THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

John F. Kennedy School

311 South 10th Street, Newark, NJ 07103

LOCAL GOVERNMENT ENERGY AUDIT PROGRAM
FOR
NEW JERSEY
BOARD OF PUBLIC UTILITIES

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CHA PROJECT NO. 27999

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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 building 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.

List of Common Energy Audit Abbreviations

- A/C – Air Conditioning
- AHS – Air Handling Unit
- BMS – Building Management System
- Btu – British thermal unit
- CDW – Condenser Water
- CFM – Cubic feet per minute
- CHW – Chilled Water
- DCV – Demand Control Ventilation
- DDC – Direct Digital Control
- DHW – Domestic Hot Water
- DX – Direct Expansion
- EER – Energy Efficiency Ratio
- EF – Exhaust Fan
- EUI – Energy Use Intensity
- Gal – Gallon
- GPD – Gallons per day
- GPF – Gallons Per Flush
- GPH – Gallons per hour
- GPM – Gallons per minute
- GPS – Gallons per second
- HHW – Heating Hot Water
- HID – High Intensity Discharge
- HP – Horsepower
- HRU – Heat Recovery Unit
- HVAC – Heating, Ventilation, Air Conditioning
- HX – Heat Exchanger
- kbtu/mbtu – One thousand (1,000) Btu
- kW – Kilowatt (1,000 watts)
- kWh – Kilowatt-hours
- LED – Light Emitting Diode
- mbh – Thousand Btu per hour
- mmbtu – One million (1,000,000) Btu
- OCC – Occupancy Sensor
- PSI – Pounds per square inch
- RTU – Rooftop Unit
- SBC – System Benefits Charge
- SF – Square foot
- UH – Unit Heater
- V – Volts
- VAV – Variable Air Volume
- VSD – Variable Speed Drive
- W – Watt

1.0 EXECUTIVE SUMMARY

This report summarizes the energy audit performed by CHA for Newark Public Schools (NPS), in connection with the New Jersey Board of Public Utilities (NJBPU) Local Government Energy Audit (LGEA) Program. The purpose of this report is to identify energy savings opportunities associated with major energy consumers and inefficient practices. Low-cost and no-cost are also identified during the study. This report details the results of the energy audit conducted for the building listed below:

Building Name	Address	Square Feet	Construction Date
John F. Kennedy School	311 South 10th Street, Newark NJ 07103	46,576	1967

The annual energy and cost savings for the recommended energy conservation measures (ECM) identified in the survey are shown below:

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings ($)	Payback (years)
John F. Kennedy School	107,230	6,509	25,239	11.6

Each individual measure's annual savings are dependent on that measure alone, there are no interactive effects calculated. There are three options shown for Lighting ECM savings; only one option can be chosen. Incentives shown (if any) are based only on the SmartStart Incentive Program. Other NJBPU or local utility incentives may also be available/ applicable and are discussed in Section 6.0.

Each measure recommended by CHA typically has a stand-alone simple payback period of 15 years or less. However, if the owner choses to pursue an Energy Savings Improvement Plan (ESIP), high payback measures could be bundled with lower payback measures which ultimately can result in a payback which is favorable for an ESIP project to proceed. Occasionally, we will recommend an ECM that has a longer payback period, based on the need to replace that piece(s) of equipment due to its age, such as a boiler for example.

The following table provides a detailed summary of each ECM for the building surveyed, including costs, savings, SmartStart incentives and payback.

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
1	Replace One Boiler with a Condensing Boiler	93,629	1,398	67.0	1,500	65.9	N
2	Install Window A/C Unit Controllers	1,200	940	1.3	0	1.3	Y
3	Upgrade to Premium Efficiency Motors and Install Variable Speed Drives	37,173	5,272	7.1	1,800	6.7	Y
4**	Install Basic Controls	21,309	17,931	1.2	0	1.2	N
5	Re-Commission Chiller Automated Logic BACnet Control System	87,300	5,286	16.5	0	16.5	Y
6	Install Pool Cover	112,704	6,801	16.6	0	16.6	Y
7	Install Low Flow Plumbing Fixtures	126,197	704	179.3	0	179.3	N
L1**	Lighting Replacements / Upgrades	37,534	5,079	7.4	0	7.4	N
L2**	Install Lighting Controls (Occupancy Sensors)	17,280	3,865	4.5	2,240	3.9	N
L3	Lighting Replacements with Controls	54,814	6,941	7.9	2,240	7.6	Y
	Total**	**513,017**	**27,341**	**18.8**	**5,540**	**18.6**	
	Total (Recommended)	**293,192**	**25,239**	**11.6**	**4,040**	**11.5**	

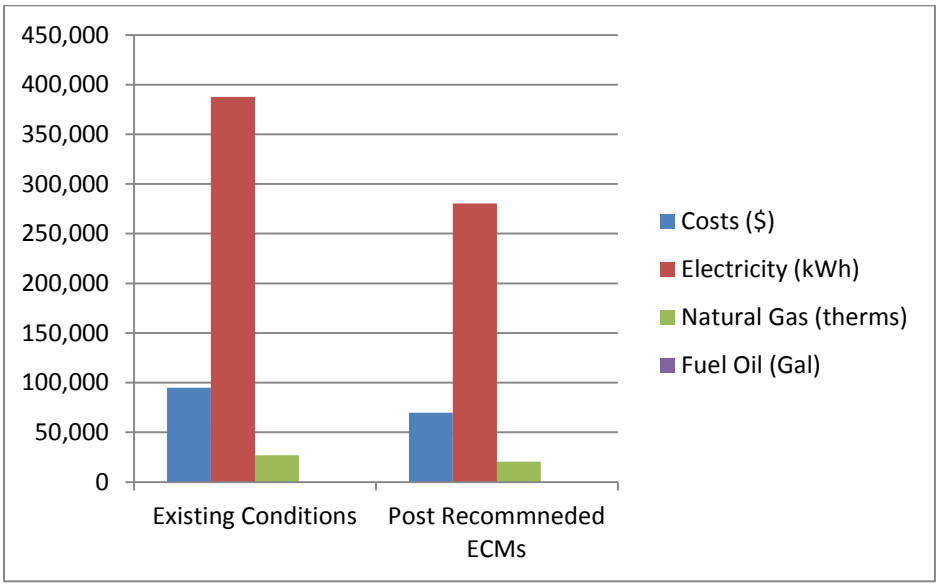
* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

The following alternative energy measures are also recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 170 kW System

If NPS implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	94,917	69,678	27%
Electricity (kWh)	387,600	280,370	28%
Natural Gas (therms)	26,929	20,420	24%
Site EUI (kbtu/SF/Yr)	86.2	64.4	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

The following is a summary of building information related to HVAC, plumbing, building envelope, lighting, kitchen equipment and domestic hot water systems as observed during CHAs site visit. See appendix B for detailed information on mechanical equipment, including capacities, model numbers and age. See appendix F for some representative photos of some of the existing conditions observed while onsite.

Building Name: John F. Kennedy School
Address: 311 South 10th Street, Newark NJ
Gross Floor Area: 46,576 square feet
Number of Floors: 2
Year Built: 1967

Description of Spaces: Classrooms, offices, cafeteria, auditorium, library, storage rooms, toilet rooms and oiler rooms.
Description of Occupancy: The school is a special need education type school and serves 174 students. There are about 120 school faculty and staff members.
Number of Computers: The school has approximately 60 desktop and laptop computers.
Building Usage: School hours are 8:15 AM – 2:40 PM Monday through Thursday and 8:10 AM – 3:55 PM on Friday, with various after-school activities till 5:30 PM. The two-shift custodian hours are from 6:30 AM to 11:00 PM.
Construction Materials: The exterior walls are brick structure and the interior walls are plaster walls.
Façade: Brick veneer
Roof: The building has flat roofing covered with grey rubber membrane. The roof was in good condition. No ECM was evaluated for the roof.
Windows: The building has single pane aluminum frame windows.
Exterior Doors: The school has wood frame doors. Sweeps on exterior doors were in good condition and did not need to be replaced.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The building is heated by three Patterson-Kelley heating hot water (HHW) boilers that were installed in 2003. Each boiler has a rated maximum energy input of 1,500 MBH and maximum energy output of 1,275 MBH which results in a nameplate efficiency of 85%.
The classrooms and offices are heated by unit ventilators equipped with HHW coils and the hallways are heated by HHW fin-tube baseboard heaters. In addition to UVs and baseboard heaters, there are three air handling units (AHU) equipped with HHW coils providing heat for gymnasium, cafeteria and medical offices. A few electric unit heaters are also observed in the medical office to supply supplemental heat. Discussing with medical staff, it is found that these electric unit heaters are manually turned on when they feel cold and off when the room is warm enough.

An ECM is included to evaluate the replacement of one boiler with a gas-fired condensing boiler and operate that boiler as the primary.

The heating hot water is circulated around the building by three HHW circulating pumps. Each HHW pump is driven by a WEG 5 HP electric motor. The HW pumps do not have NEMA premium efficiency motors or VFD control. An ECM is included to upgrade these pump motors to premium efficiency motors and install VFDs and/or replace 3-way valves with 2-way valves.
Each boiler also has its own return hot water pump driven by a Baldor 1.5 HP electric motor

Cooling: A McQuay air cooled chiller located in the court yard is used to provide chilled water for the UVs and AHUs. This chiller equipped with two reciprocating compressors has a rated cooling capacity of 150 tons. The chilled water is circulated to the building by two water pumps driven by 10HP electric motors. The CHW pumps do not have NEMA premium efficiency motors or VFD control. An ECM is included to upgrade these pump motors to premium efficiency motors and install VFDs and/or replace 3-way valves with 2-way valves. Each classroom has a UV equipped with both a HHW coil and a chilled water (CHW) coil. In addition to the three AHUs mentioned in the heating section, there is an AHU-4 quipped with direct expansion (DX) evaporator coils serving the pool. AHU-4 is malfunctioned during the site visit and the cooling capacity is unknown. The AHUs are listed as follows:

AHU Name	Location	Serve Area
AHU-gym	Gymnasium storage room	Two gyms
AHU-Med	Medical office utility room	Medical offices
AHU-Café	Cafeteria utility room	Cafeteria
AHU-4	Pool mechanical room	Pool

In addition to the central cooling system, there are about 6 window units in the building to serve the computer lab and classrooms for supplemental cooling. The window A/C units are manually operated and are assumed to be operating when no occupants are present. A window A/C controller ECM is included.

Ventilation: The classrooms and offices are ventilated by unit ventilators (UV). Each UV has a 1' by 3' grill outdoor air intake to bring outdoor air for room ventilation.

Exhaust: The kitchen has a 5' by 16' kitchen exhaust hood but it is not more operational according to kitchen staff. Besides the kitchen exhaust hood, there are exhaust fans in the kitchen, cafeteria, gymnasiums and pool.

Pool Heating: The school has a small swimming pool and the pool is used for about 4 hours per day. The pool water is heated by a gas fired LRZ pool water heater. The pool water is circulated by a pool water pump driven by a WEG 1.5 HP motor. There is no pool cover to prevent evaporation while the pool is unoccupied. An ECM for installing a pool cover is included in Section 5.

Controls Systems

The building has a Johnson Controls METASYS control system. After discussions with the facility staff, it was noted that this control system had failed to work properly and the heating system is controlled by the thermostats in the rooms. Each room in the building has an Automated Logic programmable electric thermostat. It is found that the thermostats are preset at occupied mode and cannot be changed locally. During the site visit, it is noted that the temperature at a few rooms are at 78 ^{o}F and the rooms are too warm. The central chilled water system has an Automated Logic DDC system. However, the facility people have trouble logging into the central control computer and this control system has not been used for years. Based on the field observation, this DDC system controls the UVs, AHUs and chilled water loop. Due to the existing controls system not cooling the building properly, an ECM is evaluated to re-commission the system to operate properly so these window air conditioners can be eliminated.

A Basic Controls ECM is included to address the boiler valve operation. An alternate ECM is also included that evaluates the energy savings potential of adding a full DDC controls system.

Domestic Hot Water Systems

The building is served by one gas fired A.O Smith domestic hot water heater. The heater has a rated energy input of 399 MBH and energy output of 322.79 MBH which results in a nameplate efficiency of 81%. The DHW water is stored in three 115 gallon storage tanks.

Kitchen Equipment

The kitchen has one Hobart electric dual doors oven, one GE electric stoves, refrigerators made by Traulsen and Delfield and freezers. There is also a dishwasher equipped with a 12 kW electric booster heater, but it was not used any more according to kitchen staff. No kitchen equipment ECMs are being considered as the equipment appears to be new.

Plumbing Systems

The restrooms contain older style toilets and urinals that utilize a higher volume of water per flush than currently available new units. The sinks have metered faucets and were not considered to be upgraded. An ECM is included to evaluate the water savings potential of installing low- flow water closets and urinals.

Plug Load

This school has computers, copiers, smart boards, residential appliances (microwave, refrigerator), printers and portable electric heaters (personal) which contribute to the plug load in the building.

Lighting Systems

The building has a mixture of T-8 fluorescent lighting and metal halides. The majority lighting fixtures in the building are T8 fluorescent fixtures. The two gymnasiums have four metal halides each. All the lights in this building are controlled by manual switches or key switches. After discussion with facility staff, it was noted that the classroom lights are typically turned off after the janitor cleaning the rooms and the hallway lights are on 24/7.

Three lighting ECMs have been included which include adding occupancy sensors to the existing lighting, replacement of the T-8 lighting with LED lighting and a third ECM that evaluates the effect of occupancy sensors used with the LED lighting upgrades.

3.0 UTILITIES

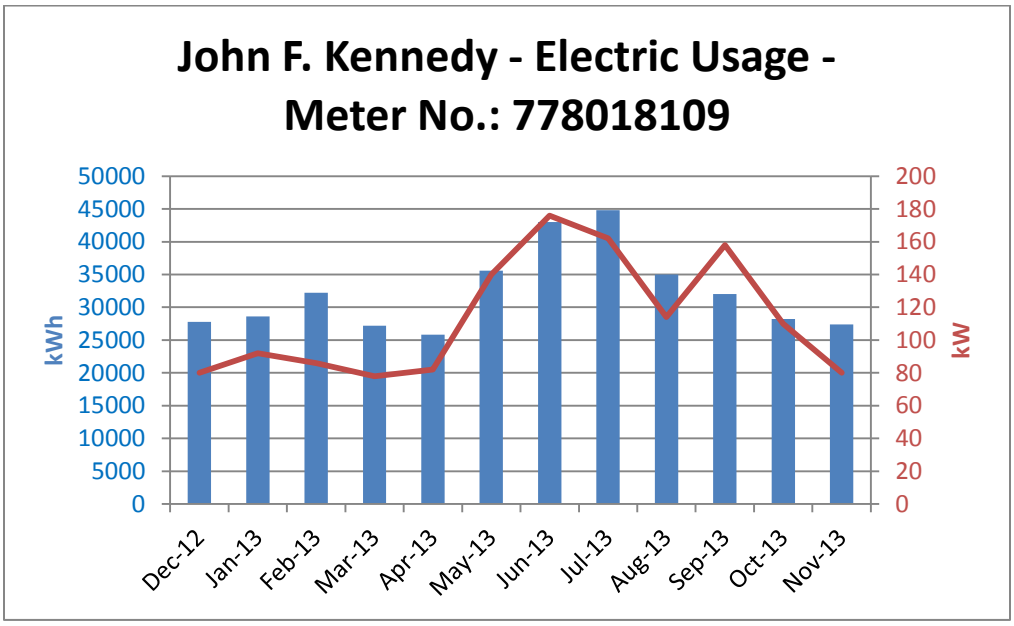
Utilities used by the building are delivered and supplied by the following utility companies:

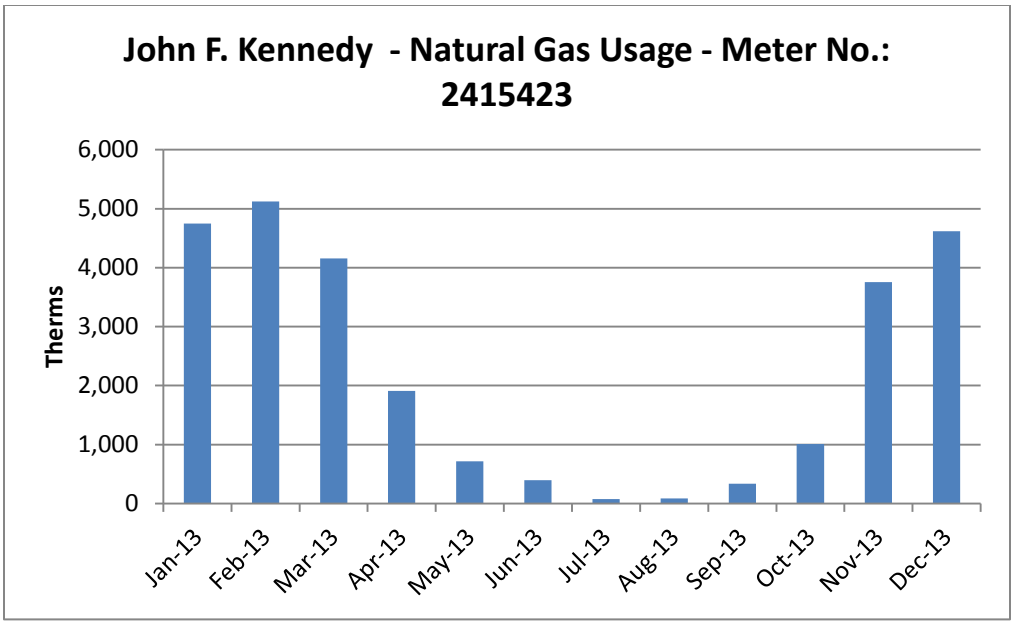
	Electric	Natural Gas
Deliverer	PSEG	PSEG
Supplier	Nextera Energy Services	PSEG

For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	387,600	kWh
Annual Cost	$69,557	$
Blended Unit Rate	$0.18	$/kWh
Supply Rate	$0.17	$/kWh
Demand Rate	$3.54	$/kW
Peak Demand	176.0	kW
Natural Gas		
Annual Consumption	26,929	Therms
Annual Cost	$25,361	$
Unit Rate	$0.94	$/therm

Blended Rate: Average rate charged determined by the annual cost / annual usage
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)





In addition, domestic water and sewer services are provided by City of Newark Division of Water at $7.55/1000 gal.

See Appendix A for a utility analysis.

Under New Jersey's energy deregulation law, the supply portion of the electric (or natural gas) bill is separated from the delivery portion. The supply portion is open to competition, and customers can shop around for the best price for their energy suppliers. The electric and natural gas distribution utilities will still deliver the gas/ electric supplies through their wires and pipes – and respond to emergencies, should they arise – regardless of where those supplies are purchased. Purchasing the 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 the service.

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	School Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.17	$0.12	Y
Natural Gas	$/Therm	$0.94	$0.95	N

* Per U.S. Energy Information Administration (2013 data – Electricity and Natural Gas, 2012 data – Fuel Oil)

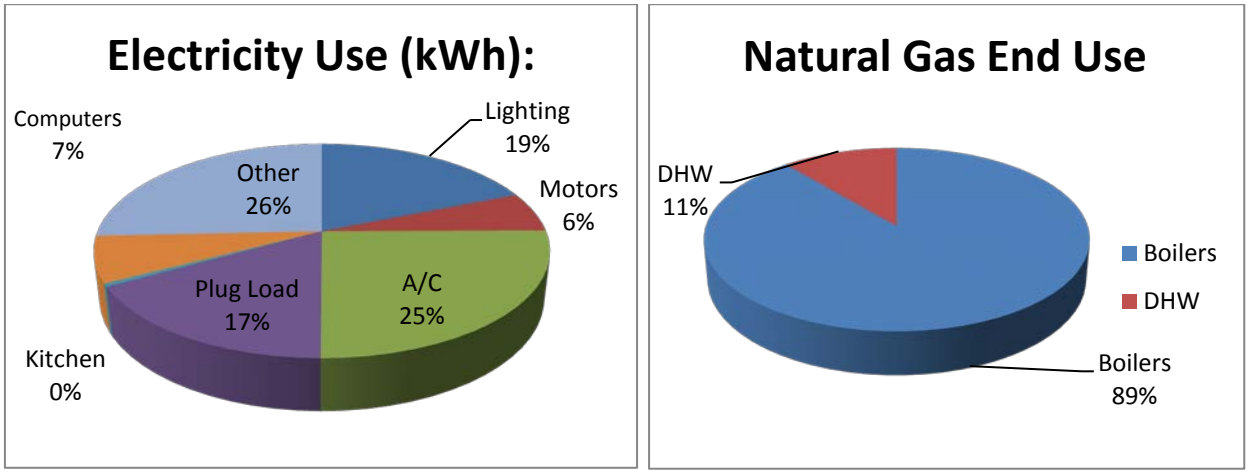
Additional information on selecting a third party energy supplier is available here:

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.

