

THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

EAST SIDE HIGH SCHOOL

238 Van Buren St, Newark, NJ 07105

**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 $\pm 20\%$, 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
East Side High School	238 Van Buren St, Newark, NJ 07105	302,353	1911

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)
East Side High School	416,394	42,292	98,767	13.1

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 chooses 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
1A	Replace Steam to Hot Water Heat Exchanger w/ Dedicated Hot Water Boilers	450,541	14,047	32.1	12,000	31.2	Y
1B**	Convert Steam Heating System to Hydronic Heat w/ High Efficiency Condensing Boilers	3,006,712	11,864	253.4	12,000	252.4	N
2	Install Premium Efficiency Motors	7,275	212	34.4	0	34.4	Y
3	Install Window AC Controllers	10,000	5,859	1.7	0	1.7	Y
4A	Install Basic Controls	21,309	23,084	0.9	0	0.9	Y
4B**	Install Full DDC Controls	1,295,684	44,718	29.0	0	29.0	N
5	Domestic Hot Water System Improvements	17,937	1,354	13.2	700	12.7	Y
6	Install Walk-In Cooler/Freezer Controls	41,250	1,280	32.2	0	32.2	Y
7	Install Vending Machine Occupancy Sensors	1,120	1,441	0.8	0	0.8	Y
8	Install Low Flow Plumbing Fixtures	590,264	18,263	32.3	0	32.3	N
L1**	Lighting Replacements / Upgrades	690,686	44,074	15.7	4,800	15.6	N
L2**	Install Lighting Controls (Add Occupancy Sensors)	49,997	14,285	3.5	6,660	3.0	N
L3	Lighting Replacements with Controls (Occupancy Sensors)	740,684	51,489	14.4	11,460	14.2	Y
Total**		1,880,380	117,029	16.1	24,160	15.9	
Total (Recommended)		1,290,116	98,767	13.1	24,160	12.8	

* Incentive shown is per the New Jersey SmartStart Program.

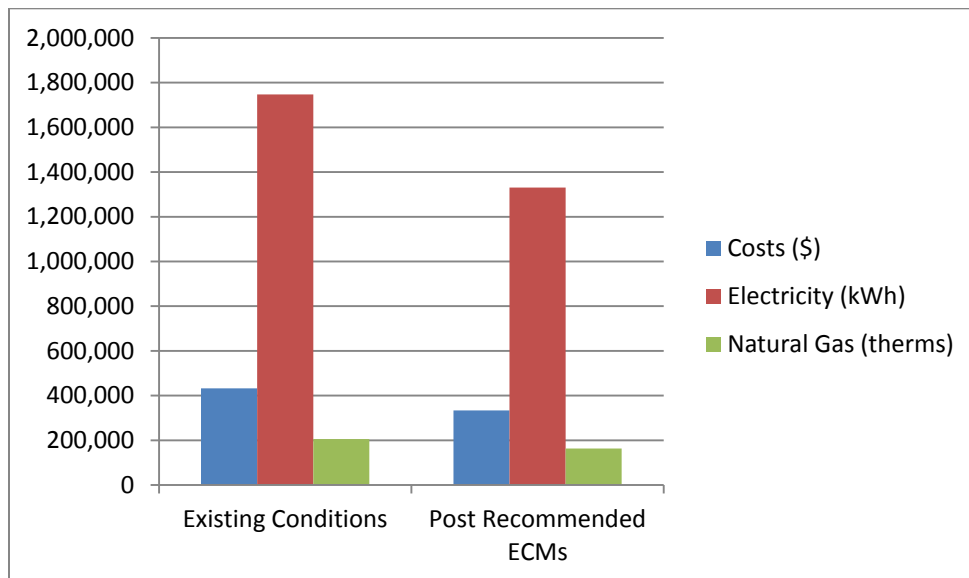
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 130 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	432,109	333,342	23%
Electricity (kWh)	1,747,200	1,330,806	24%
Natural Gas (therms)	205,673	163,381	21%
Site EUI (kbtu/SF/Yr)	87.7	69.1	



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: East Side High School (Index No. 26)

Address: 238 Van Buren St, Newark NJ 07105

Gross Floor Area: 302,353 Square Feet

Number of Floors: 6

Year Built: 1911 (A-wing)

Additions: 1916 (B-wing), 1925 (C-wing), 1979 (D-wing)



Description of Spaces: Classrooms, offices, cafeteria, kitchen, two gymnasiums, weight room, auditorium with a stage, auto-shop, library, computer labs, science labs, storage rooms, toilet rooms and a mechanical room.

Description of Occupancy: The school serves 1467 students from 9th to 12th grade. There are 110 school faculty and staff members.

Number of Computers: The school has approximately 75 desktop and laptop computers.

Building Usage: Hours of operation are 6:30 AM – 3:00 PM Monday through Friday, with various after-school activities until 9:00 PM. Custodians are in the building until 11:00 each night. In general the occupied hours are considered 80 hours per week, 10 months per year

Construction Materials: The building is constructed of brick and concrete masonry units (CMU) with steel framing and insulation only in vintages where it was required by building code (1979). The interior walls are a mixture of brick and plaster.

Façade: Brick

Roof: The roof is flat with about 3" of sprayed high density closed cell polyurethane spray foam coated with an enriched polyuria coating to prevent leaks and seal the roof. Although well insulated, the roof appeared to be in need of some patching.

Windows: The windows throughout the building are double hung single pane aluminum framed windows. Windows are in good condition and no ECMs associated with window replacement were evaluated.

Exterior Doors: Exterior doors throughout the school are FRP with double pane safety glass. The door seals and sweeps are in good condition; there are no ECMs associated with the exterior doors.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Heating in this building is generated by three (3) natural gas fired Trane packaged fire tube steam boilers with capacities of 13,390 lbs/hr each located in the boiler room in the A-building. The custodian on staff indicated that only one boiler was needed on average to maintain the heat within the buildings, however a second was always on standby in the event more heat is needed. All three boilers never run at the same time. Boiler blow-down is performed once per day and a steam trap survey and steam system inspection is performed once per year. There are two uninsulated heat exchangers mounted from the ceiling which convert roughly 75% of the steam to hot water (HW) which is circulated throughout the B, C and D wings by three (3) 7.5 HP pumps. The custodian on staff noted that the steam pressure is normally maintained at 4psi, while the target HW temperature is usually 200-205F. Steam is distributed to steam radiators in corridors and rooms in the A-wing. HW is distributed to heating and ventilation (HV) units in the B-wing and to unit ventilators (UV) and HW radiators in B, C and D-wings.

In general a steam heating system is less efficient and consumes more energy than that of a hot water heating system. For the portion of the steam which is used to generate HW for heating, it would be far more efficient to generate HW directly from high efficiency condensing hot water boilers. We have included two ECM's to address this issue, one replaces the heat exchangers with high efficiency hot water boilers and the second ECM replaces the entire steam heating system with a high efficiency hot water system.

A separate ECM has also been included which evaluates replacing the existing pump motors with premium efficiency motors.

Cooling: This building has no central cooling system of any kind. There are roughly 52 window air conditioning units which make up an estimated 5% of the building which is cooled. Since there is not automated control, occasionally window ACs may be left on while the building is unoccupied. There is an ECM included which evaluates using window AC controllers.

Ventilation: There are two McQuay HVs located in a penthouse on the top floor of B-wing which supply 100% ventilation air and contain HW coils for heating. The units supply fresh air to the gymnasium and cafeteria.

There are also two (2) HV units with HW coils located in C-wing penthouse which used to bring in fresh air and supply UVs in the ceiling of the corridors, but are no longer functioning.

Other ventilation in classrooms is achieved by either UVs which bring in a small amount of ventilation air, or through teachers opening windows.

There are no ECMs associated with the ventilation system.

Exhaust: There are several small fractional horsepower exhaust fans located throughout the school which provide general exhaust, exhaust for restrooms and some specialty exhaust for science rooms with fume hoods. There is also two (2) exhaust fans estimated to be 1 HP each which provide exhaust for the kitchen hoods and are controllable from switches in the kitchen.

Normally a kitchen hood controller would be recommended any time there is a kitchen hood in use; however kitchen staff indicated that the hood is almost never used; therefore there would be no savings for implementing this measure.

Controls Systems

The boilers for the most part are manually controlled by the head custodian on staff. There is a Johnson Controls Metasys control system which can automatically fire the back-up boiler if there is a flame failure on the lead boiler, but is otherwise not reliable. The radiators in the classrooms and corridors have no control valves whatsoever. UVs in classrooms also have no controls unless the panel is open, in which case teachers can dial back the fan if desired. It was observed that windows were open throughout the school during the facility visit which is an indication of overheating. In general heating in the building is regulated by teachers opening and closing the windows. The boilers are typically turned on in October and off in April. UVs in rooms which have them are manually controlled on each unit. In general there are no thermostats in the class rooms and corridors and therefore no set points. The gymnasium and cafeteria HV units are controlled by thermostats and appeared to be set at 70F during the facility visit. A Basic Controls ECM is included to address the boiler/ steam valve operation. An alternate ECM is also included that evaluates the energy savings potential of adding a full DDC controls system that will control all terminal units as well as the boilers.

Domestic Hot Water Systems

Domestic hot water (DHW) is generated by one (1) 85 gallon natural gas fired AO Smith DHW heater with an input capacity of 365,000 btu/h which is connected to two (2) 119 gallon storage tanks. DHW is used throughout the school for restroom faucets, custodial mop sinks and the kitchen scullery sinks. ECM is included to evaluate the replacement of this water heater and connected storage tanks with a smaller capacity condensing gas domestic water heater.

Kitchen Equipment

The kitchen at East Side High School is only used to reheat food (cooking is performed elsewhere). Kitchen equipment includes two (2) double convection ovens, one (1) deep fryer, two (2) three door steam pressure cookers and two (2) kettles; however kitchen staff noted that none of the cooking equipment is used except for the ovens. In addition there are four (4) double door reach-in coolers, three (3) double door freezer, one (1) 15'x15' walk-in cooler and one (1) 8'x6' walk-in freezer. There is no dishwasher in this school and therefore no dishwasher booster heater. All pots and pans are washed by hand in the kitchen scullery sinks. An ECM has been included which evaluates installing walk-in cooler / freezer controls. The remainder of the kitchen equipment appeared to be in good condition and is not recommended for replacement.

Plug Load

This school has computers, audio/video equipment, copiers, smart boards, residential appliances (microwave, refrigerator), printers and vending machines which contribute to the plug load in the building. An ECM has been included to install vending machine occupancy sensors.

Plumbing Systems

The plumbing fixtures (i.e., toilets and urinals) appear to be high flow and lavatory faucets have metering-type faucets. Older ceramic drinking fountains are present in corridors. An ECM is included to evaluate the water savings potential of installing low- flow water closet and urinals.

Lighting Systems

The lighting in the building is primarily 4' ceiling/flush, pendant or recessed mounted linear fluorescent T8 fixtures with either one or two lamps each. The gymnasium has 200W metal halide (MH) fixtures. In general all fixtures are controlled by switches mounted on the wall; although the corridors are controlled by breaker.

Exterior lighting consists of 70W metal halide wall packs. Exterior fixtures are likely controlled by photo-sensors mounted on the lighting fixtures. Three lighting ECM options have been included to evaluate adding occupancy sensors to the existing lighting; replacing the existing lighting with LED lighting and a third ECM which assesses the savings of occupancy sensors installed on the proposed LED lights.

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

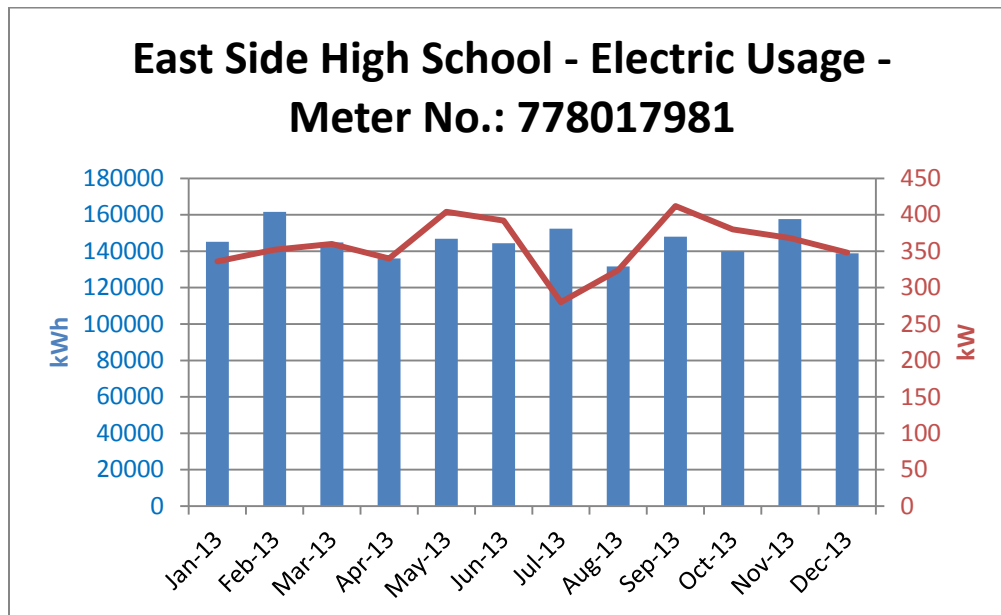
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	1,747,200	kWh
Annual Cost	244,221	\$
Blended Unit Rate	0.14	\$/kWh
Supply Rate	0.12	\$/kWh
Demand Rate	6.29	\$/kW
Peak Demand	412	kW
Natural Gas		
Annual Consumption	205,673	Therms
Annual Cost	187,888	\$
Unit Rate	0.91	\$/therm

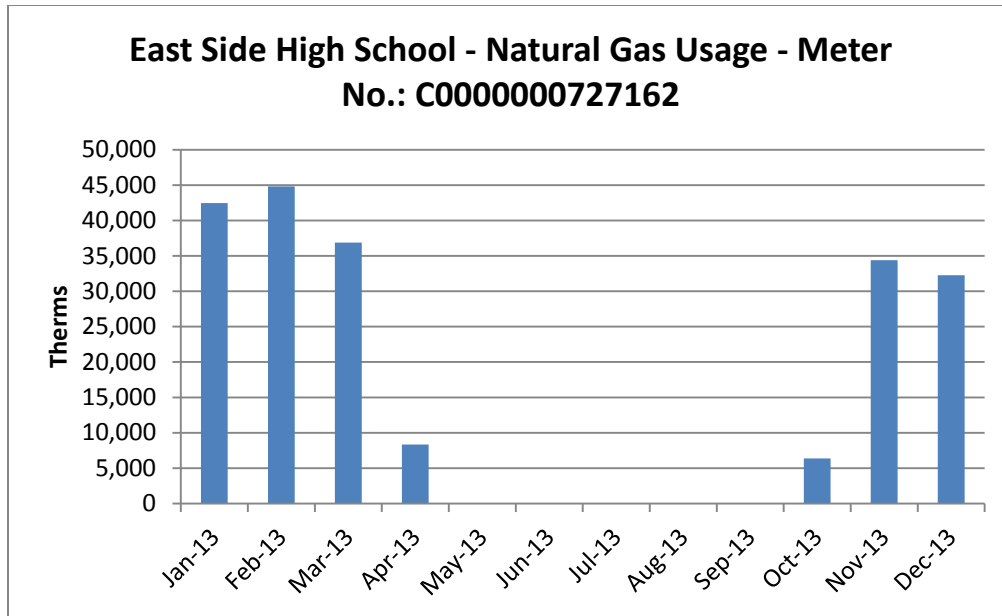
Blended Rate: Average rate charged determined by the annual cost / annual usage

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)



The electric usage remains constant all year round which is expected from this type of school which does not have any major cooling systems. There is a small rise in demand during the summer months which could be attributed to window ACs; but drops off in July and August when school is not in session.



Natural gas is used primarily for space heating during the winter months which can be easily seen in the chart above. The small amount of baseline usage during the summer months is attributed to the domestic hot water system as well as kitchen equipment.

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 detailed 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	\$0.124	\$0.128	N
Natural Gas	\$/Therm	\$0.914	\$0.955	N

* Per U.S. Energy Information Administration (Annual 2013 data – Electricity and Natural Gas)

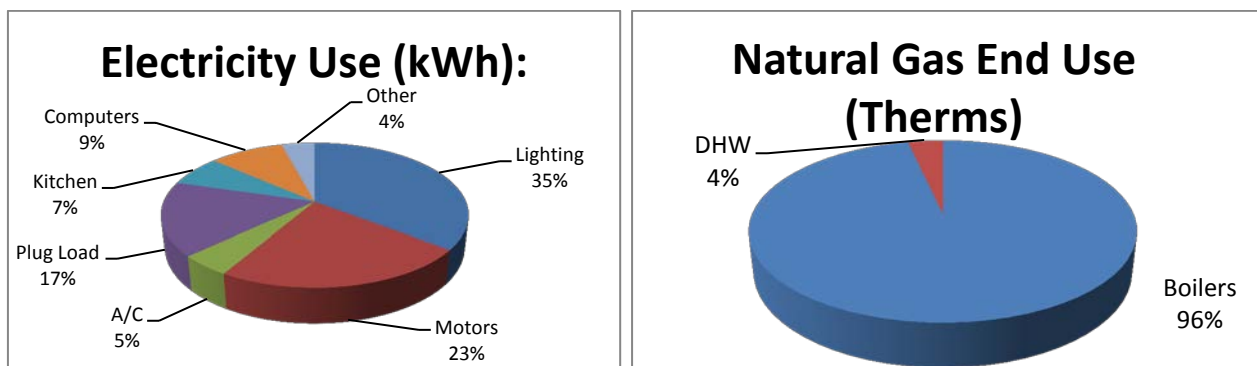
Additional information on selecting a third party energy supplier is available here:

<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.

