

THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

WEST SIDE HIGH SCHOOL

403 S Orange Ave, Newark, NJ 07103

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

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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
West Side High School	403 S Orange Ave, Newark, NJ 07103	145,501	1926, 1982

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)
West Side High School	222,569	5,250	36,989	11.1

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
1	Install Condensing Boiler for Shoulder Month Operation	91,760	1,395	65.8	0	65.8	Y
2	Install Premium Efficiency Motors	5,447	380	14.3	0	14.3	Y
3	Install Window AC Controller	5,800	6,262	0.9	0	0.9	Y
4A	Install Basic Controls	21,309	2,868	7.4	0	7.4	Y
4B**	Install DDC Controls	673,619	5,117	131.6	0	131.6	N
5	Domestic Hot Water System Improvements	35,718	925	38.6	0	38.6	Y
6	Install Vending Machine Controls	560	815	0.7	0	0.7	Y
7	Install Low Flow Plumbing Fixtures	241,867	3,982	60.7	0	60.7	N
L1**	Lighting Replacements / Upgrades	226,257	21,145	10.7	0	10.7	N
L2**	Install Lighting Controls (Add Occupancy Sensors)	23,220	7,906	2.9	3,010	2.6	N
L3	Lighting Replacements with Controls (Occupancy Sensors)	249,477	24,343	10.2	3,010	10.1	Y
Total**		651,938	40,971	15.9	3,010	15.8	
Total (Recommended)		410,072	36,989	11.1	3,010	11.0	

* Incentive shown is per the New Jersey SmartStart Program.

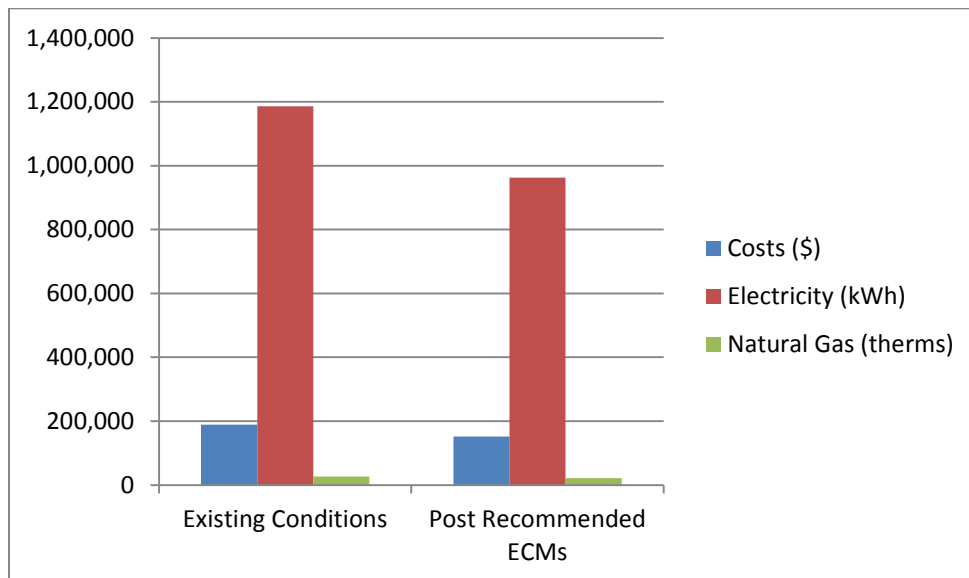
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 280 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	189,203	152,214	20%
Electricity (kWh)	1,185,600	963,031	19%
Natural Gas (therms)	26,929	21,409	20%
Site EUI (kbtu/SF/Yr)	46.3	37.3	



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: West Side High School (Index No. 78)

Address: 403 S. Orange Ave., Newark, NJ 07103

Gross Floor Area: 145,501 Square Feet

Number of Floors: 3

Year Built: 1926

Additions: 1982



Description of Spaces: Classrooms, offices, cafeteria, kitchen, auditorium with a stage, gymnasium, library, computer rooms, storage rooms, weight room, toilet rooms and a mechanical room.