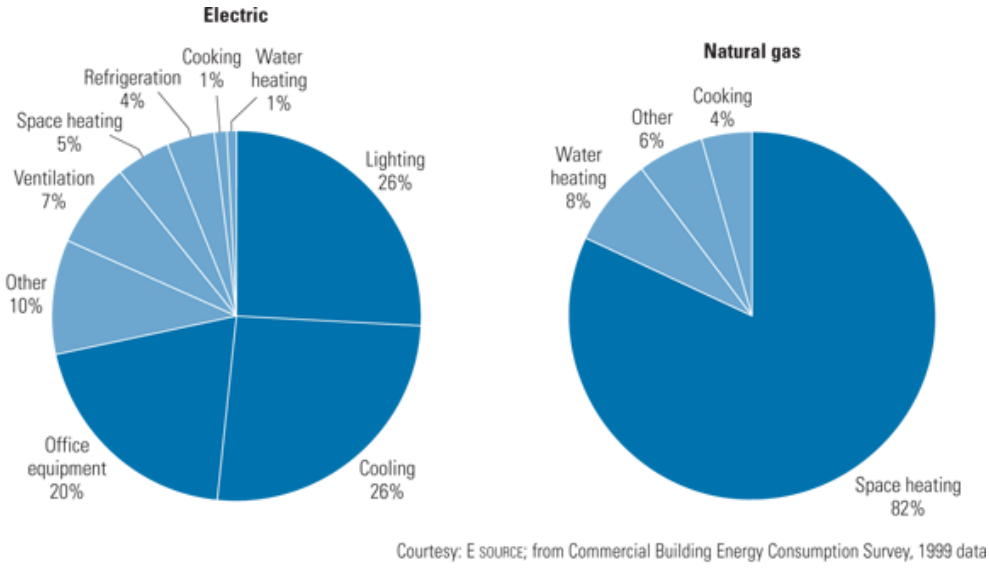
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



Most of the electricity consumed by educational facilities is used to for lighting, cooling, and plug loads such as computers and copiers; most of the natural gas is used for space heating. Each school's energy profile is different, and the following charts represent typical utility profiles for K-12 schools per U.S. Department of Energy.

Typical End-Use Utility Profile for Educational Facilities



Courtesy: E SOURCE; from Commercial Building Energy Consumption Survey, 1999 data

4.0 BENCHMARKING

TRC has previously benchmarked this building, the results of which have been provided to NPS. The results are summarized below. Copies of the benchmarking report are available in Appendix G.

The EPA Portfolio Manager benchmarking tool 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 benchmarking are contained in the table below.

Site EUI kBtu/ft^2/yr	Energy Star Rating (1-100)
86.2*	46**

* Calculated by CHA using Utility Data provided by NPS
** Provided by TRC

The school has a below average Energy Star Rating Score (50 being the median score), and as such by implementing the measures discussed in this report, it is expected that the EUI can be further reduced and the Energy Star Rating further increased.

5.0 ENERGY CONSERVATION MEASURES

The following types of energy savings opportunities are identified in this section of the report:

- Energy conservation measures (ECMs) are energy savings recommendations that typically require a financial investment. For these areas of opportunity, CHA prepared detailed calculations, as summarized in this section and in Appendix C. In general, additional savings may exist from reductions in maintenance activities associated with new equipment or better controls; however for conservatism, maintenance savings are not accounted for in this report; instead the only savings which are reported are those derived directly from reductions in energy which can be tracked by the utility bills.

- Operational and Maintenance measures (O&M) consist of low- or no-cost operational opportunities, which if implemented would have positive impacts on overall building operation, comfort levels, and/or energy usage. There are no estimated savings, costs or paybacks associated with the O&M measures included as part of this study.

Energy savings were quantified in the form of:

- electrical usage (kWh=Kilowatt-hour),
- electrical demand (kW=kilowatts),
- natural gas (therms=100,000 Btu),
- propane gas (gallons=91,650 Btu),
- fuel oil (gallons =138,700 Btu), and
- water (kgal=1,000 gallons).

These recommendations are influenced by the time period that it takes for a proposed project to "break even" referred to as "Simple Payback". Simple payback is calculated by dividing the estimated cost of implementing the ECM by the energy cost savings (in dollars) of that ECM.

Another financial indicator of the performance of a particular ECM is the Return on Investment or ROI, which represents the benefit (annual savings over the life of a project) of an investment divided by the cost of the investment. The result is expressed as a percentage or ratio.

Two other financial analyses included in this report are Internal Rate of Return (IRR) and Net Present Value (NPV). Internal Rate of Return is the discount rate at which the present value of a project costs equals the present value of the project savings. Net Present Value is the difference between present value of an investment's future net cash flows and the initial investment. If the NPV equals "0", the project would equate to investing the same amount of dollars at the desired rate. NPV is sometimes referred to as Net Present Worth. These values are provided in the Summary Tab in Appendix C.

5.1 ECM-1 Replace One Boiler with a Condensing Boiler

The boiler room has three Patterson-Kelley heating hot water (HHW) boilers that were installed in 2003. Each boiler has a rated maximum energy input of 1,500 MBH and maximum energy output of 1,275 MBH which results in a nameplate efficiency of 85%.

This ECM evaluates replacing one of the boilers in kind with a gas-fired condensing boiler and operating this boiler as the primary boiler. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. The other boilers could be used during the winter when additional capacity is needed. New dedicated boiler venting would also need to be installed either through the roof or sidewall. Asbestos abatement may need to be performed prior to any work and the cost for this is not included in the payback analysis.

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

ECM-1 Replace One Boiler with a Condensing Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
93,629	0	0	1,484	1,398	(0.6)	1,500	67.0	65.9

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended due to the high cost and long payback. As long as the boilers are maintained properly they should continue to operate beyond their service life.

5.2 ECM-2 Install Window A/C Controller

There are approximately six (6) window air conditioners located throughout the school serving various spaces throughout the school.

This ECM evaluates the installation of programmable “smart” timers that interrupt the electrical supply to the window air conditioners when cooling is not needed due to the room being unoccupied. The timers are configurable to operate as a standalone timer or they can be wirelessly interconnected to provide remote temperature control using software.

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

ECM-2 Install Window A/C Controller

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,200	0	5,236	0	940	10.7	0	1.3	1.3

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

This measure is recommended.

5.3 ECM-3 Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

The hot water pumps are 5 HP each which operate at 87.5% efficiency. New 5 HP premium efficiency motors can operate as high as 89.5% efficient. The chilled water pumps are 10 HP each which operate at 85.7% efficiency. New 10 HP premium efficiency motors can operate as high as 91.7% efficient. Both systems, hot and chilled water, are currently circulated by pumps that run at constant speed. Installing premium efficiency motors driven by VFDs and two-way valves will save energy when full load operation is not required. As the load is reduced and the two-way valves on the coils close, the VFD will slow the motor down to maintain the required system pressure and the energy consumption of the pump motors will be reduced.

The savings of this measure are calculated from the motor efficiency improvement and the motor speed reduction the results when the systems are only partially loaded.

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

ECM-3 Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
37,173	1.6	31,142	0	5,272	1.3	1,800	7.1	6.7

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

This measure is recommended.

5.4.1 ECM-4A Install Basic Controls

The three (3) Patterson-Kelley heating hot water (HHW) boilers are controlled by a Johnson Controls METASYS control system. This control system is not operating properly according to staff. The thermostats in the rooms cannot be changed locally and rooms experience over/under heating depending on the location. No night temperature set-back is implemented, unless the operator remembers to turn the boilers off before their shift ends. This highly inefficient method of operation consumes excessive fuel (natural gas).

A Basic control system is recommended to provide automatic control of the boiler(s) to produce only enough hot water needed to heat the building, based on a single or multiple averaging space thermostats. This system will provide more tenable space temperatures but will not provide for independent room temperature control.

ECM-4A Install Basic Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
21,309	0	60,702	7,473	17,931	11.6	0	1.2	1.2

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-5.

5.5 ECM-5 Re-Commission Chiller Automated Logic BACnet Control System

The central chilled water system has an Automated Logic DDC system. As observed during the site visit, however, the integration and functionality of the system with respect to building systems could be improved. The system can also be expanded to include the heating system as well.

Commissioning is the process of verifying that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. Retro-commissioning is the same systematic process applied to existing buildings.

Both controls and components of the heating and cooling systems present saving opportunities during the retro-commissioning process. The DDC system and controls within a building play a crucial role in providing a comfortable building environment. Over time, temperature sensors or thermostats may drift out of synch. Poorly calibrated sensors can increase heating and cooling loads and lead to occupant discomfort. The following procedure is recommended:

- Calibrate the indoor and outdoor building sensors. Calibration of room thermostats, duct thermostats, humidistats, and pressure and temperature sensors should be in accordance with the original design specifications. Calibrating these controls may require specialized skills or equipment and may require outside expertise.
- Inspect damper and valve controls to verify proper functioning. Dampers should also be examined for proper opening and closing. Stiff dampers can cause improper modulation of the amount of outside air being used in the supply airstream. In some cases, dampers may be wired in a single position or disconnected, violating minimum outside air requirements.
- Review building operating schedules. HVAC controls must be adjusted to heat and cool the building properly during occupied hours. Occupancy schedules can change frequently over the life of a building, and control schedules should be adjusted accordingly. When the building is unoccupied, the temperature should be set back to save heating or cooling energy; however, minimal heating and cooling may be required when the building is unoccupied. In cold climates, for example, heating may be needed to keep water pipes from freezing.

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

ECM-5 Re-Commission Chiller Automated Logic BACnet Control System

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
87,300	0	29,458	0	5,286	(0.1)	0	16.5	16.5

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

This measure is recommended.

5.6 ECM-6 Install Pool Cover

Swimming pools lose energy in a variety of ways although evaporation is one of largest sources of energy loss. Evaporation occurs because the pool water is heated to a temperature above the temperature of the natatorium and because natatoriums must be highly ventilated to control humidity. Pool covers can help reduce the amount of evaporation when the pools are not in use which will reduce energy consumption of the water heating equipment.

The evaporation reduction would result in water savings, pool water heating energy reductions and ventilation energy usage savings.

Implementation of this measure will require installation of pool cover, reel system and control system.

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

ECM-6 Install Pool Cover

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
$	kW	kWh	Therms	kGal	$		$	Years	Years
112,704	0	2,378	6,509	32	6,801	0.2	0	16.6	16.6

. * Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

This measure is recommended.

5.7 ECM-7 Install Low Flow Plumbing Fixtures

The plumbing fixtures in this building are older high flow fixtures. The water savings associated from replacing existing high flow fixtures with low-flow fixtures was calculated by taking the difference of the annual water usage for the proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures. Replacing the existing fixtures in the restrooms with 1.28 Gals/flush toilets and 1.0 gal/flush urinals will conserve water which will result in lower annual water

and sewer charges. Facets with low-flow push valves were not considered for replacement.

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

ECM-7 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
$	kW	kWh	Therms	kGal	$	%	$	Years	Years
126,197	0	0	0	93	704	(0.9)	0	179.3	179.3

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

These measures are not recommended due to the long paybacks.

5.8.1 ECM-L1 Lighting Replacement / Upgrades

The existing lighting system consists of mostly T8 linear fluorescent fixtures which until recently represented the most efficient lighting technology available. Recent technological improvements in light emitting diode (LED) technologies have driven down the initial costs making it a viable option for installation.

Overall energy consumption can be reduced by replacing inefficient bulbs and linear fluorescent bulbs with more efficient LED technology. To compute the annual savings for this ECM, the energy consumption of the current lighting fixtures was established and compared to the proposed fixture power requirement with the same annual hours of operation. The difference between the existing and proposed annual energy consumption was the energy savings. These calculations are based on 1 to 1 replacements of the fixtures, and do not take into account lumen output requirements for a given space. A more comprehensive engineering study should be performed to determine correct lighting levels.

Supporting calculations, including assumptions for lighting hours and annual energy usage for each fixture, are provided in Appendix C and summarized below:

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
37,534	10.0	27,874	0	5,079	1.2	0	7.4	7.4

* LED retrofits must go through the “custom” measures incentive option under New Jersey SmartStart Program. There are no “prescriptive” incentives for LED retrofits. Projects must achieve a minimum of 75,000 kWh annual savings to qualify for “custom” incentives. See section 6.0 for other incentive opportunities

This measure is not recommended in lieu of ECM L3.

5.8.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Presently, all interior lighting fixtures are controlled my wall mounted switches. Review of the comprehensive lighting survey determined that lighting in some areas could benefit from installation of occupancy sensors to turn off lights when they are unoccupied.

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in Section 5.8.1, 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-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
17,280	0	23,135	0	3,865	2.6	2,240	4.5	3.9

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM L3.

5.8.3 ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

This measure is a combination of ECM-L1 and ECM-L2; recommending 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-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
54,814	10.0	39,017	0	6,941	1.0	2,240	7.9	7.6

* LED retrofits must go through the “custom” measures incentive option under New Jersey SmartStart Program. There are no “prescriptive” incentives for LED retrofits. Projects must achieve a minimum of 75,000 kWh annual savings to qualify for “custom” incentives. See section 6.0 for other incentive opportunities

This measure is recommended.

5.9 Additional O&M Opportunities

This list of operations and maintenance (O&M) - type measures represent low-cost or no-cost opportunities, which if implemented will have a positive impact on the overall

building operations, comfort and/or energy consumption. The recommended O&M measures for this building are as follows:

- Install Covers on Window Air Conditioners
- Clean Window AC filters before each season
- Replace Unit Ventilator filters at least twice a year
- Clear surface above unit ventilators of materials, plants, or books
- Set computers monitors to turn off and computers to sleep mode when not in use
- Look for the ENERGY STAR® label when purchasing Window AC units or Kitchen Appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train custodians to turn off lights and set HVAC temperatures to minimum levels when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance
- Educate students and staff about how their behavior affects energy use. Create student energy patrols to monitor and inform administration when energy is being wasted.
- During the winter, Custodians should ensure all windows are closed as part of cleaning routine
- Daylighting controls in hallway
- Apply Reflective Film in hallway

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

The following sections give detailed information on available incentive programs including New Jersey Smart Start, Direct Install, New Jersey Pay for Performance (P4P) and Energy Savings Improvement Plan (ESIP). If the School District wishes to and is eligible to participate in the Energy Savings Improvement Plan (ESIP) program and/or the Pay for Performance Incentive Program (P4P), it cannot participate in either the Smart Start or Direct Install Programs. Refer to Appendix D for more information on the Smart Start program.

6.1.1 New Jersey Smart Start Program

For this energy audit, The New Jersey Smart Start Incentives are used in the energy savings calculations, where applicable. This program is intended for medium and large energy users and provides incentives for:

- Electric Chillers
- Gas Chillers
- Gas Heating
- Unitary HVAC
- Ground Source Heat Pumps
- Variable frequency Drives/ motors
- Refrigeration
- Prescriptive and performance lighting and lighting controls

The equipment is procured using a typical bid- build method, installed and paid for and then the incentives are reimbursed to the owner.

Refer to Appendix D for more information on the Smart Start program.

6.1.2 Direct Install Program

The Direct Install Program applies to smaller facilities that have a peak electrical demand of 200 kW or less 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 reduce the implementation cost of energy conservation projects.

The Direct Install program has specific HVAC equipment and lighting requirements and is generally applicable only to smaller package HVAC units, small boilers and lighting retrofits.

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 an approved Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this energy audit. The incentive is reimbursed to the Owner upon successful replacement and payment of the equipment.

The building qualifies for this program because its electrical demand is less than the maximum peak electrical demand of 200 kW for the last 12 month period.

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

This building may 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 to offset the cost of energy conservation projects for facilities that pay the Societal Benefits Charge (SBC) and whose demand (kW) in any of the preceding 12 months exceeds 100 kW. This demand minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations and *is not applicable to public schools*. 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). Additionally, the overall return on investment (ROI) must exceed 10%. 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). The ERP must include a detailed energy audit of the desired ECMs, energy savings calculations (using building modeling software) and inputting of all utility bills into the EPA Portfolio Manager website.

- 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. The ERP must be completed by a Certified Energy Manager (CEM) and submitted along with the project application.

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.

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.

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.

Combining Incentives #2 and #3 will provide a total of $0.18/ kWh and $1.8/therm not to exceed 50% of total project cost. Additional Incentives for #2 and #3 are increased by $0.005/kWh and $0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

For the purpose of demonstrating the eligibility of the ECM's to meet the minimum savings requirement of 15% annual savings and 10% ROI for the Pay for Performance Program, all ECM's identified in this report have been included in the incentive calculations. The results for the building are shown in Appendix C, with more detailed program information in Appendix D.

6.1.4 Energy Savings Improvement Plan

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" (ESO) to pay for the capital costs of energy improvements to their facilities. ESIP loans have a maximum loan term of 15 year. ESOs 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. 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. Refer to Appendix D for more information on this program.

6.1.5 Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) is part of New Jersey's efforts to reach its Energy Master Plan goals of striving to use 30 percent of electricity from renewable sources by 2020.

Incentives for sustainable bio-power projects and for energy storage projects are currently under development, with competitive solicitations for each of those technologies expected to begin in the first quarter of 2014. The wind program is currently on hold.

New solar projects are no longer eligible for REIP incentives, but can register for Solar Renewable Energy Certificates (SRECs) through the SREC Registration Program (SRP).

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

The building 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 amount of available roof area determines how large of a solar array can be installed on any given roof. The table below summarizes the approximate roof area available on the building and the associated solar array size that can be installed.

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
21,576	170

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

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. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of $155/SREC for 2013 and this number was utilized in the cash flow for this report.

The system costs for PV installations were derived from recent solar contractor budgetary pricing in the state of New Jersey and include the total cost of the system installation (PV panels, inverters, wiring, ballast, controls). The cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a typical system. There are other considerations that have not been included in this pricing, such as the condition of the roof and need for structural reinforcement. Photovoltaic systems can be ground mounted if the roof is not suitable, however, this installation requires a substantial amount of open property (not wooded) and underground wiring, which adds more cost. 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 most likely need to be replaced during the useful life of the PV system.

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

Photovoltaic (PV) Rooftop Solar Power Generation – 170 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
680,000	170.0	221,567	0	39,882	34,343	17.1	9.2	FS

Note: CHA typically recommends a more detailed evaluation be conducted for the installation of PV Solar arrays when the screening evaluation shows a payback of less than 20 years. Therefore, this ECM is recommended for further study. Before implementation is pursued, the school district should consult with a certified solar PV contractor.

7.1.2 Solar Thermal Hot Water Generation

Active solar thermal systems use solar collectors to gather the sun's energy to heat a fluid. An absorber in the collector (usually black colored piping) converts the sun's energy into heat. The heat is transferred to circulating water, antifreeze, or air for immediate use or is storage for later utilization. Applications for active solar thermal energy include supplementing domestic hot water, heating swimming pools, space heating or 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 at the same angle as the site's latitude, to maximize the amount of solar radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). The most practical system would transfer the heat from the panels to thermal storage tanks and then use the pre-heated water for domestic hot water production. DHW is presently produced by natural gas fired water heaters and, therefore, this measure would offer natural gas utility savings. Unfortunately, the amount of domestic hot water that is currently used by this school is very small. Installing a solar domestic hot water system is not recommended due to the limited amount of domestic hot water presently consumed by the school.

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

Solar Thermal Hot Water Generation

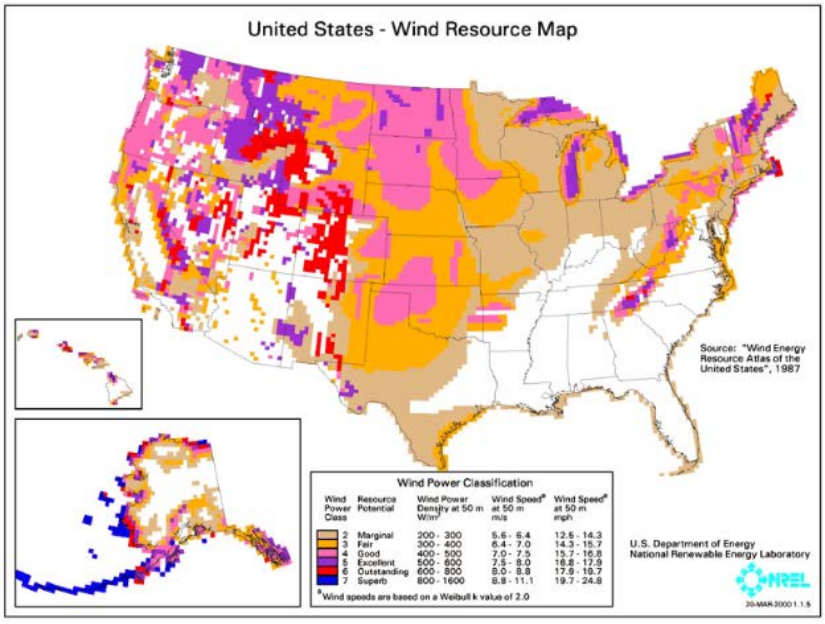
Budgetary Cost	Annual Utility Savings			Total Savings	Incentives*	Payback (without incentives)	Payback (with incentives)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
658,600	0	0	32,006	30,086	0	21.9	21.9	N

*Presently, there are no incentives available for the installation of solar hot water systems.