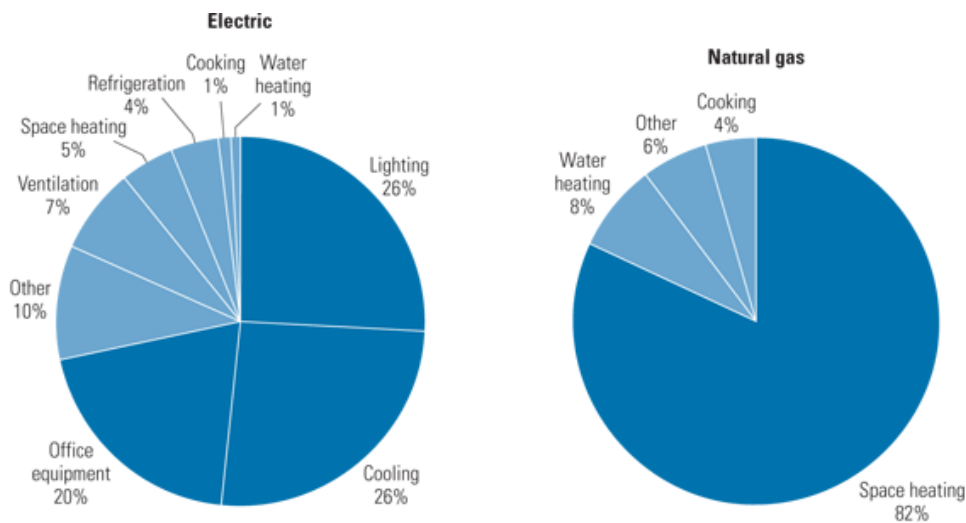
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

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/ft²/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 an 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)
87.7*	68**

* Calculated by CHA using Utility Data provided by NPS

** Provided by TRC

The school has an above average Energy Star Rating Score (50 being the median score), and is considered an energy efficient building.

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.

5.1.1 ECM-1A Separate Hot Water System from Steam

Presently, 75% of the building is heated by hot water which is generated through a heat exchanger with steam from the steam boilers. This is an inefficient process which could be improved by installing dedicated hot water boilers which would generate hot water directly for the system rather than using steam.

New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. To implement this ECM, the heat exchanger and associated piping will be removed and the new hot water boilers, distribution piping and primary pumps put in their place. Some piping and wiring modifications will be 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-1A Separate Hot Water System from Steam

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
450,541	-	-	15,436	14,047	(0.2)	12,000	32.1	31.2

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

This measure is recommended.

5.1.2 ECM-1B Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers

The heating system consists of two (2) natural gas fired steam boilers. The boilers have a nameplate efficiency of 80%.

Steam heating systems are inherently inefficient and high maintenance as compared to re-circulated hot water heating systems or other modern heating systems. As steam systems age, the steam traps fail which then requires more untreated cold make-up water. This in turn requires more chemical treatment and increases the risk of boiler thermal shock. Steam piping becomes fouled with scale and corrosion over time resulting in poor heat transfer and ultimately pipe failure. Steam heating systems use boilers that only operate up to 84% combustion efficiency and have even lower thermal efficiency. Multiple condensate pumps and boiler feed water pumps consume electricity that would not be needed in other modern heating systems.

In lieu of replacing the boilers in kind, this ECM evaluates replacing the steam system in its entirety with a more efficient hot water system. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. To implement this ECM, the old steam boilers, distribution piping, venting and terminal units would be removed and the new hot water boilers, distribution piping and primary pumps

put in their place. Significant piping and wiring modifications would be 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-1B Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
3,006,712	-	-	13,037	11,864	(0.9)	12,000	253.4	252.4

* 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 capital cost as well as long payback period, however this ECM should be considered based on the life cycle cost savings as the current boilers and heating system are well beyond their useful life.

5.2 ECM-2 Install Premium Efficiency Motors on Pumps

There are several pump motors in the boiler room which were observed to be less than premium efficiency. These include two (2) 7.5 HP feedwater pumps (88.5%), four (4) 2 HP condenser water pumps (84%) and three (3) 7.5 HP hot water pumps (89.5%). Premium efficiency 7.5 HP motors are 91% efficiency while 2 HP motors are 86.5% efficient.

The savings of this measure are calculated from the motor efficiency improvement for the motors operating at full load.

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

ECM-2 Install Premium Efficiency Motors on Pumps

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
7,275	0.6	1,319	-	212	(0.4)	-	34.4	34.4

* 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 Install Window A/C Controller

There are approximately 52 window air conditioners located throughout the school in classrooms and offices.

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-3 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
10,000	-	41,853	-	5,859	4.9	-	1.7	1.7

* 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 building uses steam boilers that are currently controlled manually by the building operators. Steam pressure is maintained at 3-5 psi most of the day with no regard to space temperature. Classrooms are overheated as a result and the teachers open the windows in an attempt to cool the rooms down. 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 will provide automatic control of the boiler(s) to produce only enough steam (or hot water) needed to heat the building, based on a single or multiple averaging space thermostats and outdoor air temperatures. This system will not provide for independent room temperature control, but could be expanded in the future to provide this function, if desired using thermostatic radiator control valves. This system could also provide basic boiler and space temperature monitoring, trending and remote notification of boiler failure.

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	-	-	25,367	23,084	9.8	-	0.9	0.9

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

This measure is recommended.

5.4.2 ECM-4B Install Full DDC Controls

A Full Direct Digital Control (DDC) building automation system consists of automatic control of individual space heating and ventilation equipment, and provides monitoring, trending and alarms which notify an operator when a piece of equipment fails or operates outside a given set-point. This system allows for the implementation of energy efficient strategies, such as: time of day (TOD) optimization, set point optimization, staggered start, night setback, temporary daytime setback, economizer (free cooling), demand control ventilation, exhaust fan shut down, and holiday TOD optimization. It also allows for remote access and control of the building's systems. This ECM is recommended only if the building HVAC system is to be fully renovated to include new boilers, pumps and ventilation equipment as it will optimize the energy savings potential of the new systems.

Energy savings are generated from temperature reduction during the day and night as well as other controls sequences mentioned above, as applicable to the proposed HVAC system improvements. The savings is estimated at 10% overall energy reduction based on past experience with similar sized school buildings having fully functioning digital controls.

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

ECM-4B Install Full DDC Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
1,295,684	-	-	49,140	44,718	(0.7)	-	29.0	29.0

* 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-4A and due to the high cost of implementation and long payback period.

5.5 ECM-5 Domestic Hot Water System Improvements

The existing domestic hot water heating system consists of one (1) natural gas fired DHW heater and two storage tanks with a combined capacity of 323 gallons. The DHW heater has a thermal efficiency of 80%. The amount of stored water is oversized for this type of school which only uses hot water at hand sinks.

Implementation of this ECM will entail replacing the existing DHW heater with a high efficiency condensing water heaters. The tank size of the existing system will be reduced to which will result in a combined savings from reducing the storage losses as well as reducing the overall fuel consumption. The proposed DHW heaters include one (1) high efficiency condensing heater with 100 gallon capacity.

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

ECM-5 Domestic Hot Water System Improvements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
17,937	-	-	1,488	1,354	0.9	700	13.2	12.7

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

This measure is recommended.

5.6 ECM-6 Install Walk-in Cooler / Freezer Controls

Presently there is one (1) walk-in cooler and one (1) walk-in freezer in this building.

Installing a walk-in cooler/ freezer control system was assessed. The system will monitor both dry and wet bulb temperature within the walk-in unit and allow evaporators and compressors to modulate up and down based on enthalpy set points rather than by dry bulb temperature alone. Savings is a result of reduced run time of evaporator fans, compressors and door heaters.

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

ECM-6 Install Walk-in Cooler / Freezer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
41,250	-	9,142	-	1,280	(0.5)	-	32.2	32.2

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

This measure is recommended.

5.7 ECM-7 Install Vending Misers

The building presently has three (3) cold beverage and one (1) snack-type vending machines in the building.

These vending machines operate continuously 24 hours per day, seven (7) days a week. Installing controls such as timers or occupancy sensors allow the machines to turn on only when a customer is present or when the compressor must run to maintain the product at the desired temperature. By implementing this measure electrical energy savings could be realized.

The calculation uses electrical consumption and annual electrical cost as the baseline, vs. the reduced electrical consumption and cost for the proposed case. The difference between the two values is the energy savings.

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

ECM-7 Install Vending Misers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
1,120	-	10,295	-	1,441	11.9	-	0.8	0.8

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

This measure is recommended.

5.8 ECM-8 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, 1.0 gal/flush urinals, and 0.5 gpm faucets 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-8 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
590,264	-	-	-	2,419	18,263	(0.1)	-	32.3	32.3

* 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 high capital cost and long payback period.

5.9.1 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. Exterior lighting includes 70W wall mounted area light fixtures. 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
690,686	101	293,988	-	44,074	(0.3)	4,800	15.7	15.6

* 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 not recommended in lieu of ECM L3.

5.9.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Presently, all interior lighting fixtures are controlled by 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 5.9.1, 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
49,997	0	115,204	-	14,285	2.2	6,660	3.5	3.0

* 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.

5.9.3 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
740,684	101	353,785	-	51,489	(0.2)	11,460	14.4	14.2

* 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.

5.10 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
- Perform a steam trap assessment yearly to ensure steam traps are functioning properly.
- Insulate hot water heat exchangers
- 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

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 does not qualify for this program because its electrical demand is more 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, along with more detailed program information provided 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)
16,832	130

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 2014 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 – 130 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	
520,000	130	162,366	0	22,731	25,167	22.9	10.9	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.

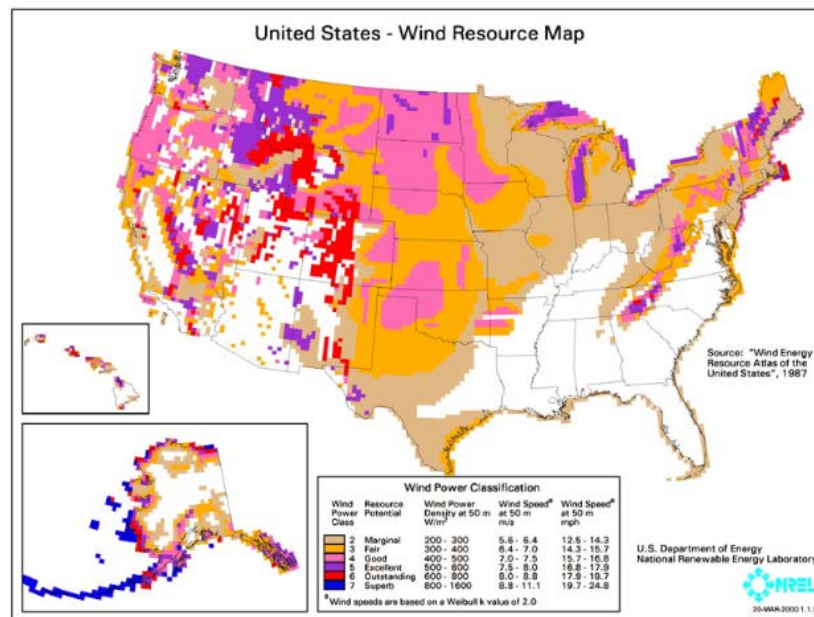
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). 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.

This measure is not recommended due to the relatively low domestic hot water usage.

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 due the location of the school.

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 lack of sufficient year round thermal load need to make a CHP system financially viable.

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
412	280	358	Y	Y

This measure is not recommended because the building does not have adequate onsite generation to support the entire electrical building load.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of \$98,767/yr with an overall payback of 13.1 years, if the recommended ECMs are implemented.

The potential annual energy and cost savings for the recommended ECMs are shown in the following table.

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
416,394	42,292	98,767	13.1

The following projects should be considered for implementation:

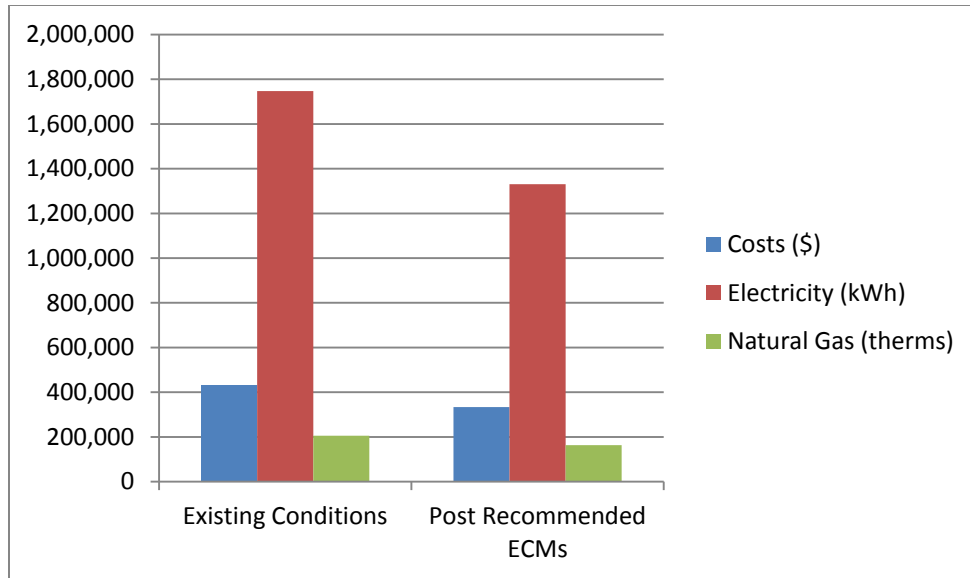
- Replace Steam to Hot Water Heat Exchanger w/ Dedicated Hot Water Boilers
- Install Premium Efficiency Motors
- Install Window A/C Controller
- Install Basic Controls
- Domestic Hot Water System Improvements
- Install Walk-In Cooler/Freezer Controls
- Install Vending Machine Occupancy Sensors
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 130 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	432,109	333,342	23%
Electricity (kWh)	1,747,200	1,330,806	24%
Natural Gas (therms)	205,673	163,381	21%
Site EUI (kbtu/SF/Yr)	87.7	69.1	



Next Steps: This energy audit has identified several areas of potential energy savings. Newark Public Schools can use this information to pursue incentives offered by the NJBPU's NJ Clean Energy Program. Additional meetings will be scheduled with NPS staff members to review possible options.

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

East Side High School - Electric Usage

										Blended	Consumpt	Demand
Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption (\$)	Rate (\$/kWh)	ion Rate (\$/kWh)	Rate (\$/kW)	
1/5/2012	2/2/2012	152400	372	24,385.00		0	4,663.40	1,297.02	23,087.98	0.16	0.15	3.49
2/3/2012	3/5/2012	163200	376	26,110.00		0	4,966.63	1,310.96	24799.04	0.16	0.15	3.49
3/6/2012	4/3/2012	143200	368	22,915.00		0	4,405.10	1,283.07	21631.93	0.16	0.15	3.49
4/4/2012	5/3/2012	143200	352	22,910.00		0	4,405.10	1,227.28	21682.72	0.16	0.15	3.49
5/4/2012	6/4/2012	157200	376	25,150.00		0	7,917.01	1,310.96	23839.04	0.16	0.15	3.49
6/5/2012	7/3/2012	133200	364	21,258.45	12,653.73	7,335.60	1,269.12	19989.33	0.16	0.15	3.49	
7/4/2012	8/2/2012	133600	232	19,837.52	12,762.62	6,266.01	808.89	19028.63	0.15	0.14	3.49	
8/3/2012	8/31/2012	131600	236	19,320.41	12,250.02	6,247.55	822.84	18497.57	0.15	0.14	3.49	
9/1/2012	10/2/2012	152800	376	20,164.91	13,936.62	4,917.32	1,310.97	18,853.94	0.13	0.12	3.49	
10/3/2012	10/31/2012	128400	356	17,714.23	12,307.66	4,165.34	1,241.23	16473	0.14	0.13	3.49	
11/1/2012	12/3/2012	149600	336	19,405.87	13,468.71	4,765.66	1,171.50	18234.37	0.13	0.12	3.49	
12/4/2012	1/3/2013	145200	332	19,064.48	13,256.69	4,648.38	1,159.41	17905.07	0.13	0.12	3.49	
1/4/2013	2/1/2013	145200	336	19,163.55	13,233.87	4,738.76	1,190.92	17972.63	0.13	0.12	3.54	
2/2/2013	3/5/2013	161600	352	20,822.48	14,649.54	4,925.31	1,247.63	19574.85	0.13	0.12	3.54	
3/6/2013	4/4/2013	144800	360	19,344.80	13,616.62	4,452.20	1,275.98	18068.82	0.13	0.12	3.54	
4/5/2013	5/3/2013	136000	340	18,704.55	13,295.07	4,204.38	1,205.10	17499.45	0.14	0.13	3.54	
5/4/2013	6/4/2013	146800	404	23,576.08	14,191.22	4,546.35	4,838.51	18737.57	0.16	0.13	11.98	
6/4/2013	7/3/2013	144400	392	23,212.55	13,786.29	4,731.48	4,694.78	18517.77	0.16	0.13	11.98	
7/3/2013	8/2/2013	152400	280	22,014.86	13,688.58	4,972.86	3,353.42	18661.44	0.14	0.12	11.98	
8/2/2013	9/3/2013	131600	324	20,109.13	11,883.48	4,345.26	3,880.39	16228.74	0.15	0.12	11.98	
9/3/2013	10/2/2013	148000	412	19,665.90	13,364.40	4,841.21	1,460.29	18205.61	0.13	0.12	3.54	
10/2/2013	10/31/2013	140000	380	18,602.00	12,642.00	4,613.13	1,346.87	17255.13	0.13	0.12	3.54	
11/1/2013	12/3/2013	157600	368	20,681.62	14,231.28	5,146.00	1,304.34	19377.28	0.13	0.12	3.54	
12/3/2013	1/3/2014	138800	348	18,323.23	12,533.64	4,556.14	1,233.45	17089.78	0.13	0.12	3.54	

