, project management fees, financing, etc.

A thorough walkthrough of the school was performed, which included gathering nameplate information and operating parameters for all accessible equipment and lighting systems. Unless otherwise stated, model, efficiency, and capacity information included in this report were collected directly from equipment nameplates and /or from documentation provided by the owner during the site visit. Typical operation and scheduling information was obtained from interviewing staff and spot measurements taken in the field.

1.0 EXECUTIVE SUMMARY

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.

This energy audit was performed by CHA in connection with the New Jersey Board of Public Utilities' Local Government Energy Audit Program for the Bethlehem Township Board of Education. The purpose of this report is to convey the findings of the energy audit to identify energy savings potential associated with major energy consumers and inefficient practices. This report details the results of the energy audit conducted for:

Building Name	Address	Square Feet	Construction Date
Ethel Hoppock Middle School	280 Asbury/West Portal Road Asbury, NJ 08802	44,200	1927

The Energy Conservation Measures (ECMs) and Operations and Maintenance Measures (OMMs) identified in this report are potential energy savings opportunities that, if implemented, will reduce the consumption of electricity, water, gas and/or fuel oil. These measures may qualify for incentive programs such as New Jersey SmartStart Buildings Program, Direct Install Program, Pay for Performance (P4P) or Energy Savings Improvement Plan (ESIP). A brief summary of the requirements of each program is provided in this report and more detailed information is available at the NJBPU website:

The potential annual energy savings and associated cost savings for each energy conservation measure (ECM) is shown in Table 1 below. Each measure's savings are dependent on implementing that measure alone. There are no interactive effects included in the calculations. The lighting ECM's are presented in three options. Only one option can be included. The potential incentive saving is calculated using the Smart Start program only. Additional incentives may be available for some ECM's and should evaluated if the incentive is to implemented.

Table 1: Summary of Energy Conservation Measures

Summary of Energy Conservation Measures							
Energy Conservation Measure		**Approx. Costs ($)**	**Approx. Savings ($/year)**	**Payback (Years) w/o Incentive**	**Potential Incentive ($)***	**Payback (Years) w/ Incentive**	**Recommended For Implementation**
ECM-1	Nighttime Setback for HVAC Equipment	1,000	6,400	0.2	0	0.2	X
ECM-2	Premium Efficiency Motors	5,000	2,900	1.7	300	1.6	X
ECM-3	Demand Control Ventilation (DCV)	17,000	5,800	2.9	0	2.9	X
ECM-4	Hot Water Reset for Boilers	17,000	1,700	10.0	0	10.0	X
ECM-5	Replace Pneumatic Controls with DDC	315,000	10,100	14.4	0	>20	
ECM-6	Lighting Replacements	108,000	12,800	8.4	8,600	7.8	
ECM-7	Lighting Controls	9,000	6,300	1.4	1,400	1.2	
ECM-8	Lighting Replacements & Controls	117,000	17,200	6.8	10,000	6.2	X

The measures recommended in this report are those having a simple payback period of less than 15 years based on the requirement of the New Jersey Energy Savings Improvement Plan (ESIP) that allows a cumulative payback period up to 15 years. If the recommended measures are implemented a total potential annual savings of $34,000 may be realized with a payback period of 4.2 years.

2.0 INTRODUCTION AND BACKGROUND

The Ethel Hoppock Middle School is a 44,200 square foot building consisting of three floors, a main floor, partial upper floor, and partial lower floor. The building was constructed in 1927 with renovations performed in 1966, 1069, 1974, and 2002. The school includes the following spaces: classrooms, offices, gymnasium, computer room, library media center, cafeteria, kitchen, storage, and toilet rooms. The school hours of operation are from 6:00 AM – 11:00 PM Monday through Friday, with various after-school activities. The summer hours of operation are 7:00AM to 3:00PM Monday through Friday. The school has approximately 160 students and 40 faculty and staff members.

Figure 1: Ethel Hoppock Elementary School

3.0 UTILITIES

Utilities include electricity and #2 fuel oil. Electricity is supplied and delivered by Jersey Central Power & Light. Fuel Oil #2 is supplied and delivered by Allied Oil LLC.

For the 12-month period ending in June 2012, the utilities usage for the building was as follows:

Table 2: Actual Cost & Site Utility Usage

Electric		
Annual Usage	437,440	kWh/yr
Annual Cost	68,087.97	$
Blended Rate	0.156	$/kWh
Consumption Rate	0.135	$/kWh
Demand Rate	6.01	$/kW
Peak Demand	142.2	kW
Min. Demand	92.30	kW
Avg. Demand	124.35	kW
Fuel Oil		
Annual Usage	18,245	gallons/yr
Annual Cost	59,498	$
Rate	3.26	$/gallon

Electrical usage was generally higher in the summer months when air conditioning equipment was operational. Fuel oil consumption was higher in winter months for heating. See Appendix A for a detailed utility analysis.

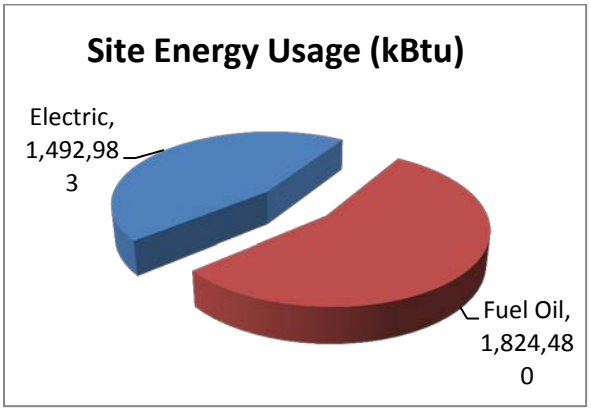


Figure 2: Annual Site Energy Usage

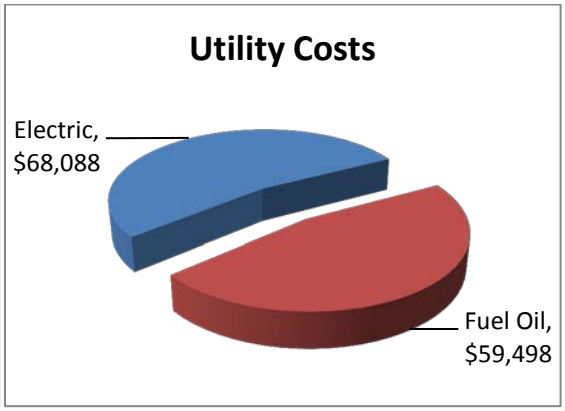


Figure 3: Annual Energy Cost

Under New Jersey's energy deregulation law, the supply portion of the electric (or natural gas) bill is separated from the delivery portion. With the supply portion open to competition, customers can compare different supplier costs and get the best price on their energy supplies. Their electric and natural gas distribution utilities will still deliver those supplies through their wires and pipes – and respond to emergencies, should they arise – regardless of where those supplies are purchased. Purchasing your energy supplies from a company other than your electric or gas utility is purely an economic decision; it has no impact on the reliability or safety of your service. Additional information on selecting a third party energy supplier is available here: http://www.state.nj.us/bpu/commercial/shopping.html. See Appendix A for a list of third-party energy suppliers licensed by the Board of Public Utilities to sell within the building's service area.

4.0 EXISTING CONDITIONS AND ENERGY SAVINGS OPPORTUNITIES

Energy conservation measures (ECM) are energy savings improvements that require a financial investment. Each ECM has an associated simple payback period that is cost to implement the ECM divided by the energy savings (in dollars). Large capital intensive ECM's typically have longer payback periods. Operational and maintenance measures (OMM) are low or no cost operational opportunities, which can be implemented to have positive impacts on overall building operation, comfort levels, or energy usage.

4.1 Building Envelope

The original building is built of concrete masonry units with brick veneer. The interior walls are block walls with a painted drywall interior. There is currently no insulation in the walls of the original school. There is painted gypsum board on the interior walls of the newest addition of the building. The gymnasium edition of the school is built of concrete masonry units with a tan stucco exterior finish.

Windows and doors throughout the school building were installed according to the years of the part of building they were built. The majority of the windows are operable aluminum framed double glazing units. The windows seem to be in fair condition as examined during the site visit, but seals are unsatisfactory.

The roof of the school building consists of a flat black rubber membrane roofing system with foam insulation tiles. Another section of the roof is constructed out of red asphalt shingles and another section of the roof is constructed out of dark grey asphalt shingles. During the site visit it was noted that the roof was in fair condition.

4.2 HVAC Systems

Ethel Hoppock Middle School is equipped with two H.B. Smith 28A-10 series cast iron oil fired hot water boilers. These boilers have a capacity of 22 gallons per hour and 2.172 million BTUs per hour. The burners on these boilers are Power Flame Burner model number C2-OB with a capacity of 5.5 gph minimum and 22 gph maximum with a 1.5 hp motor. There are two pumps for the circulation of the hot water for heating the school from the boilers. They are model number AE53A ITT Bell & Gossett with 15 hp and 89% efficiency. Each of these pumps was integrated with a Siemens variable frequency drive. The boiler room has a louver exhaust with an actuator damper for boiler start up.

There is an air handling unit located in the old industrial arts classroom located in the bottom of the 1970s addition. This AHU is accessible only by the door outside at the rear. There is large outdoor air louvers located on the outside walls.

Classrooms numbers 10 through 18 are heated by unit ventilators with hot water coils. The unit ventilators are controlled with pneumatic valves, dampers and actuators. These controls are not precise because of the age of the system. Rooms number 53, 1, 2, and the associated bathrooms in the old section of the building are served by older unit ventilators with hot water coils and are also pneumatically controlled. Rooms number 3, 4, 5, and 6 have newer hot water coil unit ventilators as these four rooms were a part of an addition. The upper level consists of rooms 20, 21A, 21B, 22, 23 and 25. Rooms 20 and 25 have cooling unit ventilators. Room 23 has hot water fin tube radiation as its form

of heating and a window a/c unit for cooling. The newest addition, which was in 2002, consists of a library media center, computer room, and science room. The computer room number 48 is ducted with air conditioning diffusers and has no fin tube radiation. The unit ventilators that were part of the 2002 addition are DDC controlled.

The rooftop units that are serving the school are all Carrier units. The roof consists of miscellaneous exhaust fans. There are dedicated packaged rooftop units serving the science room, computer room, corridor, library media center, and the cafeteria.

The school's maintenance department is very diligent about maintaining the HVAC equipment.

Specifics on mechanical equipment can be found within the equipment inventory located in Appendix B.

The following ECMs were identified as HVAC system improvements:

4.2.1 ECM-1 Night Setback for HVAC Equipment

The building does not have a night setback control system utilized. Installing a night setback sequence to automatically reset the building temperature to 60°F was assessed.

The annual fuel oil usage for the facility was taking from the utility bills. According to the US Energy Information Agency (EIA), implementing a night setback system typically saves 5% of a facility's annual heating cost. This savings is multiplied by the annual fuel oil and converted to monetary savings using the unit cost of the fuel oil obtained from the utility analysis.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-1 Night-time Setback for HVAC Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
1,000	21,900	0	900	6,400	0	6,400	94.8	0	0.2	0.2

Expected Life: 15 years

Lifetime Savings: 328,500 kWh 13,500 gallons $96,000

* No incentives are available for this measure.

This measure is recommended.

4.2.2 ECM-2 Premium Efficiency Motors

Some of the existing HVAC system air handler unit (AHU) motors are older and inefficient. This ECM evaluates replacing the existing the less efficient motors with premium efficiency motors. Savings were determined by comparing the energy usage of the existing AHU motors to the energy usage with premium efficiency motors.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-2 Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	Gallons	$	$	$		$	Years	Years
5,000	17,900	0	0	2,900	0	2,900	9.9	300	1.7	1.6

Expected Life: 20 years

Lifetime Savings: 358,000 kWh 0 gallons $58,000

* Incenive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.2.3 ECM-3 Demand Control Ventilation

Five rooftop air handling units serve the middle school (RTU-1 through RTU-5). There are dedicated packaged rooftop units serving the science room, computer room, corridor, library media center, and the cafeteria. It is assumed that the original system controls provide the originally specified design ventilation outside air flow rate. Reducing outside air flow rate during occupied time periods will reduce heating and cooling energy used. This can be accomplished using carbon dioxide sensors to monitor the actual levels of carbon monoxide and adjust the quantity of ventilation air based on maintaining an acceptable carbon dioxide (CO_2) level in the space. A limit of 1000 PPM of CO_2 is recommended in ASHRAE Standard 62-2010, Ventilation for Acceptable Indoor Air Quality. Sensors will be installed to measure the CO_2 concentration in the space, and a revised control sequence of operation will be implemented by the building automation system (BAS) to operate the outdoor air dampers on the roof mounted HVAC unit. During unoccupied periods the outside air dampers will be closed.

For RTU-1 through RTU-5, the savings from this ECM can either pay back the cost of only adding demand control ventilation, or it can be implemented in conjunction with ECM-2 which addresses the addition of premium efficiency motors and variable speed drives.

Equipment supply and outside airflows were obtained from existing design drawings where possible, or from vendors per serial/model numbers found in the field. For the analysis, estimated savings for implementing demand control ventilation are calculated by reducing the outdoor air quantities from 30% to 10%. The energy savings are the differences in thermal energy usage and fan horsepower electrical savings.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-3 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
17,000	500	0	1,800	5,800	0	5,800	4.3	0	2.9	2.9

Expected Life: 15 years

Lifetime Savings: 7,500 kWh 27,000 gallons $87,000

* No incentives are available for this measure.

This measure is recommended.

4.2.4 ECM-4 Hot Water Reset for the Boilers

The middle school currently houses two boilers located in one boiler room. The boilers produce constant 180°F hot water regardless of the outdoor temperature conditions during the heating months in order to heat the facility. This ECM evaluates the installation of a hot water reset. The purpose of the hot water reset is to modulate the heating hot water temperature depending on the outdoor air temperature; meaning on a warmer day outside, the boiler can stand to produce lower temperature HHW inside to meet facility heating demands. Savings were determined through improved boiler efficiency as the heating hot water temperature decreased.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-4 Hot Water Reset for the Boilers

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
17,000	0	0	500	1,700	0	1,700	0.5	0	10.0	10.0

Expected Life: 15 years

Lifetime Savings: 0 kWh 7,500 gallons $25,500

* No incentives are available for this measure.

This measure is recommended.

OMM-1 HVAC Unit Maintenance

Regular maintenance of HVAC units is necessary not only because it saves energy by keeping them operating at optimal efficiency, but also insures that the equipment does not fail. Some areas that reduce efficiency are: dirty condenser/evaporator coils, dirty filters and fan blades, air leaks and dirty heat transfer surfaces. Implementing a routine maintenance strategy will allow for better indoor air quality, increased efficiency and improved equipment life.

4.3 Control Systems

The building does not have a direct digital control system throughout the whole building. There are DDC controls in the newest part of the building. The hydronic heating system including the classroom unit ventilators and the oil-fired hot water boilers utilize pneumatic controls. The system includes valves, actuators and dampers controlled through the use of a 5 horsepower air compressor. The pneumatic system is old and outdated, does not function correctly and has depreciated with age.

Typical set points range between 70 and 72 degrees Fahrenheit. There is no unoccupied set point and the school is heated continuously to 70-72°F during the heating season between November and April. The majority of the school is not cooled.

The following ECMs identified are improvements to the school's HVAC control system:

4.3.1 ECM-5 Install Direct Digital Controls and Building Management System

Pneumatic control systems use compressed air as a medium to control HVAC equipment. This is accomplished by bleeding or draining the compressed air in the air lines going to the control devices such as sensors or thermostats to maintain a set line pressure. This in turn provides feedback in the loop to close or open dampers and actuators to meet the control set point. In addition to the age and inadequacies of the system, compressed air is an inefficient and expensive means of controlling a building's HVAC system.

New direct digital control (DDC) systems use electrical signals to manage HVAC equipment. In combination with a building management system (BMS) which allows for trending, scheduling and remote control, the DDC and BMS system will save fuel oil and electrical energy. The new system will be able to set a schedule for occupied and unoccupied set points as well as shutdown/startup of HVAC equipment. It will also eliminate the compressed air system including the air compressor and compressed air dryer.

Savings are seen from temperature scheduling for occupied and unoccupied hours and from the elimination of the air compressor.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-5 Install Direct Digital Controls and Building Management System

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
315,000	1,900	0	2,900	10,100	0	10,100	0.0	0	>20	>20

Expected Life: 15 years

Lifetime Savings: 28,500 kWh 43,500 gallons $151,100

* No incentives are available for this measure.

This measure is not recommended.

4.4 Domestic Hot Water System

Ethel Hoppock Middle School has one domestic hot water heater located in the boiler room. The water heater is a Turbo Power (500 N 250A-TPO) oil fired commercial domestic hot water heater with a capacity of 250 gallons with 80% efficiency and an input of 399,000 BTU. There is a ½ horsepower pump used to circulate the water for the domestic hot water heater system. The domestic hot water heater serves the kitchen, toilet rooms and sinks located throughout the school.

4.5 Lighting/Electrical Systems

The majority of the lighting in the middle school is T-12 fixtures with magnetic ballasts or T-8 fluorescent tube fixtures with electronic ballasts. The gym is equipped with 6 lamp T-8 light fixtures. The cafeteria is equipped with 3 lamp T-8 fixtures. The building exterior utilizes metal halides and par 38 120 watt spotlights. A comprehensive lighting survey can be found in Appendix B.

The following ECMs identified are improvements to Lenox Elementary School's lighting and electrical system:

4.5.1 ECM-6 Lighting Replacement / Upgrades

The school mostly utilizes T-12 fluorescent fixtures. Compared to T-8s these bulbs consume more energy and are less efficient. The ballasts are magnetic as well. Each switch and circuit was identified, and the number of fixtures, locations, and existing wattage established (Appendix B). There is an opportunity to reduce consumption by upgrading the lighting fixtures to a super T-8 fixture and all incandescent fixtures to compact fluorescent lamps. The exterior lighting can be proposed to be changed from metal halide to LED which has a longer life and consumes much less energy. To upgrade the T12 fixtures to super T8's the fixtures need to be re-lamped and re-ballasted and incandescent replacement only involves changing the bulbs to compact

fluorescent bulbs. The exterior lighting would require a full fixture replacement to change to LED fixtures.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to estimated times of operation. These calculations are based upon 1 to 1 replacements with the fixtures. They do not take into account lumen output and square footage. A more comprehensive study may be performed to determine correct lighting levels.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-6 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
108,000	71,000	0	0	12,800	0	12,800	0.6	8,600	8.4	7.8

Expected Life: 15 Years

Lifetime Savings: 1,065,000 kWh 0 gallons $192,000

* Incenive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-8.

4.5.2 ECM-7 Install Lighting Controls (Occupancy Sensors)

Review of the comprehensive lighting survey determined that lighting in classrooms and various other spaces are typically operational, regardless of occupancy. Therefore, installing an occupancy sensor in these spaces to turn off lights when the areas are unoccupied was assessed.