Note: This measure competes directly with the PV solar analysis because it uses the same available roof space to install solar flat plate collectors. This ECM is not recommended due to the long payback and because PV solar is recommended for further study.

7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are mounted onto a tower. Newer wind turbines also use advanced technology to generate electricity at a variety of frequencies depending on the wind speed, convert it to DC and then back to AC before sending it to the grid. Wind turbines range from 50 – 750 kW for utility scale turbines down to below 50 kW for residential use. On a scale of 1 (the lowest) to 7 (the highest), Class 3 and above (wind speeds of 13 mph or greater) are generally considered “good wind resource” according to the Wind Energy Development Programmatic EIS Information Center hosted by the Bureau of Land Management. According to the map below, published by NREL, Newark, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



This measure is not recommended.

7.3 Combined Heat and Power Plant

Combined heat and power (CHP), cogeneration, is self-production of electricity on-site with beneficial recovery of the heat byproduct from the electrical generator. Common CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter; however thermal usage during the summer months does not exist. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. CHP is not recommended due to the building's limited summer thermal demand.

This measure is not recommended due to the absence of year-round thermal loads which are needed for efficiency CHP operation.

7.4 Demand Response Curtailment

Presently, electricity is delivered by PSE&G, which receives the electricity from regional power grid RFC. PSE&G is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From January 2013 through December 2013 the following table summarizes the electricity load profile for the building.

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
176.0	78.0	113.2	N	Y

This measure is not recommended because the building does not have enough onsite generation to cover the entire electrical load of the building.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of $25,239/yr with an overall payback of 11.6 years, if the recommended ECMs are implemented.

The potential annual energy and cost savings (payback includes potential incentive) are shown in the following table.

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings ($)	Payback (years)
107,230	6,509	25,239	11.6

The following projects should be considered for implementation:

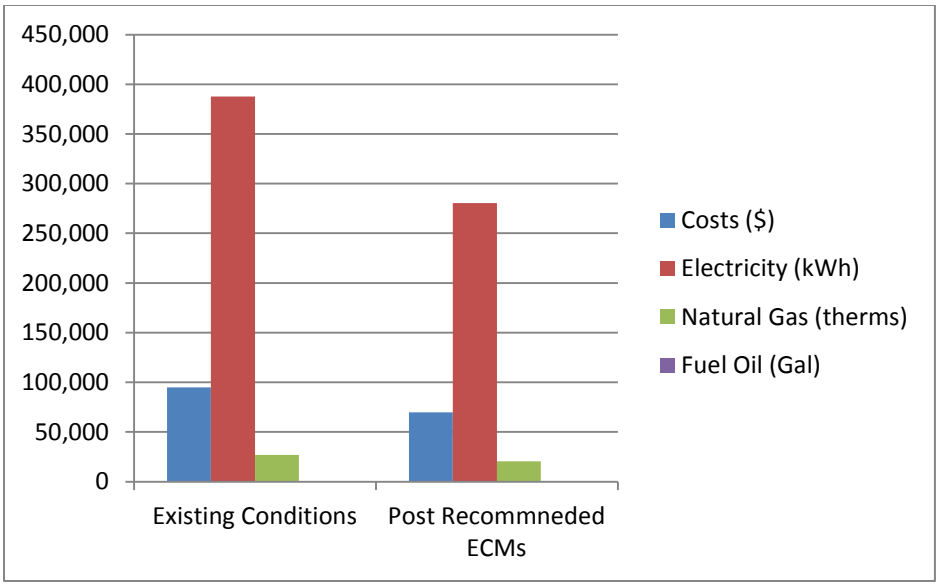
- Re-Commission Chiller Automated Logic BACnet Control System
- Upgrade to Premium Efficiency Motors and Install Variable Speed Drives
- Install Window A/C Controller
- Install Pool Cover
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 170.0 kW System

If NPS implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	94,917	69,678	27%
Electricity (kWh)	387,600	280,370	28%
Natural Gas (therms)	26,929	20,420	24%
Site EUI (kbtu/SF/Yr)	86.2	64.4	


450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Existing Conditions
Post Recommneded ECMs
Costs ($)
Electricity (kWh)
Natural Gas (therms)
Fuel Oil (Gal)

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

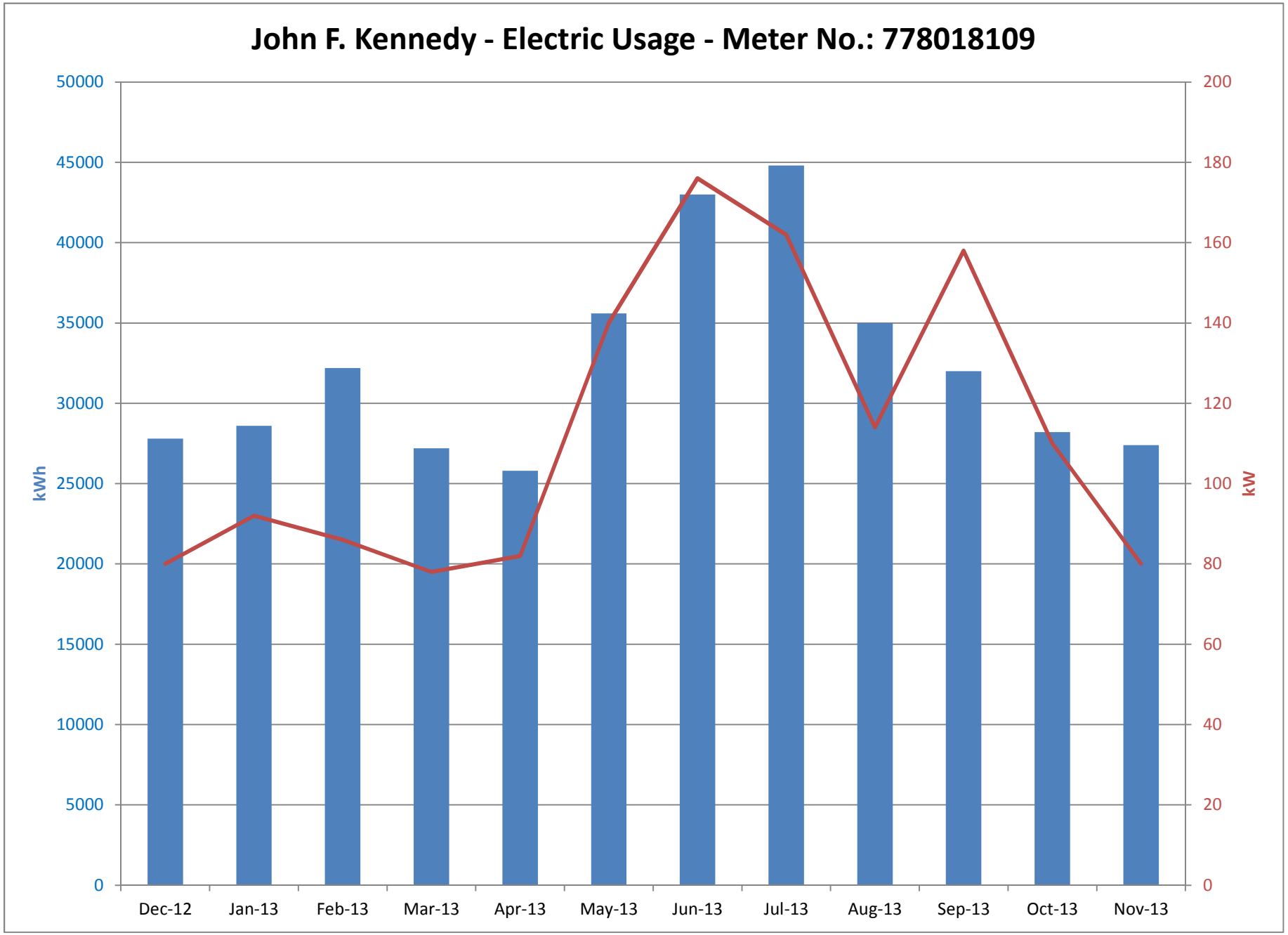
John F. Kennedy - Electric Usage

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption ($)	Blended Rate ($/kWh)	Consumption Rate ($/kWh)	Demand Rate ($/kW)
1/5/2012	2/2/2012	32800	92	6,085.00	0	1,305.51	320.76	5,764.24	$ 0.19	$ 0.18	$ 3.49
2/3/2012	3/5/2012	34800	90	6,455.00	0	1,361.67	313.79	6141.21	$ 0.19	$ 0.18	$ 3.49
3/6/2012	4/3/2012	29400	86	5,455.00	0	1,210.05	299.85	5155.15	$ 0.19	$ 0.18	$ 3.49
4/4/2012	5/4/2012	28000	98	5,195.00	0	1,170.75	341.69	4853.31	$ 0.19	$ 0.17	$ 3.49
5/5/2012	6/4/2012	34000	176	6,305.00	0	2,799.09	613.64	5691.36	$ 0.19	$ 0.17	$ 3.49
6/5/2012	7/3/2012	42000	172	8,303.92	4,652.80	3,051.42	599.7	7704.22	$ 0.20	$ 0.18	$ 3.49
7/4/2012	8/2/2012	49800	164	9,140.11	5,348.34	3,219.97	571.8	8,568.31	$ 0.18	$ 0.17	$ 3.49
8/3/2012	8/30/2012	40200	140	7,724.49	4,497.51	2,738.86	488.12	7236.37	$ 0.19	$ 0.18	$ 3.49
8/31/2012	10/1/2012	42200	142	6,759.85	4,628.08	1,636.67	495.1	6264.75	$ 0.16	$ 0.15	$ 3.49
10/2/2012	12/3/2012	62600	110	10,974.28	7,599.96	2,607.27	767.05	10207.23	$ 0.18	$ 0.16	$ 6.97
12/4/2012	1/3/2013	27800	80	5,030.78	3,551.26	1,200.15	279.37	4751.41	$ 0.18	$ 0.17	$ 3.49
1/4/2013	2/1/2013	28600	92	5,145.99	3,586.39	1,233.52	326.08	4819.91	$ 0.18	$ 0.17	$ 3.54
2/2/2013	3/5/2013	32200	86	5,605.86	4,019.76	1,281.28	304.82	5301.04	$ 0.17	$ 0.16	$ 3.54
3/6/2013	4/4/2013	27200	78	5,101.26	3,684.33	1,140.47	276.46	4824.8	$ 0.19	$ 0.18	$ 3.54
4/5/2013	5/3/2013	25800	82	5,038.96	3,647.27	1,101.05	290.64	4748.32	$ 0.20	$ 0.18	$ 3.54
5/4/2013	6/5/2013	35600	140	7,457.52	4,392.53	2,568.78	496.21	6961.31	$ 0.21	$ 0.20	$ 3.54
6/6/2013	7/3/2013	43000	176	8,668.91	4,889.11	3,155.99	623.81	8045.1	$ 0.20	$ 0.19	$ 3.54
7/4/2013	8/2/2013	44800	162	8,634.72	4,968.28	3,092.25	574.19	8060.53	$ 0.19	$ 0.18	$ 3.54
8/3/2013	9/3/2013	35000	114	5,956.37	3,160.50	2,391.81	404.06	5552.31	$ 0.17	$ 0.16	$ 3.54
9/4/2013	10/1/2013	32000	158	4,789.79	2,889.60	1,340.18	560.01	4229.78	$ 0.15	$ 0.13	$ 3.54
10/2/2013	10/31/2013	28200	110	4,164.61	2,546.46	1,228.27	389.88	3774.73	$ 0.15	$ 0.13	$ 3.54
11/1/2013	12/3/2013	27400	80	3,961.82	2,474.22	1,204.05	283.55	3678.27	$ 0.14	$ 0.13	$ 3.54

John F. Kennedy		Start Date	End Date	Months
311 S. 10th St., 07103		1/5/2012	12/3/2013	22
Account Number	2147483647			
Meter Number	778018109			

ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING: 12/3/2013

Total Usage	387,600	**kwh**
Total Charges	$69,557	
Blended Rate	$0.18	**$/kWh**
Consumption Rate	$0.17	**$/kWh**
Demand Rate	$3.54	**$/kW**
Max Demand	176.0	**kW**
Min Demand	78.0	**kW**
Avg Demand	113.2	**kW**


John F. Kennedy - Electric Usage - Meter No.: 778018109
kWh
kW
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
200
180
160
140
120
100
80
60
40
20
0
Dec-12
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13

Newark Public Schools LGEA
CHA Project# 27999

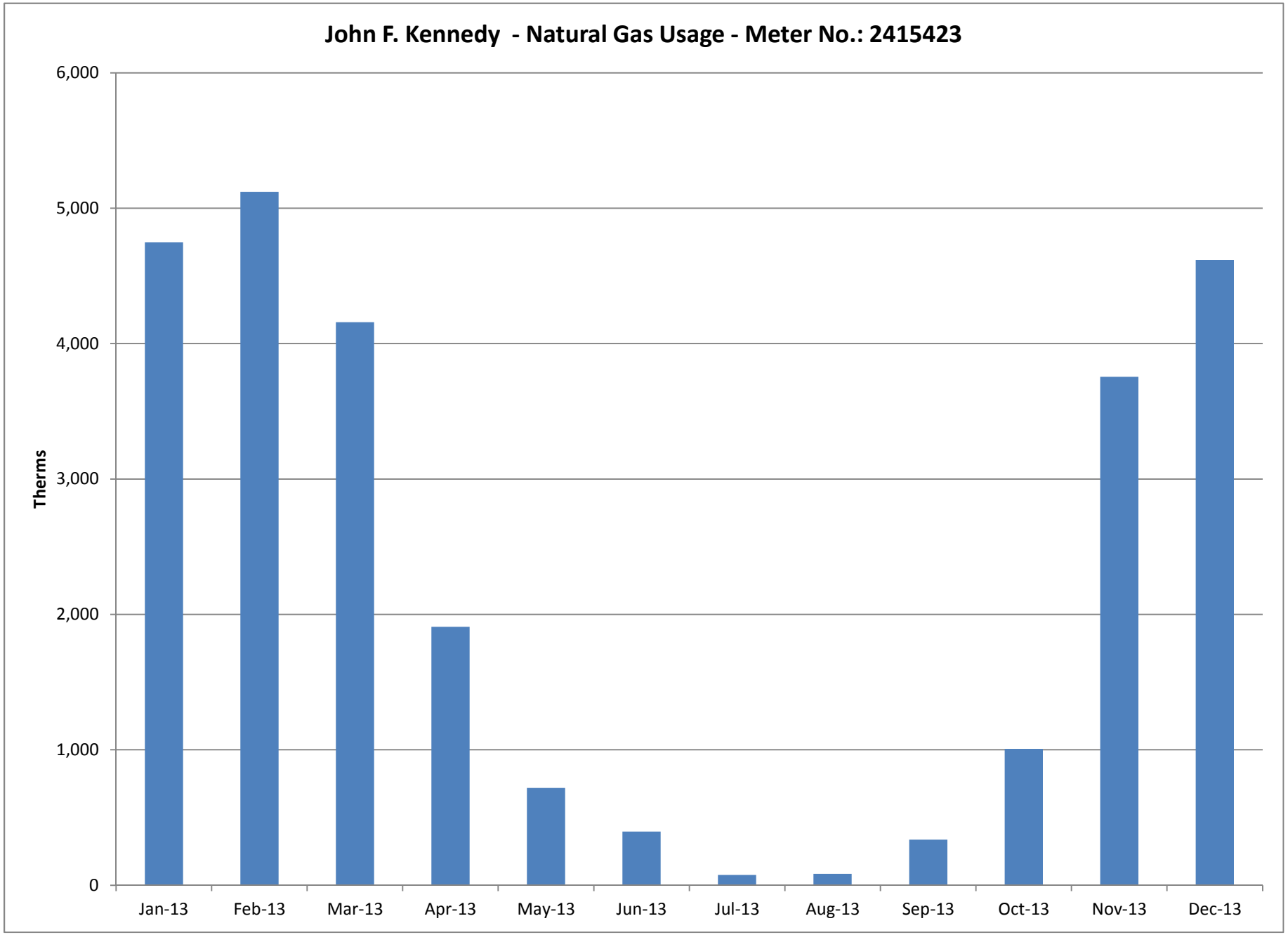
John F. Kennedy - Natural Gas Usage

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	$/therm
41	John F. Kennedy	4200805804	2415423	1/5/2012	2/2/2012	5,096.85	4,906.29	0.96
41	John F. Kennedy	4200805804	2415423	2/3/2012	3/5/2012	5,106.79	4,299.19	0.84
41	John F. Kennedy	4200805804	2415423	3/6/2012	4/3/2012	2,431.70	1,581.25	0.65
41	John F. Kennedy	4200805804	2415423	4/4/2012	5/4/2012	1,355.93	912.21	0.67
41	John F. Kennedy	4200805804	2415423	5/5/2012	6/4/2012	483.31	390.13	0.81
41	John F. Kennedy	4200805804	2415423	6/5/2012	7/3/2012	180.79	215.86	1.19
41	John F. Kennedy	4200805804	2415423	7/4/2012	8/2/2012	149.69	201.3	1.34
41	John F. Kennedy	4200805804	2415423	8/3/2012	8/30/2012	147.33	203.29	1.38
41	John F. Kennedy	4200805804	2415423	8/31/2012	10/1/2012	367.76	344.07	0.94
41	John F. Kennedy	4200805804	2415423	10/2/2012	11/2/2012	815.55	1,343.06	1.65
41	John F. Kennedy	4200805804	2415423	11/3/2012	12/3/2012	4,825.63	4,742.16	0.98
41	John F. Kennedy	4200805804	2415423	12/4/2012	1/3/2013	4,610.24	4,578.92	0.99
41	John F. Kennedy	4200805804	2415423	1/4/2013	2/1/2013	4,747.22	4,524.91	0.95
41	John F. Kennedy	4200805804	2415423	2/2/2013	3/5/2013	5,121.67	4,866.03	0.95
41	John F. Kennedy	4200805804	2415423	3/6/2013	4/4/2013	4,159.31	3,042.10	0.73
41	John F. Kennedy	4200805804	2415423	4/5/2013	5/3/2013	1,909.34	1,544.64	0.81
41	John F. Kennedy	4200805804	2415423	5/4/2013	6/5/2013	718.35	670.66	0.93
41	John F. Kennedy	4200805804	2415423	6/6/2013	7/3/2013	396.75	415.22	1.05
41	John F. Kennedy	4200805804	2415423	7/4/2013	8/2/2013	75.15	159.77	2.13
41	John F. Kennedy	4200805804	2415423	8/3/2013	9/3/2013	84.28	163.61	1.94
41	John F. Kennedy	4200805804	2415423	9/4/2013	10/1/2013	336.32	344.61	1.02
41	John F. Kennedy	4200805804	2415423	10/2/2013	10/31/2013	1,007.47	1,508.59	1.50
41	John F. Kennedy	4200805804	2415423	11/1/2013	12/3/2013	3,754.25	3,630.02	0.97
41	John F. Kennedy	4200805804	2415423	12/4/2013	1/3/2014	4,619.07	4,490.54	0.97

John F. Kennedy		Start Date	End Date	# Months
Account Number	4200805804	1/5/2012	1/3/2014	23
Meter Number	2415423			

NATURAL GAS USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING: 1/3/2014

Annual Usage	26,929	**Therms**
Annual Cost	$25,361	
Rate	$0.94	**$/Therm**


John F. Kennedy - Natural Gas Usage - Meter No.: 2415423
Therms
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13

PSE&G ELECTRIC 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**
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	**C** **ACTIVE**
Amerigreen Energy, Inc. 1463 Lamberton Road Trenton, NJ 08611	888-423-8357 www.amerigreen.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**
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(888) 978-9974 www.group.barclays.com	**C** **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**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	**C** **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) 348-4193 www.directenergy.com	**R** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 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.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/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**
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 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 08837	(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**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.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**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 3711 Market Street, 10th Fl. Philadelphia, PA 19104	(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**
Keil & Sons, Inc. **d/b/a Systrum Energy** 1 Bergen Blvd. Fairview, NJ 07022	(877) 797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**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**
MXenergy Electric Inc. 900 Lake Street Ramsey, NJ 07446	(800) 785-4374 www.mxenergy.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**
New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	**R/C** **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 Avenue 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	**C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**