Description of Occupancy: The school serves 756 students from 9th to 12th grade. There are 80 school faculty and staff members.

Number of Computers: The school has approximately 57 desktop and laptop computers.

Building Usage: Hours of operation are 8:15 AM – 3:00 PM Monday through Friday, with various after-school activities until 6:00 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: Generally structural steel with concrete masonry units (CMU), brick and plaster covered terracotta speedtile interior walls. Due to the age of the building there is likely no insulation in the exterior walls.

Façade: Brick and limestone

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. The roof has good insulation value, however it is in need of some patching.

Windows: Windows throughout the building are operable double pane windows with thermally sealed aluminum frames. The windows appeared to be in good condition. There are no ECMs associated with the windows.

Exterior Doors: The exterior doors around the building are FRP with double pane glass that has a metal grate on the exterior for security purposes. The doors and seals appeared to be in good condition during the facility assessment. There are no ECMs associated with the exterior doors.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Heating equipment in this building consists of eight (8) natural gas fired Paterson Kelly Modu-Fire hot water (HW) boilers. The boilers are non-condensing type with an input capacity of 2,000 MBH with a nameplate efficiency of 85%. The boilers were installed in 2003 and appear to be in good condition. Each boiler has a Grundos 3/4HP in-line pump on the supply side to feed the building loop. In addition, there are two (2) 20 HP HW pumps (91% efficient) which operate in lead/lag as well as two (2) 7.5HP HW pumps (85.5% efficient) which were both running during the facility visit. It is likely that each of these sets of pumps circulate HW to different sections of the building. The PK Modu-Fire boilers are controlled by a boiler sequencer which is likely to include HW temperature reset; which would defeat the purpose of installing VFDs onto the HW pump motors. Therefore there is no ECM to install VFDs included in this report. HW is distributed throughout the school to unit ventilators (UVs) in classrooms and HW radiators in corridors. An ECM is included to install one condensing boiler for shoulder month operation.

The auditorium is heated by a heating and ventilation (HV) unit which has a penthouse plenum and draws 100% outdoor air (OA) through a HW coil. The CFM is unknown and difficult to estimate without being able to see the supply duct.

The gymnasium addition has two natural gas fired HV units mounted on the ceiling. The tag was not available during the facility visit; but are estimated to be 12,000 CFM each using a ductulator.

An additional ECM has been included which evaluates replacing the existing energy efficient HW pump motors with premium efficiency motors.

Cooling: The only source of cooling in the building is from (30) window air conditioning units located in various rooms. The window A/C units vary in size with the average of 24,000 Btu/h. The window A/C units are not programmable and run the risk of operating when no occupants are present. There is a chance that some may be left on when occupants leave the room. An ECM is included to address this condition.

Ventilation: The classrooms have individual unit ventilators that have outdoor air capabilities, however most have their fans turned off and are acting as radiators. The HV unit for the auditorium provides ventilation to that space and was operating at the time of our visit. This unit used the room it was located in as a plenum, drawing outdoor air through a hot water coil mounted to the wall. There are two ceiling mounted HV units for the gymnasium however these were not accessible and were not operating at the time of our visit. There are no ECMs associated with the ventilation systems.

Exhaust: There are roughly 40 fractional horsepower exhaust fans located on the roof which are used for general building exhaust and bathroom exhaust. The kitchen exhaust fan is

included in the total and is also assumed to be fractional horsepower. According to kitchen staff, the kitchen exhaust fan is currently not functioning. All of these fans were operating at the time of our site visit. There are no ECMs associated with the exhaust systems, however controlling these fans is included in the controls ECMs.

Controls Systems

The boilers are controlled by Heat Timer Controls with a Johnson Metasys system overlay which is no longer operational. The Heat Timer controls are in good condition but could use some re-programming. The school used to have a pneumatic control system, but it is no longer operational. Heat in the classrooms is presently regulated by teachers opening and closing windows. Two ECMs are included to address this issue. One includes basic boiler controls that use indoor and outdoor air temperatures to control the boilers using a hot water reset schedule, while the second alternative ECM includes a full DDC controls systems.