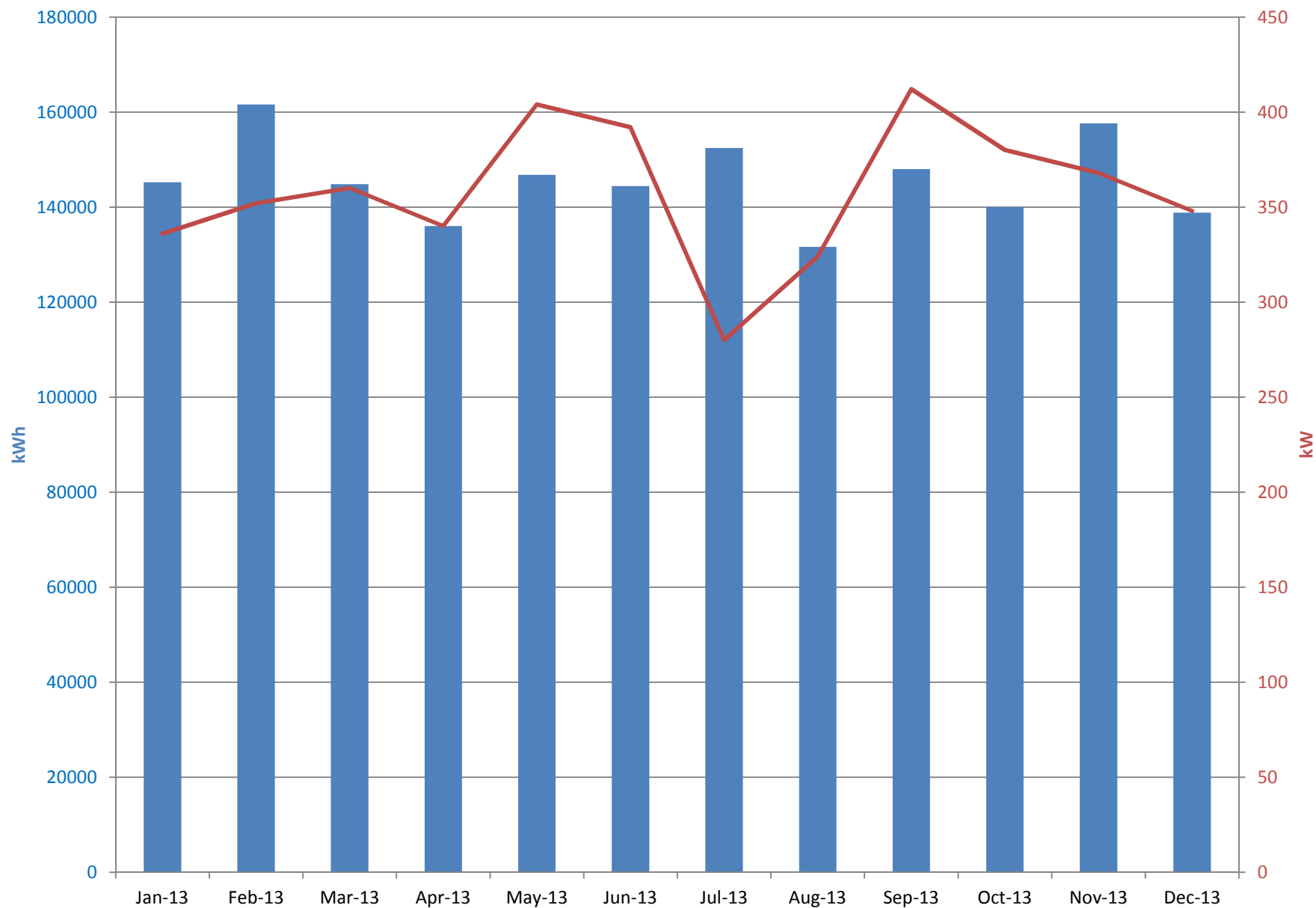
East Side High School	Start Date	End Date	Months
238 Van Buren St., 07105	1/5/2012	1/3/2014	23
Account Number	2147483647		
Meter Number	778017981		

ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:

1/3/2014

Total Usage	1,747,200	kwh
Total Charges	\$244,221	
Blended Rate	\$0.14	\$/kWh
Consumption Rate	\$0.12	\$/kWh
Demand Rate	\$6.29	\$/kW
Max Demand	412.0	kW
Min Demand	280.0	kW
Avg Demand	358.0	kW

East Side High School - Electric Usage - Meter No.: 778017981



East Side High School - Natural Gas Usage

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	\$/therm
26	East Side High School	4200102803	C0000000727162	1/5/2012	2/2/2012	34,046.08	29,479.83	0.87
26	East Side High School	4200102803	C0000000727162	2/3/2012	3/5/2012	31,764.40	26,277.88	0.83
26	East Side High School	4200102803	C0000000727162	3/6/2012	4/2/2012	11,050.08	6,680.97	0.60
26	East Side High School	4200102803	C0000000727162	4/3/2012	5/3/2012	7,544.98	4,419.22	0.59
26	East Side High School	4200102803	C0000000727162	5/4/2012	6/4/2012	572.86	443.93	0.77
26	East Side High School	4200102803	C0000000727162	6/5/2012	7/3/2012	39.69	125.06	3.15
26	East Side High School	4200102803	C0000000727162	7/4/2012	8/2/2012	7.76	104.79	13.50
26	East Side High School	4200102803	C0000000727162	8/3/2012	8/30/2012	8.86	105.75	11.94
26	East Side High School	4200102803	C0000000727162	8/31/2012	10/2/2012	171.7	213.9	1.25
26	East Side High School	4200102803	C0000000727162	10/3/2012	11/2/2012	611.11	4,292.94	7.02
26	East Side High School	4200102803	C0000000727162	11/3/2012	12/3/2012	33,497.76	31,829.44	0.95
26	East Side High School	4200102803	C0000000727162	12/4/2012	1/3/2013	32,206.89	31,173.54	0.97
26	East Side High School	4200102803	C0000000727162	1/4/2013	2/1/2013	42,453.04	38,699.50	0.91
26	East Side High School	4200102803	C0000000727162	2/2/2013	3/5/2013	44,808.30	41,769.85	0.93
26	East Side High School	4200102803	C0000000727162	3/6/2013	4/4/2013	36,868.80	25,879.82	0.70
26	East Side High School	4200102803	C0000000727162	4/5/2013	5/3/2013	8,345.83	6,286.35	0.75
26	East Side High School	4200102803	C0000000727162	5/4/2013	6/4/2013	55.6	148.09	2.66
26	East Side High School	4200102803	C0000000727162	6/5/2013	7/3/2013	32.29	129.48	4.01
26	East Side High School	4200102803	C0000000727162	7/4/2013	8/2/2013	8.97	110.86	12.36
26	East Side High School	4200102803	C0000000727162	8/3/2013	9/4/2013	10.11	111.38	11.02
26	East Side High School	4200102803	C0000000727162	9/5/2013	10/2/2013	51.69	141.14	2.73
26	East Side High School	4200102803	C0000000727162	10/3/2013	10/31/2013	6,380.11	10,520.34	1.65
26	East Side High School	4200102803	C0000000727162	11/1/2013	12/3/2013	34,389.23	32,216.17	0.94
26	East Side High School	4200102803	C0000000727162	12/4/2013	1/3/2014	32,268.58	31,874.90	0.99

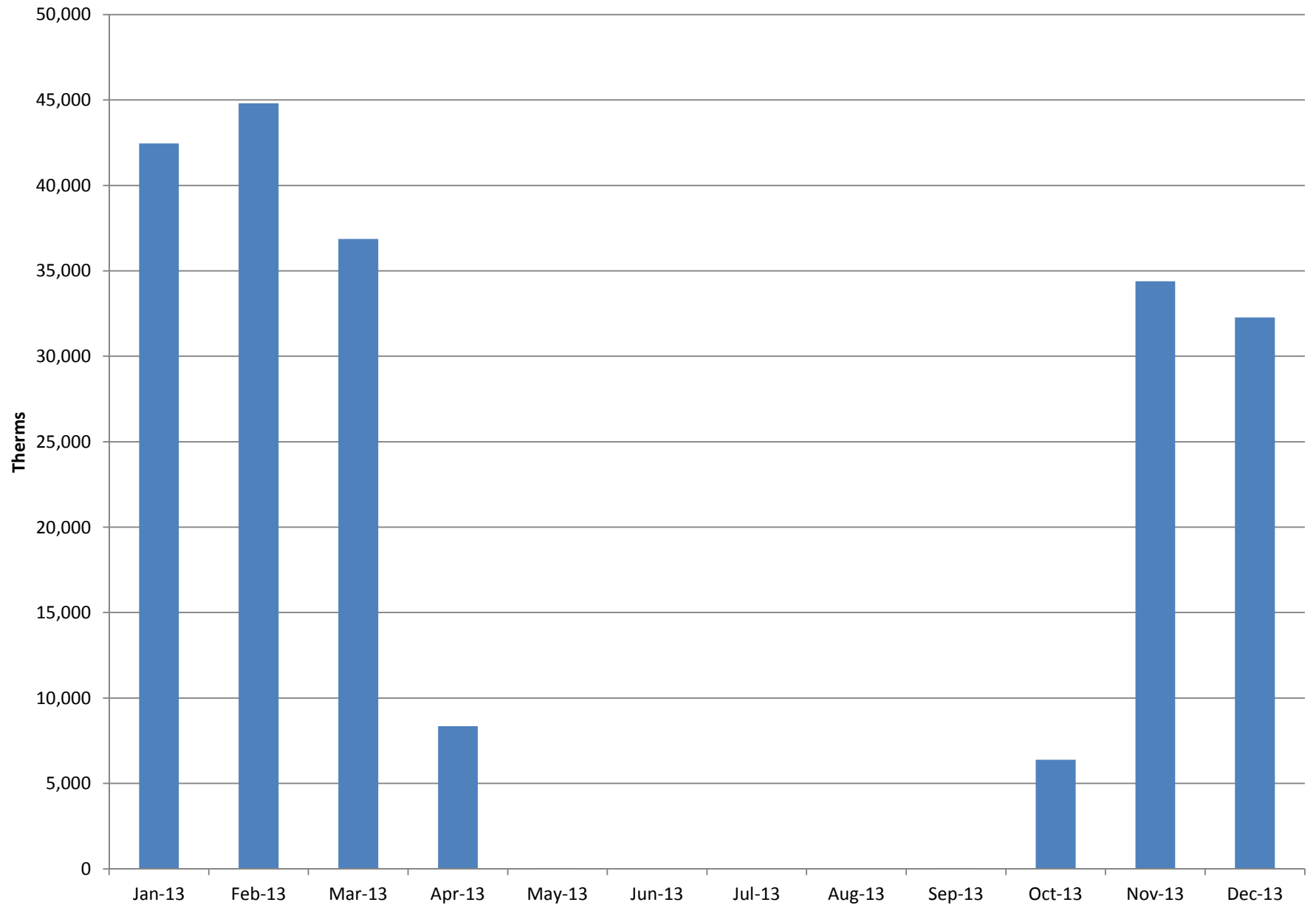
East Side High School	Start Date	End Date	# Months
Account Number 4200102803	1/5/2012	1/3/2014	23
Meter Number C0000000727162			

NATURAL GAS USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:

1/3/2014

Annual Usage	205,673	Therms	
Annual Cost	\$187,888		
Rate	\$0.91	\$/Therm	Bill missing. Two month average used

East Side High School - Natural Gas Usage - Meter No.: C0000000727162



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

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DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	C/I ACTIVE
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Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	C/I ACTIVE

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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
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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
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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
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BBPC, LLC Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	888-651-4121 www.greateasternenergy.com	C/I ACTIVE
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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
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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
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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
Integrays Energy Services – Natural Gas, LLC 99 Wood Avenue South Suite #802 Iselin, NJ 08830	800-536-0151 www.integraysenergy.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 Schools
CHA Project# 27998
East Side High School

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Actual	Remaining Useful Life (years)	Other Info.
									Estimated		
Boiler-1	3	Trane	Unknown	76-142	Steam Boiler, Natural Gas	13,390 lbs/hr (estimated 80%)	Boiler Room	Heating System	1976	-8	Three never run at the same time
Burner-1	3	Gordon-Platt	Unknown	76-142	Modulating Burner, Natural Gas	13,390 lbs/hr (estimated 80%)	Boiler Room	Heating System	1976	-17	Modulating
Heat Exchanger	2	Unknown	Unknown	Unknown	Steam to Hot Water Heat Exchanger	Unknown	Boiler Room	Heating System	1985	-5	Un-insulated, 75% of school
Feedwater Water Pump	2	Baldor	M3311T	Unknown	Electric Motor, Pump	7.5 HP, 88.5%	Boiler Room	Heating System	2006	10	
Condensate Return Pumps	4	Marathon Electric	BVB S6T34D55915 P	Unknown	Electric Motor, Pump	2 HP, 84.0%	Boiler Room	Heating System	2006	10	
Hot Water Pump	3	U.S. Electric Motors	T763A	Unknown	Electric Motor, Pump	7.5 HP, 89.5%	Boiler Room	Heating System	2006	10	
DHW	1	AO Smith	BTR 365A 118	1236M000412	Domestic Hot Water Heater, Natural Gas	365,000 btu/h, 80% eff, 85 Gal	Boiler Room	Domestic Hot Water System	2012	23	130F
DHW Tank	2	AO Smith	TJV 120M 000000Y00	1239M001053	Domestic Hot Water Storage Tank	119.0 Gal	Boiler Room	Domestic Hot Water System	2012	23	130F
AHU-3	1	McQuay	CAH012FHAC	FB0U030500252	Heating & Ventilation Unit, Hot Water Heat	Unknown (Custom Build)	Penthouse	Cafeteria	2006	17	
AHU-5	1	McQuay	CAH012FHAC	FB0U030500251	Heating & Ventilation Unit, Hot Water Heat	Unknown (Custom Build)	Penthouse	Unknown	2006	17	
Walk-in Cooler	1	Unknown	Unknown	Unknown	Walk-in Cooler	15' x 15'	Kitchen	Kitchen	2006	12	No Controls
Walk-in Freezer	1	Unknown	Unknown	Unknown	Walk-in Freezer	8' x 6'	Kitchen	Kitchen	2006	12	No Controls
Kitchen Hood	2	Unknown	Unknown	Unknown	Kitchen Hood	4' x 12'	Kitchen	Kitchen	2006	12	
Window AC	52	Various	Various	Various	Window Air Conditioning Unit	12,000 btu/h - 24,000 btu/h	Classrooms and Offices	Classrooms and Offices	2006	7	

Cost of Electricity:

\$0.124	\$/kWh
\$6.29	\$/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
15LED	UN-240	Storage	6	S 32 C F 2 (ELE)	F42LL	60	0.36	SW	520	187	OCC	
35LED	UN-241	Storage	4	T 32 R F 3 (ELE)	F43SSILL	72	0.29	SW	520	150	OCC	
32LED	461.5	Offices	12	1T 32 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
32LED	UN-242	Storage	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	520	187	OCC	
32LED	462	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	463	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	UN-243	Classrooms	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
32LED	UN-244	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-245	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-246	Classrooms	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
32LED	464	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	465	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	466	Staff Lounge	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
32LED	UN-249	Classrooms	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	2600	780	C-OCC	
32LED	467	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	468	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	UN-251	Storage	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	520	187	OCC	
32LED	UN-252	Storage	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	520	187	OCC	
32LED	UN-253	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-254	Classrooms	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	C-OCC	
32LED	489	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	UN-255	Storage	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	520	156	OCC	
32LED	UN-257	Storage	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	520	156	OCC	
32LED	UN-258	Linen/Utility/Wet/Janitor/Electrical	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	780	47	NONE	
220LED	UN-247	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	3120	62	NONE	
220LED	UN-248	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	3120	62	NONE	
32LED	461	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	460	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	459	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	Corridor D	Hallways	12	1T 32 R F 2 (ELE)	F42LL	60	0.72	SW	6240	4,493	NONE	
35LED	Corridor D	Hallways	12	T 32 R F 3 (ELE)	F43SSILL	72	0.86	SW	6240	5,391	NONE	
20LED	409	Classrooms	10	S 28 P F 1 (ELE)	F41SSILL	26	0.26	SW	2600	676	C-OCC	
20LED	410	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	411	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	412	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	413	Classrooms	16	S 28 P F 1 (ELE)	F41SSILL	26	0.42	SW	2600	1,082	C-OCC	
220LED	UN-260	Storage	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	520	10	NONE	
20LED	414-C	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	415	Classrooms	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	C-OCC	
20LED	400 (Gym)	Gymnasium	8	S 28 P F 1 (ELE)	F41SSILL	26	0.21	SW	2600	541	NONE	
20LED	407	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	408	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	406	Classrooms	22	S 28 P F 1 (ELE)	F41SSILL	26	0.57	SW	2600	1,487	C-OCC	
20LED	405	Classrooms	24	S 28 P F 1 (ELE)	F41SSILL	26	0.62	SW	2600	1,622	C-OCC	
20LED	UN-273	Storage	1	S 28 P F 1 (ELE)	F41SSILL	26	0.03	SW	520	14	NONE	
20LED	UN-274	Storage	1	S 28 P F 1 (ELE)	F41SSILL	26	0.03	SW	520	14	NONE	
15LED	UN-275	Storage	2	S 32 C F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
15LED	UN-276	Offices	6	S 32 C F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
15LED	UN-277	Offices	6	S 32 C F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
15LED	404L	Staff Lounge	6	S 32 C F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
15LED	403C	Classrooms	18	S 32 C F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
15LED	402	Classrooms	18	S 32 C F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
15LED	401	Classrooms	15	S 32 C F 2 (ELE)	F42LL	60	0.90	SW	2600	2,340	C-OCC	
32LED	UN-272	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
220LED	UN-271	Storage	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	520	10	NONE	
32LED	UN-270	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
81	UN-268	Restroom	2	S 34 C F 2	F42EE	72	0.14	SW	3120	449	C-OCC	
74	UN-269	Linen/Utility/Wet/Janitor/Electrical	1	I 50	I50/1	50	0.05	SW	780	39	NONE	
81	UN-267	Storage	3	S 34 C F 2	F42EE	72	0.22	SW	520	112	OCC	
81	UN-266	Storage	3	S 34 C F 2	F42EE	72	0.22	SW	520	112	OCC	
20LED	425	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	423	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	