PPL Energy Plus, 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) 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**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, N.J. 08007	(800) 695-0666 www.sjnaturalgas.com	**R/C** **ACTIVE**
Spark Energy, L.P. 2105 CityWest Blvd., Ste 100 Houston, Texas 77042	(800) 441-7514 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	**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 Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 39-8150 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**

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PSE&G GAS SERVICE TERRITORY
Last Updated: 10/24/12

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

Supplier	Telephone & Web Site	*Customer Class
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877)-30-AMBIT (877) 302-6248 www.ambitenergy.com	**R/C** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	888-850-1872 www.astralenergyllc.com	**R/C/I** **ACTIVE**
BBPC, LLC Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	888-651-4121 www.greateasternenergy.com	**C/I** **ACTIVE**
Clearview Electric Inc. **d/b/a Clearview Gas** 1744 Lexington Ave. Pennsauken, NJ 08110	800-746-4720 www.clearviewenergy.com	**R/C** **ACTIVE**
Colonial Energy, Inc. 83 Harding Road Wyckoff, NJ 07481	845-429-3229 www.colonialgroupinc.com	**C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07746	(888) 817-8572 www.commerceenergy.com	**R** **ACTIVE**
Compass Energy Services, Inc. 1085 Morris Avenue, Suite 150 Union, NJ 07083	866-867-8328 908-638-6605 www.compassenergy.net	**C/I** **ACTIVE**
ConocoPhillips Company 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Consolidated Edison Energy, Inc. **d/b/a Con Edison Solutions** 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-686-1383 x2130 www.conedenergy.com	

Consolidated Edison Solutions, Inc. Cherry Tree Corporate Center 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
Constellation NewEnergy-Gas Division, LLC 900A Lake Street, Suite 2 Ramsey, NJ 07466	(800) 900-1982 www.constellation.com	**C/I** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	888-925-9115 www.directenergy.com	**C/I** **ACTIVE**
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-348-4193 www.directenergy.com	**R** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	**R/C/I** **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**
Global Energy Marketing, LLC 129 Wentz Avenue Springfield, NJ 07081	800-542-0778 www.globalp.com	**C/I** **ACTIVE**
Great Eastern Energy 116 Village Blvd., Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.com	**C/I** **ACTIVE**
Greenlight Energy 330 Hudson Street, Suite 4 Hoboken, NJ 07030	718-204-7467 www.greenlightenergy.us	**C** **ACTIVE**
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	**C/I** **ACTIVE**
Hess Small Business Services, LLC One Hess Plaza Woodbridge, NJ 07095	888-494-4377 www.hessenergy.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C** **ACTIVE**

Hudson Energy Services, LLC 7 Cedar Street Ramsey, NJ 07446	877- Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	877-887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Integrys Energy Services – Natural Gas, LLC 99 Wood Avenue South Suite #802 Iselin, NJ 08830	800-536-0151 www.integrysenergy.com	**C/I** **ACTIVE**
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-927-9794 www.intelligentenergy.org	**R/C/I** **ACTIVE**
Keil & Sons, Inc. **d/b/a Systrum Energy** 1 Bergen Blvd. Fairview, NJ 07022	1-877-797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Major Energy Services, LLC 10 Regency CT Lakewood, NJ 08701	888-625-6760 www.majorenergy.com	**R/C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	888-779-7255 www.mecny.com	**R/C/I** **ACTIVE**
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	800-828-9427 www.metromediaenergy.com	**C** **ACTIVE**
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	888-53-Metro www.metroenergy.com	**R/C** **ACTIVE**
MxEnergy, Inc. 900 Lake Street Ramsey, NJ 07446	800-758-4374 www.mxenergy.com	**R/C/I** **ACTIVE**
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	**C** **ACTIVE**
New Energy Services LLC 101 Neptune Avenue Deal, New Jersey 07723	800-660-3643 www.newenergyservicesllc.com	**R/C/I** **ACTIVE**

New Jersey Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	866-568-0290 www.NJGandE.com	**R/C** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power & Gas, LLC d/b/a North American Power 197 Route 18 South Ste. 3000 East Brunswick, NJ 08816	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
Palmco Energy 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 Street Lebanon, NJ 08833	800-363-7499 www.pepco-services.com	**C/I** **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 - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	**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	800-266-6020 www.southjerseyenergy.com	**C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	800-695-0666 www.sjnaturalgas.com	**R/C** **ACTIVE**
Spark Energy Gas, L.P. 2105 CityWest Blvd, Ste 100 Houston, Texas 77042	800-411-7514 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	855-466-2842 www.spragueenergy.com	**C/I** **ACTIVE**

Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-640-6457 www.stuyfuel.com	**C** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(973) 494-8097 www.streamenergy.net	**R/C** **ACTIVE**
Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**
Woodruff Energy US LLC 73 Water Street, P.O. Box 777 Bridgeton, NJ 08302	856-455-1111 800-557-1121 www.woodruffenergy.com	**C/I** **ACTIVE**
Xoom Energy New Jersey, LLC 744 Broad Street Newark, NJ 07102	888-997-8979 www.xoomenergy.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**

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APPENDIX B

Equipment Inventory

Newark Public Schools
CHA Project# 27999
John F. Kennedy Elementary

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
B-1	1	Patterson-Kelley	NM-1500	CL21-03-25002	Heating / Natural Gas	1,500 MBH in, 1,275 MBH out (85%)	MER	School	2003	14	
B-2	1	Patterson-Kelley	NM-1500	CL21-03-25003	Heating / Natural Gas	1,500 MBH in, 1,275 MBH out (85%)	MER	School	2003	14	
B-3	1	Patterson-Kelley	NM-1500	CL14-03-24802	Heating / Natural Gas	1,500 MBH in, 1,275 MBH out (85%)	MER	School	2003	14	
HWP-1	2	Taco	F12509EZEAJM0A	S/N not legible	Hot Water / Electric	5 HP, 87.5%	MER	School	2003	1	One Pump needs repair
CH-1	1	McQuay	ALR150F12-ER11	STNU030900124	Chilled Water / Electric	150-TON	Outside	School	2009	20	Efficiency Unknown
CWP-1	2	Baldor	M/N not legible	S/N not legible	Chilled Water / Electric	10 HP	Closet	School	2009	7	Efficiency Unknown
DHW-1	1	A.O. Smith	HW-399-932	H0269774	Hot Water / Natural Gas	399,000 BTU in, 322,790 BTU out (80%)	MER	School	2002	0	(2) 119 Storage Tanks
RHWP-1	1	Taco	M/N not legible	S/N not legible	Hot Water / Electric	1/2 HP, 87.5%	Roof	School	2003	1	
RHWP-2	1	Taco	M/N not legible	S/N not legible	Hot Water / Electric	1/2 HP, 87.5%	Roof	School	2003	1	
RHWP-3	1	Taco	M/N not legible	S/N not legible	Hot Water / Electric	1/2 HP, 87.5%	Roof	School	2003	1	
AHU-gym	1	No tag	No tag	No tag	Chilled Water Cooling / Electric	Unknown	Gymnasium storage room	Two gyms	2009	7	
AHU-Med	1	No tag	No tag	No tag	Chilled Water Cooling / Electric	Unknown	Medical office utility room	Medical offices	2009	20	
AHU-Café	1	No tag	No tag	No tag	Chilled Water Cooling / Electric	Unknown	Cafeteria utility room	Cafeteria	2009	20	
AHU-4	1	No tag	No tag	No tag	DX Cooling / Electric	Unknown	Pool mechanical room	Pool	2003	14	
Window AC	6	Various	Various	Various	Window Air Conditioner	12,000 - 18,000 btu/h	Classrooms and Offices	Classrooms and Offices	2005	6	
Refrigerator	2	Traulsen	Unknown	Unknown	Commercial Reach-In Refrigerator	Unknown ft^3	Kitchen	Kitchen	2008	5	
Freezer	2	Delfield	Unknown	Unknown	Commercial Reach-In Freezer	Unknown ft^3	Kitchen	Kitchen	2008	5	

Energy Audit of John F. Kennedy Elementary School
CHA Project No. 27999
Existing Lighting & Audit Input

Cost of Electricity: **$0.167** **$/kWh**
$3.54 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	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	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)	Retrofit control device	Notes
20LED	MER	Boiler Room	11	S 32 C F 1 (ELE)	F41LL	32	0.35	SW	1820	641	NONE	
40LED	MER	Boiler Room	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1820	218	NONE	
39	MER Stairs	Stairway	2	2' 17 W F 2 (ELE)	F22ILL	33	0.07	SW	6240	412	NONE	
40LED	Kitchen	Kitchen	10	T 32 R F 2 (ELE)	F42LL	60	0.60	SW	3000	1,800	C-OCC	
39	Office	Offices	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
39	TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	4300	142	NONE	
20LED	Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
20LED	Janitor Closet	Janitor	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	3000	96	C-OCC	
39	Cafeteria	Cafeteria	5	2' 17 W F 2 (ELE)	F22ILL	33	0.17	SW	2000	330	NONE	
40LED	Cafeteria	Cafeteria	16	T 32 R F 2 (ELE)	F42LL	60	0.96	SW	2000	1,920	NONE	
20LED	Storage	Storage Areas	4	S 32 C F 1 (ELE)	F41LL	32	0.13	SW	1000	128	C-OCC	
20LED	Vest	Hallways	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	6240	599	NONE	
39	Corridor	Hallways	8	2' 17 W F 2 (ELE)	F22ILL	33	0.26	SW	6240	1,647	NONE	
39	Cori	Hallways	11	2' 17 W F 2 (ELE)	F22ILL	33	0.36	SW	6240	2,265	NONE	
39	Mens TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	4300	142	NONE	
39	Womens TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	4300	142	NONE	
20LED	113 Child Study	Classroom	9	S 32 C F 1 (ELE)	F41LL	32	0.29	SW	2912	839	C-OCC	
20LED	Office	Offices	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	2400	461	C-OCC	
20LED	Office	Offices	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	2400	461	C-OCC	
20LED	Main Office	Offices	13	S 32 C F 1 (ELE)	F41LL	32	0.42	SW	2400	998	C-OCC	
20LED	Copy Room	Offices	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	2400	461	C-OCC	
20LED	Principal Office	Offices	9	S 32 C F 1 (ELE)	F41LL	32	0.29	SW	2400	691	C-OCC	
39	Corridor	Hallways	8	2' 17 W F 2 (ELE)	F22ILL	33	0.26	SW	6240	1,647	NONE	
40LED	Vest	Hallways	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	6240	749	NONE	
20LED	Vest	Hallways	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	6240	399	NONE	
20LED	Corrdior	Hallways	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	6240	200	NONE	
20LED	Waiting Wellness	Offices	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	2400	154	C-OCC	
20LED	Nurse Office	Offices	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	2400	230	C-OCC	
20LED	Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
220	TR	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	4300	86	NONE	
40LED	TR	Restroom	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	4300	258	NONE	
20LED	Locker Room	Locker	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	2400	77	C-OCC	
20LED	Exam Room	Offices	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	2400	154	C-OCC	
20LED	108 OT/PT	Offices	4	S 32 C F 1 (ELE)	F41LL	32	0.13	SW	2400	307	C-OCC	
20LED	Janitor Closet	Janitor	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	3000	96	C-OCC	
20LED	Corridor	Hallways	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	6240	1,198	NONE	
20LED	107 Gym	Gymnasium	4	S 32 C F 1 (ELE)	F41LL	32	0.13	SW	2912	373	NONE	
20LED	Office	Offices	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	2400	154	C-OCC	
20LED	Men's Locker	Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.22	SW	2400	538	C-OCC	
220	Men's Locker	Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	2400	48	C-OCC	
20LED	Womens Locker	Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.22	SW	2400	538	C-OCC	
220	Womens Locker	Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	2400	48	C-OCC	
20LED	Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
40LED	Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
20LED	Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
20LED	Swim Office	Offices	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	2400	230	C-OCC	
40LED	Pool	Gymnasium	12	T 32 R F 2 (ELE)	F42LL	60	0.72	SW	2912	2,097	NONE	
20LED	Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
39	Corridor	Hallways	3	2' 17 W F 2 (ELE)	F22ILL	33	0.10	SW	6240	618	NONE	
20LED	105 Music	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
39	Corridor	Hallways	10	2' 17 W F 2 (ELE)	F22ILL	33	0.33	SW	6240	2,059	NONE	
20LED	104 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	103 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	102 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	101 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
39	Corridor	Hallways	9	2' 17 W F 2 (ELE)	F22ILL	33	0.30	SW	6240	1,853	NONE	
20LED	Vest	Hallways	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	6240	200	NONE	
40LED	Mens TR	Restroom	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	4300	258	NONE	
40LED	Womens TR	Restroom	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	4300	258	NONE	
20LED	116 Classroom	Classroom	24	S 32 C F 1 (ELE)	F41LL	32	0.77	SW	2912	2,236	C-OCC	
20LED	201 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	202 Autistic	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	203 Autistic	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	204 Autistic	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	205 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	206 Computer Lab	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	207 Parents Room	Classroom	9	S 32 C F 1 (ELE)	F41LL	32	0.29	SW	2912	839	C-OCC	
20LED	208 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	210 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	212 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	214 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	

Energy Audit of John F. Kennedy Elementary School
CHA Project No. 27999
Existing Lighting & Audit Input

Cost of Electricity: **$0.167** **$/kWh**
$3.54 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	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	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)	Retrofit control device	Notes
20LED	216 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	209 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	211 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	213 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	215 Classroom	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
39	Corridor	Hallways	10	2' 17 W F 2 (ELE)	F22ILL	33	0.33	SW	6240	2,059	NONE	
39	Corridor	Hallways	11	2' 17 W F 2 (ELE)	F22ILL	33	0.36	SW	6240	2,265	NONE	
39	Corridor	Hallways	10	2' 17 W F 2 (ELE)	F22ILL	33	0.33	SW	6240	2,059	NONE	
20LED	UN-51	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
20LED	UN-50	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
40LED	200 Classroom	Classroom	7	T 32 R F 2 (ELE)	F42LL	60	0.42	SW	2912	1,223	C-OCC	
20LED	219 Art	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	UN-53 Storage	Storage Areas	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	1000	96	C-OCC	
20LED	UN-52 Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
20LED	218 Wood Working	Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2912	1,398	C-OCC	
20LED	UN-54 Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
20LED	217 Classroom	Classroom	5	S 32 C F 1 (ELE)	F41LL	32	0.16	SW	2912	466	C-OCC	
20LED	217 Classroom	Classroom	12	S 32 C F 1 (ELE)	F41LL	32	0.38	SW	2912	1,118	C-OCC	
20LED	UN-55	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
20LED	UN-56	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
20LED	UN-59	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
20LED	UN-60	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
	Total		**664**				**22.79**			**73,110**		

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
CHA Project Numer: 27999

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
$ 0.179	$/kWh blended		0.000420205	46,576	Electric	Natural Gas	Fuel Oil
$ 0.167	$/kWh supply	387,600	0.000420205		$ 69,557	$ 25,361	
$ 3.54	$/kW	176.0	0				
$ 0.94	$/Therm	26,929	0.00533471				
$ 7.55	$/kgals		0				
	$/Gal						

John F. Kennedy

Recommend? Y or N		Item	Savings kW	kWh	therms	No. 2 Oil gal	Water kgal	$	Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings kW	kWh	therms	kgal/yr	$	ROI	NPV	IRR
N	ECM-1	Replace One Boiler with a Condensing Boiler	0.0	0	1,484	0	0	1,398	$ 93,629	67.0	25	7.9	$ 1,500	N	65.9	0.0	0	37,107	0	$ 34,945	(0.6)	($67,788)	-6.4%
Y	ECM-2	Install Window A/C Unit Controllers	0.0	5,236	0	0	0	940	$ 1,200	1.3	15	2.2	$ -	N	1.3	0.0	78,537	0	0	$ 14,094	10.7	$10,017	78.3%
Y	ECM-3	Upgrade to Premium Efficiency Motors and Install Variable Speed	1.6	31,142	0	0	0	5,272	$ 37,173	7.1	15	13.1	$ 1,800	N	6.7	24.5	467,126	0	0	$ 84,870	1.3	$27,559	12.3%
N	ECM-4	Install Basic Controls	0.0	60,702	7,473	0	0	17,931	$ 21,309	1.2	15.0	65.4	$ -	N	1.2	0.0	910,536	112,098	0	$ 268,969	11.6	$192,753	84.1%
Y	ECM-5	Re-Commission Chiller Automated Logic BACnet Control System	0.0	29,458	0	0	0	5,286	$ 87,300	16.5	15.0	12.4	$ -	N	16.5	0.0	441,864	0	0	$ 79,295	(0.1)	($24,193)	-1.2%
Y	ECM-6	Install Pool Cover	0.0	2,378	6,509	0	32	6,801	$ 112,704	16.6	20.0	35.7	$ -	N	16.6	0.0	47,566	130,189	646	$ 136,018	0.2	($11,524)	1.9%
N	ECM-7	Install Low Flow Plumbing Fixtures	0.0	0	0	0	93	704	$ 126,197	179.3	15.0	0.0	$ -	N	179.3	0.0	0	0	1,398	$ 10,557	(0.9)	($117,794)	-21.8%
N	ECM-L1	Lighting Replacements / Upgrades	10.0	27,874	0	0	0	5,079	$ 37,534	7.4	15.0	11.7	$ -	N	7.4	149.3	418,109	0	0	$ 81,377	1.2	$23,102	10.5%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	23,135	0	0	0	3,865	$ 17,280	4.5	15.0	9.7	$ 2,240	N	3.9	0.0	347,022	0	0	$ 62,275	2.6	$31,095	24.8%
Y	ECM-L3	Lighting Replacements with Controls (Occupany Sensors)	10.0	39,017	0	0	0	6,941	$ 54,814	7.9	15.0	16.4	$ 2,240	N	7.6	149.3	585,252	0	0	$ 111,372	1.0	$30,283	10.1%
		Total (Does Not Include 4, ECM-L1 & ECM-L2)	**11.6**	**107,230**	**7,994**	**0**	**126**	**$ 27,341**	**$ 513,017**	**18.8**	**17.1**	**88**	**$ 5,540**		**18.6**	**174**	**1,620,345**	**167,296**	**2,044**	**$ 471,151**	**(0.1)**	**(147,505)**	**-1.0%**
		Recommended Measures (highlighted green above)	**11.6**	**107,230**	**6,509**	**0**	**32**	**$ 25,239**	**$ 293,192**	**11.6**	**16.0**	**80**	**$ 4,040**	**0**	**11.5**	**174**	**1,620,345**	**130,189**	**646**	**$ 425,649**	**0.5**	**27,880**	**4.2%**
		% of Existing	**7%**	**28%**	**30%**	**#DIV/0!**	**#DIV/0!**																

	City:	Newark, NJ				
	Occupied Hours/Week	70	70	70	70	50
		Building Operating	Auditorium Occupied	Gymnasium Occupied	Library Occupied	Classrooms Occupied
Temp	Enthalpy h (Btu/lb)	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5							
97.5	35.4	6	3	3	3	3	2
92.5	37.4	31	13	13	13	13	9
87.5	35.0	131	55	55	55	55	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	198
67.5	27.2	854	356	356	356	356	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	16.0	491	205	205	205	205	146
42.5	14.5	656	273	273	273	273	195
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	252	105	105	105	105	75
17.5	5.4	125	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