Domestic Hot Water Systems

Domestic hot water (DHW) is generated by one (1) AO Smith 420,000 btu/h natural gas fired DHW boiler which circulates water through six (6) 119 gallon storage tanks. DHW is used for toilet rooms as well as kitchen scullery sinks. The storage capacity of the existing DHW system is considered oversized for this type of building. An ECM calculation has been included which evaluates the use of a lower storage capacity with a high efficiency DHW heater.

Kitchen Equipment

The kitchen is used for reheating food only with actual cooking performed elsewhere. All kitchen equipment is natural gas fired. There are three (3) reach-in freezers and (5) reach-in coolers and no walk-in units. The kitchen hood is an estimated 4' x 10'; however kitchen staff indicated that the exhaust fan is no longer functioning. All of the cooking equipment and refrigeration equipment appears to be new and therefore no ECM is included to improve it.

Plug Load

This school has computers, copiers, smart boards, residential appliances (microwave, refrigerator), printers, portable electric heaters (personal) and vending machines which contribute to the plug load in the building. An ECM is included which evaluates installing 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 on the first floor. An ECM is included that evaluates the water savings associated with low flow urinals and water closets.

Lighting Systems

The lighting in the building is primarily 4' ceiling/flush mounted linear fluorescent T8 strip fixtures with either four lamps, two lamps or one lamp. There are also a handful of 2'x4' and 1'x4' recessed troffer fixtures with two or four lamps each. 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

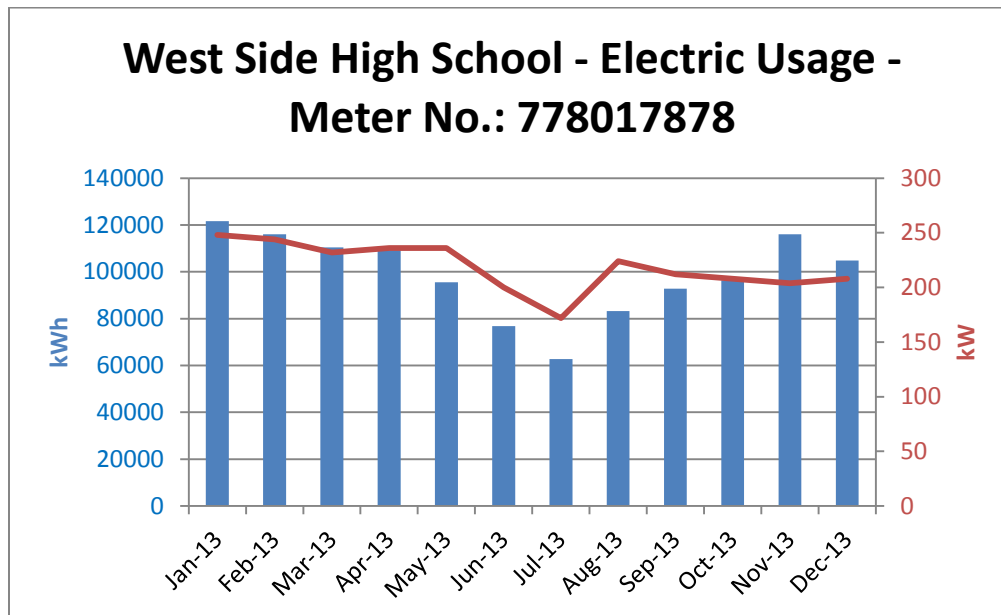
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	1,185,600	kWh
Annual Cost	163,842	\$
Blended Unit Rate	0.14	\$/kWh
Supply Rate	0.13	\$/kWh
Demand Rate	5.02	\$/kW
Peak Demand	248	kW
Natural Gas		
Annual Consumption	26,929	Therms
Annual Cost	25,361	\$
Unit Rate	0.94	\$/therm