Cost of Electricity:

\$0.124	\$/kWh
\$6.29	\$/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	426	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	424	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	422	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	421	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	420	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	419	Classrooms	6	S 28 P F 1 (ELE)	F41SSILL	26	0.16	SW	2600	406	C-OCC	
20LED	418	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	417	Classrooms	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	C-OCC	
20LED	416	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
32LED	Corridor A	Hallways	21	1T 32 R F 2 (ELE)	F42LL	60	1.26	SW	6240	7,862	NONE	
35LED	Corridor A	Hallways	14	T 32 R F 3 (ELE)	F43SSILL	72	1.01	SW	6240	6,290	NONE	
32LED	UN-301	Restroom	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	3120	374	OCC	
32LED	UN-302	Restroom	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	3120	374	OCC	
32LED	UN-300	Linen/Utility/Wet/Janitor/Electrical	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	780	94	NONE	
32LED	UN-299	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	480	Classrooms	26	1T 32 R F 2 (ELE)	F42LL	60	1.56	SW	2600	4,056	C-OCC	
32LED	UN-298	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-297	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	482B	Classrooms	33	1T 32 R F 2 (ELE)	F42LL	60	1.98	SW	2600	5,148	C-OCC	
32LED	483	Classrooms	29	1T 32 R F 2 (ELE)	F42LL	60	1.74	SW	2600	4,524	C-OCC	
32LED	UN-295	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	448B	Classrooms	25	1T 32 R F 2 (ELE)	F42LL	60	1.50	SW	2600	3,900	C-OCC	
32LED	485B	Classrooms	25	1T 32 R F 2 (ELE)	F42LL	60	1.50	SW	2600	3,900	C-OCC	
32LED	486B	Classrooms	25	1T 32 R F 2 (ELE)	F42LL	60	1.50	SW	2600	3,900	C-OCC	
32LED	487	Classrooms	25	1T 32 R F 2 (ELE)	F42LL	60	1.50	SW	2600	3,900	C-OCC	
32LED	488B	Classrooms	32	1T 32 R F 2 (ELE)	F42LL	60	1.92	SW	2600	4,992	C-OCC	
32LED	489B	Classrooms	32	1T 32 R F 2 (ELE)	F42LL	60	1.92	SW	2600	4,992	C-OCC	
32LED	UN-305	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-304	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-303	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-268	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	Corridor C	Hallways	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	6240	1,123	NONE	
40LED	Corridor C	Hallways	21	T 28 R F 2 (ELE)	F42LL	60	1.26	SW	6240	7,862	NONE	
32LED	UN-198	Storage	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	520	562	OCC	
32LED	366	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	367	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	368	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	369	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	370	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	365	Classrooms	30	1T 32 R F 2 (ELE)	F42LL	60	1.80	SW	2600	4,680	C-OCC	
32LED	UN-192	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-193	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-194	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	UN-195	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
32LED	364	Classrooms	30	1T 32 R F 2 (ELE)	F42LL	60	1.80	SW	2600	4,680	C-OCC	
32LED	363	Classrooms	36	1T 32 R F 2 (ELE)	F42LL	60	2.16	SW	2600	5,616	C-OCC	
32LED	361	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	360	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	359 (Work Room)	Classrooms	7	1T 32 R F 2 (ELE)	F42LL	60	0.42	SW	2600	1,092	C-OCC	
32LED	UN-191	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
32LED	UN-190	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
32LED	UN-189	Storage	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	520	125	OCC	
32LED	UN-188	Storage	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	520	125	OCC	
32LED	UN-205	Storage	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	520	125	OCC	
32LED	UN-204	Storage	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	520	125	OCC	
32LED	Corridor D	Hallways	12	1T 32 R F 2 (ELE)	F42LL	60	0.72	SW	6240	4,493	NONE	
35LED	Corridor D	Hallways	12	T 32 R F 3 (ELE)	F43SSILL	72	0.86	SW	6240	5,391	NONE	
20LED	310	Classrooms	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	C-OCC	
20LED	311	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	312A	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	312B	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	313	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	

Cost of Electricity:

\$0.124	\$/kWh
\$6.29	\$/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	309	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	307	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	308	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
40LED	306	Offices	6	T 28 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
20LED	305	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
46LED	304	Offices	6	W 28 C F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
20LED	303	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	302	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	301	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	326	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	323	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	324	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	325	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	322	Classrooms	15	S 28 P F 1 (ELE)	F41SSILL	26	0.39	SW	2600	1,014	C-OCC	
20LED	321	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	320	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
20LED	319	Offices	6	S 28 P F 1 (ELE)	F41SSILL	26	0.16	SW	2600	406	OCC	
20LED	318	Classrooms	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	C-OCC	
20LED	317	Classrooms	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	C-OCC	
20LED	316	Classrooms	24	S 28 P F 1 (ELE)	F41SSILL	26	0.62	SW	2600	1,622	C-OCC	
20LED	315	Classrooms	24	S 28 P F 1 (ELE)	F41SSILL	26	0.62	SW	2600	1,622	C-OCC	
20LED	314	Classrooms	18	S 28 P F 1 (ELE)	F41SSILL	26	0.47	SW	2600	1,217	C-OCC	
35LED	Corridor A	Hallways	46	T 32 R F 3 (ELE)	F43SSILL	72	3.31	SW	6240	20,667	NONE	
32LED	UN-226	Restroom	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	3120	562	C-OCC	
32LED	UN-227	Restroom	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	3120	562	C-OCC	
32LED	380	Classrooms	27	1T 32 R F 2 (ELE)	F42LL	60	1.62	SW	2600	4,212	C-OCC	
32LED	381B	Classrooms	48	1T 32 R F 2 (ELE)	F42LL	60	2.88	SW	2600	7,488	C-OCC	
40LED	UN-230	Storage	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
40LED	UN-231	Storage	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
40LED	UN-232	Storage	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
40LED	UN-233	Storage	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
40LED	UN-234	Storage	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
32LED	New Storage (Music)	Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
32LED	382	Classrooms	21	1T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2600	3,276	C-OCC	
32LED	383B	Classrooms	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
32LED	384	Offices	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
40LED	Corridor C	Classrooms	20	T 28 R F 2 (ELE)	F42LL	60	1.20	SW	2600	3,120	C-OCC	
32LED	Gym Connect	Gymnasium	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	2600	468	C-OCC	
32LED	Gym Lobby	Gymnasium	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
32LED	Gym Lobby	Classrooms	15	1T 32 R F 2 (ELE)	F42LL	60	0.90	SW	2600	2,340	C-OCC	
32LED	Gym Office	Gymnasium	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
9LED	Gym	Gymnasium	32	High Bay MH 200 35 Feet High	MH200/1	232	7.42	SW	2600	19,302	NONE	
32LED	Boys Locker Room	Locker	40	1T 32 R F 2 (ELE)	F42LL	60	2.40	SW	2600	6,240	NONE	
32LED	Girl's Locker Room	Locker	40	1T 32 R F 2 (ELE)	F42LL	60	2.40	SW	2600	6,240	NONE	
32LED	Team Room Boys	Locker	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	NONE	
32LED	Team Room Girls	Locker	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	NONE	
32LED	Main Office	Offices	32	1T 32 R F 2 (ELE)	F42LL	60	1.92	SW	2600	4,992	C-OCC	
40LED	Main Office Side Room	Offices	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	OCC	
32LED	Main Office Side Room	Offices	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Main Office Kitchenette	Breakroom	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	1700	408	OCC	
35LED	Maain Office Storage	Storage	1	T 32 R F 3 (ELE)	F43SSILL	72	0.07	SW	520	37	OCC	
40LED	Principal's Office	Offices	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
32LED	Main Office Corridor	Offices	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	NONE	
40LED	Office	Offices	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
32LED	Office	Offices	9	1T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2600	1,404	C-OCC	
15LED	Office Storage	Storage	1	S 32 C F 2 (ELE)	F42LL	60	0.06	SW	520	31	NONE	
32LED	Main Office Teachers Lounge	Staff Lounge	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
32LED	Exit 2B	Hallways	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	6240	374	NONE	
65	Women's Staff Restroom	Restroom	1	I 100	I100/1	100	0.10	SW	3120	312	NONE	
65	Men's Staff Restroom	Restroom	1	I 100	I100/1	100	0.10	SW	3120	312	NONE	
40LED	Corridor	Hallways	11	T 28 R F 2 (ELE)	F42LL	60	0.66	SW	6240	4,118	C-OCC	
32LED	170	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	

Cost of Electricity:

\$0.124	\$/kWh
\$6.29	\$/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
32LED	Guidance Office	Offices	19	1T 32 R F 2 (ELE)	F42LL	60	1.14	SW	2600	2,964	C-OCC	
40LED	Guidance Office Copy Room	Offices	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
32LED	Guidance Office - Office	Offices	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
40LED	Guidance Office 1	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 2	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 3	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 4	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 5	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 6	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 7	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 8	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office 9	Offices	1	T 28 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
40LED	Guidance Office - Conference Room	Conference	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	1200	144	C-OCC	
103LED	Main Entrance	Hallways	130	1T 32 R F 1	F41LL	32	4.16	SW	6240	25,958	NONE	
102	Main Entrance	Hallways	6	O CF 26	CFQ26/1-L	27	0.16	SW	6240	1,011	NONE	
26	Main Entrance Display Case	Hallways	12	S 30 C F 1 (MAG)	F31SS	46	0.55	SW	6240	3,444	NONE	
46LED	Auditorium	Auditorium	22	W 28 C F 2 (ELE)	F42LL	60	1.32	SW	2600	3,432	NONE	
46LED	Auditorium	Auditorium	111	W 28 C F 2 (ELE)	F42LL	60	6.66	SW	2600	17,316	NONE	
20LED	Stage	Auditorium	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	SW	2600	811	NONE	
46LED	Stage Right	Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
46LED	Stage Left	Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.12	SW	520	62	NONE	
32LED	Corridor (Outside Auditorium)	Hallways	20	1T 32 R F 2 (ELE)	F42LL	60	1.20	SW	6240	7,488	NONE	
250	Gymnasium	Gymnasium	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.43	SW	2600	11,505	NONE	
32LED	Stairwell	Stairway	9	1T 32 R F 2 (ELE)	F42LL	60	0.54	SW	6240	3,370	NONE	
40LED	Cafeteria	Cafeteria	110	T 28 R F 2 (ELE)	F42LL	60	6.60	SW	2000	13,200	C-OCC	
32LED	Parent Survey	Offices	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	NONE	
32LED	Kitchen Dishwasher Room	Cafeteria	12	1T 32 R F 2 (ELE)	F42LL	60	0.72	SW	2000	1,440	NONE	
32LED	Kitchen	Cafeteria	56	1T 32 R F 2 (ELE)	F42LL	60	3.36	SW	2000	6,720	NONE	
51LED	Basement (Under Kitchen)	Hallways	4	W 34 F 4 (ELE) 1'x8'	F44ILL	112	0.45	SW	6240	2,796	NONE	
51LED	Pantry	Storage	5	W 34 F 4 (ELE) 1'x8'	F44ILL	112	0.56	SW	520	291	NONE	
20LED	Locker Room	Locker	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	2600	135	C-OCC	
20LED	Locker Room	Locker	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	2600	135	C-OCC	
35LED	Corridor A 1	Hallways	14	T 32 R F 3 (ELE)	F43SSILL	72	1.01	SW	6240	6,290	NONE	
15LED	Starway 22	Stairway	14	S 32 C F 2 (ELE)	F42LL	60	0.84	SW	6240	5,242	NONE	
15LED	Basement Storage	Storage	15	S 32 C F 2 (ELE)	F42LL	60	0.90	SW	520	468	C-OCC	
34LED	Child Study	Offices	18	1T 32 C F 2 (ELE)	F42ILL	59	1.06	SW	2600	2,761	C-OCC	
34LED	Child Study Office	Offices	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2600	920	C-OCC	
34LED	Child Study Office	Offices	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2600	920	C-OCC	
32LED	Corridor	Hallways	9	1T 32 R F 2 (ELE)	F42LL	60	0.54	SW	6240	3,370	NONE	
20LED	Detention Room	Classrooms	30	S 28 P F 1 (ELE)	F41SSILL	26	0.78	SW	2600	2,028	C-OCC	
51LED	101	Classrooms	19	W 34 F 4 (ELE) 1'x8'	F44ILL	112	2.13	SW	2600	5,533	C-OCC	
51LED	Athletic Office	Offices	6	W 34 F 4 (ELE) 1'x8'	F44ILL	112	0.67	SW	2600	1,747	C-OCC	
20LED	Athletic Office	Offices	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	2600	135	NONE	
51LED	Auto Shop	Classrooms	27	W 34 F 4 (ELE) 1'x8'	F44ILL	112	3.02	SW	2600	7,862	C-OCC	
15LED	Auto Shop	Classrooms	8	S 32 C F 2 (ELE)	F42LL	60	0.48	SW	2600	1,248	C-OCC	
18LED	209	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2600	1,165	C-OCC	
18LED	207	Classrooms	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2600	582	C-OCC	
46LED	207 Restroom	Restroom	1	W 28 C F 2 (ELE)	F42LL	60	0.06	SW	3120	187	NONE	
32LED	208	Classrooms	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
32LED	Corridor D	Hallways	20	1T 32 R F 2 (ELE)	F42LL	60	1.20	SW	6240	7,488	NONE	
32LED	261	Classrooms	30	1T 32 R F 2 (ELE)	F42LL	60	1.80	SW	2600	4,680	C-OCC	
32LED	264	Classrooms	60	1T 32 R F 2 (ELE)	F42LL	60	3.60	SW	2600	9,360	C-OCC	
32LED	270	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	265	Classrooms	48	1T 32 R F 2 (ELE)	F42LL	60	2.88	SW	2600	7,488	C-OCC	
32LED	269	Classrooms	18	1T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
32LED	267 - Health Office	Offices	11	1T 32 R F 2 (ELE)	F42LL	60	0.66	SW	2600	1,716	C-OCC	
40LED	267 - Health Office	Offices	6	T 28 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
32LED	268	Classrooms	9	1T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2600	1,404	C-OCC	
32LED	266 - Teachers Lounge	Staff Lounge	14	1T 32 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
220LED	266 - Teachers Lounge Women's Restroom	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	3120	62	NONE	
220LED	266 - Teachers Lounge Men's Restroom	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	3120	62	NONE	
32LED	Boy's Restroom	Restroom	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	3120	936	C-OCC	

Cost of Electricity:

\$0.124	\$/kWh
\$6.29	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	Usage Describe Usage Type using Operating Hours	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)	Retrofit control device	Notes
32LED	Girl's Restroom	Restroom	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	3120	936	C-OCC	
35LED	Corridor A 2	Hallways	40	T 32 R F 3 (ELE)	F43SSILL	72	2.88	SW	6240	17,971	NONE	
46LED	210 - Office	Offices	4	W 28 C F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
46LED	210 - Office Storage	Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
46LED	210 - Office Storage	Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.12	SW	520	62	OCC	
46LED	210 - Office Conference Room	Conference	4	W 28 C F 2 (ELE)	F42LL	60	0.24	SW	1200	288	C-OCC	
46LED	213A	Classrooms	5	W 28 C F 2 (ELE)	F42LL	60	0.30	SW	2600	780	C-OCC	
50LED	213	Classrooms	36	W 32 P F 2 (ELE)	F42LL	60	2.16	SW	2600	5,616	C-OCC	
50LED	214A	Classrooms	15	W 32 P F 2 (ELE)	F42LL	60	0.90	SW	2600	2,340	C-OCC	
24LED	Media Center	Classrooms	64	1B 32 P F 2 (ELE)	F42LL	60	3.84	SW	2600	9,984	C-OCC	
32LED	Media Center	Classrooms	90	1T 32 R F 2 (ELE)	F42LL	60	5.40	SW	2600	14,040	C-OCC	
32LED	Media Center Office	Offices	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	C-OCC	
46LED	214B	Classrooms	5	W 28 C F 2 (ELE)	F42LL	60	0.30	SW	2600	780	C-OCC	
103LED	215	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	216	Classrooms	24	1T 32 R F 1	F41LL	32	0.77	SW	2600	1,997	C-OCC	
103LED	217	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	219	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	220	Classrooms	20	1T 32 R F 1	F41LL	32	0.64	SW	2600	1,664	C-OCC	
103LED	222A/B	Classrooms	36	1T 32 R F 1	F41LL	32	1.15	SW	2600	2,995	C-OCC	
103LED	223/221	Classrooms	30	1T 32 R F 1	F41LL	32	0.96	SW	2600	2,496	C-OCC	
103LED	201	Classrooms	15	1T 32 R F 1	F41LL	32	0.48	SW	2600	1,248	C-OCC	
103LED	202	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	203	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	205	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	206	Classrooms	18	1T 32 R F 1	F41LL	32	0.58	SW	2600	1,498	C-OCC	
103LED	207A	Classrooms	15	1T 32 R F 1	F41LL	32	0.48	SW	2600	1,248	C-OCC	
103LED	208B	Classrooms	15	1T 32 R F 1	F41LL	32	0.48	SW	2600	1,248	C-OCC	
32LED	Corridor C 2	Hallways	7	1T 32 R F 2 (ELE)	F42LL	60	0.42	SW	6240	2,621	NONE	
20LED	Boy's Restroom	Restroom	5	S 28 P F 1 (ELE)	F41SSILL	26	0.13	SW	3120	406	NONE	
20LED	Girl's Restroom	Restroom	5	S 28 P F 1 (ELE)	F41SSILL	26	0.13	SW	3120	406	NONE	
32LED	Corridor C 2	Hallways	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	6240	2,246	NONE	
35LED	Corridor C 2	Hallways	4	T 32 R F 3 (ELE)	F43SSILL	72	0.29	SW	6240	1,797	NONE	
35LED	215	Classrooms	10	T 32 R F 3 (ELE)	F43SSILL	72	0.72	SW	2600	1,872	C-OCC	
250	282-B Gymnasium	Gymnasium	18	T 54 W F 3 (ELE) (T-5)	F43GHL	177	3.19	SW	2600	8,284	NONE	
35LED	281-A	Offices	10	T 32 R F 3 (ELE)	F43SSILL	72	0.72	SW	2600	1,872	C-OCC	
32LED	Boys Locker Room	Locker	20	1T 32 R F 2 (ELE)	F42LL	60	1.20	SW	2600	3,120	NONE	
32LED	Entryway	Corridor	13	1T 32 R F 2 (ELE)	F42LL	60	0.78	SW	2125	1,658	C-OCC	
	Total		3,969				213.35			619,679		