Heating System Efficiency	80%
Cooling Eff (kW/ton)	1.2

Heating		
Hours	4,427	Hrs
Weighted Avg	40	F
Avg	28	F

Cooling		
Hours	4,333	Hrs
Weighted Avg	68	F
Avg	78	F

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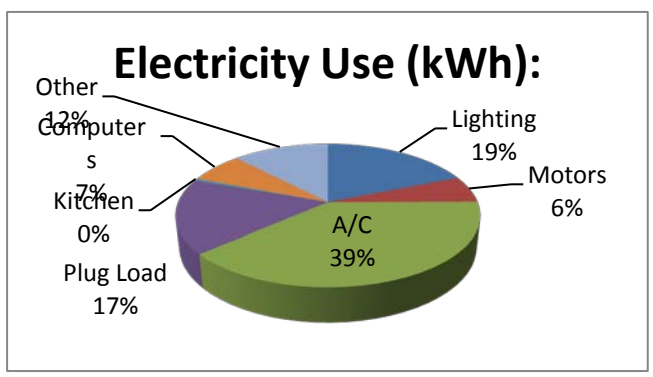
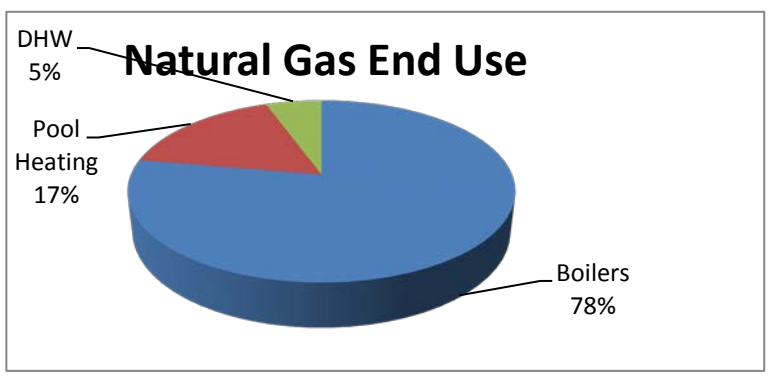
Utility End Use Analysis			
Electricity Use (kWh):		**Notes/Comments:**	
387,600	Total	Based on utility analysis	
73,110	Lighting	From Lighting Calculations	0.188621806
23,288	Motors	Estimated	0.060082559
150,000	A/C	Estimated	0.386996904
65,206	Plug Load	Estimated	0.168231166
1,750	Kitchen	Estimated	0.004514964
27,000	Computers	Estimated	0.069659443
47,246	Other	Remaining	0.121893158
Natural Gas Use (Therms):		**Notes/Comments:**	
26,929	Total	Based on utility analysis	
20,929	Boilers	Therms/SF x Square Feet Served	0.777193364
4,500	Pool Heating	Therms Estimated	
1,500	DHW	Based on utility analysis	0.055701659





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ECM-1: Replace One Boiler with a Condensing Boiler

Description: This ECM evaluates the replacement of (1) existing hot water boiler with high efficiency condensing gas boiler and operating it as the primary boiler. The existing boiler efficiency is 80% (per NJBPU protocals) and the proposed boiler efficiency is 90% (average seasonal efficiency). Electrical power consumption due to pumps is considered to be the same for both the proposed system and the baseline system.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.94	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	1,500,000	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	75	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	1,500,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	1,484		NJ Protocols Calculation
Fuel Cost Savings	$ 1,398		

Savings calculation formulas are taken from NJ Protocols document for Occupancy Controlled Thermostats

Algorithms

$$\textit{Gas Savings (Therms)} = \frac{OF \times ((CAPY_{Bi} \times EFF_Q) - (CAPY_{Qi} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

Definition of Variables

OF = Oversize factor of standard boiler or furnace (OF=0.8)

$CAPY_{Bi}$ = Total input capacity of the baseline furnace, boiler or heater in Btu/hour

$CAPY_{Qi}$ = Total input capacity of the qualifying furnace, boiler or heater in Btu/hour

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

HC_{fuel} = Conversion from Btu to therms of gas or gallons of oil or propane (100,000 btu/therm; 138,700 btu/gal of #2 oil; 92,000 btu/gal of propane)

EFF_Q = Efficiency of qualifying heater(s) (AFUE %)

EFF_B = Efficiency of baseline heaters (AFUE %)

ICF = Infrared Compensation Factor (ICF = 0.8 for IR Heaters, 1.0 for furnaces/boilers)[2]

Furnaces and Boilers

Component	Type	Value	Source
$AFUE_q$	Variable		Application
$AFUE_b$	Fixed	Furnaces: 78% Boilers: 80% Infrared: 78%	EPACT Standard for furnaces and boilers
$CAPY_{in}$	Variable		Application
ΔT	Variable	See Table Below	1
HDD_{mod}	Fixed	See Table Below	1

Sources:

1. KEMA, *Smartstart Program Protocol Review*. 2009.
2. http://www.spaceray.com/1_space-ray_faqs.php

Adjusted Heating Degree Days by Building Type

Building Type	Heating Energy Density (kBtu/sf)	Degree Day Adjustment Factor	Atlantic City (HDD)	Newark (HDD)	Philadelphia (HDD)	Monticello (HDD)
Education	29.5	0.55	2792	2783	2655	3886
Food Sales	35.6	0.66	3369	3359	3204	4689
Food Service	39.0	0.73	3691	3680	3510	5137
Health Care	53.6	1.00	5073	5057	4824	7060
Lodging	15.0	0.28	1420	1415	1350	1976
Retail	29.3	0.55	2773	2764	2637	3859
Office	28.1	0.52	2660	2651	2529	3701
Public Assembly	33.8	0.63	3199	3189	3042	4452
Public Order/Safety	24.1	0.45	2281	2274	2169	3174
Religious Worship	29.1	0.54	2754	2745	2619	3833
Service	47.8	0.89	4524	4510	4302	6296
Warehouse/Storage	20.2	0.38	1912	1906	1818	2661

Heating Degree Days and Outdoor Design Temperature by Zone

Weather Station	HDD	Outdoor Design Temperature (F)
Atlantic City	5073	13
Newark	5057	14
Philadelphia, PA	4824	15
Monticello, NY	7060	8

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Replace One Boiler with a Condensing Boiler - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
1,500 MBH NG Condensing Boiler	1	EA	$ 27,500	$ 5,300		$ 28,243	$ 6,604	$ -	$ 34,846	Vendor Estimate
Flue Installation	25	LF	$ 75.0	$ 15.00		$ 1,926	$ 467	$ -	$ 2,393	Vendor Estimate
Reprogram DDC system	1	EA	$ 100.0	$ 350.00		$ 103	$ 436	$ -	$ 539	RS Means 2012
Miscellaneous Electrical	1	LS	$ 500	$ 250		$ 514	$ 312	$ -	$ 825	RS Means 2012
Miscellaneous HW Piping	1	LS	$ 2,000	$ 1,000		$ 2,054	$ 1,246	$ -	$ 3,300	RS Means 2012
Boiler room/space construction	1	LS	$ 20,000	$ 10,000		$ 20,540	$ 12,460	$ -	$ 33,000	RS Means 2012
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 74,903	Subtotal
$ 18,726	25% Contingency
$ 93,629	**Total**

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ECM-2: Window A/C Controller

ECM Description : Window A/C units are currently controlled manually by the occupants and are not turned off when the room is unoccupied. This ECM evaluates implementation of a digital timer device that will automatically turn the window A/C unit off at a preset time .

ASSUMPTIONS			Comments
Electric Cost	$0.179	/ kWh	
Average run hours per Week	80	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	65	deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	72,000	Btu / Hr	Total BTU/hr of window A/C units.
Average EER	10.7		
Existing Annual Electric Usage	8,991	kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	3,755	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Electrical Usage Savings	5,236	kWh
Annual Cost Savings	$940	
Total Project Cost	$1,200	
Simple Payback	1	years

OAT - DB Bin Temp F	Annual Hours	**Existing Hours of Operation**	Proposed % of time of operation	**Proposed hrs of Operation**
102.5	0	0	100%	0
97.5	6	3	89%	3
92.5	31	15	79%	12
87.5	131	62	68%	43
82.5	500	238	58%	138
77.5	620	295	47%	140
72.5	664	316	37%	116
67.5	854	407	26%	107
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	**1,336**	42%	**558**

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ECM-2: Window A/C Controller - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	$ -	$ -	$ -	
Window AC Controller	6	EA	$ 150	$ -	$ -	924.3	$ -	$ -	$ 924	Estimated
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$	924	Subtotal
$	231	25% Contingency
$	**1,200**	**Total**

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ECM-3: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

Description: This ECM evaluates the energy (electrical) savings associated with replacing existing motors with high efficiency motors (based on ASHRAE 2010 NEMA ratings) and adding variable frequency drives to control motor speed based on actual load verses constant volume / constant flow.

Variable Inputs

Electric Rate	$0.17	**$/kWh**
Demand Rate	$3.54	**$/kW**

MOTOR SCHEDULE										Savings Factor		Existing Motor Energy		Proposed Motor Energy		Energy Savings	
Motor ID	Motor Type	Qty	HP	Total HP	Upgrade Motor	Load Factor	Existing Motor Eff.	New Motor Eff.	Annual Hours	Demand Savings Factor	Energy Savings Factor	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Savings (kWh)
HWP-1/HWP-2	CHW/HW	1	5.0	5.0	N	0.75	89.5%	89.5%	4,427	0.201	0.580	0.8	10,700	0.8	-	-	10,700
CWP-1/CWP-2	CHW/HW	1	10.0	10.0	Y	0.75	85.7%	91.7%	4,333	0.201	0.580	-	-	1.6	20,442	1.6	20,442
															Total:	1.6	31,141.8
																$ 69	$ 5,202
																	$ 5,272

Savings calculation formulas are taken from NJ Protocols document for VFDs

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-3: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
5 HP VFD	2	ea	$ 1,706	$ 431		$ 3,505	$ 1,073	$ -	$ 4,577	RS Means 2012
5 HP Motor	2	ea	$ 373	$ 79		$ 766	$ 196	$ -	$ 962	RS Means 2012
10 HP VFD	2	ea	$ 2,021	$ 509		$ 4,152	$ 1,269		$ 5,421	RS Means 2012
10 HP Motor	2	ea	$ 646	$ 88		$ 1,326	$ 220		$ 1,546	RS Means 2012
Piping Specialties (2-Way Valves)	1	ea	$ 7,500	$ 5,000		$ 7,703	$ 6,230		$ 13,933	Engineering Estimate
Electrical - misc.	1	ls	$ 2,000	$ 1,000		$ 2,054	$ 1,246	$ -	$ 3,300	Engineering Estimate
						$ -	$ -	$ -	$ -	

$ 29,739	Subtotal
$ 7,435	25% Contingency
$ 37,173	**Total**

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ECM-4A: Basic Controls

Description: This ECM evaluates adding automatic temperature controls that will turn the boilers on/off based on outdoor air and indoor air temperatures.

Day Setback

EXISTING CONDITIONS			
Heating			
Heating Season Facility Temp	80	F	Th
Weekly Occupied Hours	70	hrs	H
Heating Season Setback Temp	75	F	Sh
Heating Season % Savings per	3%		Ph
Annual Boiler Capacity		Mbtu/yr	
Connected Heating Load	3,000,000	Btu/hr	Caph
Equivalent Full Load Heating	900	hrs	EFLHh
Heating Equipment Efficiency	80%		AFUEh
Cooling			
Cooling Season Facility Temp	72	F	Tc
Weekly Occupied Hours	70	hrs	H
Cooling Season Setback Temp	77	F	Sc
Cooling Season % Savings per	2%		Pc
Connected Cooling Load	100	Tons	Capc
Equivalent Full Load Cooling	381	hrs	EFLHc
Cooling Equipment EER	14.0		AFUEc
SAVINGS			
Natural Gas Savings	2,802	Therms[3]	
Cooling Electricity Savings	40,180	kWh	

Nighttime Setback

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	65	F
Heating Season % Savings per	3%	
Annual Boiler Capacity		Mbtu/yr
Connected Heating Load Capacity	3,000,000	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	80%	
Cooling		
Cooling Season Facility Temp	72	F
Weekly Occupied Hours	70	hrs
Cooling Season Setback Temp	80	F
Cooling Season % Savings per	2%	
Connected Cooling Load Capacity	100	Tons
Equivalent Full Load Cooling Hours	200	hrs
Cooling Equipment EER	14.0	
SAVINGS		
Natural Gas Savings	4,671	Therms[3]
Cooling Electricity Savings	20,522	kWh

$0.18 $/kWh Blended
$0.94 $/Therm

COMBINED SAVINGS		
Natural Gas Savings	7,473	Therms
Cooling Electricity Savings	60,702	kWh
Total Cost Savings	$ 17,931	
Estimated Total Project Cost	$ 21,309	
Simple Payback	1.2	Yrs

Savings calculation formulas are taken from NJ Protocols document for Occupancy Controlled Thermostats

Algorithms

Cooling Energy Savings (kWh) = (((T$_c$*(H+5)+S$_c$*(168-(H+5)))/168)
T$_c$)*(P$_c$*Cap$_{hp}$*12*EFLH$_c$/EER$_{hp}$)

Heating Energy Savings (kWh) = (((T$_h$*(H+5)+S$_h$*(168-(H+5)))/168)-
T$_h$)*(P$_h$*Cap$_{hp}$*12*EFLH$_h$/EER$_{hp}$)

Heating Energy Savings (Therms) = (T$_h$-(T$_h$*(H+5)+S$_h$*(168-
(H+5)))/168)*(P$_h$*Cap$_h$*EFLH$_h$/AFUE$_h$/100,000)

Definition of Variables

T$_h$ = Heating Season Facility Temp. (°F)
T$_c$ = Cooling Season Facility Temp. (°F)
S$_h$ = Heating Season Setback Temp. (°F)
S$_c$ = Cooling Season Setup Temp. (°F)
H = Weekly Occupied Hours
Cap$_{hp}$ = Connected load capacity of heat pump/AC (Tons) – Provided on Application.
Cap$_h$ = Connected heating load capacity (Btu/hr) – Provided on Application.
EFLH$_c$ = Equivalent full load cooling hours
EFLH$_h$ = Equivalent full load heating hours
P$_h$ = Heating season percent savings per degree setback
P$_c$ = Cooling season percent savings per degree setup
AFUE$_h$ = Heating equipment efficiency – Provided on Application.
EER$_{hp}$ = Heat pump/AC equipment efficiency – Provided on Application

Occupancy Controlled Thermostats

Component	Type	Value	Source
T$_h$	Variable		Application
T$_c$	Variable		Application
S$_h$	Fixed	T$_h$-5°	
S$_c$	Fixed	T$_c$+5°	
H	Variable		Application; Default of 56 hrs/week
Cap$_{hp}$	Variable		Application
Cap$_h$	Variable		Application
EFLH$_c$	Fixed	381	1
EFLH$_h$	Fixed	900	PSE&G
P$_h$	Fixed	3%	2
P$_c$	Fixed	6%	2
AFUE$_h$	Variable		Application
EER$_{hp}$	Variable		Application

Sources:
1. JCP&L metered data from 1995-1999
2. ENERGY STAR Products website

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-4A: Basic Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Boiler Controller	1	ea	$ 7,500	$ 7,500		$ 7,703	$ 9,345	$ -	$ 17,048	RS Means 2012
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 17,048	Subtotal
$ 4,262	25% Contingency
$ 21,309	**Total**

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ECM-5: Re-Commission Building Controls System

Summary: The existing Automated Logic controls system can be expanded to incldue the heating system and retro-commissioned to save electrical and thermal energy.

Building Information:

46,576	Sq Footage	$0.18	$/kWh Blended
		$0.94	$/Therm

EXISTING CONDITIONS		
Existing Facility Total Electric usage	387,600	kWh
Existing Facility Total Gas usage	26,929	Therms
Existing Facility Cooling Electric usage	368,220	kWh[1]
Existing Facility Heating Natural Gas usage	0	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	29,458	kWh
Proposed Facility Natural Gas Savings	0	Therms
SAVINGS		
Retro-Commissioning Electric Savings	29,458	**kWh**
Retro-Commissioning Natural Gas Savings	0	**Therms**
Total cost savings	$ 5,286.30	

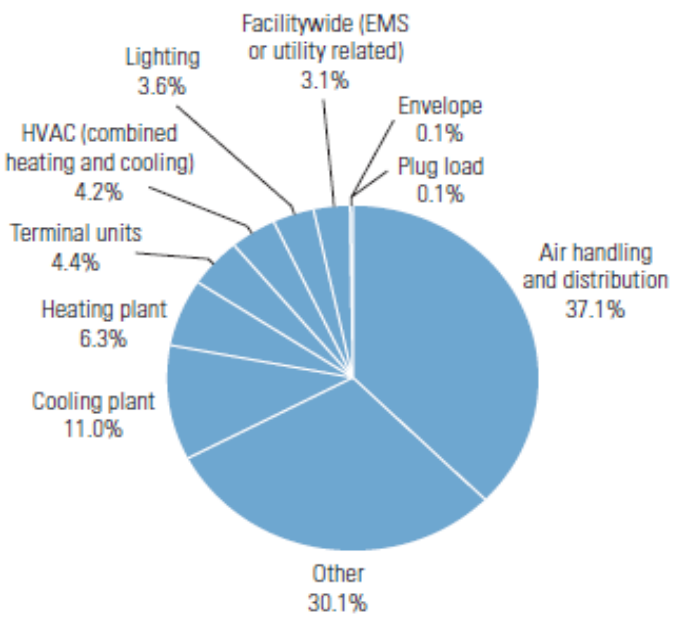
Assumptions

1	95%	of facility total electricity dedicated to Cooling based on Building Utility Analysis
2	0%	of facility total natural gas dedicated to Heating based on Building Utility Analysis
3	8%	Typical Savings associated with Retro-Commissioning of controls based on EPA Energy Star Report (CH 5 - Retro commissioning)

Figure 5.2: Retrocommissioning results

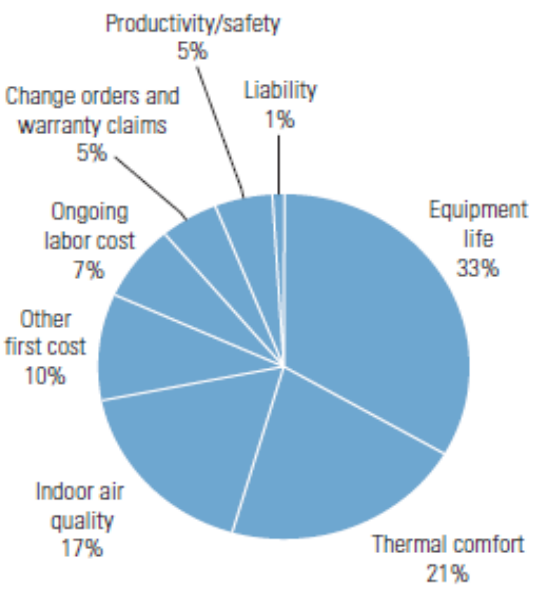
Building energy system deficiencies: A recent study of retrocommissioning revealed a wide variety of problems—those related to the overall HVAC system were the most common type (A). Energy and non-energy benefits: Retrocommissioning provided both energy and non-energy benefits—the most common of these, noted in one-third of the buildings surveyed, was the extension of equipment life (B).

A. Energy system deficiencies



Note: EMS = energy management system.

B. Energy and non-energy benefits



Courtesy: E SOURCE; data from Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., and Energy Systems Laboratory, Texas A&M University

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ECM-5: Re-Commission Building Controls System - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Controls and Sensors Retro-Commissioning	46576	SF	$ 0.27	INC	INC	$ 12,915	INC	INC	$ 12,915	EPA Estimate
Install DDC controls to expand system	1	LS	$ 25,000.00	$ 25,000		$ 25,675	$ 31,250		$ 56,925	

$ 69,840	Subtotal
$ 17,460	25% Contingency
$ 87,300	**Total**

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

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ECM-6: Install Pool Cover

DESCRIPTION: Install an automatic pool cover to cover the pool when it is not in use. This reduces evaporation, make-up water, heat loss and ventilation costs.