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in section 4.5.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-7 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
9,000	40,300	0	0	6,300	0	6,300	9.3	1,400	1.4	1.2

Expected 15 Years

Life:

Lifetime Savings: 604,500 kWh 0 gallons $94,500

* Incenive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-8.

4.5.3 ECM-8 Lighting Replacements with Controls (Occupancy Sensors)

This measure is a combination of ECM 6 and ECM 7; recommending to replace/upgrade the current lighting fixtures to more efficient ones and installing occupancy sensors on the new lights. Interactive effects of the higher efficiency lights and occupancy sensors lead the energy and cost savings for this measure to not be cumulative or equivalent to the sum of replacing the lighting fixtures alone and installing occupancy sensors without the lighting upgrade.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-8 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
117,000	99,300	0	0	17,200	0	17,200	1.0	10,000	6.8	6.2

Expected Life: 15 Years

Lifetime Savings: 1,489,500 kWh 0 gallons $285,000

* Incenive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.6 Plumbing Systems

The school has older style fixtures in the restrooms. The older style fixtures consume more water than modern plumbing fixtures. It was determined that there is a combination of (20) water closets with an average water use of 5.5 gallons per flush (GPF), (6) urinals with an average of 3 GPF and (10) faucets with a flow of 3 gallons per minute (GPM) Per the number of occupants, it was estimated that each toilet and faucet is utilized approximately 4 times per day.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The facility will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects applied to facilities whose demand in any of the preceding 12 months exceeds 100 kW. This average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations, however. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP).

- Incentive Amount: $0.10/SF
- Minimum incentive: $5,000
- Maximum Incentive: $50,000 or 50% of Facility annual energy cost

The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy savings as determined in Incentive #1 (Minimum 15% savings must be achieved), and is paid upon successful installation of recommended measures.

<u>Electric</u>

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

<u>Gas</u>

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

Incentive cap: 25% of total project cost

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

The table below shows potential incentives available for the Ethel Hoppock Middle School through Pay for Performance program:

	Incentives $		
	Elec	Therms	Total
Incentive #1	$0	$0	$5,000
Incentive #2	$15,555	$0	$15,555
Incentive #3	$15,555	$0	$15,555
Total All Incentives	**$31,111**	**$0**	**$36,111**

The estimated annual savings of the recommended ECM's exceeds 15% which makes this School eligible for all three incentives offered by the P4P program. Only electrical savings are included. Fuel oil savings are not applicable. Refer to Appendix D for detailed calculations.

5.1.2 New Jersey Smart Start Program

For this report, some energy conservation measures are applicable to the 2012 Smart Start Incentive Program and associated savings are included. This program provides incentives for pre-approved mechanical and electrical equipment replacements and pre-approved custom measures. The program includes a wide variety of incentives ranging from chillers and boilers, variable frequency drives, unitary HVAC equipment and lighting retrofits. Each incentive must be applied for and approved by the NJBPU (or corresponding utility program) prior to the installation of the equipment. Incentive payments are made to the owner after the equipment is fully installed and paid for.

5.1.3 Direct Install Program

The Direct Install Program targets small and medium sized facilities where the peak electrical demand does not exceed 150 kW in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric utility companies.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The

program will pay up to 70% of the costs for lighting, HVAC, motors, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can significantly reduce the implementation cost of energy conservation projects.

The program pays a maximum amount of $75,000 per building, and up to $250,000 per customer per year. Installations must be completed by a Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website at http://www.njcleanenergy.com. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this document.

Due to the demand being 142.20 kW, which is lower than the 150 kW threshold, this school building is eligible for Direct Install incentives.

5.1.4 Energy Savings Improvement Plans (ESIP)

The Energy Savings Improvement Program (ESIP) allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the ESIP provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

ESIP allows local units to use “energy savings obligations” to pay for the capital costs of energy improvements to their facilities. This can be done over a maximum term of 15 years. Energy savings obligations are not considered “new general obligation debt” of a local unit and do not count against debt limits or require voter approval. They may be issued as refunding bonds or leases. Savings generated from the installation of energy conservation measures pay the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach. The “Local Finance Notice” outlines how local governments can develop and implement an ESIP for their facilities (see Appendix E). The ESIP can be prepared internally if the entity has qualified staff. If not, the ESIP must be implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Solar

6.1.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. However, there is not sufficient room to size a system to meet the demand of the building. For this analysis we will consider a 130 KW system to help reduce usage.

The PVWATTS solar power generation model was utilized to calculate PV power generation, this model is provided in Appendix F.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for a period of 15 years from the date of installation. The average SREC value per credit is estimated to be about $60/ SREC per year based on current market data, and this number was utilized in the cash flow for this report.

The existing load justifies the use of 200 kW PV solar array; where incentives can be applied from a New Jersey SREC program. The system costs for PV installations were derived from contractor budgetary pricing in the state of New Jersey for estimates of total cost of system installation. It should be noted that the cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a 200 kW system. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized as follows:

Photovoltaic (PV) Rooftop Solar Power Generation – 200 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Fuel Oil	Total					
$	kW	kWh	gallons	$	$	$	$	Years	Years
800,000	200	255,279	0	39,757	39,757	0	16,593	20.1	14.2

** Estimated Solar Renewable Energy Certificate Program (SREC) at $77/1000 kWh

This measure is recommended.

6.1.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, another fluid, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by gas-fired water heaters and, therefore, this measure would offer natural gas utility savings.

Based on the relatively low domestic hot water usage of the school during predominantly non-summer months, the payback period for implementing a solar domestic hot water systems would exceed the equipment life and therefore this is not recommended.

6.1.3 Geothermal Heat Pump System

Geothermal Heat pump systems use the relatively constant ground temperature to transfer heat from and to the building. In the winter months (heating mode) heat is absorbed from the ground and transferred to the building. In the summer months (cooling mode), heat is extracted from the building and transferred to the earth. There are several configuration of a Geothermal Systems, the most common is the closed-loop deep well system. This system involves boring multiple deep (400 feet plus) and installing closed loop piping inside each bore. The heat transfer fluid (typically food grade anti-freeze) is pumped from the bore fields into the building. Within the building individual heat pump units extract or reject compressor heat to the loop piping. Room air is heated or cooled by the refrigeration compressor. Another lees common variation of the geothermal system uses an open loop distribution system. This type of system circulates pond, river or ground spring water through a heat exchanger located within the building to similar room mounted heat pump units.

This system is popular for new construction as it is first cost intensive and can be more easily absorbed within the construction budget .It does not lend itself well to retrofits as it requires bore field drilling, underground piping , dedicated pumps individual heat pump units and specifically sized indoor and outdoor piping. Installation of this system within an existing building would require extensive exterior excavation and interior ceiling work.

A large amount of available property is required for the bore field. A geothermal system requires year round operation (heating and cooling) to balance the heat transfer from/ to the ground.

Based on the high first cost and predominantly non-summer month usage, the payback period for implementing a geothermal heat pump system would exceed the equipment life and therefore this is not recommended.

7.0 EPA PORTFOLIO MANAGER

The EPA Portfolio Manager benchmarking tool was used to assess the building's energy performance. Portfolio Manager provides a site and source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft^2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive and Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase.

The site EUI is the amount of heat and electricity consumed by a building as reflected in utility bills. Site energy may be delivered to a facility in the form of primary energy, which is raw fuel burned to create heat or electricity, such as natural gas or oil; or as secondary energy, which is the product created from a raw fuel such as electricity or district steam. To provide an equitable comparison for different buildings with varying proportions of primary and secondary energy consumption, Portfolio Manager uses the convention of source EUIs. The source energy also accounts for losses incurred in production, storage, transmission, and delivery of energy to the site, which provide an equivalent measure for various types of buildings with differing energy sources. The results of the Portfolio Manager benchmarking tool are contained in the table below.

Building	Site EUI kBtu/ft^2/yr	Source EUI Btu/ft^2/yr	Energy Star Rating (1-100)
Ethel Hoppock Middle School	91	171	30

The Hoppock Middle School has a below average Energy Star Rating of 30 (Median score being 50). By implementing the measures discussed in this report, it is expected that the EUI can be reduced and the Energy Star Rating increased.

The Portfolio Manager account can be accessed by entering the username and password shown below at the login screen of the Portfolio Manager website (https://www.energystar.gov/istar/pmpam/). The account has been shared with the NYSERDABENCHMARKING master account.

[redacted]

A full EPA Energy Star Portfolio Manager Report is located in Appendix G.

The user name and password for the building's EPA Portfolio Manager Account has been provided by CHA.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Ethel Hoppock Middle School identified potential annual savings of $34,000 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Night-time Setback for HVAC Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
1,000	21,900	0	900	6,400	0	6,400	94.8	0	0.2	0.2

ECM-2 Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	Gallons	$	$	$		$	Years	Years
5,000	17,900	0	0	2,900	0	2,900	9.9	300	1.7	1.6

ECM-3 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
17,000	500	0	1,800	5,800	0	5,800	4.3	0	2.9	2.9

ECM-4 Hot Water Reset for the Boilers

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
17,000	0	0	500	1,700	0	1,700	0.5	0	10.0	10.0

ECM-8 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Fuel Oil	Total						
$	kWh	kW	gallons	$	$	$		$	Years	Years
117,000	99,300	0	0	17,200	0	17,200	1.0	10,000	6.8	6.2

APPENDIX A

Utility Usage Analysis and Alternate Suppliers List

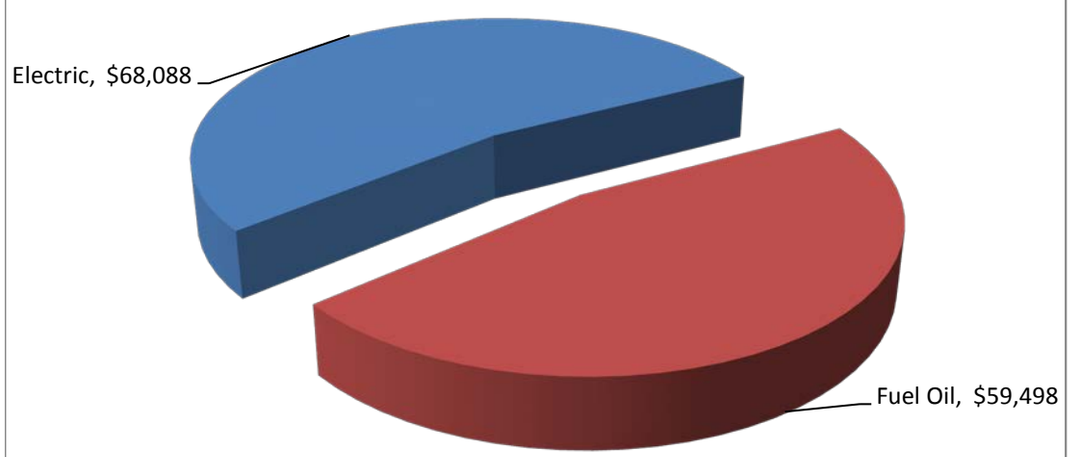
Ethel Hoppock Middle School
280 Asbury/West Portal Road, Asbury, NJ 08802

Utility Bills: Account Numbers

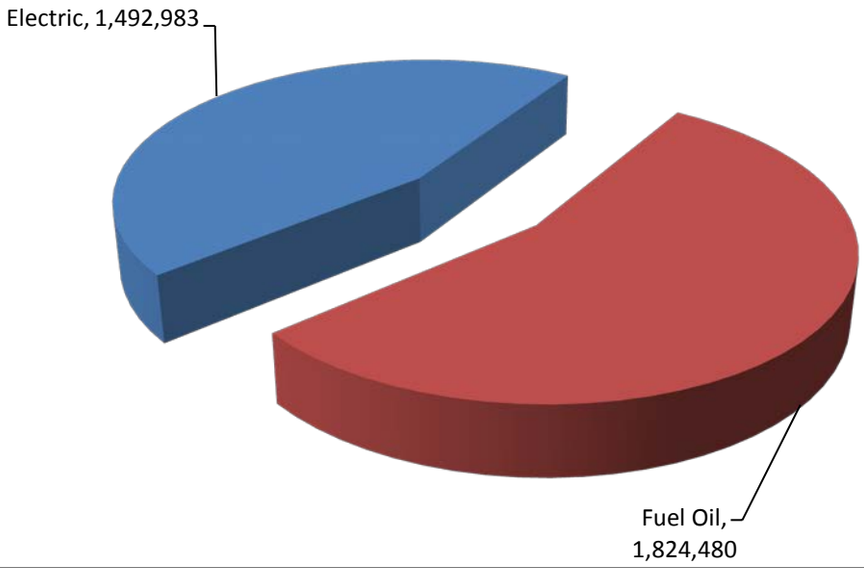
Account Number	School Building	Location	Type	Notes
	Middle School	280 Asbury/West Portal Road, Asbury, NJ 0	Fuel Oil	

Overall Utility Usage Summary			
	Electric	Fuel Oil	
Utility Costs*	$ 68,088	$ 59,498	
Utility Usage (kWh, Therm, Gal)	437,440	18,245	
$ Cost/Unit (kWh, Therm, Gal)	0.156	3.261	
Electric Demand (kW)	142		Total
Equivalent Site Usage (kBtu)	1,492,983	1,824,480	3,317,463
Equivalent Source Usage (kBtu)	4,986,562	1,910,231	6,896,793

Utility Costs



Site Energy Usage (kBtu)

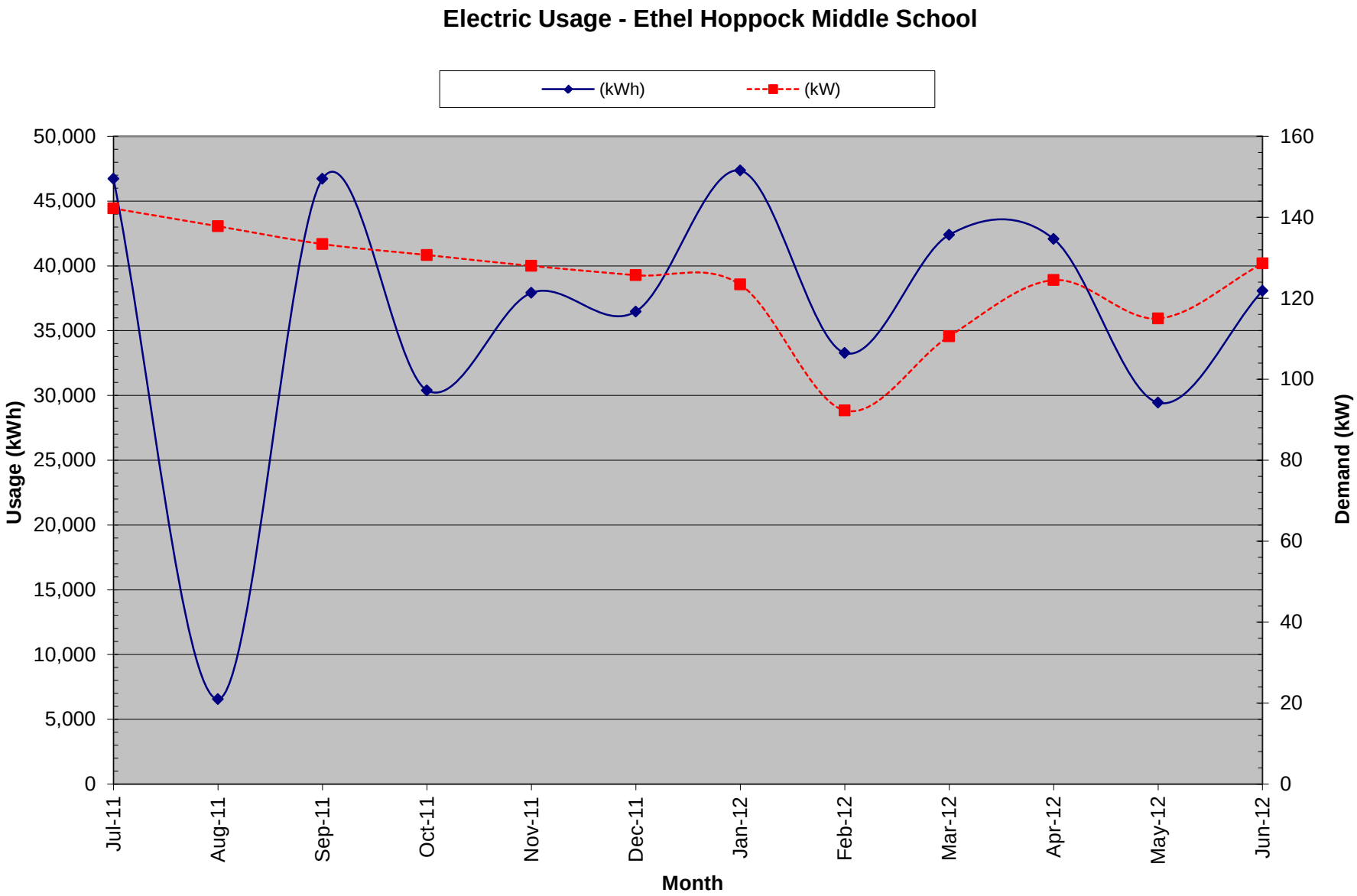


Ethel Hoppock Middle School
280 Asbury/West Portal Road, Asbury, NJ 08802

Electric Service
Delivery - JCPL Electric
Supplier - JCPL Electric

For Service at: Ethel Hoppock Middle School
Account No.: 10 00 04 6094 99
Meter No.: G17851622

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Delivery ($)	Supply ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
July-11	46,720	142.20	$7,206.05	$1,351.31	$5,854.74	$ 0.154	$ 0.135	$ 6.45
August-11	6,560	137.80	$1,788.36	$966.35	$822.01	$ 0.273	$ 0.137	$ 6.44
September-11	46,720	133.40	$7,144.98	$1,290.24	$5,854.74	$ 0.153	$ 0.135	$ 6.42
October-11	30,400	130.70	$4,975.23	$1,061.05	$3,914.18	$ 0.164	$ 0.136	$ 6.41
November-11	37,920	128.00	$6,072.56	$1,181.79	$4,890.77	$ 0.160	$ 0.139	$ 6.40
December-11	36,480	125.70	$5,730.47	$1,080.32	$4,650.15	$ 0.157	$ 0.143	$ 4.12
January-12	47,360	123.40	$6,947.90	$941.89	$6,006.01	$ 0.147	$ 0.131	$ 5.95
February-12	33,280	92.30	$5,181.52	$951.21	$4,230.31	$ 0.156	$ 0.140	$ 5.77
March-12	42,400	110.60	$6,280.86	$1,308.51	$4,972.35	$ 0.148	$ 0.133	$ 5.88
April-12	42,080	124.50	$6,290.13	$1,101.80	$5,188.33	$ 0.149	$ 0.132	$ 5.95
May-12	29,440	115.00	$4,577.92	$947.65	$3,630.27	$ 0.156	$ 0.132	$ 5.91
June-12	38,080	128.60	$5,891.99	$1,149.48	$4,742.51	$ 0.155	$ 0.134	$ 6.21
Total (12-months)	**437,440**	**142.20**	**$68,087.97**	**$13,331.60**	**$54,756.36**	**$ 0.156**	**$ 0.135**	**$ 6.01**