APPENDIX C

ECM Calculations

Newark Public Schools
CHA Project Number: 27999

Rate of Discount (used for NPV) 3.0%

Utility Costs	Yearly Usage	Electricity Cost (\$/kWh)	Building Area	Annual Utility Cost
\$ 0.140 \$/kWh blended	1,747,200	0.000420205	302,353	Electric \$ 244,221
\$ 0.124 \$/kWh supply	1,747,200	0.000420205		Natural Gas \$ 187,888
\$ 6.29 \$/kW	412.0			Fuel Oil \$ -
\$ 0.91 \$/therm	265,873	0.00533471		
\$ 7.55 \$/kgals	2,827			
\$ - \$/Gal	-			

East Side High School																							
Recommend?	Item	Savings					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				ROI	NPV	IRR			
Y or N		kW	kWh	therms	No. 2 Oil gal	Water kgal	\$							kW	kWh	therms	kgal/yr	\$					
Y	ECM-1A	Replace Steam to Hot Water Heat Exchanger w/ Dedicated Hot Water	0.0	0	15,436	0	0	14,047	\$ 450,541	32.1	25	82.3	\$ 12,000	N	31.2	0.0	0	385,909	0	\$ 351,177	(0.2)	(\$193,936)	-1.6%
N	ECM-1B	Convert Steam Heating System to Hydronic Heat w/ High Efficiency	0.0	0	13,037	0	0	11,864	\$ 3,006,712	253.4	25	69.6	\$ 12,000	N	252.4	0.0	0	325,937	0	\$ 296,603	(0.9)	(\$2,788,120)	-13.2%
Y	ECM-2	Install Premium Efficiency Motors	0.6	1,319	0	0	0	212	\$ 7,275	34.4	18	0.6		N	34.4	11.5	23,745	0	0	\$ 4,191	(0.4)	(\$4,363)	-6.1%
Y	ECM-3	Install Window AC Controllers	0.0	41,853	0	0	0	5,859	\$ 10,000	1.7	10	17.6		N	1.7	0.0	418,529	0	0	\$ 58,594	4.9	\$39,982	58.0%
Y	ECM-4A	Install Basic Controls	0.0	0	25,367	0	0	23,084	\$ 21,309	0.9	10	135.3		N	0.9	0.0	0	253,674	0	\$ 230,843	9.8	\$175,605	108.3%
N	ECM-4B	Install Full DDC Controls	0.0	0	49,140	0	0	44,718	\$ 1,295,684	29.0	10	262.1		N	29.0	0.0	0	491,403	0	\$ 447,177	(0.7)	(\$914,233)	-15.8%
Y	ECM-5	Domestic Hot Water System Improvements	0.0	0	1,488	0	0	1,354	\$ 17,937	13.2	25	7.9	\$ 700	N	12.7	0.0	0	37,201	0	\$ 33,853	0.9	\$6,343	6.0%
Y	ECM-6	Install Walk-In Cooler/Freezer Controls	0.0	9,142	0	0	0	1,280	\$ 41,250	32.2	15	3.8		N	32.2	0.0	137,129	0	0	\$ 19,198	(0.5)	(\$25,971)	-8.3%
Y	ECM-7	Install Vending Machine Occupancy Sensors	0.0	10,295	0	0	0	1,441	\$ 1,120	0.8	10	4.3		N	0.8	0.0	102,953	0	0	\$ 14,413	11.9	\$11,174	128.6%
N	ECM-8	Install Low Flow Plumbing Fixtures	0.0	0	0	0	2,419	18,263	\$ 590,264	32.3	30	0.0		N	32.3	0.0	0	72,567	0	\$ 547,879	(0.1)	(\$232,309)	-0.5%
N	ECM-L1	Lighting Replacements / Upgrades	100.9	293,988	0	0	0	44,074	\$ 690,686	15.7	10	123.5	\$ 4,800	N	15.6	1,009.0	2,939,880	0	0	\$ 487,743	(0.3)	(\$309,926)	-7.3%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	115,204	0	0	0	14,285	\$ 49,997	3.5	10	48.4	\$ 6,660	N	3.0	0.0	1,152,040	0	0	\$ 161,286	2.2	\$78,519	30.7%
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	100.9	353,795	0	0	0	51,489	\$ 740,684	14.4	10	148.7	\$ 11,460	N	14.2	1,009.0	3,537,850	0	0	\$ 571,458	(0.2)	(\$290,012)	-5.9%
Total (Not Including [B] Option ECMs or L1, L2)			101.5	416,394	42,292	0	2,419	\$ 117,829	\$ 1,880,380	16.1	17.0	401	\$ 24,160	15.9	1,828	4,220,206	676,784	72,567	\$ 1,831,607	(0.0)	(\$835,396)	-0.8%	
Recommended Measures (highlighted green above)			101.5	416,394	42,292	0	0	\$ 98,767	\$ 1,290,116	13.1	15.4	401	\$ 24,160	0	12.8	1,828	4,220,206	676,784	-	\$ 1,283,728	(0.0)	(\$86,883)	2.0%
% of Existing			25%	24%	21%	0%	0%																

City:		Newark, NJ				
Occupied Hours/Week		70	70	70	70	50
		Building	Auditorium	Gymnasium	Library	Classrooms
Temp	Enthalpy h (Btu/lb)	Bin Hours	Operating Hours	Occupied Hours	Occupied Hours	Occupied Hours
102.5						
97.5	35.4	6	3	3	3	2
92.5	37.4	31	13	13	13	9
87.5	35.0	131	55	55	55	39
82.5	33.0	500	208	208	208	149
77.5	31.5	620	258	258	258	185
72.5	29.9	664	277	277	277	198
67.5	27.2	854	356	356	356	254
62.5	24.0	927	388	388	388	276
57.5	20.3	600	250	250	250	179
52.5	18.2	730	304	304	304	217
47.5	16.0	491	205	205	205	146
42.5	14.5	656	273	273	273	195
37.5	12.5	1,023	426	426	426	304
32.5	10.5	734	306	306	306	218
27.5	8.7	324	139	139	139	98
22.5	7.0	252	105	105	105	75
17.5	5.4	125	52	52	52	37
12.5	3.7	47	20	20	20	14
7.5	2.1	34	14	14	14	10
2.5	1.3	1	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

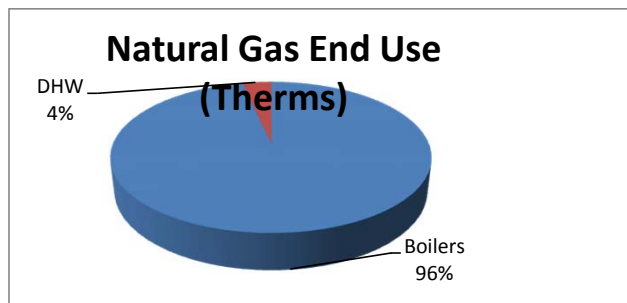
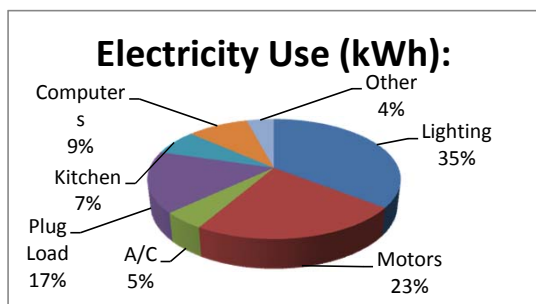
Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	79 F

Newark Public Schools
 CHA Project Number: 27999
 East Side High School

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
1,747,200	Total	Based on utility analysis
619,679	Lighting	From Lighting Calculations
401,288	Motors	Estimated
81,312	A/C	See Window AC Calculation
287,840	Plug Load	Estimated
120,960	Kitchen	Estimated
163,125	Computers	Estimated
72,997	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
205,673	Total	Based on utility analysis
198,474	Boilers	Therms/SF x Square Feet Served
7,199	DHW	Based on utility analysis

35%
 23%
 5%
 16%
 7%
 9%
 4%

97%
 4%



Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-1A: Replace Steam to Hot Water Heat Exchanger w/ Dedicated Hot Water Boilers

Description: This ECM evaluates the replacement of an existing steam to hot water heat exchanger with a high efficiency condensing gas boiler. The existing boiler efficiency is 80% (per NJ Protocols) but the heat exchanger is further de-rated to 75%. 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	\$ 0.91	/ Therm	Natural Gas
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Design Outdoor Temp	14	F	
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	9,750,000	btu/hr	75% of Avg Steam Capacity
Heating Combustion Efficiency	75%		Derated boiler + HT Exch
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	75	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	9,750,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	15,436	Therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 14,047		

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

Algorithms

Gas Savings (Therms)

$$= \frac{OF \times ((CAPY_{Bl} \times EFF_Q) - (CAPY_{Qi} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

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

Newark Public Schools

CHA Project Number: 27999

East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1A: Replace Steam to Hot Water Heat Exchanger w/ Dedicated Hot Water Boilers - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Aerco BMK3000 w/ condensate	3	EA	\$ 47,500	\$ 15,000		\$ 146,348	\$ 56,070	\$ -	\$ 202,418	Vendor Estimate
Flue Installation	100	LF	\$ 150.0	\$ 50.00		\$ 15,405	\$ 6,230	\$ -	\$ 21,635	Vendor Estimate
Miscellaneous Electrical	2	LS	\$ 5,000	\$ 15,000		\$ 10,270	\$ 37,380	\$ -	\$ 47,650	RS Means 2012
Miscellaneous HW Piping	2	LS	\$ 25,000	\$ 15,000		\$ 51,350	\$ 37,380	\$ -	\$ 88,730	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

\$ 360,433	Subtotal
\$ 90,108	25% Contingency
\$ 450,541	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-1B: Convert Steam Heating System to Hydronic Heat w/ High Efficiency Condensing Boilers

Description: This ECM evaluates the replacement of an existing steam boiler with high efficiency condensing gas boiler. The existing boiler efficiency is 80% (per NJBPU protocols) 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	\$ 0.91	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Design Outdoor Temp	14	F	
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	13,000,000	btu/hr	Avg Steam Capacity
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	74	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	13,000,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	13,037	Therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 11,864		

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

Algorithms

Gas Savings (Therms)

$$= \frac{OF \times ((CAPY_{Bl} \times EFF_Q) - (CAPY_{Ql} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

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:

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Lodging	15.0	0.28	1420	1415	1350	1976
Retail	29.3	0.55	2773	2764	2637	3859
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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

Newark Public Schools
 CHA Project Number: 27999
 East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1B: Convert Steam Heating System to Hydronic Heat w/ High Efficiency Condensing Boilers - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Hydronic Heating System (boiler, piping, radiator & UVs)	75,588	SF	\$ 14	\$ 14		\$1,086,808	\$ 1,318,561	\$ -	\$ 2,405,369	2012 RS Means Square Foot Construction Costs

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

\$ 2,405,369	Subtotal
\$ 601,342	25% Contingency
\$ 3,006,712	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-2: Install Premium Efficiency Motors

Description: This ECM evaluates the electrical savings associated with replacing less efficient electric motors with NEMA standard MG-1 rated motors

Savings Analysis

Demand
Cost
\$/kW-month
6.25

Energy
Cost
\$/kWh
0.12

Multipliers		
Material	Labor	Equipment
1.05	1.25	1.12

Cost Estimates

				Existing		Load		Coincidence		IF _{ED}		Existing		New		ΔkW		Demand		Demand		Annual		kWh		\$ kWh		Total \$		Estimated		Payback																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Notes

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

b Same as existing HP unless resized to better match load

EQUIPMENT		AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)
Window AC - 24,000	21	Classrooms and Offices	504,000
Window AC - 18,000	10	Classrooms and Offices	180,000
Window AC - 12,000	21	Classrooms and Offices	252,000

Total btu/h of all window A/C Units: 936,000 btu/h

ECM-3: 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	\$0.140 / kWh	
Average run hours per Week	80 Hours	
Space Balance Point	55 F	
Space Temperature Setpoint	70 deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	936,000 Btu / Hr	Total BTU/hr of DX cooling equipment to be replaced.
Average EER	10.7	
Existing Annual Electric Usage	81,312 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	39,459	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	41,853 kWh
Annual Cost Savings	\$5,859

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	0	0%	0
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	930	49%	451

Newark Public Schools
CHA Project Number: 27999
East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-3: Window A/C Controller - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	\$ -	\$ -	\$ -	
Window AC Controller	52	EA	\$ 150	\$ -	\$ -	8010.6	\$ -	\$ -	\$ 8,011	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 8,011	Subtotal
\$ 2,003	25% Contingency
\$ 10,000	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

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			Nighttime Setback			
EXISTING CONDITIONS			EXISTING CONDITIONS			
Heating			Heating			
Heating Season Facility Temp	78	F	Th	Heating Season Facility Temp	78	F
Weekly Occupied Hours	70	hrs	H	Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	72	F	Sh	Heating Season Setback Temp	68	F
Heating Season % Savings per	3%		Ph	Heating Season % Savings per	3%	
Annual Boiler Capacity		Mbtu/yr		Annual Boiler Capacity		Mbtu/yr
Connected Heating Load	13,000,000	Btu/hr	Caph	Connected Heating Load Capacity	13,000,000	Btu/hr
Equivalent Full Load Heating	900	hrs	EFLHh	Equivalent Full Load Heating Hours	400	hrs
Heating Equipment Efficiency	80%		AFUEh	Heating Equipment Efficiency	80%	
Cooling			Cooling			
Cooling Season Facility Temp	-	F	Tc	Cooling Season Facility Temp	-	F
Weekly Occupied Hours	-	hrs	H	Weekly Occupied Hours	-	hrs
Cooling Season Setback Temp	-	F	Sc	Cooling Season Setback Temp	-	F
Cooling Season % Savings per	-		Pc	Cooling Season % Savings per	-	
Connected Cooling Load	-	Tons	Capc	Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling	-	hrs	EFLHc	Equivalent Full Load Cooling Hours	-	hrs
Cooling Equipment EER	-		AFUEc	Cooling Equipment EER	-	
No Significant Cooling in Bldg			No Significant Cooling in Bldg			
SAVINGS			SAVINGS			
Natural Gas Savings	14,573	Therms ³		Natural Gas Savings	10,795	Therms ³
Cooling Electricity Savings	0	kWh		Cooling Electricity Savings	0	kWh

\$0.14 \$/kWh Blended
\$0.91 \$/Therm

COMBINED SAVINGS		
Natural Gas Savings	25,367	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	\$ 23,084	
Estimated Total Project Cost	\$ 21,309	
Simple Payback	0.9	Yrs

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

Algorithms

Cooling Energy Savings (kWh) = $((T_c \cdot (H+5) + S_c \cdot (168 - (H+5))) / 168) \cdot T_c \cdot (P_c \cdot \text{Cap}_{hp} \cdot 12 \cdot \text{EFLH}_c / \text{EER}_{hp})$

Heating Energy Savings (kWh) = $((T_h \cdot (H+5) + S_h \cdot (168 - (H+5))) / 168) \cdot T_h \cdot (P_h \cdot \text{Cap}_{hp} \cdot 12 \cdot \text{EFLH}_h / \text{EER}_{hp})$

Heating Energy Savings (Therms) = $(T_h \cdot (T_h \cdot (H+5) + S_h \cdot (168 - (H+5))) / 168) \cdot (P_h \cdot \text{Cap}_{hp} \cdot \text{EFLH}_h / \text{AFUE}_h / 100,000)$

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	$T_h - 5^\circ$	
S_c	Fixed	$T_c + 5^\circ$	
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

Newark Public Schools
 CHA Project Number: 27999
 East Side High School

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

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-4B: Install Full DDC Controls

Description: This ECM evaluates the energy savings associated with implementing a full wireless direct digital control system that enable remote automatic control, monitoring and alarming of all HVAC equipment. Specific energy savings sequences would include optimum Start/ Stop, night setback, temporary occupied set back, economizer control of UVs and AHU's. This energy savings percentage is based on past performance of similar buildings which have a fully functioning DDC control system.