GIVEN:

Heating Energy Cost	=	$ 0.94	$/Therm (Nat'l Gas)
Water Cost	=	$ 7.5500	$/kGal
Blended Electric Rate	=	$ 0.18	/ kWh
Area of Pool Water Surface	=	1,100	square feet
Temperature of Air	=	85	F
Temperature of Water	=	80	F
Make-up water temperature	=	55	F
Elevation of location	=	230	feet
Relative Humidity of air at above temperature	=	50%	
Pa=saturation pressure at air temp Dew Pt.	=	0.51649	" Hg
Pw=saturation vapor pressure at surface temperature	=	1.21440	" Hg
Wi=humidity ratio of pool (design)	=	0.01101	W (Lbw/Lba)
Wo=humidity ratio of outdoor air (design)	=	0.01908	W (Lbw/Lba)
Hours of operation	=	8,760	hours
Unoccupied Hours (Time when pool cover can be used)	=	4,380	hours
Proposed Reduction in Pool Evaporation Hours	=	50%	
Pool Air Heating Efficiency		80%	
Pool DX Cooling Efficiency		1.2	kW / Ton

ASSUMPTION:

Pool Cover R-value				4.0	
Heating Efficiency				80%	
Average Return Air Temperature	50% RH		80 F	31.3	Enthalpy
Activity Factor	(hotel, health clubs=1.3, Schools=1.6, Public=2.0)			1.6	
Temperature of Outside Air - Design Day	=			97	F
Average Relative Humidity of air at above temperature	=			50%	

FORMULA:

Cost of Heating ($/MMBH) = (Cost of Fuel ($/unit)) / ((Heating Efficiency (%)) x (Conversion (btu/unit))
Cost of Water ($/1000 gallons) = (Cost of Water ($/unit)) x (Conversion (unit/1000 gallons))
Evaporation Rate (lb/hr/sf) = (0.05 x (Saturation Air Pressure (Water)(Pw) - Saturation Air Pressure (Air) (Pa)) (Simplified Equation from ASHRAE)
Evaporation of water (lb/hr) = (Evaporation rate) x (Activity Factor) x (Surface Area of pool) (Without cover, With cover assumed to be zero)
Evaporation of water (gallon/year) = (Evaporation (lbs/hr)) x (Hours/Year) / (Water Density (lb/ gallon))
Water Cost ($) = (Evaporation of water(gallon/year)) x (Water Cost ($/1000 gallons))
Pool Heat Loss w/o cover (Btu) = (40) x ((Pool Temperature)-(Air Temperature)^(1/3)) (Simplified equation from ASHRAE Fund Chapter 4) (Used constant of 40 and 20 in leui of 80)
Pool Heat Loss w cover (Btu) = (1 / (R value)) x ((Pool Temperature) - (Air Temperature)))
Pool Heat Load (MMBtu) = (Heat Loss (btu)) x (Hours/Year) / (1,000,000btu/MMBtu)
Pool Heat Costs ($) = Pool Heat Load (MMBH) x (Cost of Heating ($/MMbh))
Outside air quantity required = ((Evaporation rate / ((60min/hr) x (0.075) x (humidity ratio inside(Wi) - humidity ratio outside(Wo))
Ventilation Usage (mbh) =(1.08 x OA Cfm x (Return Air Temperature - Outside Air Temperature) x (Hours in bin) / (1000 btu/MBh)
Ventilation Cost ($) = Ventilation Usage (mbh) x (Cost of Heating ($/MMbh)) x (1000 Mbh/MMbh)

CALCULATION:

Cost of Heating=($ 0.94) / (80%) / (0.1000 MMbh/Therm) = $ 11.77 $/MMBtu
Cost of Water=($ 7.5500 ($/unit)) x (1.0 1000 gallons/1000 gallons) = $ 7.550 $/1000 gallons

POOL EVAPORATION LOSSES

Evaporation Rate (0.05 x (Pw-Pa))=	(0.05) x ((1.214401834) - (0.516486353)) =	0.0349	lb/hr/sq ft
Evaporation of water =	(0.0349) x (1.6) x (1,100) =	61.42	lb/hr
Evaporation of water w/o cover=	(61.4) x (8760) / (8.33 lb/gallon) =	64,587	gallons
Evaporation of water with pool cover =	(61.4) x (4380) / (8.33 lb/gallon) =	32,293	gallons
Water Cost w/o Cover =	((64,587) gallons x ($ 7.55) / 1000 gallons =	$ 488	
Water Cost w/ Cover =	((32,293) gallons x ($ 7.55) / 1000 gallons =	$ 244	

POOL HEAT LOSSES

Pool Heat Loss w/o cover =	(40) x ((85.0) - (80.0)^(1/3)) x (1,100)=	75,239	btu/hr
Pool Heat Load w/ Dectron Condenser Heat Recovery to Pool Water =		-	btu/hr
Hours / Year w/ Dectron Condenser Heat Recovery to Pool Water =		168	hours/yr
Pool Heat Load w/o cover =	(75,239) x (8,592) / (1,000,000 btu/MMBtu) =	646	MMBtu
Evaporated Water Heat Loss =	(64,587) x (8.33 lb/gallon) x (85 - 55))/1E 6 btu/MMBtu =	16	MMBtu
Pool Heat Loss w/ cover =	(0.25) x ((85.0) - (80.0)) x (1,100)=	470	btu/hr
Pool Heat Load w/ cover =	((75,239) x (4380) + (470) x (4,380))/1E 6 btu/MMBtu =	332	MMBtu
Evaporated Water Heat Loss =	(32,293) x (8.33 lb/gallon) x (85 - 55))/1E 6 btu/MMBtu =	8	MMBtu
Heat Loss Cost w/o Cover	(646 + 16) MMBtu x ($ 11.772 $/MMBtu) =	$ 7,800	
Heat Loss Cost w/ Cover =	(332 + 8) MMBtu x ($ 11.772 $/MMBtu) =	$ 3,999	

POOL AREA VENTILATION

Outside air quantity required =	(61.42) / (60 x 0.075 x (0.011 - 0.019079374)) =	(1,692) cfm
Pool supply air humidity ratio =		0.01101 W (Lbw/Lba)
Humidity added to pool air (lb / hr) =		61 lb/hr
Total pool volume =		22,000 Cubic Ft
Total pool volume =		1,594 Lbs of Dry Air
Max Available Ventilation (size of Dectron + RA/OA System)		22,000 CFM
Dectron unit DX Enable Setpoint		80 F
Cooling Discharge Air Temperature Setpoint		55 F

POOL AREA VENTILATION TABLE:

OA BIN DATA					POOL AREA SETPOINTS						HUMIDITY GAINS		REQUIRED VENTILATION / COOLING				VENTILATION HEATING LOADS					DX COOLING LOADS								
OA Temp	OA Enth.	OA Dewpoint	OA Grains / Ft3	Annual Bin Hours	Target Room Temp	Target Room %RH	Target Room Enthalpy	Target Room Dewpoint	Target Room Grains / Ft3	Target Total Grains	Humidity Added (Grains / Hr)	1 AX / Hour Total Grains	Dehumid. Required AX / Hour	Dehumd. Required OA CFM	MAX OA CFM Available	DX Cooling Required?	OA Heating Required?	OA Heating MBH	OA Heat Recovery Effectiveness	Post-Heat Recov OA Heating MBH	Annual Natural Gas Usage (Therms)	DX Cooling Enabled?	Cooling Disch. Air Temp	Cooling Disch. Grains / Ft3	Cooling Disch. Enthalpy	1 AX / Hour Total Grains	Dehumid. Required AX / Hour	Dehumid. Required CFM	Dehumid. Cooling MBH	Dehumid. Cooling kWh
92.5	35.4	66.3	6.81	6	80	50%	32.1	60.6	5.7	125,620	429,916	149,820	0.0	0	22,000	Yes	No	0.0	0%	0.0	0	Yes	55.0	4.66	22.84	102,520	18.6	6,824	283	170
87.5	37.4	64.8	6.54	31	80	50%	32.1	60.6	5.7	125,620	429,916	143,880	0.0	0	22,000	Yes	No	0.0	0%	0.0	0	Yes	55.0	4.66	22.84	102,520	18.6	6,824	283	878
82.5	35.0	66.3	6.26	131	80	50%	32.1	60.6	5.7	125,620	429,916	137,720	0.0	0	22,000	Yes	No	0.0	0%	0.0	0	Yes	55.0	4.66	22.84	102,520	18.6	6,824	283	3,709
77.5	33.0	60.9	5.80	500	80	50%	32.1	60.6	5.7	125,620	429,916	127,600	0.0	0	22,000	Yes	No	0.0	0%	0.0	0	No	0.0	0.00	0.00	0	0.0	0	0	0
72.5	31.5	60.0	5.68	620	80	50%	32.1	60.6	5.7	125,620	429,916	124,960	651.4	238,842	22,000	Yes	No	0.0	0%	0.0	0	No	0.0	0.00	0.00	0	0.0	0	0	0
67.5	29.9	58.9	5.52	664	80	50%	32.1	60.6	5.7	125,620	429,916	121,440	102.9	37,712	22,000	Yes	No	0.0	0%	0.0	0	No	0.0	0.00	0.00	0	0.0	0	0	0
62.5	27.2	55.0	4.84	854	80	50%	32.1	60.6	5.7	125,620	429,916	106,480	22.5	8,236	22,000	No	Yes	155.7	40%	93.4	997	No	0.0	0.00	0.00	0	0.0	0	0	0
57.5	24.0	48.6	3.85	927	80	50%	32.1	60.6	5.7	125,620	429,916	84,700	10.5	3,852	22,000	No	Yes	93.6	40%	56.2	651	No	0.0	0.00	0.00	0	0.0	0	0	0
52.5	20.3	42.0	3.03	600	80	50%	32.1	60.6	5.7	125,620	429,916	66,660	7.3	2,674	22,000	No	Yes	79.4	40%	47.6	357	No	0.0	0.00	0.00	0	0.0	0	0	0
47.5	18.2	39.0	2.72	730	80	50%	32.1	60.6	5.7	125,620	429,916	59,840	6.5	2,396	22,000	No	Yes	84.1	40%	50.5	461	No	0.0	0.00	0.00	0	0.0	0	0	0
42.5	16.0	32.9	2.16	491	80	50%	32.1	60.6	5.7	125,620	429,916	47,520	5.5	2,018	22,000	No	Yes	81.7	40%	49.0	301	No	0.0	0.00	0.00	0	0.0	0	0	0
37.5	14.5	29.6	1.88	656	80	50%	32.1	60.6	5.7	125,620	429,916	41,360	5.1	1,871	22,000	No	Yes	85.9	40%	51.5	422	No	0.0	0.00	0.00	0	0.0	0	0	0
32.5	12.5	25.8	1.59	1023	80	50%	32.1	60.6	5.7	125,620	429,916	34,980	4.7	1,739	22,000	No	Yes	89.2	40%	53.5	685	No	0.0	0.00	0.00	0	0.0	0	0	0
27.5	10.5	18.7	1.15	734	80	50%	32.1	60.6	5.7	125,620	429,916	25,300	4.3	1,571	22,000	No	Yes	89.1	40%	53.5	490	No	0.0	0.00	0.00	0	0.0	0	0	0
22.5	8.7	14.6	0.95	334	80	50%	32.1	60.6	5.7	125,620	429,916	20,900	4.1	1,505	22,000	No	Yes	93.5	40%	56.1	234	No	0.0	0.00	0.00	0	0.0	0	0	0
17.5	7.0	9.6	0.75	252	80	50%	32.1	60.6	5.7	125,620	429,916	16,500	3.9	1,445	22,000	No	Yes	97.5	40%	58.5	184	No	0.0	0.00	0.00	0	0.0	0	0	0
12.5	5.4	4.9	0.60	125	80	50%	32.1	60.6	5.7	125,620	429,916	13,200	3.8	1,402	22,000	No	Yes	102.2	40%	61.3	96	No	0.0	0.00	0.00	0	0.0	0	0	0
7.5	3.7	1.1	0.49	47	80	50%	32.1	60.6	5.7	125,620	429,916	10,780	3.7	1,373	22,000	No	Yes	107.5	40%	64.5	38	No	0.0	0.00	0.00	0	0.0	0	0	0
2.5	2.1	-3.6	0.39	34	80	50%	32.1	60.6	5.7	125,620	429,916	8,580	3.7	1,347	22,000	No	Yes	112.7	40%	67.6	29	No	0.0	0.00	0.00	0	0.0	0	0	0
-2.5	1.3	-12.0	0.20	1	80	50%	32.1	60.6	5.7	125,620	429,916	4,400	3.5	1,300	22,000	No	Yes	115.9	40%	69.5	1	No	0.0	0.00	0.00	0	0.0	0	0	0
-7.5	0.0	-20.0	0.15	0	80	50%	32.1	60.6	5.7	125,620	429,916	3,300	3.5	1,289	22,000	No	Yes	121.8	40%	73.1	0	No	0.0	0.00	0.00	0	0.0	0	0	0
																					4,946									4,757

Existing Gas Ventilation Costs = (4,946 Therms) * ($ 0.94 / Therm) = **$ 4,658**

Existing Electric Ventilation Costs = (4,757 kWh) * ($ 0.18 / kWh) = **$ 854**

Ventilation savings will be respective of the evaporation savings since the ventilation system brings in outside air in response to evaporation into the air from the pool.

Proposed Gas Ventilation Costs = (2,473 Therms) * ($ 0.94 / Therm) = **$ 2,329**

Proposed Electric Ventilation Costs = (2,378 kWh) * ($ 0.18 / kWh) = **$ 427**

RESULT:

Annual Exist. Water Use	**64,587**	**gallons**	**=>**	**$ 488**
Annual Exist. Water Heating Use	**8,282**	**Therm**	**=>**	**$ 7,800**
Annual Exist. Ventilation Heating Use	**4,946**	**Therm**	**=>**	**$ 4,658**
Annual Exist. Ventilation Cooling (Dehumidifying) Use	**4,757**	**kWh**	**=>**	**$ 854**
TOTAL EXIST COST PER YEAR				**$ 13,799**

Annual Proposed Water Use	**32,293**	**gallons**	**=>**	**$ 244**
Annual Proposed Water Heating Use	**4,246**	**Therm**	**=>**	**$ 3,999**
Annual Proposed Ventilation Heating Use	**2,473**	**Therm**	**=>**	**$ 2,329**
Annual Proposed Ventilation Cooling (Dehumidifying) Use	**2,378**	**kWh**	**=>**	**$ 427**
TOTAL PROPOSED COST PER YEAR				**$ 6,998**

TOTAL SAVINGS:

					% of existing
Annual Proposed Water Savings	**32,293**	**gallons**	**=>**	**$ 244**	50%
Annual Proposed Water Heating Savings	**4,036**	**Therm**	**=>**	**$ 3,801**	49%
Annual Proposed Ventilation Heating Savings	**2,473**	**Therm**	**=>**	**$ 2,329**	50%
Annual Proposed Ventilation Cooling (Dehumidifying) Savings	**2,378**	**kWh**	**=>**	**$ 427**	50%
TOTAL COST SAVINGS PER YEAR				**$ 6,801**	49%

Newark Board of Education - NJBPU
CHA Project Numer: 27999
Science Park High School

ECM-2: Install a Pool Cover - 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.		
Pool Cover Cost	1	ls	$9,982.0	$ -	$ -	$ 10,980	$ -	$ -	$ 10,980	Vendor Quote
Pool Cover Reel System Cost	4	ea	$ 14,280	$ -	$ -	$ 62,832	$ -	$ -	$ 62,832	*Vendor Quote*
Installation & Freight	1	ls	$ -	$ 7,060	$ -	$ -	$ 9,531	$ -	$ 9,531	Vendor Quote
Electrical Estimate	1	ls	$ 6,200	$ -	$ -	$ 6,820	$ -	$ -	$ 6,820	Vendor Quote

$ 90,163	Subtotal
$ 22,540.80	25% Contingency
$ 112,704	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27999
John F. Kennedy

ECM-7: Replace urinals and flush valves with low flow

Description: This ECM evaluates the water savings associated with replacing/ upgrading urinals with 0.125 GPF urinals and or flush valves.

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Urinals in Building to be replaced	5	
Average Flushes / Urinal (per Day)	3	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	5	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	$1,200	RS Means 2012
Proposed Installation Cost of new urinal & valve	$1,000	RS Means 2012
Total cost of new urinals & valves		

SAVINGS		
Current Urinal Water Use	13.69	kGal / year
Proposed Urinal Water Use	0.68	kGal / year
Water Savings	13.00	kGal / year
Cost Savings	$98	/ year

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

Newark Board of Education - NJBPU
CHA Project Numer: 27999
John F. Kennedy

ECM-7: Replace toilets and flush valves with low flow

Description: This ECM evaluates the water savings associated with repalcing/ upgrading toilets to 1.28 GPF fixtures and/or flush valves.

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Toilets in Building	33	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	33	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	126.47	kGal / year
Proposed Toilet Water Use	46.25	kGal / year
Water Savings	80.22	kGal / year
Cost Savings	$606	/ year

Newark Board of Education - NJBPU
CHA Project Numer: 27999
John F. Kennedy

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Low-Flow Urinal	5	EA	$ 1,200	$ 1,000	$ -	$ 6,162	$ 6,230	$ -	$ 12,392	Vendor Estimate
Low-Flow Toilet	33	EA	$ 1,400	$ 1,000	$ -	$ 47,447	$ 41,118	$ -	$ 88,565	Vendor Estimate
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 100,957	Subtotal
$ 25,239	25% Contingency
$ 126,197	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27999
John F. Kennedy

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.
Values used in this calculation are for ALL identified measures, regardless of payback or IRR. P4P estimated incentives represent a best case scenario, and will likely be lower depending on which measures are included. The savings displayed here are not guaranteed to qualify for P4P incentives if IRR or payback requirements are not met.

Total Building Area (Square Feet)	46,576
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)	$69,557	$25,361
Existing Usage (from utility)	387,600	26,929
Proposed Savings	107,230	7,994
Existing Total MMBtus	4,016	
Proposed Savings MMBtus	1,165	
% Energy Reduction	**29.0%**	
Proposed Annual Savings	$25,239	

	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	Gas	Total
Incentive #1	$0	$0	$5,000
Incentive #2	$11,795	$9,992	$21,787
Incentive #3	$11,795	$9,992	$21,787
Total All Incentives	**$23,591**	**$19,984**	**$48,575**

Total Project Cost	$513,017

		Allowable Incentive
% Incentives #1 of Utility Cost*	5.3%	$5,000
% Incentives #2 of Project Cost**	4.2%	$21,787
% Incentives #3 of Project Cost**	4.2%	$21,787
Total Eligible Incentives***	**$48,575**	
Project Cost w/ Incentives	$464,442	