Utility Data - Ethel hoppock Middle School
Electric Graph

Ethel Hoppock Middle School
280 Asbury/West Portal Road, Asbury, NJ 08802

Fuel Oil Service
Delivery - Hess
Supplier - Hess

For Service at: Ethel Hoppock Middle School
Account No.: 433248
Meter No.:

Month	Total ($)	Delivery ($)	Supply ($)	Total Gallons	$/Gal
Nov-11	$ 17,350	$ -	$ -	5411	$ 3.21
Jan-12	$ 15,488	$ -	$ -	4985	$ 3.11
Feb-12	$ 16,299	$ -	$ -	4849	$ 3.36
Mar-12	$ 10,362	$ -	$ -	3000	$ 3.45
Oct-12		$ -	$ -		
Total (12-months)	**$ 59,498**	**$ -**	**$ -**	**18,245**	**$ 3.26**

Supplier Charges:
Electricity

Month	Consumption (kWh)	(Current Supplier) South Jersey Energy ($)	(Alternative Supplier) PSE&G ($)	Difference ($)
January-11	76,800	$ 8,131.85	$ 8,718.68	$ 586.83
February-11	79,500	$ 8,417.46	$ 9,595.59	$ 1,178.13
March-11	74,100	$ 7,845.71	$ 9,185.98	$ 1,340.27
April-11	66,300	$ 7,019.84	$ 8,023.02	$ 1,003.18
May-11	66,900	$ 6,257.16	$ 7,997.13	$ 1,739.97
June-11	73,800	$ 6,902.51	$ 8,897.56	$ 1,995.05
July-11	58,800	n/a	n/a	n/a
August-11	45,000	$ 4,208.85	$ 6,554.16	$ 2,345.31
September-11	61,200	$ 5,724.04	$ 7,999.16	$ 2,275.12
October-11	59,400	$ 5,555.68	$ 7,227.43	$ 1,671.75
November-11	68,400	$ 6,397.45	$ 7,783.03	$ 1,385.58
December-11	83,400	$ 7,800.40	$ 8,940.12	$ 1,139.72
January-12	79,800	$ 7,463.69	$ 9,081.93	$ 1,618.24
February-12	81,600	$ 7,871.95	$ 9,558.32	$ 1,686.37
March-12	77,400	$ 7,466.78	$ 8,800.64	$ 1,333.86
April-12	68,100	$ 6,569.61	$ 7,977.49	$ 1,407.88
Total (All)		**$ 103,632.98**	**$ 126,340.24**	**$ 22,707.26**

JCP&L SERVICE TERRITORY
Last Updated: 10/24/12

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I –INDUSTRIAL

Supplier	Telephone & Web Site	*Customer Class
AEP Energy, Inc. 309 Fellowship Road, Fl.2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	**C/I** **ACTIVE**
Alpha Gas and Electric, LLC 641 5th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	**R/C** **ACTIVE**
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877) 30-AMBIT (877) 302-6248 www.ambitenergy.com	**R/C** **ACTIVE**
AP Gas & Electric, LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apge.com	**R/C/I** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergyllc.com	**R/C/I** **ACTIVE**
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	**C/I** **ACTIVE**
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**R/C/I** **ACTIVE**
Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	888-565-4490 www.4choiceenergy.com	**R/C** **ACTIVE**
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(888) CLR-VIEW (800) 746-4702 www.clearviewenergy.com	**R/C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674 www.commerceenergy.com	**R** **ACTIVE**

ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(866) 237-7693 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, NJ 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**
Dominion Retail, Inc. **d/b/a Dominion Energy Solutions** 395 Route 70 West, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.dom.com/products	**R/C** **ACTIVE**
DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**

Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	**R/C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08819	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C** **ACTIVE**
HOP Energy, LLC d/b/a Metro Energy, HOP Fleet Fueling, HOP Energy Fleet Fueling 1011 Hudson Avenue Ridgefield, NJ 07657	(877) 390-7155 www.hopenergy.com	**R/C/I** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(973) 438-4380 www.idtenergy.com	**R/C** **ACTIVE**

Independence Energy Group, LLC 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Liberty Power Holdings, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. 532 Freeman St. Orange, NJ 07050	(973) 678-1800 x. 251 www.supremeenergyinc.com	**R/C** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
NJ Gas & Electric 1 Bridge Plaza fl.2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	**R/C/I** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Ave. Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**

Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**R/C** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Public Power & Utility of New Jersey, LLC 39 Old Ridgebury Rd. Suite 14 Danbury, CT 06810	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com/pjm	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza Route 54 Folsom, NJ 08037	(800) 800-266-6020 www.southjerseyenergy.com	**C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082	**R/C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**

Stream Energy 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 www.streamenergy.net	**R** **ACTIVE**
UGI Energy Services, Inc. **d/b/a GASMARK** 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 50 East Palisades Avenue Englewood, NJ 07631	(800) 388-3862 www.lowcostpower.com	**R/C/I** **ACTIVE**
Viridian Energy 2001 Route 46 Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
Xoom Energy New Jersey, LLC 744 Broad Street Newark, NJ 07102	(888)997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

APPENDIX B

Equipment Inventory

Ethel Hoppock Middle School
CHA Project#24735
280 Asbury/West Portal Road
Asbury, NJ 08802

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)
Air Compressor	1	Champion - Dayton	6K854BB	J10M	HVAC / Electric	5 HP / 1750 RPM / 1 Phase / Eff. 83%	Old Boiler Room	Pneumatic Controls	2002	9
Air Dryer	1	Zeks	18NCDA100	199183-M402	HVAC / Electric	115V / 1 Phase / 1 HP	Old Boiler Room	Pneumatic Controls	2002	9
DWH-1	1	Turbo Power	500 N 250A-TPO	602107742	HVAC / Oil Water Heater	250 Gal / Input: 399,000 BTU/H / 1/2 HP	Boiler Room	Building HW	2002	4
Electronic Burner	1	Beckett	A/AF/AFG/AR/AT/AG NX/CF375	S/SR/SM/SMG/SF/ST CF500/CF800	HVAC / Electric	120V / 60 Hz	Boiler Room	Building HW	2012	9
Burner Motor	1	Emerson	S55GYLDM-6017	N/A	HVAC / Electric	1/3 HP / 3450 RPM / 1 Phase	Boiler Room	Building HW	2002	9
DWH Pump -1	1	Bell & Gossett	M10711	N/A	HVAC / Electric	1/6 HP / 1725 RPM / 1 Phase	Boiler Room	Building Heating	N/A	---
DWH Pump -2	1	Bell & Gossett	M10711	N/A	HVAC / Electric	1/6 HP / 1725 RPM / 1 Phase	Boiler Room	Building Heating	N/A	---
Boiler, B-1	1	H.B. Smith	M450A-W-10	N/A	HVAC / Oil HW Heating	Input: 3,500 MBH / Boiler HP: 73.16	Boiler Room	Building Heating	2002	24
Boiler, B-2	1	H.B. Smith	M450A-W-10	N/A	HVAC / Oil HW Heating	Input: 3,500 MBH / Boiler HP: 73.16	Boiler Room	Building Heating	2002	24
Boiler Burner	1	Power Flame Burner	C2-OB	030203512	HVAC / Oil HW Heating	Min. 5.5 GPH / Max. 22 GPH / 1.5 HP	Boiler Room	Building Heating	2002	10
Boiler Burner	1	Power Flame Burner	C2-OB	030203512	HVAC / Oil HW Heating	Min. 5.5 GPH / Max. 22 GPH / 1.5 HP	Boiler Room	Building Heating	2002	10
P-1	1	ITT Bell & Gossett	AE53A	N/A	HVAC / Electric	15 HP / 1775 RPM / Eff: 89%	Boiler Room	Boilers	2002	9
P-2	1	ITT Bell & Gossett	AE53A	N/A	HVAC / Electric	15 HP / 1775 RPM / Eff: 89%	Boiler Room	Boilers	2002	9
AHU Fan Motor	1	Taco			HVAC / Electric			N/A	N/A	---
AHU Fan Motor	1	Dayton			HVAC / Electric	1.5 HP / 1750 RPM / Eff. 81.5%		N/A	N/A	---
Outdoor Condensor	1	York			HVAC / Cooling		Exterior	N/A	N/A	---
AS-1	1	ITT Bell & Gossett	Rolairtrol R-6	N/A	HVAC / HW Heating	125 PSI / 440 GPM	Boiler Room	Building Heating	2002	14
ET-1	1	ITT Bell & Gossett	B-200	N/A	HVAC / HW Heating	125 PSI / 53 Gal	Boiler Room	Hot Water	2002	14
CUH-1	1	Sterling	RWI-1130-OZ	N/A	HVAC / HW Heating	17.4 MBH / 230 CFM	Exit Corridor	Exit Corridor	N/A	N/A
FT-1	1	Sterling	VA-AR-14	N/A	HVAC / HW Heating	750 BTU/LF / 170°F	Classrooms	Classrooms	1976	-12
FT-2	1	Carrier	N/A	N/A	HVAC / HW Heating	750 BTU/LF / 170°F	Classrooms	Classrooms	1976	-12
P-3	1	ITT Bell & Gossett	Series HV	N/A	HVAC / Freeze Protection	1/6 HP / 1750	Science Room Ceiling	Science Room Ceiling	N/A	N/A
P-4	1	ITT Bell & Gossett	Series 60-11	N/A	HVAC / Freeze Protection	1/4 HP / 1750	Cafeteria Ceiling	Cafeteria Ceiling	N/A	N/A
RTU-1	1	Carrier	50HJ012	N/A	HVAC / NG Heating, DX Cooling	Supply Fan: 3475 CFM, 4.2 HP / DX Cooling: 117.8 MBH	Rooftop	N/A	2002	4
RTU-2	1	Carrier	50HJ008	N/A	HVAC / NG Heating, DX Cooling	Supply Fan: 2800 CFM, 4.2 HP / DX Cooling: 87.1 MBH	Rooftop	N/A	2002	4
RTU-3	1	Carrier	50HJ007	N/A	HVAC / NG Heating, DX Cooling	Supply Fan: 2150 CFM, 2.9 HP / DX Cooling: 66.9 MBH	Rooftop	N/A	2002	4
RTU-4	1	Carrier	50HJ004	N/A	HVAC / NG Heating, DX Cooling	Supply Fan: 1200 CFM, 1 HP / DX Cooling: 37.8 MBH	Rooftop	N/A	2002	4
RTU-5	1	AAON	RK-30	N/A	HVAC / NG Heating, DX Cooling	Supply Fan: 6000 CFM, (2) 5 HP / DX Cooling: 314.1 MBH	Rooftop	N/A	2002	4
CAC-1	1	Airdale	CAC-24	N/A	HVAC / DX Cooling, HW Heating	Cooling: 6.1 MBH / 11.2 SEER / 340 CFM Heating: 17.1 MBH / 2 GPM	Outdoor	N/A	N/A	4
CAC-2	1	Mitsubishi	PK 24 FK	N/A	HVAC / DX Cooling	Cooling: 24 MBH / 10.6 SEER / 710 CFM	Outdoor	N/A	N/A	4
HC-1	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 110 MBH Airflow: 3475 CFM	RTU-1	Media Center	2002	9
HC-2	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 76.0 MBH Airflow: 2800 CFM	RTU-2	Computer Lab	2002	9
HC-3	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 79.0 MBH Airflow: 2150 CFM	RTU-3	Science Lab	2002	9
HC-4	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 76.0 MBH Airflow: 2400 CFM	RTU-4	Corridors, Etc.	2002	9
HC-5	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 300 MBH Airflow: 6000 CFM	RTU-5	Cafeteria	2002	9
HC-6	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 30.8 MBH Airflow: 1050 CFM	RTU-6	Various	N/A	9
HC-7	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 126.6 MBH Airflow: 1666 CFM	SF-1	Fume Hood	2002	9
HC-8	1	USA Coil & Air	N/A	N/A	HVAC / HW Heating	Capacity: 387.9 MBH Airflow: 4200 CFM	(E) AHU	Cafeteria Storage	N/A	9
UV-1,2	2	Carrier	40UV-100	N/A	HVAC / HW Heating, DX Cooling	1000 CFM / 35.5 MBH / 3.5 GPM / 1/3 HP	SGI-E104, E108	SGI-E104, E108	N/A	N/A
UV-3,4	2	Carrier	40U-150	N/A	HVAC / HW Heating, DX Cooling	1500 CFM / 62 MBH / 6.2 GPM / 1/2 HP	Art Classroom E200, Classroom E204	Art Classroom E200, Classroom E204	1976	-17
UV-5	1	Carrier	40UH-150	N/A	HVAC / HW Heating, DX Cooling	1500 CFM / 62 MBH / 6.2 GPM / 1/2 HP	Classroom	Classroom	1976	-17
EF-1	1	Penn Ventilator	DOMEX DX08S	N/A	HVAC / Exhaust	50 CFM / 1300 RPM / 1/30 HP	Rooftop	Jan/ Closet	2002	9
EF-2	1	Penn Ventilator	DOMEX DX08S	N/A	HVAC / Exhaust	40 CFM / 1300 RPM / 1/50 HP	Rooftop	Gym Office	2002	9
EF-3	1	Penn Ventilator	DOMEX DX06B	N/A	HVAC / Exhaust	200 CFM / 625 RPM / 1/6 HP	Rooftop	Elev. Mech. Rm.	2002	9
EF-4	1	Penn Ventilator	DOMEX DX08B	N/A	HVAC / Exhaust	745 CFM / 1348 RPM / 1/4 HP	Rooftop	RMS E108/115	2002	9
EF-6	1	Penn Ventilator	FUMEX FX12BH	N/A	HVAC / Exhaust	1666 CFM / 1234 RPM / 1/2 HP	Rooftop	Fume Hood	2002	9
EF-7	1	Penn Ventilator	DOMEX DX08B	N/A	HVAC / Exhaust	625 CFM / 1280 RPM / 1/4 HP	Rooftop	RMS E103/E104	2002	9
EF-8	1	Penn Ventilator	DOMEX DX08B	N/A	HVAC / Exhaust	800 CFM / 1321 RPM / 1/4 HP	Rooftop	RMS E206/E204	2002	9
EF-8 ALT.	1	Penn Ventilator	DOMEX DX06B	N/A	HVAC / Exhaust	275 CFM / 1034 RPM / 1/6 HP	Rooftop	RMS E206/E204	2002	9
EF-9	1	Penn Ventilator	DOMEX DX06B	N/A	HVAC / Exhaust	400 CFM / 1125 RPM / 1/6 HP	Rooftop	Music E208	2002	9
EF-10	1	Penn Ventilator	DOMEX DX10R	N/A	HVAC / Exhaust	225 CFM / 888 CFM / 1/12 HP	Rooftop	Girls TLT 204	2002	9
EF-11	1	Penn Ventilator	DOMEX DX10R	N/A	HVAC / Exhaust	300 CFM / 1059 CFM / 1/12 HP	Rooftop	Boys TLT 205	2002	9
SF-1	1	Penn Ventilator	MUFFAN MU30	N/A	HVAC / Exhaust	1666 CFM / 797 RPM / 1 HP	Rooftop	Fume Hood	2002	9

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

Existing Lighting

Cost of Electricity: **$0.156** **$/kWh**

$6.01 **$/kW**

			EXISTING CONDITIONS									
	Area Description	**Usage**	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
13	Storage Room	Storage Areas	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	1000	OCC	120	
13	Hallway	Hallways	13	S 32 P F 2 (ELE)	F42LL	60	0.78	SW	2280	N/A	1,778	
257	Hallway	Hallways	4	CF11W	CF11/2	26	0.10	SW	2280	N/A	237	
13	Computer Lab	Classrooms	19	S 32 P F 2 (ELE)	F42LL	60	1.14	SW	2400	C-OCC	2,736	
13	MDF Room	Storage Areas	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	1000	OCC	120	
35	Library Work Room	Classrooms	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2400	OCC	432	
257	Library	Classrooms	34	CF11W	CF11/2	26	0.88	SW	2400	C-OCC	2,122	
35	Library - Media Center Office	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2400	OCC	432	
258	Library	Classrooms	20	F36ILL-R	F36ILL-R	134	2.68	SW	2400	C-OCC	6,432	
13	Hallway	Hallways	4	S 32 P F 2 (ELE)	F42LL	60	0.24	SW	2280	N/A	547	
5	Stairway	Hallways	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.12	SW	2280	N/A	274	
13	Storage Room	Storage Areas	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	1000	OCC	120	
13	Electrical Room	Storage Areas	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	1000	OCC	120	
13	Storage Room	Storage Areas	1	S 32 P F 2 (ELE)	F42LL	60	0.06	SW	1000	OCC	60	
5	Storage Room	Storage Areas	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.06	SW	1000	OCC	60	
35	5/6 Science Room	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	OCC	3,240	
35	Science Prep Room	Storage Areas	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	1000	OCC	180	
13	Elevator Maintanence	Storage Areas	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	1000	OCC	120	
259	Nurse	Offices	1	FU40T12/ES	FU1EE	43	0.04	SW	2400	OCC	103	
121	Nurse	Offices	4	W 34 P F 4	F44EE	144	0.58	SW	2400	OCC	1,382	
121	Nurse	Offices	2	W 34 P F 4	F44EE	144	0.29	SW	2400	OCC	691	
71	Nurse	Bath Room	1	I 60	I60/1	60	0.06	SW	2000	N/A	120	
71	Nurse	Offices	2	I 60	I60/1	60	0.12	SW	2400	OCC	288	
71	Girl's Locker Room	Locker	5	I 60	I60/1	60	0.30	SW	2800	N/A	840	
2	Girl's Locker Room Bathroom	Locker	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.64	SW	2800	N/A	1,792	
71	Boy's Locker Room	Locker	5	I 60	I60/1	60	0.30	SW	2800	N/A	840	
2	Boy's Locker Room Bathroom	Locker	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.64	SW	2800	N/A	1,792	
121	Speech Room	Offices	2	W 34 P F 4	F44EE	144	0.29	SW	2400	OCC	691	
260	Gymnasium	Cafeteria	28	F46ILL	F46ILL	175	4.90	SW	1600	C-OCC	7,840	
18	Gym Office	Cafeteria	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	1600	OCC	538	
2	Gym Storage	Storage Areas	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.32	SW	1000	OCC	320	
259	Hallway	Hallways	34	FU40T12/ES	FU1EE	43	1.46	SW	2280	N/A	3,333	
2	Storage	Storage Areas	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.16	SW	1000	OCC	160	
121	Custodian Office	Offices	2	W 34 P F 4	F44EE	144	0.29	SW	2400	OCC	691	
2	Girl's Bathroom	Bath Room	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.24	SW	2000	N/A	480	
93	Guidance Room - 11	Offices	4	I 75	I75/1	75	0.30	SW	2400	OCC	720	
121	Guidance Room - 11	Offices	6	W 34 P F 4	F44EE	144	0.86	SW	2400	OCC	2,074	
2	Boy's Bathroom	Bath Room	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.24	SW	2000	N/A	480	
90	Janitor Closet	Storage Areas	1	X CF 7.0	ECF7/1	10	0.01	SW	1000	OCC	10	
121	Main Office	Offices	6	W 34 P F 4	F44EE	144	0.86	SW	2400	OCC	2,074	
121	Conference Room	Offices	4	W 34 P F 4	F44EE	144	0.58	SW	2400	C-OCC	1,382	
2	Office Storage Room	Storage Areas	6	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.48	SW	1000	OCC	480	
121	7/8 Science Room - 13	Classrooms	19	W 34 P F 4	F44EE	144	2.74	SW	2400	OCC	6,566	
2	Room 10	Classrooms	21	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.68	SW	2400	OCC	4,032	
2	Room 12	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 14	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 16	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 18	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 19	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 17	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
2	Room 15	Classrooms	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.44	SW	2400	OCC	3,456	
35	Cafeteria	Cafeteria	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.16	SW	1600	C-OCC	3,456	