Building Information:

302,353	Sq Footage	\$0.14	\$/kWh Blended
N	Cooling	\$0.91	\$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	78	F
Weekly Occupied Hours	80	hrs
Heating Season Setback Temp	72	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	13,000,000	Btu/hr
Equivalent Full Load Heating Hours	900	hrs
Heating System Efficiency	65%	
Cooling		
Cooling Season Facility Temp		F
Weekly Occupied Hours		hrs
Cooling Season Setback Temp		F
Cooling Season % Savings per Degree Setback		
Connected Cooling Load Capacity		Tons
Equivalent Full Load Cooling Hours		hrs
Cooling Equipment EER	-	
No Significant Cooling		
SAVINGS		
Natural Gas Savings	16,007	Therms
Cooling Electricity Savings	0	kWh

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	1,747,200	kWh
Existing Facility Total Gas usage	205,673	Therms
Existing Facility Cooling Electric usage	-	kWh ¹
Existing Facility Heating Natural Gas usage	198,474	Therms ²
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	19,847	Therms
SAVINGS		
Electric Savings	0	kWh
Natural Gas Savings	19,847	Therms

Assumptions

- 0% of facility total electricity dedicated to Cooling; based on utility information
- 97% of facility total natural gas dedicated to Heating; based on utility information
- 10% Typical Savings associated with installation of DDC controls

Nighttime Setback

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	78	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	68	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity		Mbtu/yr
Connected Heating Load Capacity	13,000,000	Btu/hr
Equivalent Full Load Heating Hours	400	hrs
Heating Equipment Efficiency	65%	
Cooling		
Cooling Season Facility Temp	-	F
Weekly Occupied Hours	-	hrs
Cooling Season Setback Temp	-	F
Cooling Season % Savings per Degree Setback	-	
Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling Hours	-	hrs
Cooling Equipment EER	-	
No Significant Cooling in Bldg		
SAVINGS		
Natural Gas Savings	13,286	Therms ³
Cooling Electricity Savings	0	kWh

COMBINED SAVINGS

Natural Gas Savings	49,140	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	\$ 44,718	
Estimated total Project Cost	\$ 1,295,684	
Simple Payback	29.0	Yrs

Savings calculation formulas for setback are taken from NJ Protocols document for Occupancy Controlled Thermostats
Savings calculations for additional controls are estimated based on the level of control to be added and prior experience

Newark Public Schools
 CHA Project Number: 27999
 East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-4B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Unit Ventilator Controls	150	ea		\$ 4,000		\$ -	\$ 747,600	\$ -	\$ 747,600	Vendor Quote
Radiator Control (Group of 4)	35	ea		\$ 4,500		\$ -	\$ 196,245	\$ -	\$ 196,245	Vendor Quote
Exhaust Fan Control (Group of 4)	8	ea		\$ 3,300		\$ -	\$ 32,894	\$ -	\$ 32,894	Vendor Quote
H& V Units	4	ea		\$ 4,000		\$ -	\$ 19,936	\$ -	\$ 19,936	Vendor Quote
Head End Controller & Programming	1	ls		\$ 32,000		\$ -	\$ 39,872	\$ -	\$ 39,872	Vendor Quote

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

\$ 1,036,547	Subtotal
\$ 259,137	25% Contingency
\$ 1,295,684	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-5: Replace Gas-Fired DHW Heater w/ High Efficiency DHW Heater

Description: This ECM evaluates the energy savings associated with replacing a gas fired tank type water heater with an equivalent natural gas condensing water heater.

The existing DH heating system includes one (1) 85 gallon DHW heater with two (2) additional 119 gallon storage tanks is proposed to be replaced with one (1) 100 gallon high efficiency DHW heater

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	600	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	719,856	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	575,884	MBTU/yr	
Existing Tank Size	323	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	Per building personnel
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	4.6	MBH	
Annual Standby Hot Water Load	40,705	MBTU/yr	
New Tank Size	100	Gallons	
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.5	MBH	
Annual Standby Hot Water Load	13,031	MBTU/yr	
Total Annual Hot Water Demand	548,210	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		
Proposed Fuel Use	5,711	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$0.91	\$/Therm	
Existing Operating Cost of DHW	\$6,551	\$/yr	
Proposed Operating Cost of DHW	\$5,197	\$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	1,488	\$1,354

Newark Public Schools
 CHA Project Number: 27999
 East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-5: Replace Gas-Fired DHW Heater w/ High Efficiency DHW Heater - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Gas-Fired DHW Heater Removal	1	LS		\$ 50		\$ -	\$ 62	\$ -	\$ 62	RS Means 2012
High Efficiency Gas-Fired DHW Heater	1	EA	\$ 5,500	\$ 4,500		\$ 5,649	\$ 5,607	\$ -	\$ 11,256	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 300	\$ 500		\$ 308	\$ 623	\$ -	\$ 931	RS Means 2012
Venting Kit	1	EA	\$ 450	\$ 650		\$ 462	\$ 810	\$ -	\$ 1,272	RS Means 2012
Miscellaneous Piping and Valves	1	LS	\$ 200	\$ 500		\$ 205	\$ 623	\$ -	\$ 828	RS Means 2012

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

\$ 14,349	Subtotal
\$ 3,587	25% Contingency
\$ 17,937	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-6: Walk-in Cooler & Freezer EC Motor Retrofits

ECM Description :

For kitchens that contain walk-in coolers and freezers, CoolTrol is a controller that reduces energy consumption by controlling off of dewpoint temperature. Compressor cycling is reduced and the evaporator fans run 25% to 80% less. Door and frame heaters are also installed and controlled by store dew point temperature; this can reduce run time by up to 95% in coolers and 60% in freezers. The evaporator fan motors are also replaced with hi-efficiency fan motors saving 40% to 70% in energy. The proposed system comprises of an anti-sweat door controller, evaporator fan motor replacement and CoolTrol Cooler Control System.

Utility Cost

\$0.14 \$/kWh Blended

EXISTING CONDITIONS		
Walk-In Freezer(s)		
Existing Freezer Controls?	N	
Quantity of Walk-In Freezers	1	
Nameplate Amps of Freezer Evaporator Fan	4	AmpsEF
Nameplate Volts of Freezer Evaporator Fan	280	VoltsEF
Phase of Evaporator Fan	1	PhaseEF
Power Factor of Evaporator Fan	0.55	PFEF
Operating Hours	8,760	hrs
Load Reduction	65%	LR
Electricity Savings (Evaporator Fan)	3,157	kWhEF
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWhRH
Total Walk-In Freezer(s) Electricity Savings	4,571	kWh
Walk-In Cooler(s)		
Existing Cooler Controls?	N	
Quantity of Walk-In Coolers	1	
Nameplate Amps of Cooler Evaporator Fan	4	
Nameplate Volts of Cooler Evaporator Fan	280	
Phase of Evaporator Fan	1	
Power Factor of Evaporator Fan	0.55	
Operating Hours	8,760	hrs
Load Reduction	65%	
Electricity Savings (Evaporator Fan)	3,157	kWh
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh
Total Walk-In Cooler(s) Electricity Savings	4,571	kWh
SAVINGS		
Total Electricity Savings	9,142	kWh
Total Cost Savings	\$ 1,280	

Savings calculation formulas are taken from NJ Protocols document for Walk-in Controller

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

Newark Public Schools
CHA Project Number: 27999
East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-6: Walk-in Cooler & Freezer EC Motor Retrofits - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Turnkey Walk-In Controller & Equipment	2	EA	\$ 10,000	\$ 5,000	\$ -	\$ 20,540	\$ 12,460	\$ -	\$ 33,000	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 33,000	Subtotal
\$ 8,250	25% Contingency
\$ 41,250	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-7: Install Vending Machine Controls

Description : Vending machines generally operate 24/7 regardless of the actual usage. This measure proposes installing vending machine controls to reduce the total run time of these units. Cold beverage machines will cycle on for 15 minutes every two hours in order to keep beverages at a desired temperature. The result is a reduction in total electrical energy usage.

Unit Cost: \$0.140 \$/kWh blended

Energy Savings Calculations:

Existing	
Cold Beverage Vending Machine Electric usage	10,512 kWh ^{1,4,7}
Snack Vending Machine Electric usage	1,752 kWh ^{2,5,7}
Dual Vending Machine Electric Usage	- kWh ^{3,6,7}
Total Vending Machine Electric Usage	12,264 kWh

Proposed	
Cold Beverage Vending Machine Electric usage	1,654 kWh ⁸
Snack Vending Machine Electric usage	315 kWh
Dual Vending Machine Electric Usage	0 kWh
Total Vending Machine Electric Usage	1,969 kWh

Vending Machine Controls Usage Savings	10,295 kWh
Total cost savings	\$ 1,441

Assumptions

1	3	Number of cold beverage vending machines
2	1	Number of snack vending machines
3	0	Number of dual snack/beverage vending machines
4	400	Average wattage, typical of cold beverage machines based on prior project experience
5	200	Average wattage, typical of snack machines based on prior project experience
6	300	Average wattage, typical of dual snack/beverage machines based on prior project experience
7	8760	Hours per year vending machine plugged in
8	3150	Building Occupied Hours
9	0.50	Vending Machine Traffic Factor (0.75 for High Traffic, 0.5 for Medium, 0.25 for low)

Newark Public Schools
CHA Project Number: 27999
East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-7: Install Vending Machine Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Vending Miser	4	EA	\$ 200	\$ 15	\$ -	\$ 822	\$ 75	\$ -	\$ 896	Vendor Estimation
						\$ -	\$ -	\$ -	\$ -	

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

\$ 896	Subtotal
\$ 224	25% Contingency
\$ 1,120	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-8: 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	66	
Total Flushes / Urinal (per Day)	11.1	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	66	
Proposed Gallons / Flush	0.125	Gal

SAVINGS		
Current Urinal Water Use	668.9	kGal / year
Proposed Urinal Water Use	33.4	kGal / year
Water Savings	635.4	kGal / year
Cost Savings	\$4,797	/ year

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

Newark Public Schools
CHA Project Number: 27999
East Side High School

ECM-8: 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	115	
Total Flushes / Toilet (per Day)	19.1	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	115	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	2,812	kGal / year
Proposed Toilet Water Use	1,028	kGal / year
Water Savings	1,783	kGal / year
Cost Savings	\$13,465	/ year

Newark Public Schools
CHA Project Number: 27999
East Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Low-Flow Urinal	66	EA	\$ 1,200	\$ 1,000	\$ -	\$ 81,338	\$ 82,236	\$ -	\$ 163,574	Vendor Estimate
Low-Flow Toilet	115	EA	\$ 1,400	\$ 1,000	\$ -	\$ 165,347	\$ 143,290	\$ -	\$ 308,637	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 472,211	Subtotal
\$ 118,053	25% Contingency
\$ 590,264	Total

Newark Public Schools
CHA Project Number: 27999
East Side High School

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2012
 Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governments or non-profit organizations.

At a minimum, all recommended measures were used for this calculation. To qualify for P4P incentives, the following P4P requirements must be met:

- At least 15% source energy savings
- No more than 50% savings from lighting measures
- Scope includes more than one measure
- Project has at least a 10% internal rate of return
- At least 50% of the source energy savings must come from investor-owned electricity and/or natural gas (note: exemption for fuel conversions)

Total Building Area (Square Feet)	302,353
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

Incentive #1		
Audit is funded by NJ BPU	\$0.05	\$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$302,353	\$244,221
Existing Usage (from utility)	1,747,200	205,673
Proposed Savings	416,394	42,292
Existing Total MMBtus	26,530	
Proposed Savings MMBtus	5,650	
% Energy Reduction	21.3%	
Proposed Annual Savings	\$98,767	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
Incentive #2	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.11	\$1.21
Incentive #3	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.11	\$1.21

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$15,118
Incentive #2	\$45,803	\$51,379	\$97,183
Incentive #3	\$45,803	\$51,379	\$97,183
Total All Incentives	\$91,607	\$102,759	\$209,483

Total Project Cost	\$1,290,116
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	Allowable Incentive	
% Incentives #1 of Utility Cost*	2.8%	\$15,118
% Incentives #2 of Project Cost**	7.5%	\$97,183
% Incentives #3 of Project Cost**	7.5%	\$97,183
Total Eligible Incentives***	\$209,483	
Project Cost w/ Incentives	\$1,080,633	

Project Payback (years)	
w/o Incentives	w/ Incentives
13.1	10.9

* 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

EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
Field Code	Area Description	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	No. of Fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved		Annual \$ Saved (\$/kWh)	Retrofit Cost for renovations to lighting system	Prescriptive Lighting Measures	NJ Smart Start Lighting Incentive	Simple Payback	Simple Payback	
																		Original Annual kWh - (Retrofit Annual kWh)	Original Annual kWh - (Retrofit Annual kWh)							
15LED	UN-240	6	S 32 C F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	SW	520	94	94	0.2	\$	25.19	\$	1,066.20	\$0	42.3	42.3
35LED	UN-241	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	520	150	4	T 59 R LED	RTLLED38	38	0.2	SW	520	79	71	0.1	\$	19.03	\$	945.00	\$0	49.6	49.6
32LED	461.5	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872	12	4 ft LED Tube	200732x2	30	0.4	SW	2,600	936	936	0.4	\$	143.24	\$	2,132.40	\$0	14.9	14.9
32LED	UN-242	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	SW	520	94	94	0.2	\$	25.19	\$	1,066.20	\$0	42.3	42.3
32LED	462	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	463	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	UN-243	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	4 ft LED Tube	200732x2	30	0.2	SW	2,600	468	468	0.2	\$	71.62	\$	1,066.20	\$0	14.9	14.9
32LED	UN-244	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	SW	520	31	31	0.1	\$	8.40	\$	355.40	\$0	42.3	42.3
32LED	UN-245	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	SW	520	31	31	0.1	\$	8.40	\$	355.40	\$0	42.3	42.3
32LED	UN-246	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	4 ft LED Tube	200732x2	30	0.2	SW	2,600	468	468	0.2	\$	71.62	\$	1,066.20	\$0	14.9	14.9
32LED	464	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	465	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	466	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	SW	2600	2,184	14	4 ft LED Tube	200732x2	30	0.4	SW	2,600	1,092	1,092	0.4	\$	167.11	\$	2,487.80	\$0	14.9	14.9
32LED	UN-249	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	2600	780	5	4 ft LED Tube	200732x2	30	0.2	SW	2,600	390	390	0.2	\$	59.98	\$	888.50	\$0	14.9	14.9
32LED	467	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	468	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	UN-251	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	SW	520	94	94	0.2	\$	25.19	\$	1,066.20	\$0	42.3	42.3
32LED	UN-252	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	SW	520	94	94	0.2	\$	25.19	\$	1,066.20	\$0	42.3	42.3
32LED	UN-253	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	SW	520	31	31	0.1	\$	8.40	\$	355.40	\$0	42.3	42.3
32LED	UN-254	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 ft LED Tube	200732x2	30	0.1	SW	2,600	156	156	0.1	\$	23.87	\$	355.40	\$0	14.9	14.9
32LED	489	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	UN-255	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156	5	4 ft LED Tube	200732x2	30	0.2	SW	520	78	78	0.2	\$	20.99	\$	888.50	\$0	42.3	42.3
32LED	UN-257	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156	5	4 ft LED Tube	200732x2	30	0.2	SW	520	78	78	0.2	\$	20.99	\$	888.50	\$0	42.3	42.3
32LED	UN-258	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	780	47	1	4 ft LED Tube	200732x2	30	0.0	SW	780	23	23	0.0	\$	5.17	\$	1,077.70	\$0	34.4	34.4
220LED	UN-247	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62	1	2 ft LED Tube	200714x2	16	0.0	SW	3,120	50	12	0.0	\$	1.85	\$	157.70	\$0	85.3	85.3
220LED	UN-248	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62	1	2 ft LED Tube	200714x2	16	0.0	SW	3,120	50	12	0.0	\$	1.85	\$	157.70	\$0	85.3	85.3
32LED	461	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	460	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	459	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	SW	2,600	1,404	1,404	0.5	\$	214.86	\$	3,198.60	\$0	14.9	14.9
32LED	Corridor D	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	6240	4,493	12	4 ft LED Tube	200732x2	30	0.4	SW	6,240	2,246	2,246	0.4	\$	305.73	\$	2,132.40	\$0	7.0	7.0
35LED	Corridor D	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	SW	6240	5,391	12	T 59 R LED	RTLLED38	38	0.5	SW	6,240	2,845	2,546	0.4	\$	346.49	\$	2,835.00	\$0	8.2	8.2
20LED	409	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	676	10	4 ft LED Tube	200732x1	15	0.2	SW	2,600	390	286	0.1	\$	43.77	\$	1,172.00	\$0	26.8	26.8
20LED	410	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$	78.78	\$	2,109.60	\$0	26.8	26.8
20LED	411	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$	78.78	\$	2,109.60	\$0	26.8	26.8
20LED	412	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15													

Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS									
		No. of Fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	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)	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	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 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 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	312B	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	313	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	309	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	307	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	308	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
40LED	306	6	T 28 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	T 38 R LED	RTL38LED	38	0.2	SW	2,600	593	343	0.1	\$ 52.52	\$ 1,417.50	\$0	27.0	27.0							
20LED	305	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014	15	4 f LED Tube	200732x1	15	0.2	SW	2,600	585	429	0.2	\$ 65.65	\$ 1,758.00	\$0	26.8	26.8							
46LED	304	6	W 28 C F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	4 f LED Tube	200732x2	30	0.2	SW	2,600	468	468	0.2	\$ 71.62	\$ 1,312.20	\$0	18.3	18.3							
20LED	303	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	302	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	301	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014	15	4 f LED Tube	200732x1	15	0.2	SW	2,600	585	429	0.2	\$ 65.65	\$ 1,758.00	\$0	26.8	26.8							
20LED	326	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	323	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	324	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	325	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	322	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014	15	4 f LED Tube	200732x1	15	0.2	SW	2,600	585	429	0.2	\$ 65.65	\$ 1,758.00	\$0	26.8	26.8							
20LED	321	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	320	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
20LED	319	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	SW	2600	406	6	4 f LED Tube	200732x1	15	0.1	SW	2,600	234	172	0.1	\$ 26.26	\$ 703.20	\$0	26.8	26.8							
20LED	318	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	811	12	4 f LED Tube	200732x1	15	0.2	SW	2,600	468	343	0.1	\$ 52.52	\$ 1,406.40	\$0	26.8	26.8							
20LED	317	6	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	811	12	4 f LED Tube	200732x1	15	0.2	SW	2,600	468	343	0.1	\$ 52.52	\$ 1,406.40	\$0	26.8	26.8							
20LED	316	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,622	24	4 f LED Tube	200732x1	15	0.4	SW	2,600	936	686	0.3	\$ 105.04	\$ 2,812.80	\$0	26.8	26.8							
20LED	315	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,622	24	4 f LED Tube	200732x1	15	0.4	SW	2,600	936	686	0.3	\$ 105.04	\$ 2,812.80	\$0	26.8	26.8							
20LED	314	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 f LED Tube	200732x1	15	0.3	SW	2,600	702	515	0.2	\$ 78.78	\$ 2,109.60	\$0	26.8	26.8							
35LED	Corridor A	46	S 32 R F 2 (ELE)	F43SSILL	72	3.3	SW	6240	20,667	46	T 38 R LED	RTL38LED	38	0.1	SW	6,240	10,908	9,759	1.6	\$ 1,328.21	\$ 10,867.50	\$8.2	8.2	8.2							
32LED	UN-226	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	562	3	4 f LED Tube	200732x2	30	0.1	SW	3,120	281	281	0.1	\$ 41.61	\$ 533.10	\$0	12.8	12.8							
32LED	UN-227	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	562	3	4 f LED Tube	200732x2	30	0.1	SW	3,120	281	281	0.1	\$ 41.61	\$ 533.10	\$0	12.8	12.8							
32LED	380	27	1T 32 R F 2 (ELE)	F42LL	60	1.6	SW	2600	4,212	27	4 f LED Tube	200732x2	30	0.8	SW	2,600	2,106	2,106	0.8	\$ 322.28	\$ 4,797.90	\$0	14.9	14.9							
32LED	381B	48	1T 32 R F 2 (ELE)	F42LL	60	2.9	SW	2600	7,488	48	4 f LED Tube	200732x2	30	1.4	SW	2,600	3,744	3,744	1.4	\$ 572.95	\$ 8,529.60	\$0	14.9	14.9							
40LED	UN-230	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	T 38 R LED	RTL38LED	38	0.1	SW	520	40	23.00	\$ 472.50	\$0	76.7	76.7	76.7								
40LED	UN-231	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	T 38 R LED	RTL38LED	38	0.1	SW	520	40	23.00	\$ 472.50	\$0	76.7	76.7	76.7								
40LED	UN-232	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	T 38 R LED	RTL38LED	38	0.1	SW	520	40	23.00	\$ 472.50	\$0	76.7	76.7	76.7								
40LED	UN-233	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	T 38 R LED	RTL38LED	38	0.1	SW	520	40	23.00	\$ 472.50	\$0	76.7	76.7	76.7								
40LED	UN-234	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	T 38 R LED	RTL38LED	38	0.1	SW	520	40	23.00	\$ 472.50	\$0	76.7	76.7	76.7								
32LED	New Storage (Music)	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 f LED Tube	200732x2	30	0.1	SW	3,120	281	281	0.1												