Project Payback (years)	
w/o Incentives	w/ Incentives
20.3	18.4

* 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

Energy Audit of John F. Kennedy Elementary School
CHA Project No. 27999
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual $ Saved (kWh Saved) * ($/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive Prescriptive Lighting Measures	Simple Paybak With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered
20LED	MER	11	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	1820	641	11	4 ft LED Tube	200732x1	15	0.2	SW	1,820	300	340	0.2	$ 64.80	$ 798.60	$0	12.3	12.3
40LED	MER	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1820	218	2	T 59 R LED	RTLED38	38	0.1	SW	1,820	138	80	0.0	$ 15.25	$ -	$0	0.0	0.0
39	MER Stairs	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	412	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6,240	412	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Kitchen	10	T 32 R F 2 (ELE)	F42LL	60	0.6	SW	3000	1,800	10	T 59 R LED	RTLED38	38	0.4	SW	3,000	1,140	660	0.2	$ 119.60	$ -	$0	0.0	0.0
39	Office	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4,300	142	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96	1	4 ft LED Tube	200732x1	15	0.0	SW	3,000	45	51	0.0	$ 9.24	$ 72.60	$0	7.9	7.9
39	Cafeteria	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	SW	2000	330	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	SW	2,000	330	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Cafeteria	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2000	1,920	16	T 59 R LED	RTLED38	38	0.6	SW	2,000	1,216	704	0.4	$ 132.56	$ -	$0	0.0	0.0
20LED	Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128	4	4 ft LED Tube	200732x1	15	0.1	SW	1,000	60	68	0.1	$ 14.25	$ 290.40	$0	20.4	20.4
20LED	Vest	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	599	3	4 ft LED Tube	200732x1	15	0.0	SW	6,240	281	318	0.1	$ 55.33	$ 217.80	$0	3.9	3.9
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	1,647	-	0.0	$ -	$ -	$0		#DIV/0!
39	Cori	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6,240	2,265	-	0.0	$ -	$ -	$0		#DIV/0!
39	Mens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4,300	142	-	0.0	$ -	$ -	$0		#DIV/0!
39	Womens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4,300	142	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	113 Child Study	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	839	9	4 ft LED Tube	200732x1	15	0.1	SW	2,912	393	446	0.2	$ 80.93	$ 653.40	$0	8.1	8.1
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	SW	2,400	216	245	0.1	$ 45.23	$ 435.60	$0	9.6	9.6
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	SW	2,400	216	245	0.1	$ 45.23	$ 435.60	$0	9.6	9.6
20LED	Main Office	13	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2400	998	13	4 ft LED Tube	200732x1	15	0.2	SW	2,400	468	530	0.2	$ 97.99	$ 943.80	$0	9.6	9.6
20LED	Copy Room	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	SW	2,400	216	245	0.1	$ 45.23	$ 435.60	$0	9.6	9.6
20LED	Principal Office	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691	9	4 ft LED Tube	200732x1	15	0.1	SW	2,400	324	367	0.2	$ 67.84	$ 653.40	$0	9.6	9.6
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	1,647	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Vest	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	6240	749	2	T 59 R LED	RTLED38	38	0.1	SW	6,240	474	275	0.0	$ 47.73	$ -	$0	0.0	0.0
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399	2	4 ft LED Tube	200732x1	15	0.0	SW	6,240	187	212	0.0	$ 36.89	$ 145.20	$0	3.9	3.9
20LED	Corrdior	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	SW	6,240	94	106	0.0	$ 18.44	$ 72.60	$0	3.9	3.9
20LED	Waiting Wellness	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	SW	2,400	72	82	0.0	$ 15.08	$ 145.20	$0	9.6	9.6
20LED	Nurse Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230	3	4 ft LED Tube	200732x1	15	0.0	SW	2,400	108	122	0.1	$ 22.61	$ 217.80	$0	9.6	9.6
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
220	TR	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	4300	86	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	4,300	86	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	SW	4,300	163	95	0.0	$ 16.74	$ -	$0	0.0	0.0
20LED	Locker Room	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	2400	77	1	4 ft LED Tube	200732x1	15	0.0	SW	2,400	36	41	0.0	$ 7.54	$ 72.60	$0	9.6	9.6
20LED	Exam Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	SW	2,400	72	82	0.0	$ 15.08	$ 145.20	$0	9.6	9.6
20LED	108 OT/PT	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	307	4	4 ft LED Tube	200732x1	15	0.1	SW	2,400	144	163	0.1	$ 30.15	$ 290.40	$0	9.6	9.6
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96	1	4 ft LED Tube	200732x1	15	0.0	SW	3,000	45	51	0.0	$ 9.24	$ 72.60	$0	7.9	7.9
20LED	Corridor	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	6240	1,198	6	4 ft LED Tube	200732x1	15	0.1	SW	6,240	562	636	0.1	$ 110.66	$ 435.60	$0	3.9	3.9
20LED	107 Gym	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2912	373	4	4 ft LED Tube	200732x1	15	0.1	SW	2,912	175	198	0.1	$ 35.97	$ 290.40	$0	8.1	8.1
20LED	Office	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	SW	2,400	72	82	0.0	$ 15.08	$ 145.20	$0	9.6	9.6
20LED	Men's Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	538	7	4 ft LED Tube	200732x1	15	0.1	SW	2,400	252	286	0.1	$ 52.77	$ 508.20	$0	9.6	9.6
220	Men's Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2,400	48	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Womens Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	538	7	4 ft LED Tube	200732x1	15	0.1	SW	2,400	252	286	0.1	$ 52.77	$ 508.20	$0	9.6	9.6
220	Womens Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2,400	48	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
40LED	Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.61	$ -	$0	0.0	0.0
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
20LED	Swim Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230	3	4 ft LED Tube	200732x1	15	0.0	SW	2,400	108	122	0.1	$ 22.61	$ 217.80	$0	9.6	9.6
40LED	Pool	12	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2912	2,097	12	T 59 R LED	RTLED38	38	0.5	SW	2,912	1,328	769	0.3	$ 139.64	$ -	$0	0.0	0.0
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
39	Corridor	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	618	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6,240	618	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	105 Music	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	2,059	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	104 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	103 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	102 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	101 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
39	Corridor	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,853	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	1,853	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Vest	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	SW	6,240	94	106	0.0	$ 18.44	$ 72.60	$0	3.9	3.9
40LED	Mens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	SW	4,300	163	95	0.0	$ 16.74	$ -	$0	0.0	0.0
40LED	Womens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	SW	4,300	163	95	0.0	$ 16.74	$ -	$0	0.0	0.0
20LED	116 Classroom	24	S 32 C F 1 (ELE)	F41LL	32	0.8	SW	2912	2,236	24	4 ft LED Tube	200732x1	15	0.4	SW	2,912	1,048	1,188	0.4	$ 215.81	$ 1,742.40	$0	8.1	8.1
20LED	201 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	202 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	203 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	204 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	205 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	206 Computer Lab	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	207 Parents Room	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	839	9	4 ft LED Tube	200732x1	15	0.1	SW	2,912	393	446	0.2	$ 80.93	$ 653.40	$0	8.1	8.1
20LED	208 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	210 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	212 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	214 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	216 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	209 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	211 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	213 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	215 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	2,059	-	0.0	$ -	$ -	$0		#DIV/0!
39	Corridor	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6,240	2,265	-	0.0	$ -	$ -	$0		#DIV/0!
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6,240	2,059	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	UN-51	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
20LED	UN-50	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
40LED	200 Classroom	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2912	1,223	7	T 59 R LED	RTLED38	38	0.3	SW	2,912	775	448	0.2	$ 81.46	$ -	$0	0.0	0.0
20LED	219 Art	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	UN-53 Storage	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	96	3	4 ft LED Tube	200732x1	15	0.0	SW	1,000	45	51	0.1	$ 10.69	$ 217.80	$0	20.4	20.4
20LED	UN-52 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
20LED	218 Wood Working	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	SW	2,912	655	743	0.3	$ 134.88	$ 1,089.00	$0	8.1	8.1
20LED	UN-54 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
20LED	217 Classroom	5	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2912	466	5	4 ft LED Tube	200732x1	15	0.1	SW	2,912	218	248	0.1	$ 44.96	$ 363.00	$0	8.1	8.1
20LED	217 Classroom	12	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2912	1,118	12	4 ft LED Tube	200732x1	15	0.2	SW	2,912	524	594	0.2	$ 107.90	$ 871.20	$0	8.1	8.1
20LED	UN-55	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
20LED	UN-56	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
20LED	UN-59	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.56	$ 72.60	$0	20.4	20.4
20LED	UN-60	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 7.12	$ 145.20	$0	20.4	20.4
	Total	**664**				**22.8**			**73,110**	**664**			**1,910**	**12.8**				**45,236**	**27,874**	**10.0**	**$5,079**	**$37,534**	**$0**		
																		Demand Savings			**10.0**	**$423**			
																		kWh Savings			**27,874**	**$4,656**			
																		Total savings				**$5,079**		**7.4**	**7.4**

Energy Audit of John F. Kennedy Elementary School
CHA Project No. 27999
ECM-L2 Install Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code Lighting Fixture Code	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual $ Saved (kW Saved) * ($/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered
20LED	MER	11	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	1820	640.6	11	S 32 C F 1 (ELE)	F41LL	32	0.4	NONE	1820	640.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	MER	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1820	218.4	2	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	1820	218.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	MER Stairs	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	411.8	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	NONE	6240	411.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Kitchen	10	T 32 R F 2 (ELE)	F42LL	60	0.6	SW	3000	1,800.0	10	T 32 R F 2 (ELE)	F42LL	60	0.6	C-OCC	1500	900.0	900.0	0.0	$150.34	$270.00	$35.00	1.8	1.6
39	Office	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$6.62	$270.00	$35.00	40.8	35.5
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	141.9	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4300	141.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	1500	48.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
39	Cafeteria	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	SW	2000	330.0	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	NONE	2000	330.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Cafeteria	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2000	1,920.0	16	T 32 R F 2 (ELE)	F42LL	60	1.0	NONE	2000	1,920.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128.0	4	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	32.0	96.0	0.0	$16.04	$270.00	$35.00	16.8	14.7
20LED	Vest	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	599.0	3	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	6240	599.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647.4	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	1,647.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Cori	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265.1	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	NONE	6240	2,265.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Mens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	141.9	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4300	141.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Womens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	141.9	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4300	141.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	113 Child Study	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	838.7	9	S 32 C F 1 (ELE)	F41LL	32	0.3	C-OCC	1456	419.3	419.3	0.0	$70.05	$270.00	$35.00	3.9	3.4
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	460.8	6	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1200	230.4	230.4	0.0	$38.49	$270.00	$35.00	7.0	6.1
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	460.8	6	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1200	230.4	230.4	0.0	$38.49	$270.00	$35.00	7.0	6.1
20LED	Main Office	13	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2400	998.4	13	S 32 C F 1 (ELE)	F41LL	32	0.4	C-OCC	1200	499.2	499.2	0.0	$83.39	$270.00	$35.00	3.2	2.8
20LED	Copy Room	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	460.8	6	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1200	230.4	230.4	0.0	$38.49	$270.00	$35.00	7.0	6.1
20LED	Principal Office	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691.2	9	S 32 C F 1 (ELE)	F41LL	32	0.3	C-OCC	1200	345.6	345.6	0.0	$57.73	$270.00	$35.00	4.7	4.1
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647.4	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	1,647.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Vest	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	6240	748.8	2	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	6240	748.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399.4	2	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	6240	399.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corrdior	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	199.7	1	S 32 C F 1 (ELE)	F41LL	32	0.0	NONE	6240	199.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Waiting Wellness	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	153.6	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	76.8	76.8	0.0	$12.83	$270.00	$35.00	21.0	18.3
20LED	Nurse Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230.4	3	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	115.2	115.2	0.0	$19.24	$270.00	$35.00	14.0	12.2
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
220	TR	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	4300	86.0	1	S 17 C F 1(ELE)	F21ILL	20	0.0	NONE	4300	86.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Locker Room	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	2400	76.8	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	1400	44.8	32.0	0.0	$5.35	$270.00	$35.00	50.5	44.0
20LED	Exam Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	153.6	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	76.8	76.8	0.0	$12.83	$270.00	$35.00	21.0	18.3
20LED	108 OT/PT	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	307.2	4	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	153.6	153.6	0.0	$25.66	$270.00	$35.00	10.5	9.2
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	1500	48.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	Corridor	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	6240	1,198.1	6	S 32 C F 1 (ELE)	F41LL	32	0.2	NONE	6240	1,198.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	107 Gym	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2912	372.7	4	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	2912	372.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Office	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	153.6	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	76.8	76.8	0.0	$12.83	$270.00	$35.00	21.0	18.3
20LED	Men's Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	537.6	7	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1400	313.6	224.0	0.0	$37.42	$270.00	$35.00	7.2	6.3
220	Men's Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48.0	1	S 17 C F 1(ELE)	F21ILL	20	0.0	C-OCC	1400	28.0	20.0	0.0	$3.34	$270.00	$35.00	80.8	70.3
20LED	Womens Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	537.6	7	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1400	313.6	224.0	0.0	$37.42	$270.00	$35.00	7.2	6.3
220	Womens Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48.0	1	S 17 C F 1(ELE)	F21ILL	20	0.0	C-OCC	1400	28.0	20.0	0.0	$3.34	$270.00	$35.00	80.8	70.3
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
40LED	Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$7.52	$270.00	$35.00	35.9	31.3
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	Swim Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230.4	3	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	115.2	115.2	0.0	$19.24	$270.00	$35.00	14.0	12.2
40LED	Pool	12	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2912	2,096.6	12	T 32 R F 2 (ELE)	F42LL	60	0.7	NONE	2912	2,096.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
39	Corridor	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	617.8	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	NONE	6240	617.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	105 Music	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059.2	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	2,059.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	104 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	103 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	102 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	101 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
39	Corridor	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,853.3	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	1,853.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Vest	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	199.7	1	S 32 C F 1 (ELE)	F41LL	32	0.0	NONE	6240	199.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Mens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Womens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	116 Classroom	24	S 32 C F 1 (ELE)	F41LL	32	0.8	SW	2912	2,236.4	24	S 32 C F 1 (ELE)	F41LL	32	0.8	C-OCC	1456	1,118.2	1,118.2	0.0	$186.79	$270.00	$35.00	1.4	1.3
20LED	201 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	202 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	203 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	204 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	205 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	206 Computer Lab	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	207 Parents Room	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	838.7	9	S 32 C F 1 (ELE)	F41LL	32	0.3	C-OCC	1456	419.3	419.3	0.0	$70.05	$270.00	$35.00	3.9	3.4
20LED	208 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	210 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	212 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	214 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	216 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	209 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	211 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	213 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	215 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059.2	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	2,059.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Corridor	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265.1	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	NONE	6240	2,265.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059.2	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6240	2,059.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	UN-51	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
20LED	UN-50	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
40LED	200 Classroom	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2912	1,223.0	7	T 32 R F 2 (ELE)	F42LL	60	0.4	C-OCC	1456	611.5	611.5	0.0	$102.15	$270.00	$35.00	2.6	2.3
20LED	219 Art	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	UN-53 Storage	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	96.0	3	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	24.0	72.0	0.0	$12.03	$270.00	$35.00	22.4	19.5
20LED	UN-52 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	218 Wood Working	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,397.8	15	S 32 C F 1 (ELE)	F41LL	32	0.5	C-OCC	1456	698.9	698.9	0.0	$116.75	$270.00	$35.00	2.3	2.0
20LED	UN-54 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	217 Classroom	5	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2912	465.9	5	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1456	233.0	233.0	0.0	$38.92	$270.00	$35.00	6.9	6.0
20LED	217 Classroom	12	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2912	1,118.2	12	S 32 C F 1 (ELE)	F41LL	32	0.4	C-OCC	1456	559.1	559.1	0.0	$93.40	$270.00	$35.00	2.9	2.5
20LED	UN-55	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
20LED	UN-56	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
20LED	UN-59	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$4.01	$270.00	$35.00	67.3	58.6
20LED	UN-60	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$8.02	$270.00	$35.00	33.7	29.3
															0	#N/A	#VALUE!	#VALUE!	#N/A	#VALUE!			#VALUE!	#VALUE!
	Total	**664**				**22.8**			**73109.8**	**664.0**				**22.8**			**49975.0**	**23134.8**	**0.0**	**3864.6**	**17280.0**	**2240.0**		
																	Demand Savings			**0.0**	**$0**			
																	kWh Savings			**23,135**	**$3,865**			
																	Total Savings				**$3,865**		**4.5**	**3.9**

Energy Audit of John F. Kennedy Elementary School
CHA Project No. 27999
ECM-L3 Lighting Replacements with Occupancy Sensors

		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	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	(kWspace) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	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	(kWspace) * (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
20LED	MER	11	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	1820	641	11	4 ft LED Tube	200732x1	15	0.2	NONE	1,820	300	340	0.2	$ 64.80	$ 798.60	$ -	$ 12.3	12.3
40LED	MER	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1820	218	2	T 59 R LED	RTLED38	38	0.1	NONE	1,820	138	80	0.0	$ 15.25	$ -	$ -	0.0	0.0
39	MER Stairs	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	412	2	2' 17 W F 2 (ELE)	F22ILL	33	0.1	NONE	6,240	412	-	0.0	$ -	$ -	$ -	$ -	
40LED	Kitchen	10	T 32 R F 2 (ELE)	F42LL	60	0.6	SW	3000	1,800	10	T 59 R LED	RTLED38	38	0.4	C-OCC	1,500	570	1,230	0.2	$ 214.82	$ 270.00	$ 35	1.3	1.1
39	Office	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1,200	40	40	0.0	$ 6.62	$ 270.00	$ 35	40.8	35.5
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4,300	142	-	0.0	$ -	$ -	$ -		
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,500	23	74	0.0	$ 13.00	$ 342.60	$ 35	26.4	23.7
39	Cafeteria	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	SW	2000	330	5	2' 17 W F 2 (ELE)	F22ILL	33	0.2	NONE	2,000	330	-	0.0	$ -	$ -	$ -		
40LED	Cafeteria	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2000	1,920	16	T 59 R LED	RTLED38	38	0.6	NONE	2,000	1,216	704	0.4	$ 132.56	$ -	$ -	0.0	0.0
20LED	Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128	4	4 ft LED Tube	200732x1	15	0.1	C-OCC	250	15	113	0.1	$ 21.77	$ 560.40	$ 35	25.7	24.1
20LED	Vest	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	599	3	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	281	318	0.1	$ 55.33	$ 217.80	$ -	3.9	3.9
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	1,647	-	0.0	$ -	$ -	$ -		
39	Cori	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	NONE	6,240	2,265	-	0.0	$ -	$ -	$ -		
39	Mens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4,300	142	-	0.0	$ -	$ -	$ -		
39	Womens TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	4,300	142	-	0.0	$ -	$ -	$ -		
20LED	113 Child Study	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	839	9	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,456	197	642	0.2	$ 113.76	$ 923.40	$ 35	8.1	7.8
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	108	353	0.1	$ 63.27	$ 705.60	$ 35	11.2	10.6
20LED	Office	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	108	353	0.1	$ 63.27	$ 705.60	$ 35	11.2	10.6
20LED	Main Office	13	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2400	998	13	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,200	234	764	0.2	$ 137.08	$ 1,213.80	$ 35	8.9	8.6
20LED	Copy Room	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	461	6	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	108	353	0.1	$ 63.27	$ 705.60	$ 35	11.2	10.6
20LED	Principal Office	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691	9	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	162	529	0.2	$ 94.90	$ 923.40	$ 35	9.7	9.4
39	Corridor	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,647	8	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	1,647	-	0.0	$ -	$ -	$ -		
40LED	Vest	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	6240	749	2	T 59 R LED	RTLED38	38	0.1	NONE	6,240	474	275	0.0	$ 47.73	$ -	$ -	0.0	0.0
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399	2	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	187	212	0.0	$ 36.89	$ 145.20	$ -	3.9	3.9
20LED	Corrdior	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	94	106	0.0	$ 18.44	$ 72.60	$ -	3.9	3.9
20LED	Waiting Wellness	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	36	118	0.0	$ 21.09	$ 415.20	$ 35	19.7	18.0
20LED	Nurse Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230	3	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	54	176	0.1	$ 31.63	$ 487.80	$ 35	15.4	14.3
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
220	TR	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	4300	86	1	S 17 C F 1(ELE)	F21ILL	20	0.0	NONE	4,300	86	-	0.0	$ -	$ -	$ -		
40LED	TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	NONE	4,300	163	95	0.0	$ 16.74	$ -	$ -	0.0	0.0
20LED	Locker Room	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	2400	77	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,400	21	56	0.0	$ 10.04	$ 342.60	$ 35	34.1	30.6
20LED	Exam Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	36	118	0.0	$ 21.09	$ 415.20	$ 35	19.7	18.0
20LED	108 OT/PT	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	307	4	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	72	235	0.1	$ 42.18	$ 560.40	$ 35	13.3	12.5
20LED	Janitor Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,500	23	74	0.0	$ 13.00	$ 342.60	$ 35	26.4	23.7
20LED	Corridor	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	6240	1,198	6	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	562	636	0.1	$ 110.66	$ 435.60	$ -	3.9	3.9
20LED	107 Gym	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2912	373	4	4 ft LED Tube	200732x1	15	0.1	NONE	2,912	175	198	0.1	$ 35.97	$ 290.40	$ -	8.1	8.1
20LED	Office	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	36	118	0.0	$ 21.09	$ 415.20	$ 35	19.7	18.0
20LED	Men's Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	538	7	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,400	147	391	0.1	$ 70.31	$ 778.20	$ 35	11.1	10.6
220	Men's Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48	1	S 17 C F 1(ELE)	F21ILL	20	0.0	C-OCC	1,400	28	20	0.0	$ 3.34	$ 270.00	$ 35	80.8	70.3
20LED	Womens Locker	7	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2400	538	7	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,400	147	391	0.1	$ 70.31	$ 778.20	$ 35	11.1	10.6
220	Womens Locker	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48	1	S 17 C F 1(ELE)	F21ILL	20	0.0	C-OCC	1,400	28	20	0.0	$ 3.34	$ 270.00	$ 35	80.8	70.3
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
40LED	Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 9.37	$ 270.00	$ 35	28.8	25.1
20LED	Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
20LED	Swim Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	230	3	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	54	176	0.1	$ 31.63	$ 487.80	$ 35	15.4	14.3
40LED	Pool	12	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2912	2,097	12	T 59 R LED	RTLED38	38	0.5	NONE	2,912	1,328	769	0.3	$ 139.64	$ -	$ -	0.0	0.0
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
39	Corridor	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	SW	6240	618	3	2' 17 W F 2 (ELE)	F22ILL	33	0.1	NONE	6,240	618	33	0.0	$ -	$ -	$ -		
20LED	105 Music	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	2,059	-	0.0	$ -	$ -	$ -		
20LED	104 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	103 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	102 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	101 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
39	Corridor	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	1,853	9	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	1,853	-	0.0	$ -	$ -	$ -		
20LED	Vest	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	94	106	0.0	$ 18.44	$ 72.60	$ -	3.9	3.9
40LED	Mens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	NONE	4,300	163	95	0.0	$ 16.74	$ -	$ -	0.0	0.0
40LED	Womens TR	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	T 59 R LED	RTLED38	38	0.0	NONE	4,300	163	95	0.0	$ 16.74	$ -	$ -	0.0	0.0
20LED	116 Classroom	24	S 32 C F 1 (ELE)	F41LL	32	0.8	SW	2912	2,236	24	4 ft LED Tube	200732x1	15	0.4	C-OCC	1,456	524	1,712	0.4	$ 303.37	$ 2,012.40	$ 35	6.6	6.5
20LED	201 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	202 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	203 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	204 Autistic	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	205 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	206 Computer Lab	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	207 Parents Room	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2912	839	9	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,456	197	642	0.2	$ 113.76	$ 923.40	$ 35	8.1	7.8
20LED	208 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	210 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	212 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	214 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	216 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	209 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	211 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	213 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	215 Classroom	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	2,059	-	0.0	$ -	$ -	$ -		
39	Corridor	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	SW	6240	2,265	11	2' 17 W F 2 (ELE)	F22ILL	33	0.4	NONE	6,240	2,265	-	0.0	$ -	$ -	$ -		
39	Corridor	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	SW	6240	2,059	10	2' 17 W F 2 (ELE)	F22ILL	33	0.3	NONE	6,240	2,059	-	0.0	$ -	$ -	$ -		
20LED	UN-51	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
20LED	UN-50	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
40LED	200 Classroom	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2912	1,223	7	T 59 R LED	RTLED38	38	0.3	C-OCC	1,456	387	836	0.2	$ 146.15	$ 270.00	$ 35	1.8	1.6
20LED	219 Art	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	UN-53 Storage	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	96	3	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	11	85	0.1	$ 16.32	$ 487.80	$ 35	29.9	27.7
20LED	UN-52 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
20LED	218 Wood Working	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2912	1,398	15	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	328	1,070	0.3	$ 189.60	$ 1,359.00	$ 35	7.2	7.0
20LED	UN-54 Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
20LED	217 Classroom	5	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	2912	466	5	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,456	109	357	0.1	$ 63.20	$ 633.00	$ 35	10.0	9.5
20LED	217 Classroom	12	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2912	1,118	12	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,456	262	856	0.2	$ 151.68	$ 1,141.20	$ 35	7.5	7.3
20LED	UN-55	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
20LED	UN-56	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
20LED	UN-59	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 5.44	$ 342.60	$ 35	63.0	56.5
20LED	UN-60	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	8	57	0.0	$ 10.88	$ 415.20	$ 35	38.2	34.9
															0	#N/A							#VALUE!
S	Total	664				22.8			73,110	664				12.8				34,093		10.0	6,941	$ 54,814	$2,240		
S																		Demand Savings			10.0	$423			
S																		kWh Savings			39,017	$6,518			
S																		Total Savings				$6,941		7.9	7.6

APPENDIX D

New Jersey Board of Public Utilities Incentives

i. **Smart Start**

ii. **Direct Install**

iii. **Pay for Performance (P4P)**

iv. **Energy Savings Improvement Plan (ESIP)**

I. SMART START

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PILOT

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

T-12 SCHOOLS LIGHTING INITIATIVE

TEACH

ARRA

TECHNOLOGIES

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

NJ SmartStart Buildings

Program Overview

New Jersey SmartStart BUILDINGS®

With New Jersey SmartStart Buildings ...