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

Existing Lighting

Cost of Electricity: **$0.156** **$/kWh**

$6.01 **$/kW**

			EXISTING CONDITIONS									
	Area Description	**Usage**	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
2	Custiodian Office	Offices	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.16	SW	2400	OCC	384	
78	Custodian Office	Offices	2	EP I 100	I100/1	100	0.20	SW	2400	OCC	480	
5	Old Boiler Room	Storage Areas	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.06	SW	1000	OCC	60	
3	Old Boiler Room	Storage Areas	1	W 34 W F 1 (MAG)	F41EE	43	0.04	SW	1000	OCC	43	
18	Old Boiler Room	Storage Areas	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	1000	OCC	112	
246	Old Boiler Room	Storage Areas	1	W96CF1 (MAG)	F81EHS	125	0.13	SW	1000	OCC	125	
18	Kitchen	Cafeteria	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	1600	N/A	1,075	
2	Kitchen Office	Offices	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.32	SW	2400	OCC	768	
X5	Walk-in Refridgerator	Storage Areas	1	CF42/1	CF42/1-L	48	0.05	SW	1000	OCC	48	
X5	Walk-in Freezer	Storage Areas	1	CF42/1	CF42/1-L	48	0.05	SW	1000	OCC	48	
225	Storage	Storage Areas	2	E 110 P F 2 Mag	F82SHE	237	0.47	SW	1000	OCC	474	
61	Room 53	Classrooms	8	T 34 R F 3 (MAG)	F43EE	115	0.92	SW	2400	OCC	2,208	
61	Room 1	Classrooms	16	T 34 R F 3 (MAG)	F43EE	115	1.84	SW	2400	OCC	4,416	
61	Room 3	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	OCC	3,312	
61	Room 5	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	OCC	3,312	
61	Room 6	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	OCC	3,312	
61	Room 4	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	OCC	3,312	
61	Room 2	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	OCC	3,312	
121	Hallway	Hallways	11	W 34 P F 4	F44EE	144	1.58	SW	2280	N/A	3,612	
18	Men's Bathroom	Bath Room	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2000	N/A	672	
18	Women's Bathroom	Bath Room	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2000	N/A	672	
3	Upper Level Hallway	Hallways	12	W 34 W F 1 (MAG)	F41EE	43	0.52	SW	2280	N/A	1,176	
61	Art Room - 25	Classrooms	12	T 34 R F 3 (MAG)	F43EE	115	1.38	SW	2400	C-OCC	3,312	
121	Room 23	Classrooms	4	W 34 P F 4	F44EE	144	0.58	SW	2400	OCC	1,382	
78	Storage	Storage Areas	2	EP I 100	I100/1	100	0.20	SW	1000	OCC	200	
121	Room 21A	Offices	6	W 34 P F 4	F44EE	144	0.86	SW	2400	OCC	2,074	
121	Room 21B	Offices	6	W 34 P F 4	F44EE	144	0.86	SW	2400	OCC	2,074	
259	Room 21 Hallway	Offices	1	FU40T12/ES	FU1EE	43	0.04	SW	2400	OCC	103	
121	Music Room 20	Classrooms	12	W 34 P F 4	F44EE	144	1.73	SW	2400	OCC	4,147	
121	Room 22	Classrooms	12	W 34 P F 4	F44EE	144	1.73	SW	2400	OCC	4,147	
90	Faculty Men's Bathroom	Bath Room	1	X CF 7.0	ECF7/1	10	0.01	SW	2000	N/A	20	
90	Faculty Women's Bathroom	Bath Room	1	X CF 7.0	ECF7/1	10	0.01	SW	2000	N/A	20	
121	Faculty Room	Offices	4	W 34 P F 4	F44EE	144	0.58	SW	2400	OCC	1,382	
2	Hallway	Hallways	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.24	SW	2280	N/A	547	
259	Hallway	Hallways	5	FU40T12/ES	FU1EE	43	0.22	SW	2280	N/A	490	
13	Boiler Room	Storage Areas	9	S 32 P F 2 (ELE)	F42LL	60	0.54	SW	1000	OCC	540	
8	Exterior	Exterior	19	MH 175	MH175/1	215	4.09	BR	5000	N/A	20,425	
240	Exterior	Exterior	9	R 150 C I 1	i150/1	150	1.35	BR	5000	N/A	6,750	
169LED	Exterior	Exterior	3	SP 250 MH ROOF	MH250/1	295	0.89	BR	5000	N/A	4,425	
240	Exterior	Exterior	11	R 150 C I 1	i150/1	150	1.65	BR	5000	N/A	8,250	
	Total		**718**				**71.15**				**179,720**	

APPENDIX C

ECM Calculations

Summary of Energy Conservation Measures							
Energy Conservation Measure		**Approx. Costs ($)**	**Approx. Savings ($/year)**	**Payback (Years) w/o Incentive**	**Potential Incentive ($)***	**Payback (Years) w/ Incentive**	**Recommended For Implementation**
ECM-1	Night-time Setback for HVAC Equipment	1,000	6,400	0	0	0	X
ECM-2	Premium Efficiency Motors on AHUs	5,000	2,900	2	300	2	X
ECM-3	Demand Control Ventilation	17,000	5,800	3	0	3	X
ECM-4	Demand Control Ventilation	17,000	1,700	10	0	10	X
ECM-5	Replace Pneumatic Controls w/ DDC Controls	315,000	10,100	>20	0	>20	
ECM-6	Lighting Replacement / Upgrades	108,000	12,800	8	8,600	8	X
ECM-7	Install Lighting Controls (Occupancy Sensors)	9,000	6,300	1	1,400	1	
ECM-8	Lighting Replacements with Lighting Controls (Occupancy Sensors)	117,000	17,200	7	10,000	6	X

BethlehemTownship School District - NJBPU
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ECM Summary Sheet

ECM-1 Night-time Setback for HVAC Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
1,000	21,900	0	900	6,400	0	6,400	93.9	0	0.2	0.2

Expected Life: 15 years
Lifetime Savings: 328,500 kWh 13,500 gallons $ 96,000

ECM-2 Premium Efficiency Motors on AHUs

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,000	17,900	0	0	2,900	0	2,900	9.9	300	1.7	1.6

Expected Life: 20 years
Lifetime Savings: 358,000 kWh 0 gallons $ 58,000

ECM-3 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
17,000	500	0	1,800	5,800	0	5,800	4.3	0	2.9	2.9

Expected Life: 15 years
Lifetime Savings: 7,500 kWh 27,000 gallons $ 87,000

ECM-4 Hot Water Reset for Boilers

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
17,000	0	0	500	1,700	0	1,700	0.5	0	10.0	10.0

Expected Life: 15 years
Lifetime Savings: 0 kWh 7,500 gallons $ 25,500

ECM-5 Replace Pneumatic Controls w/ DDC Controls

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
315,000	1,900	0	2,900	10,100	0	10,100	(0.5)	0	>20	>20

Expected Life: 15 years
Lifetime Savings: 28,500 kWh 43,500 gallons $ 151,500

ECM-6 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
108,000	71,000	0	0	12,800	0	12,800	0.6	8,600	8.4	7.8

Expected Life: 15 years
Lifetime Savings: 1,065,000 kWh 0 gallons $ 192,000

ECM-7 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
9,000	40,300	0	0	6,300	0	6,300	9.3	1,400	1.4	1.2

Expected Life: 15 years
Lifetime Savings: 604,500 kWh 0 gallons $ 94,500

ECM-8 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
117,000	99,300	0	0	17,200	0	17,200	0.9	10,000	6.8	6.2

Expected Life: 15 years
Lifetime Savings: 1,489,500 kWh 0 gallons $ 258,000

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Utility Costs		Yearly Usage	MTCDE	Building Area	Annual Utility Cost	
$ 0.156	$/kWh blended		0.00042021	44,200	Electric	Fuel Oil
$ 0.135	$/kWh supply	437,440	0.00042021		$ 68,087.97	$ 59,498.00
$ 6.01	$/kW	142.2	0			
$ 3.26	$/gals	18,245	0.00533471			
	$/kgals		0			

Ethel Hoppock Middle School

	Item	Savings						Cost	Simple Payback	MTCDE	Life Expectancy	NJ Smart Start Incentives	Direct Install Eligible (Y/N)*	Direct Install Incentives**	Max Incentives	Payback w/ Incentives***	Simple Projected Lifetime Savings						ROI
		kW	kWh	gals	cooling kWh	kgal/yr	$										kW	kWh	therms	cooling	kgal/yr	$	
ECM-1	Night-time Setback for HVAC Equipment	0.0	21,872	912	0	0	$ 6,400	$ 1,010	0.2	14.1	15	$ -	N	$ -	$ -	0.2	0.0	328,080	13,684	0	0	$ 95,790	93.9
ECM-2	Premium Efficiency Motors on AHUs	2.0	17,880	0	0	0	$ 2,900	$ 4,713	1.6	7.5	20	$ 300	N	$ -	$ 300	1.5	40.8	357,608	0	0	0	$ 51,221	9.9
ECM-3	Demand Control Ventilation	0.0	487	1,765	0	0	$ 5,800	$ 16,600	2.9	9.6	15	$ -	Y	$ 11,600	$ -	2.9	0.0	7,310	26,469	0	0	$ 87,428	4.3
ECM-4	Hot Water Reset for Boilers	0.0	0	531	0	0	$ 1,700	$ 17,061	10.0	2.8	15	$ -	N	$ -	$ -	10.0	0.0	0	7,971	0	0	$ 25,986	0.5
ECM-5	Replace Pneumatic Controls w/ DDC Controls	3.7	1,865	2,919	0	0	$ 10,100	$ 315,150	31.2	16.4	15	$ -	N	$ -	$ -	31.2	56.0	27,975	43,788	0	0	$ 150,561	(0.5)
ECM-6	Lighting Replacement / Upgrades	23.5	70,968	0	0	0	$ 12,800	$ 107,625	8.4	29.8	15	$ 8,585	Y	$ 75,000	$ 8,585	7.7	352.5	1,064,520	0	0	0	$ 169,133	0.6
ECM-7	Install Lighting Controls (Occupancy Sensors)	0.0	40,273	0	0	0	$ 6,300	$ 9,113	1.4	16.9	15	$ 1,445	Y	$ 6,400	$ 1,445	1.2	0.0	604,095	0	0	0	$ 94,239	9.3
ECM-8	Lighting Replacements with Lighting Controls (Occupancy Sensors)	23.5	99,307	0	0	0	$ 17,200	$ 116,738	6.8	41.7	15	$ 10,030	Y	$ 75,000	$ 10,030	6.2	352.5	1,489,605	0	0	0	$ 226,519	0.9
	Total (Does Not Include ECM-6 & ECM-7)	**29.3**	**141,411.8**	**6,127.4**	**0.0**	**0.0**	**44,100.0**	**471,271.7**	10.7		15.8	$ 10,330		$ 86,600	$ 10,330	10.5	449.3	2,210,578	91,912	0	0	$ 637,504	0.4
	Total Measures with Payback <15	**25.5**	**139,546.8**	**3,208.2**	**0.0**	**0.0**	**34,000.0**	**156,121.7**	4.6		15.8	$ 10,330		$ 86,600	$ 10,330	4.3	393.32	2,182,603	40,152	0	0	$ 460,958	2.0
	% of Existing	**21%**	**32%**	**34%**	**0%**	**#DIV/0!**																	

BethlehemTownship School District - NJBPU
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ECM-1 Night Setback for HVAC Equipment
Add VSD's to the HV unit fans

E X I S T I N G C O N D I T I O N S		
Existing Facility Total Electric usage	437,440	kWh
Existing Facility Fuel Oil #2 Usage	18,245	Gal Oil #2
Cost of Electricty	$ 0.16	$/kWh
	$ 3.26	$/Gal Oil #2
S A V I N G S		
TOD Electric savings	21,872	kWh2
TOD Fuel Oil savings	912	Gallons3
Total Cost Savings	$ 6,386	
Estimated Total Project Cost	$ 1,000	4
Simple Payback	0.2	**years**

Assumptions

1	5%	Approximate electric savings due to night setback
2	5%	Approximate natural gas savings due to night setback
3		Project cost is an estimate, includes cost of replacing non- programmbale thermostats with programmbale thermostats
4		control work cost

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ECM-1 Night Setback for HVAC Equipment

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Night Setback	1	EA		$ 200	$ 450	$ -	$ 270	$ 495	$ 765	

$	765	Subtotal
$	76.50	10% Contingency
$	168.30	20% Contractor O&P
$	-	
$	**1,010**	**Total**

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ECM-2: Install Premium Efficiency Motors

Demand Cost $/kW-month	Energy Cost $/kWh
$ 6.01	$ 0.16

Multipliers		
Material	Labor	Equipment
1.10	1.35	1.10

Savings Analysis

Cost Estimates

#	Description	Location	Existing HP	Load Factor	Existing Efficiency$_a$	Existing kW	New HP$_b$	New Load Factor	New Efficiency$_a$	New kW	Demand Savings	Demand Savings $	Annual Hours	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years	Unit Costs Materials	Unit Costs Labor	Unit Costs Equipment	Subtotal Costs Materials	Subtotal Costs Labor	Subtotal Costs Equipment	Total Cost	Remarks
1	RTU-1	Rooftop	5	0.8	77.20%	3.9	5	0.8	88.50%	3.4	0.493	$ 36	8,760	4,322	$ 674	$ 710	$ 943	1.3	$ 550	$ 250	$ -	$ 605	$ 338	$ -	$ 943	
2	RTU-2	Rooftop	5	0.8	77.20%	3.9	5	0.8	88.50%	3.4	0.493	$ 36	8,760	4,322	$ 674	$ 710	$ 943	1.3	$ 550	$ 250	$ -	$ 605	$ 338	$ -	$ 943	
3	RTU-3	Rooftop	3	0.8	87.50%	2.0	3	0.8	90.50%	2.0	0.068	$ 5	8,760	594	$ 93	$ 98	$ 943	9.7	$ 550	$ 250	$ -	$ 605	$ 338	$ -	$ 943	
4	RTU-5	Rooftop	5	0.8	77.20%	3.9	5	0.8	88.50%	3.4	0.493	$ 36	8,760	4,322	$ 674	$ 710	$ 943	1.3	$ 550	$ 250	$ -	$ 605	$ 338	$ -	$ 943	
5	RTU-5	Rooftop	5	0.8	77.20%	3.9	5	0.8	88.50%	3.4	0.493	$ 36	8,760	4,322	$ 674	$ 710	$ 943	1.3	$ 550	$ 250	$ -	$ 605	$ 338	$ -	$ 943	
		Total	**23**			**17.5**	**23**			**15.5**	**2.04**	**$ 147**		**17,880**	**$ 2,789**	**$ 2,937**	**$ 4,713**									

Notes

a Existing and new efficiencies should be entered if known. If not known, use provided curve fit based on "DOE Survey Installed Average" and NEMA Premium values, respectively.

b Same as existing HP unless resized to better match load

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ECM-2: Install Premium Efficiency Motors

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Premium Efficiency Motors	1	EA		$ 1,000	$ 2,019	$ -	$ 1,350	$ 2,220	$ 3,570	

$ 3,570	Subtotal
$ 357.04	10% Contingency
$ 785.48	20% Contractor O&P
$ -	
$ 4,713	**Total**

BethlehemTownship School District - NJBPU
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	Total CFM	O.A. CFM	O.A. %	
Org. scheduled CFM	15,625	2,344	15%	
Derated CFM	15,625	1,094	7%	
SA Enthalpy	26.4	BTU/lbma		
SA Set point, Winter	68.0	°F		
SA Set point, Summer	74.0	°F		
Heating "On" Point	55.0	°F		
Cooling System Eff.	1.2	kW/Ton		(Includes ancillary equ
Heating System Eff.	82%			(Includes distribution l

ECM-3: Install Demand Control Ventilation

Description:
Outside air can be significantly reduced for most of the time that the building is occupied.
Savings will result from the avoided heating and cooling of excessive outside air.