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 before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control	Annual Hours	Annual kWh (kWhspace) * (Annual Hours)	Number of Fixtures after the retrofit	Standard Fixture Code Example 2T 40 R F(U) = 2x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code	Watts per Fixture	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control device	Annual Hours	Annual kWh (kWhspace) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual \$ Saved (kW Saved) * (\$/kWh)	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback Length of time for renovations cost to be recovered	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual \$ Saved (kW Saved) * (\$/kWh)	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback Length of time for renovations cost to be recovered
15LED	UN-240	6	S 32 C F 2 (ELE)	F42LL	60	0.4	SW	520	187.2	6	S 32 C F 2 (ELE)	F42LL	60	0.4	CCC	520	187.2	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
35LED	UN-241	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	520	149.8	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	CCC	520	149.8	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	461.5	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872.0	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	C-CCC	1200	864.0	1,008.0	\$124.99	\$270.00	\$35.00	2.2								1.9
32LED	UN-242	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187.2	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	CCC	520	187.2	0.0	\$0.00	\$128.25	\$20.00									2.2
32LED	462	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	463	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	UN-243	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936.0	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	C-CCC	1820	655.2	280.8	\$34.82	\$270.00	\$35.00	7.8								6.7
32LED	UN-244	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	CCC	520	62.4	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-245	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	CCC	520	62.4	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-246	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936.0	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	C-CCC	1820	655.2	280.8	\$34.82	\$270.00	\$35.00	7.8								6.7
32LED	464	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	465	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	466	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	SW	2600	2,184.0	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	C-CCC	3000	2,520.0	-336.0	\$41.66	\$270.00	\$35.00									-5.6
32LED	UN-249	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	2600	2,780.0	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	C-CCC	1820	546.0	234.0	\$29.02	\$270.00	\$35.00	9.3								8.1
32LED	467	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	468	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	UN-251	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187.2	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	CCC	520	187.2	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-252	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187.2	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	CCC	520	187.2	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-253	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	CCC	520	62.4	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-254	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	C-CCC	1820	218.4	93.6	\$11.61	\$270.00	\$35.00	23.3								20.2
32LED	489	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	UN-255	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156.0	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	CCC	520	156.0	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-257	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156.0	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	CCC	520	156.0	0.0	\$0.00	\$128.25	\$20.00									#DIV/0!
32LED	UN-258	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	780	46.8	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	780	46.8	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
220LED	UN-247	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62.4	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	NONE	3120	62.4	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
220LED	UN-248	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62.4	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	NONE	3120	62.4	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
32LED	461	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	460	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	459	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	C-CCC	1820	1,965.6	842.4	\$104.46	\$270.00	\$35.00	2.6								2.2
32LED	Corridor D	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	6240	4,492.8	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	NONE	6240	4,492.8	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
35LED	Corridor D	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	SW	6240	5,391.4	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	NONE	6240	5,391.4	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
20LED	409	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	676.0	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	C-CCC	1820	473.2	202.8	\$26.15	\$270.00	\$35.00	10.7								9.3
20LED	410	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	951.8	365.0	\$46.26	\$270.00	\$35.00	6.0								5.2
20LED	411	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	951.8	365.0	\$46.26	\$270.00	\$35.00	6.0								5.2
20LED	412	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	951.8	365.0	\$46.26	\$270.00	\$35.00	6.0								5.2
20LED	413	16	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,081.6	16	S 28 P F 1 (ELE)	F41SSILL	26	0.4	C-CCC	1820	757.1	324.5	\$40.24	\$270.00	\$35.00	6.7								5.8
220LED	UN-260	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	520	10.4	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	NONE	520	10.4	0.0	\$0.00	\$0.00	\$0.00									#DIV/0!
20LED	414-C	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	951.8	365.0	\$46.26	\$270.00	\$35.00	6.0								5.2
20LED	415	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	811.2	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	C-CCC	1820	567.8	243.4	\$30.18	\$270.00	\$35.00	8.9								7.8
20LED	400 (Gym)	8	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	840.8	8	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	640.8	190.0	\$28.00	\$270.00	\$35.00	8.0								#DIV/0!
20LED	407	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-CCC	1820	951.8	365.0	\$46.26	\$270.00	\$35.00	6.0								5.2
20LED	408	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014.0	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	C-CCC	1820	709.8	304.2	\$37.72	\$270.00	\$35.00	7.2								6.2
20LED	406	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,487.2	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	C-CCC	1820	1,041.0	446.2	\$55.32	\$270.00	\$35.00	4.9								4.2
20LED	405	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,622.4	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	C-CCC	1820	1,135.7	486.7	\$60.35	\$270.00	\$35.00	4.5								3.9
20LED	UN-273	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	SW	520	13.5	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	NONE	520	13.5	0.0	\$0.00	\$0.00	\$0.00									#DIV

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 before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	No. of Fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) Recess. Floor 2 lamps U shape	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control device	Annual Hours	Annual kWh	(Original Annual kWh) - (Retrofit Annual kWh)	Annual kWh Saved	Annual kWh Saved (kW Saved) * (\$/kWh)	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
20LED	312B	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	313	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	309	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	307	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	308	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
40LED	306	6	T 28 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936.0	6	T 28 R F 2 (ELE)	F42LL	60	0.4	OCC	1200	432.0	504.0	0.0	\$62.50	\$128.25	\$20.00	2.1	1.7					
20LED	305	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014.0	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	C-OCC	1820	709.8	304.2	0.0	\$37.72	\$270.00	\$35.00	7.2	6.2					
46LED	304	6	W 28 C F 2 (ELE)	F42LL	60	0.4	SW	2600	936.0	6	W 28 C F 2 (ELE)	F42LL	60	0.4	OCC	1200	432.0	504.0	0.0	\$62.50	\$128.25	\$20.00	2.1	1.7					
20LED	303	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	302	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	301	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014.0	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	C-OCC	1820	709.8	304.2	0.0	\$37.72	\$270.00	\$35.00	7.2	6.2					
20LED	326	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	323	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	324	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	325	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	322	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	2600	1,014.0	15	S 28 P F 1 (ELE)	F41SSILL	26	0.4	C-OCC	1820	709.8	304.2	0.0	\$37.72	\$270.00	\$35.00	7.2	6.2					
20LED	321	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	320	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
20LED	319	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	SW	2600	405.6	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	OCC	1200	187.2	218.4	0.0	\$27.08	\$128.25	\$20.00	4.7	4.0					
20LED	318	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	811.2	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	C-OCC	1820	567.8	243.4	0.0	\$30.18	\$270.00	\$35.00	8.9	7.8					
20LED	317	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	811.2	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	C-OCC	1820	567.8	243.4	0.0	\$30.18	\$270.00	\$35.00	8.9	7.8					
20LED	316	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,622.4	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	C-OCC	1820	1,135.7	486.7	0.0	\$60.35	\$270.00	\$35.00	4.5	3.9					
20LED	315	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	2600	1,622.4	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	C-OCC	1820	1,135.7	486.7	0.0	\$60.35	\$270.00	\$35.00	4.5	3.9					
20LED	314	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,216.8	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	C-OCC	1820	951.8	365.0	0.0	\$45.26	\$270.00	\$35.00	6.0	5.2					
38LED	Corridor A	72	T 32 R F 3 (ELE)	F43SSILL	72	20.666.9				48	T 32 R F 3 (ELE)	F43SSILL	72	3.3	NONE	6240	20,866.9	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
32LED	UN-226	3	IT 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	561.6	3	IT 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	2038	365.0	196.6	0.0	\$24.37	\$270.00	\$35.00	11.1	9.6					
32LED	UN-227	3	IT 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	561.6	3	IT 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	2038	365.0	196.6	0.0	\$24.37	\$270.00	\$35.00	11.1	9.6					
32LED	380	27	IT 32 R F 2 (ELE)	F42LL	60	1.6	SW	2600	4,212.0	27	IT 32 R F 2 (ELE)	F42LL	60	1.6	C-OCC	1820	2,948.4	1,263.6	0.0	\$156.69	\$270.00	\$35.00	1.7	1.5					
32LED	381B	48	IT 32 R F 2 (ELE)	F42LL	60	2.9	SW	2600	7,488.0	48	IT 32 R F 2 (ELE)	F42LL	60	2.9	C-OCC	1820	5,241.6	2,246.4	0.0	\$278.55	\$270.00	\$35.00	1.0	0.8					
40LED	UN-230	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	T 28 R F 2 (ELE)	F42LL	60	0.1	NONE	520	62.4	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
40LED	UN-231	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	T 28 R F 2 (ELE)	F42LL	60	0.1	NONE	520	62.4	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
40LED	UN-232	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	T 28 R F 2 (ELE)	F42LL	60	0.1	NONE	520	62.4	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
40LED	UN-233	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	T 28 R F 2 (ELE)	F42LL	60	0.1	NONE	520	62.4	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
40LED	UN-234	2	T 28 R F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	T 28 R F 2 (ELE)	F42LL	60	0.1	NONE	520	62.4	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!						
32LED	New Storage (Music)	60	IT 32 R F 2 (ELE)	F42LL	60	2.4	SW	2600	6,240.0	60	IT 32 R F 2 (ELE)	F42LL	60	2.4	C-OCC	1820	3,980.0	2,260.0	0.0	\$280.00	\$270.00	\$35.00	2.2	1.9					

			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 annual hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 21 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * (\$/kWh)	Cost for renovations to lighting system	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered			
32LED	266 - Teachers Lounge	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	SW	2600	2,184.0	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	C-OCC	3000	2,520.0	-336.0	0.0	-\$41.66	\$270.00	\$35.00		-5.6		
220LED	266 - Teachers Lounge Women's Restroom	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62.4	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	NONE	3120	62.4	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
220LED	266 - Teachers Lounge Men's Restroom	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62.4	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	NONE	3120	62.4	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
32LED	Boy's Restroom	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	3120	936.0	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	C-OCC	2028	608.4	327.6	0.0	\$40.62	\$270.00	\$35.00	6.6	5.8		
32LED	Girl's Restroom	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	3120	936.0	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	C-OCC	2028	608.4	327.6	0.0	\$40.62	\$270.00	\$35.00	6.6	5.8		
35LED	Corridor A 2	40	T 32 R F 3 (ELE)	F43SSILL	72	2.9	SW	6240	17,971.2	40	T 32 R F 3 (ELE)	F43SSILL	72	2.9	NONE	6240	17,971.2	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
46LED	210 - Office	4	W 28 C F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	W 28 C F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	288.0	336.0	0.0	\$41.66	\$270.00	\$35.00	6.5	5.6		
46LED	210 - Office Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	W 28 C F 2 (ELE)	F42LL	60	0.1	OCC	520	62.4	0.0	0.0	\$0.00	\$128.25	\$20.00		#DIV/0!		
46LED	210 - Office Storage	2	W 28 C F 2 (ELE)	F42LL	60	0.1	SW	520	62.4	2	W 28 C F 2 (ELE)	F42LL	60	0.1	OCC	520	62.4	0.0	0.0	\$0.00	\$128.25	\$20.00		#DIV/0!		
46LED	210 - Office Conference Room	4	W 28 C F 2 (ELE)	F42LL	60	0.2	SW	1200	288.0	4	W 28 C F 2 (ELE)	F42LL	60	0.2	C-OCC	840	201.6	86.4	0.0	\$10.71	\$270.00	\$35.00	25.2	21.9		
46LED	213A	5	W 28 C F 2 (ELE)	F42LL	60	0.3	SW	2600	780.0	5	W 28 C F 2 (ELE)	F42LL	60	0.3	C-OCC	1820	546.0	234.0	0.0	\$29.02	\$270.00	\$35.00	9.3	8.1		
50LED	213	36	W 32 P F 2 (ELE)	F42LL	60	2.2	SW	2600	5,616.0	36	W 32 P F 2 (ELE)	F42LL	60	2.2	C-OCC	1820	3,931.2	1,684.8	0.0	\$208.92	\$270.00	\$35.00	1.3	1.1		
50LED	214A	15	W 32 P F 2 (ELE)	F42LL	60	0.9	SW	2600	2,340.0	15	W 32 P F 2 (ELE)	F42LL	60	0.9	C-OCC	1820	1,638.0	702.0	0.0	\$87.05	\$270.00	\$35.00	3.1	2.7		
24LED	Media Center	64	1B 32 P F 2 (ELE)	F42LL	60	3.8	SW	2600	9,984.0	64	1B 32 P F 2 (ELE)	F42LL	60	3.8	C-OCC	1820	6,988.8	2,995.2	0.0	\$371.40	\$270.00	\$35.00	0.7	0.6		
32LED	Media Center	90	1T 32 R F 2 (ELE)	F42LL	60	5.4	SW	2600	14,040.0	90	1T 32 R F 2 (ELE)	F42LL	60	5.4	C-OCC	1820	9,828.0	4,212.0	0.0	\$522.29	\$270.00	\$35.00	0.5	0.4		
32LED	Media Center Office	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1200	144.0	168.0	0.0	\$20.83	\$270.00	\$35.00	13.0	11.3		
46LED	214B	5	W 28 C F 2 (ELE)	F42LL	60	0.3	SW	2600	780.0	5	W 28 C F 2 (ELE)	F42LL	60	0.3	C-OCC	1820	546.0	234.0	0.0	\$29.02	\$270.00	\$35.00	9.3	8.1		
103LED	215	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	216	24	1T 32 R F 1	F41LL	32	0.8	SW	2600	1,996.8	24	1T 32 R F 1	F41LL	32	0.8	C-OCC	1820	1,397.8	599.0	0.0	\$74.28	\$270.00	\$35.00	3.6	3.2		
103LED	217	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	219	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	220	20	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,664.0	20	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,164.8	499.2	0.0	\$61.90	\$270.00	\$35.00	4.4	3.8		
103LED	222A/B	36	1T 32 R F 1	F41LL	32	1.2	SW	2600	2,995.2	36	1T 32 R F 1	F41LL	32	1.2	C-OCC	1820	2,096.6	898.6	0.0	\$111.42	\$270.00	\$35.00	2.4	2.1		
103LED	223/221	30	1T 32 R F 1	F41LL	32	1.0	SW	2600	2,496.0	30	1T 32 R F 1	F41LL	32	1.0	C-OCC	1820	1,747.2	748.8	0.0	\$92.85	\$270.00	\$35.00	2.9	2.5		
103LED	201	15	1T 32 R F 1	F41LL	32	0.5	SW	2600	1,248.0	15	1T 32 R F 1	F41LL	32	0.5	C-OCC	1820	873.6	374.4	0.0	\$46.43	\$270.00	\$35.00	5.8	5.1		
103LED	202	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	203	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	205	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	206	18	1T 32 R F 1	F41LL	32	0.6	SW	2600	1,497.6	18	1T 32 R F 1	F41LL	32	0.6	C-OCC	1820	1,048.3	449.3	0.0	\$55.71	\$270.00	\$35.00	4.8	4.2		
103LED	207A	15	1T 32 R F 1	F41LL	32	0.5	SW	2600	1,248.0	15	1T 32 R F 1	F41LL	32	0.5	C-OCC	1820	873.6	374.4	0.0	\$46.43	\$270.00	\$35.00	5.8	5.1		
103LED	208B	15	1T 32 R F 1	F41LL	32	0.5	SW	2600	1,248.0	15	1T 32 R F 1	F41LL	32	0.5	C-OCC	1820	873.6	374.4	0.0	\$46.43	\$270.00	\$35.00	5.8	5.1		
32LED	Corridor C 2	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,620.8	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	NONE	6240	2,620.8	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
20LED	Boy's Restroom	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	3120	405.6	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	3120	405.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
20LED	Girl's Restroom	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	3120	405.6	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	3120	405.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
32LED	Corridor C 2	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,246.4	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	NONE	6240	2,246.4	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
35LED	Corridor C 2	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	6240	1,797.1	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	NONE	6240	1,797.1	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
35LED	215	10	T 32 R F 3 (ELE)	F43SSILL	72	0.7	SW	2600	1,872.0	10	T 32 R F 3 (ELE)	F43SSILL	72	0.7	C-OCC	1820	1,310.4	561.6	0.0	\$69.64	\$270.00	\$35.00	3.9	3.4		
250	282-B Gymnasium	18	T 54 W F 3 (ELE) (T-5)	F43GHL	177	3.2	SW	2600	8,283.6	18	T 54 W F 3 (ELE) (T-5)	F43GHL	177	3.2	NONE	2600	8,283.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
35LED	281-A	10	T 32 R F 3 (ELE)	F43SSILL	72	0.7	SW	2600	1,872.0	10	T 32 R F 3 (ELE)	F43SSILL	72	0.7	C-OCC	1200	864.0	1,008.0	0.0	\$124.99	\$270.00	\$35.00	2.2	1.9		
32LED	Boys Locker Room	20	1T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2600	3,120.0	20	1T 32 R F 2 (ELE)	F42LL	60	1.2	NONE	2600	3,120.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!		
32LED	Entryway	13	1T 32 R F 2 (ELE)	F42LL	60	0.8	SW	2125	1,657.5	13	1T 32 R F 2 (ELE)	F42LL	60	0.8	C-OCC	1000	780.0	877.5	0.0	\$108.81	\$270.00	\$35.00	2.5	2.2		
Total		3,969				213.4			619678.7	3969.0			213.4		0	#N/A	#VALUE!	#N/A	#VALUE!	49997.3	6660.0					
																		Demand Savings		0.0	\$0					
																		kWh Savings		115,204	\$14,285					
																		Total Savings			\$14,285		3.5	3.0		