... A smart start now means better performance later! Whether you're starting a commercial or industrial project from the ground up, renovating existing space, or upgrading equipment, you have unique opportunities to upgrade the energy efficiency of the project.

New Jersey SmartStart Buildings can provide a range of support — at no cost to you — to yield substantial energy savings, both now and for the future. Learn more about:

- Project Categories
- Custom Measures
- Incentives for Qualifying Equipment and Projects
- Program Terms and Conditions
- Find a Trade Ally

Please note: pre-approval is required for almost all energy efficiency incentives. This means you must submit an application form (and applicable worksheets) and receive an approval letter from the program before any equipment is installed (click here for complete Terms and Conditions.) Upon receipt of an approval letter, you may proceed to install the equipment listed on your approved application. Equipment installed prior to the date of the approval letter is not eligible for an incentive. **Any customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Getting Started

Submit your project application form as soon as you know you will be doing a construction project, or replacing/adding equipment.

Smart-Growth Eligibility: *Check to make sure your project is eligible for incentives.*

Incentives for new construction are available only for projects in areas designated for growth in the NJ State Development and Redevelopment Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for incentives throughout the State.

Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Site Evaluator Tool available from the HMFA website. Contact a program representative if you are uncertain about project eligibility. The Smart Growth policies will be implemented consistent with Board Orders as described more fully in the C&I Operational Procedure Manual.

Apply for pre-approval by submitting an application for the type of equipment you have chosen to install. The application should be accompanied by a related worksheet, where applicable, and a manufacturer's specification sheet (refer to the specific program requirements on the back of the application for specs needed for your project) for the equipment you are planning to install. (Program representatives will review your application package and approve it, reject it, and/or advise you of upgrades in equipment that will save energy costs and/or increase your incentives.)

Support for Custom Energy-Efficiency Measures

Custom measures allows program participants the opportunity to receive an incentive for unique energy-efficiency measures that are not on the prescriptive equipment incentive list, but are project/facility specific.

Incentives for Qualifying Equipment and Projects

Financial incentives are available for large and small projects. These incentives offset some — or maybe even all! — of the added cost to purchase qualifying energy-efficient equipment, which provides significant long-term energy savings. Ranges of incentives are available for qualifying equipment (depending on type, size, and efficiency) in several categories.

Find out more about equipment incentives!

For specific details on equipment requirements and financial incentives, including incentives for equipment not listed here, contact a program representative. Annual financial incentives may be

Program Updates

Notice of 2013 Changes to C&I Programs

Warranty and Lease Terms for CHP/Fuel Cells Increased to 10 Years

Large Combined Heat & Power/Fuel Cell Program Update

Board Order - Standby Charges for Distributed Generation Customers

Other updates posted.

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

- PROGRAMS
  - NJ SMARTSTART BUILDINGS
    - EQUIPMENT INCENTIVES
    - APPLICATION FORMS
    - TOOLS AND RESOURCES
  - PAY FOR PERFORMANCE
  - COMBINED HEAT & POWER AND FUEL CELLS
  - LOCAL GOVERNMENT ENERGY AUDIT
  - LARGE ENERGY USERS PILOT
  - ENERGY SAVINGS IMPROVEMENT PROGRAM
  - DIRECT INSTALL
  - ENERGY BENCHMARKING
  - OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS
  - EDA PROGRAMS
  - T-12 SCHOOLS LIGHTING INITIATIVE
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  - ARRA
- TECHNOLOGIES
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Home » Commercial & Industrial » Programs » NJ SmartStart Buildings

Equipment Incentives

More reasons for a smart start on your next project!

New Jersey SmartStart Buildings provides **financial incentives for qualifying equipment**. These incentives were developed to help our customers offset some of the added cost to purchase qualifying energy-efficient equipment, which provides significant long-term energy savings. A wide range of incentives are available for qualifying equipment (depending on type, size and efficiency).

Listed below are the types of qualifying equipment and ranges of incentives. For details on equipment requirements and full listings of incentives, refer to the **online application forms**.

Please note that almost all equipment incentives require pre-approval before equipment is installed. (**click for exceptions**)To start the pre-approval process, submit an Equipment Application, and appropriate Equipment Worksheets, for the type or types of equipment you are planning to install along with equipment specification sheets (refer to the specific program requirements on the back of the application for specifications needed for your project) and a current utility bill(s).

In order to be eligible to receive financial incentives under this Program, Applicants must receive electric and/or gas service from one of the regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Electric Chillers

- Water-cooled chillers ($12 - $170 per ton)
- Air-cooled chillers ($8 - $52 per ton)

Gas Cooling

- Gas absorption chillers ($185-$450 per ton)
- Gas Engine-Driven Chillers (Calculated through Custom Measure Path)

Desiccant Systems ($1.00 per cfm - gas or electric)

Electric Unitary HVAC

- Unitary AC and split systems ($73 - $92 per ton)
- Air-to-air heat pumps ($73 - $92 per ton)
- Water-source heat pumps ($81 per ton)
- Packaged terminal AC & HP ($65 per ton)
- Central DX AC Systems ($40 - $72 per ton)
- Dual Enthalpy Economizer Controls ($250)
- Occupancy Controlled Thermostats ($75 each)

Ground Source Heat Pumps

- Closed Loop ($450-750 per ton)

Gas Heating

- Gas-fired boilers < 300 MBH ($300 per unit)
- Gas-fired boilers ≥ 300 MBH - 1500 MBH ($1.75 per MBH)
- Gas-fired boilers ≥ 1500 MBH - ≤ 4000 MBH ($1.00 per MBH)
- Gas-fired boilers > 4000 MBH (Calculated through Custom Measure Path)
- Gas furnaces ($300-$400 per unit)

Variable Frequency Drives

- Variable air volume ($65 - $155 per hp)
- Chilled-water pumps ($60 per hp)
- Compressors ($5,250 to $12,500 per drive)

Natural Gas Water Heating

Program Updates

- Notice of 2013 Changes to C&I Programs
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- Large Combined Heat & Power/Fuel Cell Program Update
- Board Order - Standby Charges for Distributed Generation Customers

Other updates posted.

Featured Success Story

Mannington Mills:

NJ SmartStart Buildings custom measures case study presented at Globalcon Conference

Applications and Brochures

Download the latest program materials.

e-Newsletter SIGN UP TODAY!

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II. DIRECT INSTALL

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 PROGRAM
  - DIRECT INSTALL
    - PARTICIPATION STEPS
    - PARTICIPATING CONTRACTORS
    - SUSTAINABLE JERSEY
  - ENERGY BENCHMARKING
  - OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS
  - EDA PROGRAMS
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Home » Commercial & Industrial » Programs » Direct Install

Direct Install - Steps to Participation

New Jersey SmartStart BUILDINGS

NEW JERSEY'S CLEAN ENERGY PROGRAM DIRECT Install

SIX SIMPLE STEPS TO PARTICIPATION

CONTACT THE PARTICIPATING CONTRACTOR IN YOUR AREA

Identify the contractor assigned and trained to provide Direct Install services in the county where your project is located. Using the contact information provided, call or send an e-mail to the participating contractor to discuss your project. The contractor will schedule an energy assessment and work with you to complete the program application and participation agreement.

If you're unable to contact the participating contractor or have questions, you may contact us at 866-NJSMART or send an e-mail to DirectInstall@NJCleanEnergy.com..

REVIEW RESULTS

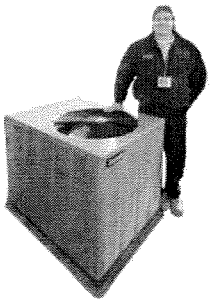
After the energy assessment, the contractor will review the results with you, including what measures qualify and your share of the project cost.

MOVE FORWARD

You will sign a scope of work document to proceed with implementation of qualifying measures.

ARRANGE INSTALLATION

You and the participating contractor will set a convenient start date for the installation.



CONFIRM INSTALLATION

Once the participating contractor completes the installation, you accept the work by signing a project completion form.

COMPLETE TRANSACTION

You pay the participating contractor your share of the project cost and New Jersey's Clean Energy Program pays the rest.

Program Updates

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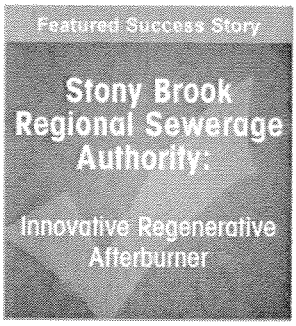

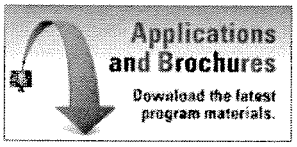

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III. PAY FOR PERFORMANCE (P4P)

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.

IV. 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
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Energy Savings Improvement Program

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

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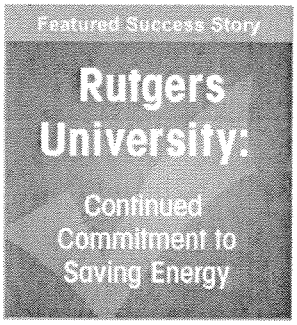

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LFN 2011-17

June 16, 2011

Local Finance Notice

Chris Christie, *Governor* | Kim Guadagno, *Lt. Governor* | Lori Grifa, *Commissioner* | Thomas H. Neff, *Director*

Update on Implementing Energy Savings Improvement Programs

This Local Finance Notice provides guidance concerning Energy Savings Improvement Program (ESIP) matters that affect local units covered under the Local Public Contracts Law (LPCL, N.J.S.A. 40A:11) and the Public School Contracts Law (PSCL, N.J.S.A. 18A:18A).

The Notice covers a model ESCO (Energy Services Company) Request for Proposal document and provides information on using the "Do-It-Yourself" process for implementing an ESIP. This Notice supplements Local Finance Notice 2009-11 concerning ESIPs.

Model ESCO Request for Proposal Document

General Issues

The Division of Local Government Services and the Board of Public Utilities have completed development of a model ESCO Request for Proposal Document. It is designed to assist all organizations (contracting units) covered by the LPCL and PSCL hire an energy services company (ESCO) to develop and implement an Energy Savings Plan (ESP) as part of an Energy Savings Improvement Program as authorized under N.J.S.A. 40A:11-4.6 and 18A:18A-4.6.

Specifically, the document serves as the starting point for these government agencies to select an ESCO through the competitive contracting procedure (N.J.S.A. 40A:11-4.1 et seq. and 18A:18A-4.1 et seq.).

Notwithstanding the efforts of the State agencies to ensure that the RFP is consistent with all relevant procurement procedures, laws, and regulations, there are several issues contracting unit personnel should keep in mind:

1) Local legal advisors should review the document to ensure it is consistent with any allowable local practices and legal considerations.
2) The individual responsible for managing the project should review the entire RFP in order to be able to answer questions and ensure the document meets local needs.
3) Forms have been carefully designed to meet the need of this specific process. Care should be taken if proposed forms are removed and replaced with ones normally used by the contracting unit.

Contact Information

Director's Office
V. 609.292.6613
F. 609.292.9073

Local Government Research
V. 609.292.6110
F. 609.292.9073

Financial Regulation and Assistance
V. 609.292.4806
F. 609.984.7388

Local Finance Board
V. 609.292.0479
F. 609.633.6243

Local Management Services
V. 609.292.7842
F. 609.633.6243

Authority Regulation
V. 609.984.0132
F. 609.984.7388

Mail and Delivery
101 South Broad St.
PO Box 803
Trenton, New Jersey
08625-0803
Web: www.nj.gov/dca/lgs
E-mail: dlgs@dca.state.nj.us

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Local Procurement Officials

The RFP also uses a formal process for potential proposers to submit questions and requests for clarifications. Appendix B is a form for the submission of these requests and is referred to throughout the text.

Contracting units are also reminded the Competitive Contracting process does not allow for negotiating proposals. While legal elements of the contract (project development agreement) may require legal determinations and modifications, the process does not allow for negotiation of price or related substantive elements and any element that would have provided less than a level playing field for proposers.

Contracting units are also cautioned that setting qualification standards that arbitrarily limit competition is inconsistent with public bidding requirements.

Office of State Comptroller Filing: Contracting units are also reminded of their obligations to meet State Comptroller requirements for public contracts. In accordance with N.J.S.A 52:15C-10, contracting units must notify OSC as early as practicable, but no later than 30 days before advertisement, of any negotiation or solicitation of a contract that may exceed $10 million. Contracting units must also provide post-award notification for any contract for an amount exceeding $2 million. Notification must be given within 20 days of the award.

Substantive Edits:

Several sections are highlighted in green. These sections should be carefully edited to meet contracting unit needs. This has important application to evaluation criteria in Section D. Once finalized, the green highlight should be removed.

Section B-16; Insurance should be reviewed by the contracting unit's Risk Management professionals to be sure the standards are appropriate to the contracting unit and the work to be done.

The following Sections also require local decisions and editing:

- A-3: # of copies of proposal and # of CDs to be submitted
- A-4: Web posting address, if desired
- A-5: If extra credit is to be provided on evaluation scoring for attending site walk through
- B-11: Delete LPCL or PSCL section as appropriate
- B-34: Use only if PSCL
- C-1: Explanation of type of audit information
- C-3(k): Include if ESCO is to provide financing option
- Use of Appendix F and Proposal Requirements #8: These forms are related to submission of Political Contribution Disclosure forms. Only PSCL agencies are required to use these forms as pursuant to Public School Fiscal Accountability Procedures (N.J.A.C. 6A23A-6.3). The forms and references to it should be removed for all LPCL users.

Under the ESIP DIY approach, there would be no conflict in a properly procured single organization conducting the audit, developing the ESP, then preparing plans and specifications. This does not apply when using the ESCO approach, where the auditor and ESCO must be independent.

Once construction plans and specifications are complete, the contracting unit would then conduct the bidding process as it would any public works construction project: manage the project as it sees fit (the firm that did the plans could also serve as construction manager), and then contract as necessary for commissioning and final third party verification. The two verification steps (the ESP and verifying implementation) must be performed by an organization independent of the ones preparing the ESP, overseeing construction and commissioning.

By following this process, the contracting unit can then apply to the Local Finance Board for the issuance of ESIP-based energy saving obligations or enter into appropriate lease financing.

The ESIP approach to energy improvement provides a range of options for contracting units to accrue energy savings while improving the environment, taking advantage of low-cost financing and state and federal incentives. DLGS and the BPU encourage comments and questions (through the ESIP web page) on this new opportunity so we can improve it as time goes on.

Approved: Thomas H. Neff, Director, Division of Local Government Services

Table of Web Links

Page	Shortcut text	Internet Address
1, 4	Local Finance Notice 2009-11	http://www.nj.gov/dca/lgs/lfns/09lfns/2009-11.doc
2	ESIP webpage	http://www.nj.gov/dca/lgs/lpcl/esip.htm
2	email comments	mailto:lpcl@dca.state.nj.us
2	to register (via email	mailto:lpcl@dca.state.nj.us
2	GovConnect Local Procurement	http://www.nj.gov/dca/surveys/ppsurvey.htm
3	State Comptroller requirements.	http://www.nj.gov/comptroller/compliance/index.html

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.

APPENDIX E

Photovoltaic Analysis

Newark Public Schools
John F. Kennedy

Cost of Electricity	$0.18	/kWh
Electricity Usage	387,600	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
$680,000	**170.0**	**221,567**	**0**	**$39,882**	**0**	**$39,882**	**$0**	**$34,343**	**17.1**	**9.2**

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $155 /1000kwh

Area Output*
2,358 m2
25,384 ft2

Perimeter Output*
386 m
ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
21,576 ft2

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

8 watt/ft2
172,611 DC watts
170 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	07103	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output
221,567 annual kWh calculated in PV Watts program

% Offset Calc

Usage	387,600	(from utilities)
PV Generation	221,567	(generated using PV Watts)
% offset	57%	

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

AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification

Cell ID:	0268370
State:	New Jersey
Latitude:	40.9 ° N
Longitude:	74.2 ° W

PV System Specifications

DC Rating:	170.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	141.1 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0 °
Array Azimuth:	180.0 °

Energy Specifications

Cost of Electricity:	18.0 ¢/kWh

Results

Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	2.65	11876	2137.68
2	3.47	14065	2531.70
3	4.83	20875	3757.50
4	5.28	21397	3851.46
5	5.93	24412	4394.16
6	6.32	24512	4412.16
7	5.87	23073	4153.14
8	5.55	21965	3953.70
9	5.04	19661	3538.98
10	4.14	17289	3112.02
11	2.82	11611	2089.98
12	2.46	10831	1949.58
Year	4.54	221567	39882.06

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

RReDC home page (http://rredc.nrel.gov)

Estimated Cost:

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
40 SF Solar Hot Water Collector (and associated systems included)	540	EA	$ 950	INC	INC	$ 526,851	INC	INC	$ 526,851	Estimated based on previous experience
						$ -	$ -	$ -	$ -	

64800 gal

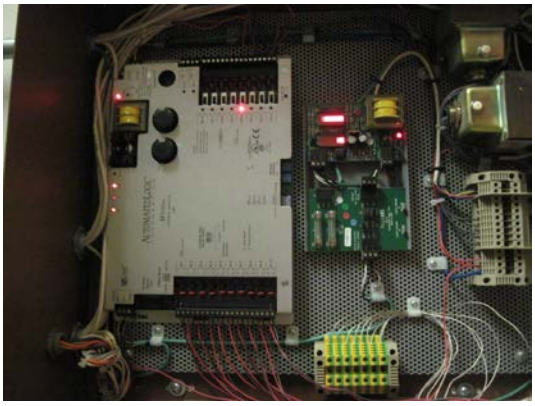
*Cost Estimates are for energy calulations only . Do not use for procurement

$ 526,851	Subtotal
$ 131,713	25% Contingency
$ 658,600	Total

APPENDIX F

Photos

1: Existing boilers



2: Existing window AC unit

L1: Example of existing lighting in classroom

3: Existing HHW pumps and motors

APPENDIX G

EPA Benchmarking Report

ENERGY STAR® Statement of Energy Performance

46

ENERGY STAR® Score[1]

John F. Kennedy School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 46,576
Built: 1968

For Year Ending: May 31, 2013
Date Generated: April 22, 2014

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

Property & Contact Information

Property Address
John F. Kennedy School
311 South 10th Street
Newark, New Jersey 07103

Property Owner
Newark Public Schools
2 Cedar Street
Newark, NJ 07102
(____)____-_____

Primary Contact
Newark Public Schools
2 Cedar Street
Newark, NJ 07102
9737337334
webmaster@nps.k12.nj.us

Property ID: 3924341

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
89.9 kBtu/ft²

Source EUI
157.8 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	2,775,288 (66%)
Electric - Grid (kBtu)	1,412,568 (34%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	87.5
National Median Source EUI (kBtu/ft²)	153.6
% Diff from National Median Source EUI	3%

Annual Emissions

Greenhouse Gas Emissions (MtCO2e/year)	326

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____Date: _____

Licensed Professional

Gregory Coleman
10 Maxwell Drive
Suite 200
Clifton Park, NY 12065
000-000-0000
mvadney@trcsolutions.com

Professional Engineer Stamp (if applicable)