Method:
The outdoor air introduced into the spaces is currently constant based on design occupancy conditions.
This ECM proposes the installation of CO2 sensors in the space to allow for reduced outdoor air flows when conditions allow.
An average reduction of 50% is assumed possible with the implementation of DCV
The DCV system will automatically adjust the outdoor air damper position through the EMS to reduce outdoor air flows based on indoor CO2 levels.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
			Existing					Proposed Demand Ventilation					Savings	
Avg. DB Bin Temp °F	OA Enthalpy Btu/lb	Occupied Bin HOURS	OA CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating gallons	Derated O.A. CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating gallons	Cooling kWh	Heating Gallons
115	50.1	0	2,344	250	0	0	-	1,094	117	0	0	-	0	-
110	42.5	0	2,344	170	0	0	-	1,094	79	0	0	-	0	-
105	39.5	0	2,344	138	0	0	-	1,094	64	0	0	-	0	-
100	36.6	0	2,344	108	0	0	-	1,094	50	0	0	-	0	-
95	34.0	3	2,344	80	0	24	-	1,094	37	0	11	-	13	-
90	31.6	34	2,344	55	0	186	-	1,094	26	0	87	-	99	-
85	29.2	131	2,344	30	0	387	-	1,094	14	0	181	-	206	-
80	27.0	500	2,344	6	0	316	-	1,094	3	0	148	-	169	-
75	24.5	620	2,344	0	0	0	-	1,094	0	0	0	-	0	-
70	21.4	664	2,344	0	0	0	-	1,094	0	0	0	-	0	-
65	18.7	854	2,344	0	0	0	-	1,094	0	0	0	-	0	-
60	16.2	927	2,344	0	0	0	-	1,094	0	0	0	-	0	-
55	14.4	600	2,344	0	33	0	174	1,094	0	15	0	81	0	93
50	12.6	610	2,344	0	46	0	244	1,094	0	21	0	114	0	130
45	10.7	611	2,344	0	58	0	313	1,094	0	27	0	146	0	167
40	8.6	656	2,344	0	71	0	409	1,094	0	33	0	191	0	218
35	6.8	1023	2,344	0	84	0	751	1,094	0	39	0	351	0	401
30	5.5	734	2,344	0	96	0	621	1,094	0	45	0	290	0	331
25	4.1	334	2,344	0	109	0	320	1,094	0	51	0	149	0	170
20	2.6	252	2,344	0	122	0	269	1,094	0	57	0	126	0	144
15	1.0	125	2,344	0	134	0	147	1,094	0	63	0	69	0	79
10	0.0	47	2,344	0	147	0	61	1,094	0	69	0	28	0	32
5	-1.5	22	2,344	0	159	0	31	1,094	0	74	0	14	0	16
Total		**8,747**		**836**		**914**	**3,309**		**390**		**426**	**1,544**	**487**	**1,765**

ANNUAL SAVINGS		
Annual Oil Usage	**1,765**	**Gallons**
Annual Electrical Usag	**487**	**kWh**
Annual Cost Savings	$5,829	
Total Project Cost	$16,600	
Simple Payback	2.8	years

BethlehemTownship School District - NJBPU
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ECM-3: HVAC Demand Control Ventilation - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
CO2 sensor	4	ea	$ 500	$ 150	$ -	$ 2,200	$ 810	$ -	$ 3,010	
Replace damper actuators	4	ea	$ 250	$ 50	$ -	$ 1,100	$ 270	$ -	$ 1,370	
Reprogram DDC system	4	ea	$ 150	$ 350	$ -	$ 660	$ 1,890	$ -	$ 2,550	
Miscellaneous electrical/wiring	4	ls	$ 300	$ 750	$ -	$ 1,320	$ 4,050	$ -	$ 5,370	

$ 12,300	Subtotal
$ 2,460	10% Contingency
$ 1,845	20% Contractor O&P
$ -	0% Engineering
$ 16,600	**Total**

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Hot Water Boiler Reset Control

Notes:

1. Building heat is provided by one oil-fired hot water boiler.
2. Boiler currently does not have hot water reset control, boiler water temprature remains constant throughout the year.
3. Recommend installation of boiler controls to allow for automatic boiler water reset based on OA temperature.

BOILER WATER TEMPERATURE RESET:

80.0%	…BOILER COMBUSTION EFFICIENCY (OLDEFF)
5.0%	…BOILER/PIPING RADIANT& MISC. HEAT LOSSES (OLDLOSS)
80	…AMBIENT ROOM TEMPERATURE (AMBTEMP)
180	...CURRENT BOILER TEMPERATURE (OLDTEMP)
150	...NEW BOILER TEMPERATURE (NEWTEMP)
30	...AVERAGE REDUCTION IN BOILER TEMP (AVGRED) = (OLDTEMP-NEWTEMP)
0.75%	...REDUCTION IN COMBUSTION LOSSES BY RESET (COMBRED) = AVGRED/40/100
1.50%	...REDUCTION IN RADIANT LOSSES (RADRED)=(OLDLOSS-(OLDLOSS*(NEWTEMP-AMBTEMP)/(OLDTEMP-AMBTEMP)))
2.25%	...NET IMPROVEMENT IN BOILER FUEL-TO-HEAT EFFICIENCY (NETEFF) = COMBRED+RADRED
Gallons	...TYPE OF FUEL (GAS MCF, OIL GAL, COAL TONS)
$ 3.26	... COST / UNIT OF FUEL
138,700	...BTUs / UNIT (BTUs/UNIT)
18245.00	...ANNUAL TOTAL FUEL CONSUMPTION FROM BILLS (TOTFUEL)
0.00	…ESTIMATED NON-BOILER FUEL CONSUMPTION (OTHFUEL)
18245.00	...ANNUAL BOILER FUEL CONSUMPTION (HEATFUEL) = TOTFUEL-OTHFUEL
75.0%	…CURRENT BOILER FUEL-TO-HEAT EFFICIENCY (CEFF) = OLDEFF-OLDLOSS
77.3%	…RETROFIT BOILER FUEL-TO-HEAT EFFICIENCY (REFF) = CEFF+NETEFF
531.41	...CALCULATED ANNUAL FUEL SAVINGS (FUELSAVE) = ANNFUEL - (ANNFUEL*CEFF/REFF)

531.41 GALLONS SAVINGS

FUELSAVE * COST/UNIT OF FUEL ========== **$1,732.39** **COST SAVINGS**

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ECM-4: Hot Water Reset for Boilers

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Hot Water Reset Control	1	EA	$ 1,500	$ 1,500		$ 1,650	$ 2,025	$ -	$ 3,675	
Wiring	1	EA	$ 500.0	$ 1,000.00		$ 550	$ 1,350	$ -	$ 1,900	
Controls	2	EA	$ 1,500.0	$ 1,500.00		$ 3,300	$ 4,050	$ -	$ 7,350	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 12,925	Subtotal
$ 1,292.50	10% Contingency
$ 2,843.50	20% Contractor O&P
$ -	
$ 17,061	**Total**

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ECM 5 - Replace Pneumatice Controls with DDC Controls

EXISTING CONDITIONS			
Electricity Consumed by Air Compressor	1,865	kWh	3.73kW * 500 hours
Fuel Oil Consumed by HVAC System	14,596	gallons[1]	From Utility Analysis
SAVINGS			
Electric Savings	1,865	kWh[2]	
Electric Demand Savings	4	kW[2]	
Fuel Oil Savings	2,919	gallons[3]	
Total Cost Savings	$ 9,830		
Estimated Total Project Cost	$ 315,000	[4]	
Simple Payback	32.0	**years**	

Assumptions

1		Fuel Oil consumption based on utility data, boiler capacity & operating hours
2		Electric savings from removing the air compressor
3	20%	Approximate oil savings from night setback & temperature scheduling
4		Project cost is an estimate - +/- 20%

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ECM 5 - Replace Pneumatice Controls with DDC Controls

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Controls	1	LS	$ 125,000.0	$ 75,000.00		$ 137,500	$ 101,250	$ -	$ 238,750	

$ 238,750	Subtotal
$ 23,875.00	10% Contingency
$ 52,525.00	20% Contractor O&P
$ -	
$ 315,150	**Total**

ECM-W1: Replace urinals and flush valves with low flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons		$ / kGal
Urinals in Building	0	
Average Flushes / Urinal (per Day)	0	
Average Gallons / Flush	0.0	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	0	
Proposed Gallons / Flush	1.0	Gal
Proposed Material Cost		
Proposed Installation Cost		
Total cost of new urinals & valves	$0	

SAVINGS		
Current Urinal Water Use	0	kGal / year
Proposed Urinal Water Use	0	kGal / year
Water Savings	0	kGal / year
Cost Savings	$0	/ year
Simple Payback	#DIV/0!	years

ECM-W3: Replace toilets and flush valves with low flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons		$ / kGal
Toilets in Building	0	
Average Flushes / Toilet (per Day)	0	
Average Gallons / Flush	0.0	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	0	
Proposed Gallons / Flush	1.6	Gal
Proposed Material Cost of new Flush Valves		
Proposed Installation cost of new Flush Valves		
Total cost of new toilets & valves	$0	

SAVINGS		
Current Toilet Water Use	0	kGal / year
Proposed Toilet Water Use	0	kGal / year
Water Savings	0	kGal / year
Cost Savings	$0	/ year
Simple Payback	#DIV/0!	years

ECM-W4: Replace faucets with low flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons		$ / kGal
Faucets in Building	1	
Average Uses / Faucet (per day)	1	Gal
Average Time of Use	0.5	min
Average Flowrate	3.0	gpm

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	1	
Proposed Flowrate	1.5	gpm
Proposed Material Cost of new Faucets		
Proposed Installation cost of new Faucets		
Total cost of new faucets	$0	

SAVINGS		
Current Faucet Water Use	1	kGal / year
Proposed Faucet Water Use	0	kGal / year
Water Savings	0	kGal / year
Cost Savings	$0	/ year
Simple Payback	#DIV/0!	years

ECM-1 Lighting Replacements

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$107,625	**23.5**	**70,968**	**0**	**$12,769**	**0**	**$12,769**	**$8,585**	**8.4**	**7.8**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-2 Install Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$9,113	**0.0**	**40,273**	**0**	**$6,283**	**0**	**$6,283**	**$1,445**	**1.5**	**1.2**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-3 Lighting Replacements with Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$116,738	**23.5**	**99,307**	**0**	**$17,190**	**0**	**$17,190**	**$10,030**	**6.8**	**6.2**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

ECM-1 Lighting Replacements

Cost of Electricity: **$0.156 $/kWh**

$6.01 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	($/kWh) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	SW	1,000	96	24	0.0	$ 5.47	$ 229.50	$20	41.9	8.7
13	Hallway	13	S 32 P F 2 (ELE)	F42LL	60	0.8	SW	2280	1,778	13	0	F42SSILL	48	0.6	SW	2,280	1,423	356	0.2	$ 66.74	$ 1,491.75	$130	22.4	3.8
257	Hallway	4	CF11W	CF11/2	26	0.1	SW	2280	237	4	CF11W	CF11/2	26	0.1	SW	2,280	237	-	0.0	$ -	$ -	$0		
13	Computer Lab	19	S 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,736	19	0	F42SSILL	48	0.9	SW	2,400	2,189	547	0.2	$ 101.81	$ 2,180.25	$190	21.4	3.6
13	MDF Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	SW	1,000	96	24	0.0	$ 5.47	$ 229.50	$20	41.9	8.7
35	Library Work Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2,400	432	-	0.0	$ -	$ -	$0		
257	Library	34	CF11W	CF11/2	26	0.9	SW	2400	2,122	34	CF11W	CF11/2	26	0.9	SW	2,400	2,122	-	0.0	$ -	$ -	$0		
35	Library - Media Center Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2,400	432	-	0.0	$ -	$ -	$0		
258	Library	20	F36ILL-R	F36ILL-R	134	2.7	SW	2400	6,432	20	F36ILL-R	F36ILL-R	134	2.7	SW	2,400	6,432	-	0.0	$ -	$ -	$0		
13	Hallway	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2280	547	4	0	F42SSILL	48	0.2	SW	2,280	438	109	0.0	$ 20.53	$ 459.00	$40	22.4	3.8
5	Stairway	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	2280	274	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	2,280	274	-	0.0	$ -	$ -	$0		
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	SW	1,000	96	24	0.0	$ 5.47	$ 229.50	$20	41.9	8.7
13	Electrical Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	SW	1,000	96	24	0.0	$ 5.47	$ 229.50	$20	41.9	8.7
13	Storage Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	0	F42SSILL	48	0.0	SW	1,000	48	12	0.0	$ 2.74	$ 114.75	$10	41.9	8.7
5	Storage Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1,000	60	-	0.0	$ -	$ -	$0		
35	5/6 Science Room	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2,400	3,240	-	0.0	$ -	$ -	$0		
35	Science Prep Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1000	180	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1,000	180	-	0.0	$ -	$ -	$0		
13	Elevator Maintanence	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	SW	1,000	96	24	0.0	$ 5.47	$ 229.50	$20	41.9	8.7
259	Nurse	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	24	0.0	$ 4.47	$ 101.25	$10	22.7	3.8
121	Nurse	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	SW	2,400	922	461	0.2	$ 85.73	$ 567.00	$40	6.6	1.1
121	Nurse	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	SW	2,400	461	230	0.1	$ 42.87	$ 283.50	$20	6.6	1.1
71	Nurse	1	I 60	I60/1	60	0.1	SW	2000	120	1	CF 26	CFQ26/1-L	27	0.0	SW	2,000	54	66	0.0	$ 12.68	$ 6.75	$0	0.5	0.1
71	Nurse	2	I 60	I60/1	60	0.1	SW	2400	288	2	CF 26	CFQ26/1-L	27	0.1	SW	2,400	130	158	0.1	$ 29.47	$ 13.50	$0	0.5	0.1
71	Girl's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840	5	CF 26	CFQ26/1-L	27	0.1	SW	2,800	378	462	0.2	$ 83.97	$ 33.75	$0	0.4	0.1
2	Girl's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792	8	W 28 W F 2	F42SSILL	48	0.4	SW	2,800	1,075	717	0.3	$ 130.28	$ 2,160.00	$128	16.6	2.8
71	Boy's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840	5	CF 26	CFQ26/1-L	27	0.1	SW	2,800	378	462	0.2	$ 83.97	$ 33.75	$0	0.4	0.1
2	Boy's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792	8	W 28 W F 2	F42SSILL	48	0.4	SW	2,800	1,075	717	0.3	$ 130.28	$ 2,160.00	$128	16.6	2.8
121	Speech Room	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	SW	2,400	461	230	0.1	$ 42.87	$ 283.50	$20	6.6	1.1
260	Gymnasium	28	F46ILL	F46ILL	175	4.9	SW	1600	7,840	28	F46ILL	F46ILL	175	4.9	SW	1,600	7,840	-	0.0	$ -	$ -	$0		
18	Gym Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	1600	538	3	0	F44SSILL	96	0.3	SW	1,600	461	77	0.0	$ 15.44	$ 344.25	$30	22.3	4.1
2	Gym Storage	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	1000	320	4	W 28 W F 2	F42SSILL	48	0.2	SW	1,000	192	128	0.1	$ 29.20	$ 1,080.00	$64	37.0	7.9
259	Hallway	34	FU40T12/ES	FU1EE	43	1.5	SW	2280	3,333	34	2T 17 R F 2 (ELE)	F22ILL	33	1.1	SW	2,280	2,558	775	0.3	$ 145.45	$ 3,442.50	$340	23.7	4.0
2	Storage	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	1000	160	2	W 28 W F 2	F42SSILL	48	0.1	SW	1,000	96	64	0.1	$ 14.60	$ 540.00	$32	37.0	7.9
121	Custodian Office	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	SW	2,400	461	230	0.1	$ 42.87	$ 283.50	$20	6.6	1.1
2	Girl's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480	3	W 28 W F 2	F42SSILL	48	0.1	SW	2,000	288	192	0.1	$ 36.88	$ 810.00	$48	22.0	4.0
93	Guidance Room - 11	4	I 75	I75/1	75	0.3	SW	2400	720	4	CF 26	CFQ26/1-L	27	0.1	SW	2,400	259	461	0.2	$ 85.73	$ 21.60	$0	0.3	0.0
121	Guidance Room - 11	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	SW	2,400	1,382	691	0.3	$ 128.60	$ 850.50	$60	6.6	1.1
2	Boy's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480	3	W 28 W F 2	F42SSILL	48	0.1	SW	2,000	288	192	0.1	$ 36.88	$ 810.00	$48	22.0	4.0
90	Janitor Closet	1	X CF 7.0	ECF7/1	10	0.0	SW	1000	10	1	X 1.5C LED	ELED1.5/1	1.5	0.0	SW	1,000	2	9	0.0	$ 1.94	$ 128.25	$10	66.1	13.9
121	Main Office	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	SW	2,400	1,382	691	0.3	$ 128.60	$ 850.50	$60	6.6	1.1
121	Conference Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	SW	2,400	922	461	0.2	$ 85.73	$ 567.00	$40	6.6	1.1
2	Office Storage Room	6	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.5	SW	1000	480	6	W 28 W F 2	F42SSILL	48	0.3	SW	1,000	288	192	0.2	$ 43.80	$ 1,620.00	$96	37.0	7.9
121	7/8 Science Room - 13	19	W 34 P F 4	F44EE	144	2.7	SW	2400	6,566	19	W 28 P F 4	F44SSILL	96	1.8	SW	2,400	4,378	2,189	0.9	$ 407.23	$ 2,693.25	$190	6.6	1.1
2	Room 10	21	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.7	SW	2400	4,032	21	W 28 W F 2	F42SSILL	48	1.0	SW	2,400	2,419	1,613	0.7	$ 300.06	$ 5,670.00	$336	18.9	3.3
2	Room 12	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 14	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 16	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 18	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	0	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 19	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 17	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
2	Room 15	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	SW	2,400	2,074	1,382	0.6	$ 257.20	$ 4,860.00	$288	18.9	3.3
35	Cafeteria	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	SW	1600	3,456	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	SW	1,600	3,456	-	0.0	$ -	$ -	$0		
2	Custodian Office	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2400	384	2	W 28 W F 2	F42SSILL	48	0.1	SW	2,400	230	154	0.1	$ 28.58	$ 540.00	$32	18.9	3.3
78	Custodian Office	2	EP I 100	I100/1	100	0.2	SW	2400	480	2	CF 26	CFQ26/1-L	27	0.1	SW	2,400	130	350	0.1	$ 65.19	$ 40.50	$0	0.6	0.1
5	Old Boiler Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1,000	60	-	0.0	$ -	$ -	$0		
3	Old Boiler Room	1	W 34 W F 1 (MAG)	F41EE	43	0.0	SW	1000	43	1	W 28 W F 1	F41SSILL	26	0.0	SW	1,000	26	17	0.0	$ 3.88	$ 189.00	$0	48.7	11.1
18	Old Boiler Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	1000	112	1	0	F44SSILL	96	0.1	SW	1,000	96	16	0.0	$ 3.65	$ 114.75	$10	31.4	6.5
246	Old Boiler Room	1	W96CF1 (MAG)	F81EHS	125	0.1	SW	1000	125	1	W96CF1 (MAG)	F81EHS	125	0.1	SW	1,000	125	-	0.0	$ -	$ -	$0		
18	Kitchen	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	1600	1,075	6	0	F44SSILL	96	0.6	SW	1,600	922	154	0.1	$ 30.89	$ 688.50	$60	22.3	4.1
2	Kitchen Office	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	2400	768	4	W 28 W F 2	F42SSILL	48	0.2	SW	2,400	461	307	0.1	$ 57.15	$ 1,080.00	$64	18.9	3.3
X5	Walk-in Refridgerator	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48	1	CF42/1	CF42/1-L	48	0.0	SW	1,000	48	-	0.0	$ -	$ -	$0		
X5	Walk-in Freezer	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48	1	CF42/1	CF42/1-L	48	0.0	SW	1,000	48	-	0.0	$ -	$ -	$0		
225	Storage	2	E 110 P F 2 Mag	F82SHE	237	0.5	SW	1000	474	2	E 110 P F 2 Mag	F82SHE	237	0.5	SW	1,000	474	-	0.0	$ -	$ -	$0		
61	Room 53	8	T 34 R F 3 (MAG)	F43EE	115	0.9	SW	2400	2,208	8	T 28 R F 3	F43SSILL	72	0.6	SW	2,400	1,382	826	0.3	$ 153.60	$ 1,026.00	$80	6.7	1.1
61	Room 1	16	T 34 R F 3 (MAG)	F43EE	115	1.8	SW	2400	4,416	16	T 28 R F 3	F43SSILL	72	1.2	SW	2,400	2,765	1,651	0.7	$ 307.21	$ 2,052.00	$160	6.7	1.1
61	Room 3	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
61	Room 5	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
61	Room 6	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
61	Room 4	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
61	Room 2	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
121	Hallway	11	W 34 P F 4	F44EE	144	1.6	SW	2280	3,612	11	W 28 P F 4	F44SSILL	96	1.1	SW	2,280	2,408	1,204	0.5	$ 225.88	$ 1,559.25	$110	6.9	1.2
18	Men's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672	3	0	F44SSILL	96	0.3	SW	2,000	576	96	0.0	$ 18.44	$ 344.25	$30	18.7	3.3
18	Women's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672	3	0	F44SSILL	96	0.3	SW	2,000	576	96	0.0	$ 18.44	$ 344.25	$30	18.7	3.3
3	Upper Level Hallway	12	W 34 W F 1 (MAG)	F41EE	43	0.5	SW	2280	1,176	12	W 28 W F 1	F41SSILL	26	0.3	SW	2,280	711	465	0.2	$ 87.27	$ 2,268.00	$0	26.0	4.9
61	Art Room - 25	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	SW	2,400	2,074	1,238	0.5	$ 230.40	$ 1,539.00	$120	6.7	1.1
121	Room 23	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	SW	2,400	922	461	0.2	$ 85.73	$ 567.00	$40	6.6	1.1
78	Storage	2	EP I 100	I100/1	100	0.2	SW	1000	200	2	CF 26	CFQ26/1-L	27	0.1	SW	1,000	54	146	0.1	$ 33.31	$ 40.50	$0	1.2	0.3
121	Room 21A	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	SW	2,400	1,382	691	0.3	$ 128.60	$ 850.50	$60	6.6	1.1
121	Room 21B	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	SW	2,400	1,382	691	0.3	$ 128.60	$ 850.50	$60	6.6	1.1
259	Room 21 Hallway	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	24	0.0	$ 4.47	$ 101.25	$10	22.7	3.8
121	Music Room 20	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147	12	W 28 P F 4	F44SSILL	96	1.2	SW	2,400	2,765	1,382	0.6	$ 257.20	$ 1,701.00	$120	6.6	1.1
121	Room 22	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147	12	W 28 P F 4	F44SSILL	96	1.2	SW	2,400	2,765	1,382	0.6	$ 257.20	$ 1,701.00	$120	6.6	1.1
90	Faculty Men's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20	1	X 1.5C LED	ELED1.5/1	1.5	0.0	SW	2,000	3	17	0.0	$ 3.27	$ 128.25	$10	39.3	7.0
90	Faculty Women's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20	1	X 1.5C LED	ELED1.5/1	1.5	0.0	SW	2,000	3	17	0.0	$ 3.27	$ 128.25	$10	39.3	7.0
121	Faculty Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	SW	2,400	922	461	0.2	$ 85.73	$ 567.00	$40	6.6	1.1
2	Hallway	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2280	547	3	W 28 W F 2	F42SSILL	48	0.1	SW	2,280	328	219	0.1	$ 41.07	$ 810.00	$48	19.7	3.5
259	Hallway	5	FU40T12/ES	FU1EE	43	0.2	SW	2280	490	5	2T 17 R F 2 (ELE)	F22ILL	33	0.2	SW	2,280	376	114	0.1	$ 21.39	$ 506.25	$50	23.7	4.0
13	Boiler Room	9	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	1000	540	9	0	F42SSILL	48	0.4	SW	1,000	432	108	0.1	$ 24.64	$ 1,032.75	$90	41.9	8.7
8	Exterior	19	MH 175	MH175/1	215	4.1	BR	5000	20,425	19	FXLED39	FXLED39/1	39	0.7	BR	5,000	3,705	16,720	3.3	$ 2,849.49	$ 9,105.75	$1,900	3.2	0.4
240	Exterior	9	R 150 C I 1	I150/1	150	1.4	BR	5000	6,750	9	WP 42 1	CF42/1-L	48	0.4	BR	5,000	2,160	4,590	0.9	$ 782.25	$ 1,093.50	$0	1.4	0.2
169LED	Exterior	3	SP 250 MH ROOF	MH250/1	295	0.9	BR	5000	4,425	3	FXLED78	FXLED78/1	78	0.2	BR	5,000	1,170	3,255	0.7	$ 554.73	$ 2,857.28	$525	5.2	0.7
240	Exterior	11	R 150 C I 1	I150/1	150	1.7	BR	5000	8,250	11	WP 42 1	CF42/1-L	48	0.5	BR	5,000	2,640	5,610	1.1	$ 956.08	$ 1,336.50	$0	1.4	0.2
	Total	**718**				**71.1**			**179,720**	**718**			**5,880**	**47.6**				**106,752**	**70,968**	**23.5**	**$12,769**	**$107,625**	**$8,585**		
																		Demand Savings			**23.5**	**$1,698**			
																		kWh Savings			**70,968**	**$11,071**			
																		Total savings				**$12,769**		**8.4**	**7.8**