		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 before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Pre-Inst. control device	Annual Hours	Annual kWh	No. of fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control device	Annual Hours	Annual kWh	Annual kWh Saved	Annual kWh Saved	Annual \$ Saved	Retrofit Cost	N3 Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback				
																									Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)
15LED	UN-240	6	S 32 C F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	OCC	520	94	94	0.2	\$ 25.19	\$ 1,194.45	\$ 20	47.4	46.6				
35LED	UN-241	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	520	150	4	T 59 R LED	RTLED38	38	0.2	OCC	520	79	71	0.1	\$ 19.03	\$ 1,073.25	\$ 20	56.4	55.3				
32LED	461.5	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,200	432	1,440	0.4	\$ 205.73	\$ 2,402.40	\$ 35	11.7	11.5				
32LED	UN-242	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	OCC	520	94	94	0.2	\$ 25.19	\$ 1,194.45	\$ 20	47.4	46.6				
32LED	462	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	463	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	UN-243	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,820	328	608	0.2	\$ 89.03	\$ 1,336.20	\$ 35	15.0	14.6				
32LED	UN-244	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	OCC	520	31	31	0.1	\$ 8.40	\$ 483.65	\$ 20	57.6	55.2				
32LED	UN-245	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	OCC	520	31	31	0.1	\$ 8.40	\$ 483.65	\$ 20	57.6	55.2				
32LED	UN-246	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,820	328	608	0.2	\$ 89.03	\$ 1,336.20	\$ 35	15.0	14.6				
32LED	464	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	465	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	466	14	1T 32 R F 2 (ELE)	F42LL	60	0.8	SW	2600	2,184	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	3,000	1,260	924	0.4	\$ 146.28	\$ 2,757.80	\$ 35	18.9	18.6				
32LED	UN-249	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	2600	780	5	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,820	273	507	0.2	\$ 274.19	\$ 1,158.50	\$ 35	15.6	15.1				
32LED	467	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	468	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	UN-251	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	OCC	520	94	94	0.2	\$ 25.19	\$ 1,194.45	\$ 20	47.4	46.6				
32LED	UN-252	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	520	187	6	4 ft LED Tube	200732x2	30	0.2	OCC	520	94	94	0.2	\$ 25.19	\$ 1,194.45	\$ 20	47.4	46.6				
32LED	UN-253	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	520	62	2	4 ft LED Tube	200732x2	30	0.1	OCC	520	31	31	0.1	\$ 8.40	\$ 483.65	\$ 20	57.6	55.2				
32LED	UN-254	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,820	109	203	0.1	\$ 29.68	\$ 625.40	\$ 35	21.1	19.9				
32LED	489	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	UN-255	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156	5	4 ft LED Tube	200732x2	30	0.2	OCC	520	78	78	0.2	\$ 20.99	\$ 1,016.75	\$ 20	48.4	47.5				
32LED	UN-257	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	520	156	5	4 ft LED Tube	200732x2	30	0.2	OCC	520	78	78	0.2	\$ 20.99	\$ 1,016.75	\$ 20	48.4	47.5				
32LED	UN-258	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	780	47	1	4 ft LED Tube	200732x2	30	0.0	NONE	780	23	517	0.0	\$ 5.17	\$ 177.70	-	34.4	34.4				
220LED	UN-247	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62	1	2 ft LED Tube	200714x2	16	0.0	NONE	3,120	50	12	0.0	\$ 1.85	\$ 157.70	-	85.3	85.3				
220LED	UN-248	1	S 17 C F 1 (ELE)	F21ILL	20	0.0	SW	3120	62	1	2 ft LED Tube	200714x2	16	0.0	NONE	3,120	50	12	0.0	\$ 1.85	\$ 157.70	-	85.3	85.3				
32LED	461	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	460	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	459	18	1T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,820	983	1,825	0.5	\$ 267.08	\$ 3,468.60	\$ 35	13.0	12.9				
32LED	UN-249	12	1T 32 R F 2 (ELE)	F42LL	60	0.7	SW	6240	4,493	12	4 ft LED Tube	200732x2	30	0.4	NONE	6,240	2,246	2,246	0.4	\$ 305.73	\$ 2,132.40	\$ 35	7.0	7.0				
35LED	Corridor D	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	SW	6240	5,391	12	T 59 R LED	RTLED38	38	0.5	NONE	6,240	2,845	2,546	0.4	\$ 346.49	\$ 2,835.00	-	8.2	8.2				
20LED	409	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	SW	2600	676	10	4 ft LED Tube	200732x1	15	0.2	C-OCC	1,820	273	403	0.1	\$ 58.27	\$ 1,442.00	\$ 35	24.7	24.1				
20LED	410	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,820	491	725	0.2	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4				
20LED	411	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,820	491	725	0.2	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4				
20LED	412	18	S 28 P F 1 (ELE)	F41SSILL	26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1	15															

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						NJ Smart Start Incentive		Simple Payback		Simple Payback	
Field Code	Area Description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Value from Table of Standard Fixture Wattages	Watts/Fixt) * (Fixt No.)	kW/Space	Pre-Inst. control device	Annual Hours	Annual kWh	Watts/Fixt) * (Fixt No.)	Standard Fixture Code	Fixture Code	Value from Table of Standard Fixture Wattages	Watts per Fixture	kW/Space	Retrofit Control device	Annual Hours	Annual kWh	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual \$ Saved (kWh Saved) * (\$/kWh)	Retrofit 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	Length of time for renovations cost to be recovered							
20LED	312B	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	313	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	309	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	307	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	308	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
40LED	306	6	T 28 R F 2 (ELE)	F42LL		60	0.4	SW	2600	936	6	T 38 R LED	RTLLED38		38	0.2	OCC	1,200	274	662.01	\$ 92.10	\$ 1,545.75	\$ 20	16.8	16.6								
20LED	305	15	S 28 P F 1 (ELE)	F41SSILL		26	0.4	SW	2600	1,014	15	4 ft LED Tube	200732x1		15	0.2	C-OCC	1,820	410	605.02	\$ 87.41	\$ 2,028.00	\$ 35	23.2	22.8								
46LED	304	6	W 28 C F 2 (ELE)	F42LL		60	0.4	SW	2600	936	6	4 ft LED Tube	200732x2		30	0.2	OCC	1,200	216	720.02	\$ 102.87	\$ 1,440.45	\$ 20	14.0	13.8								
20LED	303	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	302	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	301	15	S 28 P F 1 (ELE)	F41SSILL		26	0.4	SW	2600	1,014	15	4 ft LED Tube	200732x1		15	0.2	C-OCC	1,820	410	605.02	\$ 87.41	\$ 2,028.00	\$ 35	23.2	22.8								
20LED	326	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	323	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	324	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	325	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	322	15	S 28 P F 1 (ELE)	F41SSILL		26	0.4	SW	2600	1,014	15	4 ft LED Tube	200732x1		15	0.2	C-OCC	1,820	410	605.02	\$ 87.41	\$ 2,028.00	\$ 35	23.2	22.8								
20LED	321	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	320	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
20LED	319	6	S 28 P F 1 (ELE)	F41SSILL		26	0.2	SW	2600	406	6	4 ft LED Tube	200732x1		15	0.1	OCC	1,200	108	298.01	\$ 41.88	\$ 831.45	\$ 20	19.9	19.8								
20LED	318	12	S 28 P F 1 (ELE)	F41SSILL		26	0.3	SW	2600	811	12	4 ft LED Tube	200732x1		15	0.2	OCC	1,200	180	484.01	\$ 69.93	\$ 1,676.40	\$ 35	24.0	23.5								
20LED	317	12	S 28 P F 1 (ELE)	F41SSILL		26	0.3	SW	2600	811	12	4 ft LED Tube	200732x1		15	0.2	C-OCC	1,820	328	484.01	\$ 69.93	\$ 1,676.40	\$ 35	24.0	23.5								
20LED	316	24	S 28 P F 1 (ELE)	F41SSILL		26	0.6	SW	2600	1,622	24	4 ft LED Tube	200732x1		15	0.4	C-OCC	1,820	655	967.03	\$ 139.86	\$ 3,082.80	\$ 35	22.0	21.8								
20LED	315	24	S 28 P F 1 (ELE)	F41SSILL		26	0.6	SW	2600	1,622	24	4 ft LED Tube	200732x1		15	0.4	C-OCC	1,820	655	967.03	\$ 139.86	\$ 3,082.80	\$ 35	22.0	21.8								
20LED	314	18	S 28 P F 1 (ELE)	F41SSILL		26	0.5	SW	2600	1,217	18	4 ft LED Tube	200732x1		15	0.3	C-OCC	1,820	491	725.02	\$ 104.89	\$ 2,379.60	\$ 35	22.7	22.4								
38LED	Corridor A	46	T 32 R F 3 (ELE)	F43SSILL		72	0.3	SW	2600	20,667	46	T 59 R LED	RTLLED38		38	1.7	NONE	6,240	10,908	9,789.16	\$ 1,328.22	\$ 10,867.50	\$ 35	8.2	8.2								
32LED	UN-226	3	1T 32 R F 2 (ELE)	F42LL		60	0.2	SW	3120	562	3	4 ft LED Tube	200732x2		30	0.1	C-OCC	2,028	183	379.01	\$ 53.80	\$ 803.10	\$ 35	14.9	14.3								
32LED	UN-227	3	1T 32 R F 2 (ELE)	F42LL		60	0.2	SW	3120	562	3	4 ft LED Tube	200732x2		30	0.1	C-OCC	2,028	183	379.01	\$ 53.80	\$ 803.10	\$ 35	14.9	14.3								
32LED	380	27	1T 32 R F 2 (ELE)	F42LL		60	1.6	SW	2600	4,212	27	4 ft LED Tube	200732x2		30	0.8	C-OCC	1,820	1,474	2,738.08	\$ 400.63	\$ 5,067.90	\$ 35	12.6	12.6								
32LED	381B	48	1T 32 R F 2 (ELE)	F42LL		60	2.9	SW	2600	7,488	48	4 ft LED Tube	200732x2		30	1.4	C-OCC	1,820	2,621	4,867.14	\$ 712.22	\$ 8,799.60	\$ 35	12.4	12.3								
40LED	UN-230	2	T 28 R F 2 (ELE)	F42LL		60	0.1	SW	520	62	2	T 38 R LED	RTLLED38		38	0.1	NONE	520	40	6.16	\$ 0.87	\$ 472.50	-	76.7	76.7								
40LED	UN-231	2	T 28 R F 2 (ELE)	F42LL		60	0.1	SW	520	62	2	T 38 R LED	RTLLED38		38	0.1	NONE	520	40	6.16	\$ 0.87	\$ 472.50	-	76.7	76.7								
40LED	UN-232	2	T 28 R F 2 (ELE)	F42LL		60	0.1	SW	520	62	2	T 38 R LED	RTLLED38		38	0.1	NONE	520	40	6.16	\$ 0.87	\$ 472.50	-	76.7	76.7								
40LED	UN-233	2	T 28 R F 2 (ELE)	F42LL		60	0.1	SW	520	62	2	T 38 R LED	RTLLED38		38	0.1	NONE	520	40	6.16	\$ 0.87	\$ 472.50	-	76.7	76.7								
40LED	UN-234	2	T 28 R F 2 (																														

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)**
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I. SMART START

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NJ SmartStart Buildings

Program Overview



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

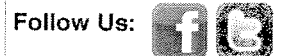
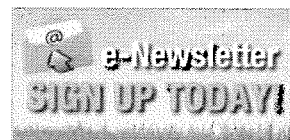
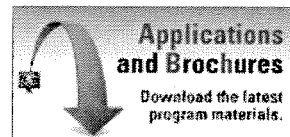
Large Combined Heat & Power/Fuel Cell Program Update

Board Order - Standby Charges for Distributed Generation Customers

Other updates posted.

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Mannington Mills:
NJ SmartStart Buildings custom measures case study presented at Globalcon Conference



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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

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

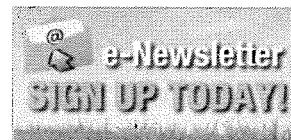
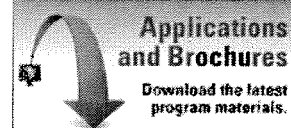
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Direct Install - Steps to Participation



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

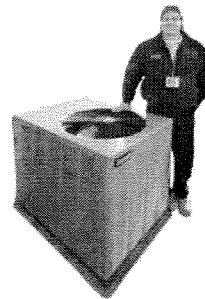
You and the participating contractor will set a convenient start date for the installation.

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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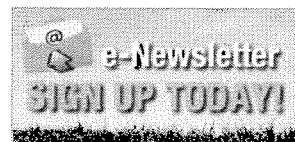
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**Stony Brook
Regional Sewerage
Authority:**

**Innovative Regenerative
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III. PAY FOR PERFORMANCE (P4P)



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)

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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)

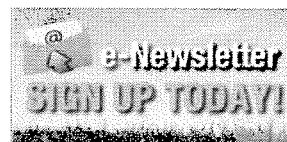
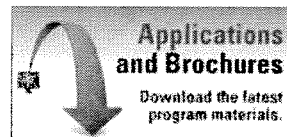
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[Large Combined Heat & Power/Fuel Cell Program Update](#)
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Rutgers University:

Continued
Commitment to
Saving Energy



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LFN 2011-17

June 16, 2011

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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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.

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

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

NEWARK PUBLIC SCHOOL DISTRICT EAST SIDE HIGH SCHOOL

Cost of Electricity	\$0.14	/kWh
Electricity Usage	1,747,200	kWh/yr
System Unit Cost	\$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary	Annual Utility Savings				Estimated	Total		New Jersey	Payback	Payback
Cost					Maintenance	Savings	Federal Tax	Renewable	(without	(with
					Savings		Credit	** SREC	SREC	SREC
\$	kW	kWh	therms	\$	\$	\$	\$	\$	Years	Years
\$520,000	130.0	162,366	0	\$22,731	0	\$22,731	\$0	\$25,167	22.9	10.9

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

Area Output*

5,022 m²
54,053 ft²

Perimeter Output*

1,044 m
3,425 ft

Available Roof Space for PV:

(Area Output - 10 ft x Perimeter) x 85%
16,832 ft²

Approximate System Size:

Is the roof flat? (Yes/No) Yes

8 watt/ft²
134,660 DC watts
130 kW Enter into PV Watts



PV Watts Inputs***

Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Tilt Angle 20
Enter into PV Watts (default)
Array Azimuth 180
Enter into PV Watts
Zip Code 07105
Enter info PV Watts
DC/AC Derate Factor 0.83

PV Watts Output

162,366 annual kWh calculated in PV Watts program

% Offset Calc

Usage 1,747,200 (from utilities)
PV Generation 162,366 (generated using PV Watts)
% offset 9%

* <http://www.freemaptools.com/area-calculator.htm>

** <http://www.flettexchange.com>

*** http://gisatnrel.nrel.gov/PVWatts_View/index.html



* * *

**AC Energy
&
Cost Savings**



Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	130.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	107.9 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.78	9496	1329.44
2	3.54	10941	1531.74
3	4.35	14485	2027.90
4	4.95	15354	2149.56
5	5.69	17826	2495.64
6	5.86	17242	2413.88
7	5.73	17215	2410.10
8	5.47	16263	2276.82
9	4.91	14570	2039.80
10	3.99	12637	1769.18
11	2.68	8482	1187.48
12	2.35	7855	1099.70
Year	4.36	162366	22731.24

*

[About the Hourly Performance Data](#)
[Saving Text from a Browser](#)

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

Please send questions and comments regarding PVWATTS to [Webmaster](#)

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

APPENDIX F

Photos



1: Existing steam to hot water heat exchangers



2: Example of steam boiler (one of three)



3: Example of pumps in boiler room



4: Johnson Metasys controls system



5: DHW heater and storage tanks



6: Walk-In cooler unit in basement under kitchen



7: Sample gymnasium lighting fixture



8: Alternative gymnasium lighting fixture

APPENDIX G

EPA Portfolio Manager



ENERGY STAR[®] Statement of Energy Performance

68

ENERGY STAR[®]
Score¹

East Side High School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 302,353
Built: 1910

For Year Ending: May 31, 2013
Date Generated: May 13, 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

East Side High School
238 Van Buren St.
Newark, New Jersey 07105

Property Owner

,
() -

Primary Contact

,
() -

Property ID: 3916667

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

85.1 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	5,830,425 (23%)
Natural Gas (kBtu)	19,907,533 (77%)

National Median Comparison

National Median Site EUI (kBtu/ft ²)	101.5
National Median Source EUI (kBtu/ft ²)	154.7
% Diff from National Median Source EUI	-16%

Source EUI

129.7 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	1,795
---	-------

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

,
() -



**Professional Engineer Stamp
(if applicable)**