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

ECM-2 Install Occupancy Sensors

Cost of Electricity: **$0.156 $/kWh**

$6.01 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	30.0	90.0	0.0	$14.04	$128.25	$20.00	9.1	7.7
13	Hallway	13	S 32 P F 2 (ELE)	F42LL	60	0.8	SW	2280	1,778.4	13	S 32 P F 2 (ELE)	F42LL	60	0.8	N/A	2280	1,778.4	0.0	0.0	$0.00	$0.00	$0.00		
257	Hallway	4	CF11W	CF11/2	26	0.1	SW	2280	237.1	4	CF11W	CF11/2	26	0.1	N/A	2280	237.1	0.0	0.0	$0.00	$0.00	$0.00		
13	Computer Lab	19	S 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,736.0	19	S 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,915.2	820.8	0.0	$128.04	$202.50	$35.00	1.6	1.3
13	MDF Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	30.0	90.0	0.0	$14.04	$128.25	$20.00	9.1	7.7
35	Library Work Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432.0	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	1680	302.4	129.6	0.0	$20.22	$128.25	$20.00	6.3	5.4
257	Library	34	CF11W	CF11/2	26	0.9	SW	2400	2,121.6	34	CF11W	CF11/2	26	0.9	C-OCC	1680	1,485.1	636.5	0.0	$99.29	$202.50	$35.00	2.0	1.7
35	Library - Media Center Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432.0	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	1200	216.0	216.0	0.0	$33.70	$128.25	$20.00	3.8	3.2
258	Library	20	F36ILL-R	F36ILL-R	134	2.7	SW	2400	6,432.0	20	F36ILL-R	F36ILL-R	134	2.7	C-OCC	1680	4,502.4	1,929.6	0.0	$301.02	$202.50	$35.00	0.7	0.6
13	Hallway	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2280	547.2	4	S 32 P F 2 (ELE)	F42LL	60	0.2	N/A	2280	547.2	0.0	0.0	$0.00	$0.00	$0.00		
5	Stairway	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	2280	273.6	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	N/A	2280	273.6	0.0	0.0	$0.00	$0.00	$0.00		
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	30.0	90.0	0.0	$14.04	$128.25	$20.00	9.1	7.7
13	Electrical Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	30.0	90.0	0.0	$14.04	$128.25	$20.00	9.1	7.7
13	Storage Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	15.0	45.0	0.0	$7.02	$128.25	$20.00	18.3	15.4
5	Storage Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60.0	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	OCC	250	15.0	45.0	0.0	$7.02	$128.25	$20.00	18.3	15.4
35	5/6 Science Room	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240.0	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	OCC	1680	2,268.0	972.0	0.0	$151.63	$128.25	$20.00	0.8	0.7
35	Science Prep Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1000	180.0	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	250	45.0	135.0	0.0	$21.06	$128.25	$20.00	6.1	5.1
13	Elevator Maintanence	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	OCC	250	30.0	90.0	0.0	$14.04	$128.25	$20.00	9.1	7.7
259	Nurse	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103.2	1	FU40T12/ES	FU1EE	43	0.0	OCC	1200	51.6	51.6	0.0	$8.05	$128.25	$20.00	15.9	13.4
121	Nurse	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382.4	4	W 34 P F 4	F44EE	144	0.6	OCC	1200	691.2	691.2	0.0	$107.83	$128.25	$20.00	1.2	1.0
121	Nurse	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691.2	2	W 34 P F 4	F44EE	144	0.3	OCC	1200	345.6	345.6	0.0	$53.91	$128.25	$20.00	2.4	2.0
71	Nurse	1	I 60	I60/1	60	0.1	SW	2000	120.0	1	I 60	I60/1	60	0.1	N/A	2000	120.0	0.0	0.0	$0.00	$0.00	$0.00		
71	Nurse	2	I 60	I60/1	60	0.1	SW	2400	288.0	2	I 60	I60/1	60	0.1	OCC	1200	144.0	144.0	0.0	$22.46	$128.25	$20.00	5.7	4.8
71	Girl's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840.0	5	I 60	I60/1	60	0.3	N/A	2800	840.0	0.0	0.0	$0.00	$0.00	$0.00		
2	Girl's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792.0	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	N/A	2800	1,792.0	0.0	0.0	$0.00	$0.00	$0.00		
71	Boy's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840.0	5	I 60	I60/1	60	0.3	N/A	2800	840.0	0.0	0.0	$0.00	$0.00	$0.00		
2	Boy's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792.0	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	N/A	2800	1,792.0	0.0	0.0	$0.00	$0.00	$0.00		
121	Speech Room	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691.2	2	W 34 P F 4	F44EE	144	0.3	OCC	1200	345.6	345.6	0.0	$53.91	$128.25	$20.00	2.4	2.0
260	Gymnasium	28	F46ILL	F46ILL	175	4.9	SW	1600	7,840.0	28	F46ILL	F46ILL	175	4.9	C-OCC	1200	5,880.0	1,960.0	0.0	$305.76	$202.50	$35.00	0.7	0.5
18	Gym Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	1600	537.6	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	OCC	1200	403.2	134.4	0.0	$20.97	$128.25	$20.00	6.1	5.2
2	Gym Storage	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	1000	320.0	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	OCC	250	80.0	240.0	0.0	$37.44	$128.25	$20.00	3.4	2.9
259	Hallway	34	FU40T12/ES	FU1EE	43	1.5	SW	2280	3,333.4	34	FU40T12/ES	FU1EE	43	1.5	N/A	2280	3,333.4	0.0	0.0	$0.00	$0.00	$0.00		
2	Storage	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	1000	160.0	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	OCC	250	40.0	120.0	0.0	$18.72	$128.25	$20.00	6.9	5.8
121	Custodian Office	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691.2	2	W 34 P F 4	F44EE	144	0.3	OCC	1200	345.6	345.6	0.0	$53.91	$128.25	$20.00	2.4	2.0
2	Girl's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480.0	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	N/A	2000	480.0	0.0	0.0	$0.00	$0.00	$0.00		
93	Guidance Room - 11	4	I 75	I75/1	75	0.3	SW	2400	720.0	4	I 75	I75/1	75	0.3	OCC	1200	360.0	360.0	0.0	$56.16	$128.25	$20.00	2.3	1.9
121	Guidance Room - 11	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,073.6	6	W 34 P F 4	F44EE	144	0.9	OCC	1200	1,036.8	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Boy's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480.0	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	N/A	2000	480.0	0.0	0.0	$0.00	$0.00	$0.00		
90	Janitor Closet	1	X CF 7.0	ECF7/1	10	0.0	SW	1000	10.0	1	X CF 7.0	ECF7/1	10	0.0	OCC	250	2.5	7.5	0.0	$1.17	$128.25	$20.00	109.6	92.5
121	Main Office	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,073.6	6	W 34 P F 4	F44EE	144	0.9	OCC	1200	1,036.8	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
121	Conference Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382.4	4	W 34 P F 4	F44EE	144	0.6	C-OCC	1200	691.2	691.2	0.0	$107.83	$202.50	$35.00	1.9	1.6
2	Office Storage Room	6	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.5	SW	1000	480.0	6	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.5	OCC	250	120.0	360.0	0.0	$56.16	$128.25	$20.00	2.3	1.9
121	7/8 Science Room - 13	19	W 34 P F 4	F44EE	144	2.7	SW	2400	6,566.4	19	W 34 P F 4	F44EE	144	2.7	OCC	1680	4,596.5	1,969.9	0.0	$307.31	$128.25	$20.00	0.4	0.4
2	Room 10	21	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.7	SW	2400	4,032.0	21	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.7	OCC	1680	2,822.4	1,209.6	0.0	$188.70	$128.25	$20.00	0.7	0.6
2	Room 12	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 14	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 16	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 18	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 19	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 17	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
2	Room 15	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456.0	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	OCC	1680	2,419.2	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
35	Cafeteria	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	SW	1600	3,456.0	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	C-OCC	1200	2,592.0	864.0	0.0	$134.78	$202.50	$35.00	1.5	1.2
2	Custodian Office	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2400	384.0	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	OCC	1200	192.0	192.0	0.0	$29.95	$128.25	$20.00	4.3	3.6
78	Custodian Office	2	EP I 100	I100/1	100	0.2	SW	2400	480.0	2	EP I 100	I100/1	100	0.2	OCC	1200	240.0	240.0	0.0	$37.44	$128.25	$20.00	3.4	2.9
5	Old Boiler Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60.0	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	OCC	250	15.0	45.0	0.0	$7.02	$128.25	$20.00	18.3	15.4
3	Old Boiler Room	1	W 34 W F 1 (MAG)	F41EE	43	0.0	SW	1000	43.0	1	W 34 W F 1 (MAG)	F41EE	43	0.0	OCC	250	10.8	32.3	0.0	$5.03	$128.25	$20.00	25.5	21.5
18	Old Boiler Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	1000	112.0	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	OCC	250	28.0	84.0	0.0	$13.10	$128.25	$20.00	9.8	8.3
246	Old Boiler Room	1	W96CF1 (MAG)	F81EHS	125	0.1	SW	1000	125.0	1	W96CF1 (MAG)	F81EHS	125	0.1	OCC	250	31.3	93.8	0.0	$14.63	$128.25	$20.00	8.8	7.4
18	Kitchen	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	1600	1,075.2	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	N/A	1600	1,075.2	0.0	0.0	$0.00	$0.00	$0.00		
2	Kitchen Office	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	2400	768.0	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	OCC	1200	384.0	384.0	0.0	$59.90	$128.25	$20.00	2.1	1.8
X5	Walk-in Refridgerator	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48.0	1	CF42/1	CF42/1-L	48	0.0	OCC	250	12.0	36.0	0.0	$5.62	$128.25	$20.00	22.8	19.3
X5	Walk-in Freezer	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48.0	1	CF42/1	CF42/1-L	48	0.0	OCC	250	12.0	36.0	0.0	$5.62	$128.25	$20.00	22.8	19.3
225	Storage	2	E 110 P F 2 Mag	F82SHE	237	0.5	SW	1000	474.0	2	E 110 P F 2 Mag	F82SHE	237	0.5	OCC	250	118.5	355.5	0.0	$55.46	$128.25	$20.00	2.3	2.0
61	Room 53	8	T 34 R F 3 (MAG)	F43EE	115	0.9	SW	2400	2,208.0	8	T 34 R F 3 (MAG)	F43EE	115	0.9	OCC	1680	1,545.6	662.4	0.0	$103.33	$128.25	$20.00	1.2	1.0
61	Room 1	16	T 34 R F 3 (MAG)	F43EE	115	1.8	SW	2400	4,416.0	16	T 34 R F 3 (MAG)	F43EE	115	1.8	OCC	1680	3,091.2	1,324.8	0.0	$206.67	$128.25	$20.00	0.6	0.5
61	Room 3	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	OCC	1680	2,318.4	993.6	0.0	$155.00	$128.25	$20.00	0.8	0.7
61	Room 5	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	OCC	1680	2,318.4	993.6	0.0	$155.00	$128.25	$20.00	0.8	0.7
61	Room 6	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	OCC	1680	2,318.4	993.6	0.0	$155.00	$128.25	$20.00	0.8	0.7
61	Room 4	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	OCC	1680	2,318.4	993.6	0.0	$155.00	$128.25	$20.00	0.8	0.7
61	Room 2	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	OCC	1680	2,318.4	993.6	0.0	$155.00	$128.25	$20.00	0.8	0.7
121	Hallway	11	W 34 P F 4	F44EE	144	1.6	SW	2280	3,611.5	11	W 34 P F 4	F44EE	144	1.6	N/A	2280	3,611.5	0.0	0.0	$0.00	$0.00	$0.00		
18	Men's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672.0	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	N/A	2000	672.0	0.0	0.0	$0.00	$0.00	$0.00		
18	Women's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672.0	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	N/A	2000	672.0	0.0	0.0	$0.00	$0.00	$0.00		
3	Upper Level Hallway	12	W 34 W F 1 (MAG)	F41EE	43	0.5	SW	2280	1,176.5	12	W 34 W F 1 (MAG)	F41EE	43	0.5	N/A	2280	1,176.5	0.0	0.0	$0.00	$0.00	$0.00		
61	Art Room - 25	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312.0	12	T 34 R F 3 (MAG)	F43EE	115	1.4	C-OCC	1680	2,318.4	993.6	0.0	$155.00	$202.50	$35.00	1.3	1.1
121	Room 23	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382.4	4	W 34 P F 4	F44EE	144	0.6	OCC	1680	967.7	414.7	0.0	$64.70	$128.25	$20.00	2.0	1.7
78	Storage	2	EP I 100	I100/1	100	0.2	SW	1000	200.0	2	EP I 100	I100/1	100	0.2	OCC	250	50.0	150.0	0.0	$23.40	$128.25	$20.00	5.5	4.6
121	Room 21A	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,073.6	6	W 34 P F 4	F44EE	144	0.9	OCC	1200	1,036.8	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
121	Room 21B	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,073.6	6	W 34 P F 4	F44EE	144	0.9	OCC	1200	1,036.8	1,036.8	0.0	$161.74	$128.25	$20.00	0.8	0.7
259	Room 21 Hallway	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103.2	1	FU40T12/ES	FU1EE	43	0.0	OCC	1200	51.6	51.6	0.0	$8.05	$128.25	$20.00	15.9	13.4
121	Music Room 20	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147.2	12	W 34 P F 4	F44EE	144	1.7	OCC	1680	2,903.0	1,244.2	0.0	$194.09	$128.25	$20.00	0.7	0.6
121	Room 22	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147.2	12	W 34 P F 4	F44EE	144	1.7	OCC	1680	2,903.0	1,244.2	0.0	$194.09	$128.25	$20.00	0.7	0.6
90	Faculty Men's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20.0	1	X CF 7.0	ECF7/1	10	0.0	N/A	2000	20.0	0.0	0.0	$0.00	$0.00	$0.00		
90	Faculty Women's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20.0	1	X CF 7.0	ECF7/1	10	0.0	N/A	2000	20.0	0.0	0.0	$0.00	$0.00	$0.00		
121	Faculty Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382.4	4	W 34 P F 4	F44EE	144	0.6	OCC	1200	691.2	691.2	0.0	$107.83	$128.25	$20.00	1.2	1.0
2	Hallway	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2280	547.2	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	N/A	2280	547.2	0.0	0.0	$0.00	$0.00	$0.00		
259	Hallway	5	FU40T12/ES	FU1EE	43	0.2	SW	2280	490.2	5	FU40T12/ES	FU1EE	43	0.2	N/A	2280	490.2	0.0	0.0	$0.00	$0.00	$0.00		
13	Boiler Room	9	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	1000	540.0	9	S 32 P F 2 (ELE)	F42LL	60	0.5	OCC	250	135.0	405.0	0.0	$63.18	$128.25	$20.00	2.0	1.7
8	Exterior	19	MH 175	MH175/1	215	4.1	BR	5000	20,425.0	19	MH 175	MH175/1	215	4.1	N/A	5000	20,425.0	0.0	0.0	$0.00	$0.00	$0.00		

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

ECM-2 Install Occupancy Sensors

Cost of Electricity: **$0.156 $/kWh**

$6.01 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
240	Exterior	9	R 150 C I 1	i150/1	150	1.4	BR	5000	6,750.0	9	R 150 C I 1	i150/1	150	1.4	N/A	5000	6,750.0	0.0	0.0	$0.00	$0.00	$0.00		
169LED	Exterior	3	SP 250 MH ROOF	MH250/1	295	0.9	BR	5000	4,425.0	3	SP 250 MH ROOF	MH250/1	295	0.9	N/A	5000	4,425.0	0.0	0.0	$0.00	$0.00	$0.00		
240	Exterior	11	R 150 C I 1	i150/1	150	1.7	BR	5000	8,250.0	11	R 150 C I 1	i150/1	150	1.7	N/A	5000	8,250.0	0.0	0.0	$0.00	$0.00	$0.00		
	Total	**641**				**71.1**			**179,720**	**718**				**71**			**139,448**	**40,273**	**0**	**6,283**	**$9,113**	**$1,445**		
																	Demand Savings			**0.0**	**$0**			
																	kWh Savings			**40,273**	**$6,283**			
																	Total Savings				**$6,283**		**1.5**	**1.2**

Energy Audit of NJBPU - Bethlehem - Ethel Hoppock Middle School

CHA Project No. 24735

Cost of Electricity: **$0.156 $/kWh**

ECM-3 Lighting Replacements with Occupancy Sensors **$6.01 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	OCC	250	24	96	0.0	$ 16.71	$ 357.75	$ 40	21.4	19.0
13	Hallway	13	S 32 P F 2 (ELE)	F42LL	60	0.8	SW	2280	1,778	13	0	F42SSILL	48	0.6	N/A	2,280	1,423	356	0.2	$ 66.74	$ 1,491.75	$ 130	22.4	20.4
257	Hallway	4	CF11W	CF11/2	26	0.1	SW	2280	237	4	CF11W	CF11/2	26	0.1	N/A	2,280	237	-	0.0	$ -	$ -	$ -	-	
13	Computer Lab	19	S 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,736	19	0	F42SSILL	48	0.9	C-OCC	1,680	1,532	1,204	0.2	$ 204.24	$ 2,382.75	$ 225	11.7	10.6
13	MDF Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	OCC	250	24	96	0.0	$ 16.71	$ 357.75	$ 40	21.4	19.0
35	Library Work Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	1,680	302	130	0.0	$ 20.22	$ 128.25	$ 20	6.3	5.4
257	Library	34	CF11W	CF11/2	26	0.9	SW	2400	2,122	34	CF11W	CF11/2	26	0.9	C-OCC	1,680	1,485	636	0.0	$ 99.29	$ 202.50	$ 35	2.0	1.7
35	Library - Media Center Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	1,200	216	216	0.0	$ 33.70	$ 128.25	$ 20	3.8	3.2
258	Library	20	F36ILL-R	F36ILL-R	134	2.7	SW	2400	6,432	20	F36ILL-R	F36ILL-R	134	2.7	C-OCC	1,680	4,502	1,930	0.0	$ 301.02	$ 202.50	$ 35	0.7	0.6
13	Hallway	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2280	547	4	0	F42SSILL	48	0.2	N/A	2,280	438	109	0.0	$ 20.53	$ 459.00	$ 40	22.4	20.4
5	Stairway	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	2280	274	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	N/A	2,280	274	-	0.0	$ -	$ -	$ -	-	
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	OCC	250	24	96	0.0	$ 16.71	$ 357.75	$ 40	21.4	19.0
13	Electrical Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	OCC	250	24	96	0.0	$ 16.71	$ 357.75	$ 40	21.4	19.0
13	Storage Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	0	F42SSILL	48	0.0	OCC	250	12	48	0.0	$ 8.35	$ 243.00	$ 30	29.1	25.5
5	Storage Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	OCC	250	15	45	0.0	$ 7.02	$ 128.25	$ 20	18.3	15.4
35	5/6 Science Room	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	OCC	1,680	2,268	972	0.0	$ 151.63	$ 128.25	$ 20	0.8	0.7
35	Science Prep Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1000	180	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	OCC	250	45	135	0.0	$ 21.06	$ 128.25	$ 20	6.1	5.1
13	Elevator Maintanence	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	0	F42SSILL	48	0.1	OCC	250	24	96	0.0	$ 16.71	$ 357.75	$ 40	21.4	19.0
259	Nurse	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	OCC	1,200	40	64	0.0	$ 10.64	$ 229.50	$ 30	21.6	18.7
121	Nurse	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	OCC	1,200	461	922	0.2	$ 157.62	$ 695.25	$ 60	4.4	4.0
121	Nurse	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	OCC	1,200	230	461	0.1	$ 78.81	$ 411.75	$ 40	5.2	4.7
71	Nurse	1	I 60	I60/1	60	0.1	SW	2000	120	1	CF 26	CFQ26/1-L	27	0.0	N/A	2,000	54	66	0.0	$ 12.68	$ 6.75	$ -	0.5	0.5
71	Nurse	2	I 60	I60/1	60	0.1	SW	2400	288	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,200	65	223	0.1	$ 39.58	$ 141.75	$ 20	3.6	3.1
71	Girl's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840	5	CF 26	CFQ26/1-L	27	0.1	N/A	2,800	378	462	0.2	$ 83.97	$ 33.75	$ -	0.4	0.4
2	Girl's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792	8	W 28 W F 2	F42SSILL	48	0.4	N/A	2,800	1,075	717	0.3	$ 130.28	$ 2,160.00	$ 128	16.6	15.6
71	Boy's Locker Room	5	I 60	I60/1	60	0.3	SW	2800	840	5	CF 26	CFQ26/1-L	27	0.1	N/A	2,800	378	462	0.2	$ 83.97	$ 33.75	$ -	0.4	0.4
2	Boy's Locker Room Bathroom	8	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.6	SW	2800	1,792	8	W 28 W F 2	F42SSILL	48	0.4	N/A	2,800	1,075	717	0.3	$ 130.28	$ 2,160.00	$ 128	16.6	15.6
121	Speech Room	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	OCC	1,200	230	461	0.1	$ 78.81	$ 411.75	$ 40	5.2	4.7
260	Gymnasium	28	F46ILL	F46ILL	175	4.9	SW	1600	7,840	28	F46ILL	F46ILL	175	4.9	C-OCC	1,200	5,880	1,960	0.0	$ 305.76	$ 202.50	$ 35	0.7	0.5
18	Gym Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	1600	538	3	0	F44SSILL	96	0.3	OCC	1,200	346	192	0.0	$ 33.41	$ 472.50	$ 50	14.1	12.6
2	Gym Storage	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	1000	320	4	W 28 W F 2	F42SSILL	48	0.2	OCC	250	48	272	0.1	$ 51.66	$ 1,208.25	$ 84	23.4	21.8
259	Hallway	34	FU40T12/ES	FU1EE	43	1.5	SW	2280	3,333	34	2T 17 R F 2 (ELE)	F22ILL	33	1.1	N/A	2,280	2,558	775	0.3	$ 145.45	$ 3,442.50	$ 340	23.7	21.3
2	Storage	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	1000	160	2	W 28 W F 2	F42SSILL	48	0.1	OCC	250	24	136	0.1	$ 25.83	$ 668.25	$ 52	25.9	23.9
121	Custodian Office	2	W 34 P F 4	F44EE	144	0.3	SW	2400	691	2	W 28 P F 4	F44SSILL	96	0.2	OCC	1,200	230	461	0.1	$ 78.81	$ 411.75	$ 40	5.2	4.7
2	Girl's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480	3	W 28 W F 2	F42SSILL	48	0.1	N/A	2,000	288	192	0.1	$ 36.88	$ 810.00	$ 48	22.0	20.7
93	Guidance Room - 11	4	I 75	I75/1	75	0.3	SW	2400	720	4	CF 26	CFQ26/1-L	27	0.1	OCC	1,200	130	590	0.2	$ 105.95	$ 149.85	$ 20	1.4	1.2
121	Guidance Room - 11	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	OCC	1,200	691	1,382	0.3	$ 236.42	$ 978.75	$ 80	4.1	3.8
2	Boy's Bathroom	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2000	480	3	W 28 W F 2	F42SSILL	48	0.1	N/A	2,000	288	192	0.1	$ 36.88	$ 810.00	$ 48	22.0	20.7
90	Janitor Closet	1	X CF 7.0	ECF7/1	10	0.0	SW	1000	10	1	X 1.5C LED	ELED1.5/1	1.5	0.0	OCC	250	0	10	0.0	$ 2.11	$ 256.50	$ 30	121.3	107.1
121	Main Office	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	OCC	1,200	691	1,382	0.3	$ 236.42	$ 978.75	$ 80	4.1	3.8
121	Conference Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	C-OCC	1,200	461	922	0.2	$ 157.62	$ 769.50	$ 75	4.9	4.4
2	Office Storage Room	6	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.5	SW	1000	480	6	W 28 W F 2	F42SSILL	48	0.3	OCC	250	72	408	0.2	$ 77.50	$ 1,748.25	$ 116	22.6	21.1
121	7/8 Science Room - 13	19	W 34 P F 4	F44EE	144	2.7	SW	2400	6,566	19	W 28 P F 4	F44SSILL	96	1.8	OCC	1,680	3,064	3,502	0.9	$ 612.10	$ 2,821.50	$ 210	4.6	4.3
2	Room 10	21	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.7	SW	2400	4,032	21	W 28 W F 2	F42SSILL	48	1.0	OCC	1,680	1,693	2,339	0.7	$ 413.28	$ 5,798.25	$ 356	14.0	13.2
2	Room 12	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 14	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 16	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 18	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	0	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 19	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 17	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
2	Room 15	18	T 34 W F 2 (MAG) RL/RB	F42ES	80	1.4	SW	2400	3,456	18	W 28 W F 2	F42SSILL	48	0.9	OCC	1,680	1,452	2,004	0.6	$ 354.24	$ 4,988.25	$ 308	14.1	13.2
35	Cafeteria	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	SW	1600	3,456	24	T 32 R F 3 (ELE)	F43ILL/2	90	2.2	C-OCC	1,200	2,592	864	0.0	$ 134.78	$ 202.50	$ 35	1.5	1.2
2	Custodian Office	2	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2400	384	2	W 28 W F 2	F42SSILL	48	0.1	OCC	1,200	115	269	0.1	$ 46.55	$ 668.25	$ 52	14.4	13.2
78	Custodian Office	2	EP I 100	I100/1	100	0.2	SW	2400	480	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,200	65	415	0.1	$ 75.30	$ 168.75	$ 20	2.2	2.0
5	Old Boiler Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	1000	60	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	OCC	250	15	45	0.0	$ 7.02	$ 128.25	$ 20	18.3	15.4
3	Old Boiler Room	1	W 34 W F 1 (MAG)	F41EE	43	0.0	SW	1000	43	1	W 28 W F 1	F41SSILL	26	0.0	OCC	250	7	37	0.0	$ 6.92	$ 317.25	$ 20	45.8	43.0
18	Old Boiler Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	1000	112	1	0	F44SSILL	96	0.1	OCC	250	24	88	0.0	$ 14.88	$ 243.00	$ 30	16.3	14.3
246	Old Boiler Room	1	W96CF1 (MAG)	F81EHS	125	0.1	SW	1000	125	1	W96CF1 (MAG)	F81EHS	125	0.1	OCC	250	31	94	0.0	$ 14.63	$ 128.25	$ 20	8.8	7.4
18	Kitchen	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	1600	1,075	6	0	F44SSILL	96	0.6	N/A	1,600	922	154	0.1	$ 30.89	$ 688.50	$ 60	22.3	20.3
2	Kitchen Office	4	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.3	SW	2400	768	4	W 28 W F 2	F42SSILL	48	0.2	OCC	1,200	230	538	0.1	$ 93.10	$ 1,208.25	$ 84	13.0	12.1
X5	Walk-in Refridgerator	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48	1	CF42/1	CF42/1-L	48	0.0	OCC	250	12	36	0.0	$ 5.62	$ 128.25	$ 20	22.8	19.3
X5	Walk-in Freezer	1	CF42/1	CF42/1-L	48	0.0	SW	1000	48	1	CF42/1	CF42/1-L	48	0.0	OCC	250	12	36	0.0	$ 5.62	$ 128.25	$ 20	22.8	19.3
225	Storage	2	E 110 P F 2 Mag	F82SHE	237	0.5	SW	1000	474	2	E 110 P F 2 Mag	F82SHE	237	0.5	OCC	250	119	356	0.0	$ 55.46	$ 128.25	$ 20	2.3	2.0
61	Room 53	8	T 34 R F 3 (MAG)	F43EE	115	0.9	SW	2400	2,208	8	T 28 R F 3	F43SSILL	72	0.6	OCC	1,680	968	1,240	0.3	$ 218.30	$ 1,154.25	$ 100	5.3	4.8
61	Room 1	16	T 34 R F 3 (MAG)	F43EE	115	1.8	SW	2400	4,416	16	T 28 R F 3	F43SSILL	72	1.2	OCC	1,680	1,935	2,481	0.7	$ 436.60	$ 2,180.25	$ 180	5.0	4.6
61	Room 3	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,667.25	$ 140	5.1	4.7
61	Room 5	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,667.25	$ 140	5.1	4.7
61	Room 6	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,667.25	$ 140	5.1	4.7
61	Room 4	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,667.25	$ 140	5.1	4.7
61	Room 2	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,667.25	$ 140	5.1	4.7
121	Hallway	11	W 34 P F 4	F44EE	144	1.6	SW	2280	3,612	11	W 28 P F 4	F44SSILL	96	1.1	N/A	2,280	2,408	1,204	0.5	$ 225.88	$ 1,559.25	$ 110	6.9	6.4
18	Men's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672	3	0	F44SSILL	96	0.3	N/A	2,000	576	96	0.0	$ 18.44	$ 344.25	$ 30	18.7	17.0
18	Women's Bathroom	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2000	672	3	0	F44SSILL	96	0.3	N/A	2,000	576	96	0.0	$ 18.44	$ 344.25	$ 30	18.7	17.0
3	Upper Level Hallway	12	W 34 W F 1 (MAG)	F41EE	43	0.5	SW	2280	1,176	12	W 28 W F 1	F41SSILL	26	0.3	N/A	2,280	711	465	0.2	$ 87.27	$ 2,268.00	$ -	26.0	26.0
61	Art Room - 25	12	T 34 R F 3 (MAG)	F43EE	115	1.4	SW	2400	3,312	12	T 28 R F 3	F43SSILL	72	0.9	C-OCC	1,680	1,452	1,860	0.5	$ 327.45	$ 1,741.50	$ 155	5.3	4.8
121	Room 23	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	OCC	1,680	645	737	0.2	$ 128.86	$ 695.25	$ 60	5.4	4.9
78	Storage	2	EP I 100	I100/1	100	0.2	SW	1000	200	2	CF 26	CFQ26/1-L	27	0.1	OCC	250	14	187	0.1	$ 39.62	$ 168.75	$ 20	4.3	3.8
121	Room 21A	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	OCC	1,200	691	1,382	0.3	$ 236.42	$ 978.75	$ 80	4.1	3.8
121	Room 21B	6	W 34 P F 4	F44EE	144	0.9	SW	2400	2,074	6	W 28 P F 4	F44SSILL	96	0.6	OCC	1,200	691	1,382	0.3	$ 236.42	$ 978.75	$ 80	4.1	3.8
259	Room 21 Hallway	1	FU40T12/ES	FU1EE	43	0.0	SW	2400	103	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	OCC	1,200	40	64	0.0	$ 10.64	$ 229.50	$ 30	21.6	18.7
121	Music Room 20	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147	12	W 28 P F 4	F44SSILL	96	1.2	OCC	1,680	1,935	2,212	0.6	$ 386.59	$ 1,829.25	$ 140	4.7	4.4
121	Room 22	12	W 34 P F 4	F44EE	144	1.7	SW	2400	4,147	12	W 28 P F 4	F44SSILL	96	1.2	OCC	1,680	1,935	2,212	0.6	$ 386.59	$ 1,829.25	$ 140	4.7	4.4
90	Faculty Men's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20	1	X 1.5C LED	ELED1.5/1	1.5	0.0	N/A	2,000	3	17	0.0	$ 3.27	$ 128.25	$ 10	39.3	36.2
90	Faculty Women's Bathroom	1	X CF 7.0	ECF7/1	10	0.0	SW	2000	20	1	X 1.5C LED	ELED1.5/1	1.5	0.0	N/A	2,000	3	17	0.0	$ 3.27	$ 128.25	$ 10	39.3	36.2
121	Faculty Room	4	W 34 P F 4	F44EE	144	0.6	SW	2400	1,382	4	W 28 P F 4	F44SSILL	96	0.4	OCC	1,200	461	922	0.2	$ 157.62	$ 695.25	$ 60	4.4	4.0
2	Hallway	3	T 34 W F 2 (MAG) RL/RB	F42ES	80	0.2	SW	2280	547	3	W 28 W F 2	F42SSILL	48	0.1	N/A	2,280	328	219	0.1	$ 41.07	$ 810.00	$ 48	19.7	18.6
259	Hallway	5	FU40T12/ES	FU1EE	43	0.2	SW	2280	490	5	2T 17 R F 2 (ELE)	F22ILL	33	0.2	N/A	2,280	376	114	0.1	$ 21.39	$ 506.25	$ 50	23.7	21.3
13	Boiler Room	9	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	1000	540	9	0	F42SSILL	48	0.4	OCC	250	108	432	0.1	$ 75.18	$ 1,161.00	$ 110	15.4	14.0
8	Exterior	19	MH 175	MH175/1	215	4.1	BR	5000	20,425	19	FXLED39	FXLED39/1	39	0.7	N/A	5,000	3,705	16,720	3.3	$ 2,849.49	$ 9,105.75	$ 1,900	3.2	2.5
240	Exterior	9	R 150 C I 1	I150/1	150	1.4	BR	5000	6,750	9	WP 42 1	CF42/1-L	48	0.4	N/A	5,000	2,160	4,590	0.9	$ 782.25	$ 1,093.50	$ -	1.4	1.4
169LED	Exterior	3	SP 250 MH ROOF	MH250/1	295	0.9	BR	5000	4,425	3	FXLED78	FXLED78/1	78	0.2	N/A	5,000	1,170	3,255	0.7	$ 554.73	$ 2,857.28	$ 525	5.2	4.2
240	Exterior	11	R 150 C I 1	I150/1	150	1.7	BR	5000	8,250	11	WP 42 1	CF42/1-L	48	0.5	N/A	5,000	2,640	5,610	1.1	$ 956.08	$ 1,336.50	$ -	1.4	1.4
	Total	**718**				**71.1**			**179,720**	**718**				**47.6**			**80,414**	**23.5**	**$ 11,359**	**$ 116,738**	**$10,030**		
																	Demand Savings		**23.5**	**$1,698**			
																	kWh Savings		**99,307**	**$15,492**			
																	Total Savings			**$17,190**		**6.8**	**6.2**

APPENDIX D

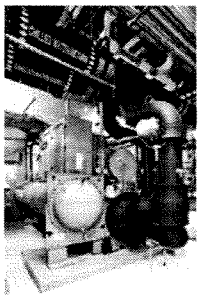
New Jersey Pay For Performance Incentive Program

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

Take a comprehensive, whole-building approach to saving energy in your existing facilities and earn incentives that are directly linked to your savings. Pay for Performance relies on a network of program partners who provide technical services under direct contract to you. Acting as your energy expert, your partner will develop an energy reduction plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and a construction schedule for installation.



Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following five customer classes are not required to meet the 100 kW demand in order to participate in the program: hospitals, public colleges and universities, 501(c)(3) non-profits, affordable multifamily housing, and local governmental entities. Your energy reduction plan must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more.

Exceptions to the 15% threshold requirement may be made for certain industrial, manufacturing, water treatment and datacenter building types whose annual energy consumption is heavily weighted on process loads. Details are available in the high energy intensity section of the FAQ page.

ENERGY STAR Portfolio Manager

Pay for Performance takes advantage of the ENERGY STAR Program with Portfolio Manager, EPA's interactive tool that allows facility managers to track and evaluate energy and water consumption across all of their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.

This rating system assesses building performance by tracking and scoring energy use in your facilities and comparing it to similar buildings. That can be a big help in locating opportunities for cost-justified energy efficiency upgrades. And, based on our findings, you may be invited to participate in the Building Performance with ENERGY STAR initiative and receive special recognition as an industry leader in energy efficiency.

Incentives

Pay for Performance incentives are awarded upon the satisfactory completion of three program milestones:

Incentive #1 - Submittal of complete energy reduction plan prepared by an approved program partner - Contingent on moving forward, incentives will be between $5,000 and $50,000 based on approximately $.10 per square foot, not to exceed 50% of the facility's annual energy expense.

Incentive #2 - Installation of recommended measures - Incentives are based on the projected level of electricity and natural gas savings resulting from the installation of comprehensive energy-efficiency measures.

Incentive #3 - Completion of Post-Construction Benchmarking Report - A completed report verifying energy reductions based on one year of post-implementation results. Incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum performance threshold of 15% savings has been achieved.

CONTACT US

A detailed Incentive Structure document is available on the applications and forms page.

Energy Efficiency Revolving Loan Fund (EE RLF)

New Jersey-based commercial, institutional or industrial entities (including 501(c)(3) organizations) that have received an approved energy reduction plan under Pay for Performance may be eligible for supplemental financing through the EE RLF. The financing, in the form of low-interest loans, can be used to support up to 80% of total eligible project costs, not to exceed $2.5 million or 100% of total eligible project costs from all public state funding sources. Visit the NJ EDA website for details.

Steps to Participation

Click here for a step-by-step description of the program.

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

New Jersey SmartStart BUILDINGS®

BPU

2012 PAY FOR PERFORMANCE PROGRAM
Existing Buildings Incentive Structure

Incentive #1: Energy Reduction Plan

Incentive Amount: ..... $0.10 per sq ft
Minimum Incentive: $5,000
Maximum Incentive:: ..... $50,000 or 50% of facility annual energy cost (whichever is less)

This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP) and is paid upon ERP approval. Incentive is contingent on implementation of recommended measures outlined in the ERP.

Incentive #2: Installation of Recommended Measures

Minimum Performance Target: 15%

Electric Incentives

Base Incentive based on 15% savings: ..... $0.09 per projected kWh saved
For each % over 15% add: ..... $0.005 per projected kWh saved
Maximum Incentive: ..... $0.11 per projected kWh saved

Gas Incentives

Base Incentive based on 15% savings: ..... $0.90 per projected Therm saved
For each % over 15% add: ..... $0.05 per projected Therm saved
Maximum Incentive: ..... $1.25 per projected Therm saved

Incentive Cap: ..... 25% of total project cost

This incentive is based on projected energy savings outlined in the ERP. Incentive is paid upon successful installation of recommended measures.

Incentive #3: Post-Construction Benchmarking Report

Minimum Performance Target: 15%

Electric Incentives

Base Incentive based on 15% savings: ..... $0.09 per actual kWh saved
For each % over 15% add: ..... $0.005 per actual kWh saved
Maximum Incentive: ..... $0.11 per actual kWh saved

Gas Incentives

Base Incentive based on 15% savings: ..... $0.90 per actual Therm saved
For each % over 15% add: ..... $0.05 per actual Therm saved
Maximum Incentive: ..... $1.25 per actual Therm saved

Incentive Cap: ..... 25% of total project cost

This incentive will be released upon submittal of a Post-Construction Benchmarking Report that verifies that the level of savings actually achieved by the installed measures meets or exceeds the minimum performance threshold. To validate the savings and achievement of the Energy Target, the EPA Portfolio Manager shall be used. Savings should be rounded to the nearest percent. Total value of Incentive #2 and Incentive #3 may not exceed 50% of the total project cost. Incentives will be limited to $1 million per gas and electric account per building; maximum of $2 million per project. See Participation Agreement for details.

BethlehemTownship School District - NJBPU
CHA Project # 24735
Ethel Hoppock Middle School

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2012.
Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
Oil savings are not applicable to the P4P program
Values used in this calculation are for measures with a positive return on investment (ROI) only.

Total Building Area (Square Feet)	44,200
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

Incentive #1		
Audit is funded by NJ BPU	$0.10	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$68,088	$0
Existing Usage (from utility)	437,440	0
Proposed Savings	141,412	0
Existing Total MMBtus	1,493	
Proposed Savings MMBtus	483	
% Energy Reduction	**32.3%**	
Proposed Annual Savings	$44,100	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	$/kWh	$/Therm	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm
Incentive #2	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.25
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.25

	Incentives $		
	Elec	Therms	Total
Incentive #1	$0	$0	$5,000
Incentive #2	$15,555	$0	$15,555
Incentive #3	$15,555	$0	$15,555
Total All Incentives	**$31,111**	**$0**	**$36,111**

Total Project Cost	$284,050

		Allowable Incentive
% Incentives #1 of Utility Cost*	7.3%	$5,000
% Incentives #2 of Project Cost**	5.5%	$15,555
% Incentives #3 of Project Cost**	5.5%	$15,555
Total Eligible Incentives***	**$36,111**	
Project Cost w/ Incentives	$247,939	

Project Payback (years)	
w/o Incentives	w/ Incentives
6.4	5.6

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 25% of total project cost.
Maximum allowable amount of Incentive #3 is 25% of total project cost.

*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account; maximum 2 million per project

APPENDIX E

Energy Savings Improvement Plan (ESIP)

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

- PROGRAMS
  - NJ SMARTSTART BUILDINGS
  - PAY FOR PERFORMANCE
  - COMBINED HEAT & POWER AND FUEL CELLS
  - LOCAL GOVERNMENT ENERGY AUDIT
  - LARGE ENERGY USERS PILOT
  - ENERGY SAVINGS IMPROVEMENT PLAN
  - DIRECT INSTALL
  - ENERGY BENCHMARKING
  - T-12 SCHOOLS LIGHTING INITIATIVE
  - OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS
  - EDA PROGRAMS
  - TEACH
  - ARRA
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Energy Savings Improvement Plan

A new State law allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the "Energy Savings Improvement Program" (ESIP), provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

This Local Finance Notice outlines how local governments can develop and implement an ESIP for their facilities. Below are two sample RFPs:

- Local Government
- School Districts (K-12)

The Board also adopted protocols to measure energy savings.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs. Local units considering an ESIP should carefully review the Local Finance Notice, the law, and consult with qualified professionals to determine how they should approach the task.

FIRST STEP – ENERGY AUDIT

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. As explained in the Local Finance Notice, this may be done internally if an agency has qualified staff to conduct the audit. If not, the audit must be implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach - and it's free. **Incentives provide 100% of the cost of the audit.**

ENERGY REDUCTION PLANS

If you have an ESIP plan you would like to submit to the Board of Public Utilities, please email it to ESIP@bpu.state.nj.us. Please limit the file size to 3MB (or break it into smaller files).

- Frankford Township School District
- Northern Hunterdon-Voorhees Regional High School
- Manalapan Township ***(180 MB** - Right Click, Save As)*

Program Updates

- Board Order - Standby Charges for Distributed Generation Customers
- T-12 Schools Lighting Replacement Initiative - Funding Allocation Reached

Other updates posted.

APPENDIX F

Photovoltaic (PV) Rooftop Solar Power Generation

Bethlehem Township Board of Education
Ethel Hoppock Middle School

Cost of Electricity	$0.156	/kWh
Electricity Usage	435,665	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$800,000	**200.0**	**255,279**	**0**	**$39,757**	**0**	**$39,757**	**$0**	**$16,593**	**20.1**	**14.2**

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $65 /1000kwh

Area Output*

3,959 m2
42,615 ft2

Perimeter Output*

364 m
1,194 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
26,075 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes

8	watt/ft2	
208,597	DC watts	
200	kW	Enter into PV Watts

PV Watts Inputs*

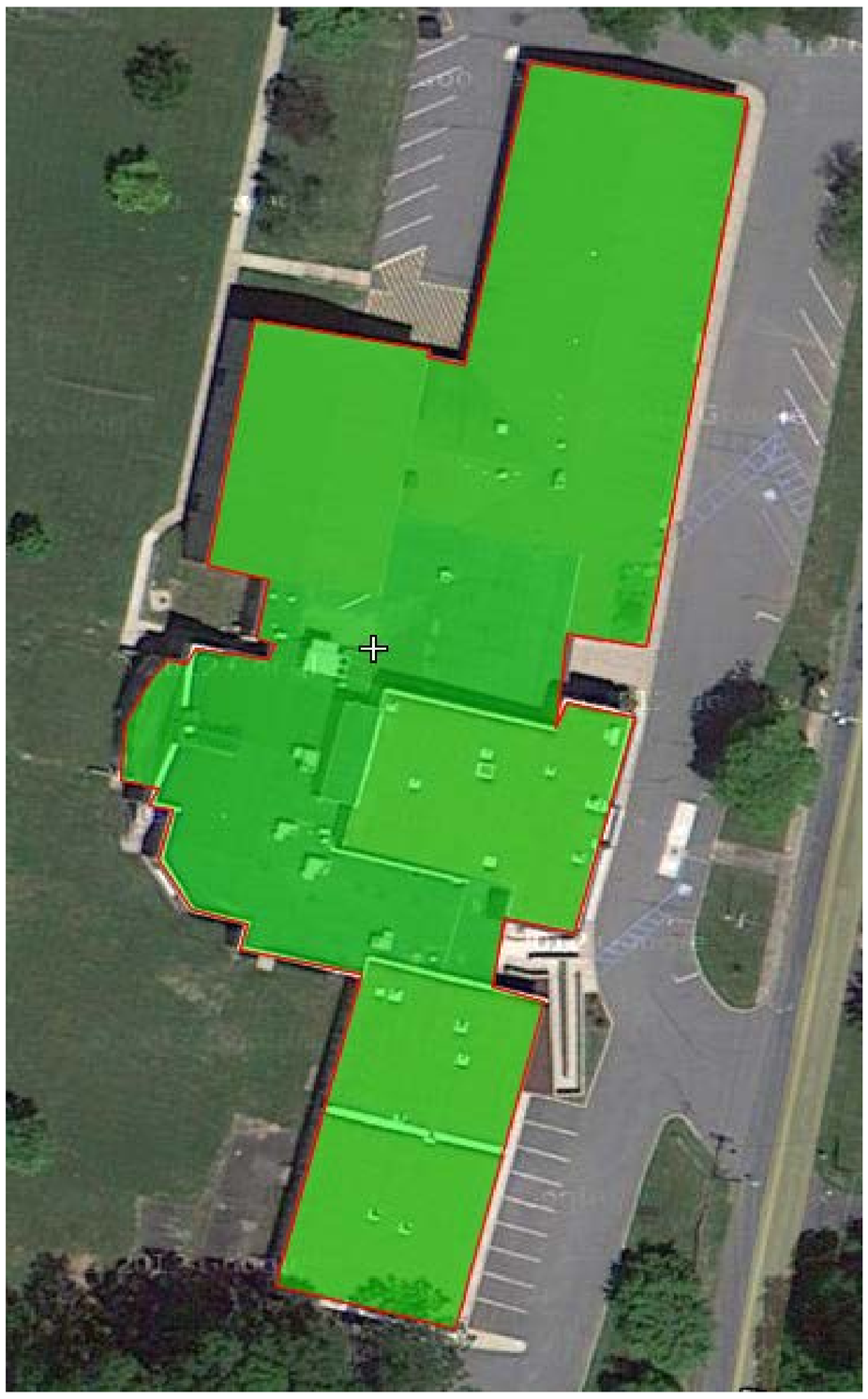
Array Tilt Angle	20	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	180	Enter into PV Watts (default)
Zip Code	08802	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output

255,279 annual kWh calculated in PV Watts program

% Offset Calc

Usage	435,665	(from utilities)
PV Generation	255,279	(generated using PV Watts)
% offset	59%	



* http://www.freemaptools.com/area-calculator.htm
**http://www.flettexchange.com
http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Allentown
State:	Pennsylvania
Latitude:	40.65° N
Longitude:	75.43° W
Elevation:	117 m
PV System Specifications	
DC Rating:	200.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	166.0 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.9 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ^{2}/day)	AC Energy (kWh)	Energy Value ($)
1	3.22	17307	2751.81
2	3.84	18526	2945.63
3	4.71	24371	3874.99
4	5.25	25256	4015.70
5	5.24	24732	3932.39
6	5.25	23625	3756.37
7	5.57	25477	4050.84
8	5.23	23964	3810.28
9	4.85	22189	3528.05
10	4.37	21425	3406.57
11	2.92	14369	2284.67
12	2.81	14730	2342.07
Year	4.44	255973	40699.71

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

Return to RReDC home page (*http://www.nrel.gov/rredc*)

APPENDIX G

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Ethel Hoppock Middle School

Building ID: 3310749
For 12-month Period Ending: June 30, 2012[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: October 31, 2012

Facility
Ethel Hoppock Middle School
280 Asbury/West Portal Road
Asbury, NJ 08802

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1927
Gross Floor Area (ft²): 44,200

Energy Performance Rating[2] (1-100) 30

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,492,545
Fuel Oil (No. 2) (kBtu)	2,530,408
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	4,022,953

Energy Intensity[4]

Site (kBtu/ft²/yr)	91
Source (kBtu/ft²/yr)	171

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	398

Electric Distribution Utility
Jersey Central Power & Light Co [FirstEnergy Corp]

National Median Comparison

National Median Site EUI	76
National Median Source EUI	143
% Difference from National Median Source EUI	19%
Building Type	K-12 School

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Ethel Hoppock Middle School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	280 Asbury/West Portal Road, Asbury, NJ 08802	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Ethel Hoppock Middle School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	44,200 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	75	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is “no“.		☐
Percent Cooled	20 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

h School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Jersey Central Power & Light Co [FirstEnergy Corp]

Fuel Type: Electricity

Meter: Electric Meter (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
06/01/2012	06/30/2012	38,080.00
05/01/2012	05/31/2012	29,440.00
04/01/2012	04/30/2012	42,080.00
03/01/2012	03/31/2012	42,400.00
02/01/2012	02/29/2012	33,280.00
01/01/2012	01/31/2012	47,360.00
12/01/2011	12/31/2011	36,480.00
11/01/2011	11/30/2011	37,920.00
10/01/2011	10/31/2011	30,400.00
09/01/2011	09/30/2011	46,720.00
08/01/2011	08/31/2011	6,560.00
07/01/2011	07/31/2011	46,720.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**437,440.00**
Electric Meter Consumption (kBtu (thousand Btu))		**1,492,545.28**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,492,545.28**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)

Meter: Fuel Oil (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
06/01/2012	06/30/2012	0.00
05/01/2012	05/31/2012	0.00
04/01/2012	04/30/2012	0.00
03/01/2012	03/31/2012	3,000.00
02/01/2012	02/29/2012	4,849.00
01/01/2012	01/31/2012	4,985.00
12/01/2011	12/31/2011	0.00
11/01/2011	11/30/2011	5,411.00
10/01/2011	10/31/2011	0.00
09/01/2011	09/30/2011	0.00

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08/01/2011	08/31/2011	0.00
07/01/2011	07/31/2011	0.00
Oil Consumption (Gallons)		**18,245.00**
Fuel Oil Consumption (kBtu (thousand Btu))		**2,530,408.17**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))		**2,530,408.17**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Ethel Hoppock Middle School
280 Asbury/West Portal Road
Asbury, NJ 08802

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Ethel Hoppock Middle School	
Gross Floor Area Excluding Parking: (ft²)	44,200
Year Built	1927
For 12-month Evaluation Period Ending Date:	June 30, 2012

Facility Space Use Summary

Ethel Hoppock Middle School	
Space Type	K-12 School
Gross Floor Area (ft²)	44,200
Open Weekends?	No
Number of PCs	75
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	20
Percent Heated	100
Months °	10
High School?	No
School District °	Bethlehem

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2012)	**Baseline** (Ending Date 06/30/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	30	30	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	91	91	60	N/A	76
Source (kBtu/ft²)	171	171	112	N/A	143
Energy Cost					
$/year	$ 127,586.97	$ 127,586.97	$ 83,838.46	N/A	$ 107,219.59
$/ft²/year	$ 2.89	$ 2.89	$ 1.90	N/A	$ 2.43
Greenhouse Gas Emissions					
MtCO$_2$e/year	398	398	262	N/A	334
kgCO$_2$e/ft²/year	9	9	6	N/A	8

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.