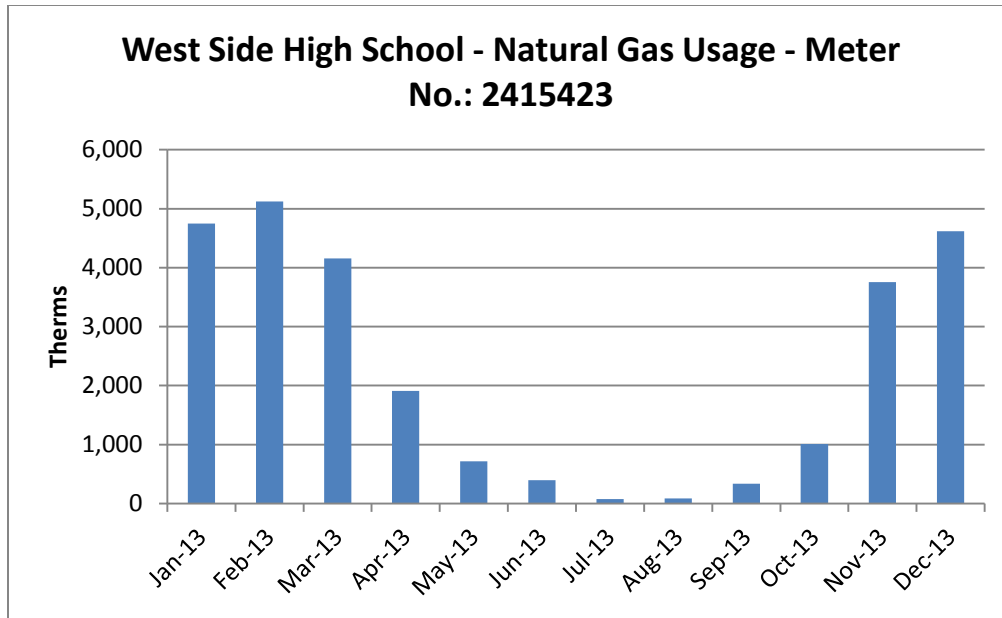
Blended Rate: Average rate charged determined by the annual cost / annual usage

Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)

Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)



The electrical consumption month to month remains fairly constant all year without regard to the heating or cooling seasons which is reasonable as there is no major cooling in this building. There appears to be a drop in electrical usage during the summer months which is attributed to school not being in session.



Natural gas is used primarily for space heating during the winter months. The baseline usage during the summer months is attributed to domestic hot water and kitchen equipment usage.

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	\$0.127	\$0.128	N
Natural Gas	\$/Therm	\$0.942	\$0.955	N

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

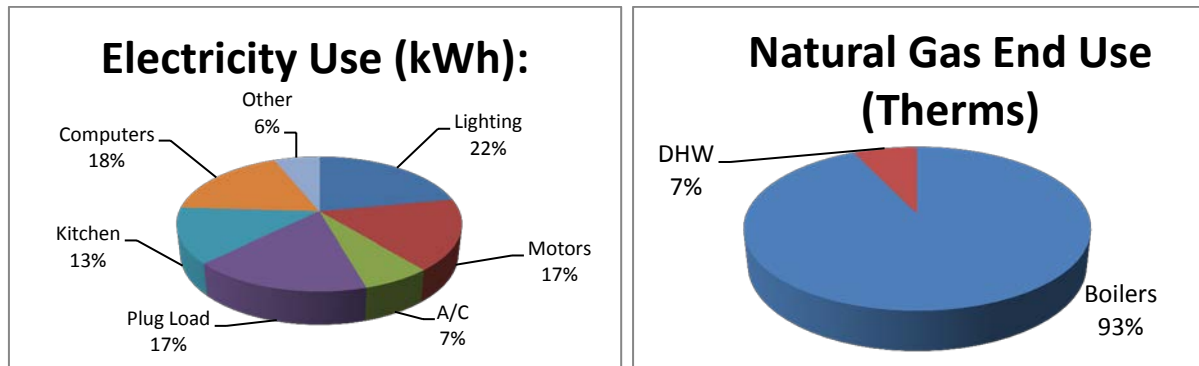
Additional information on selecting a third party energy supplier is available here:

<http://www.state.nj.us/bpu/commercial/shopping.html>.

See Appendix A for a list of third-party energy suppliers licensed by the Board of Public Utilities to sell within the building's service area.

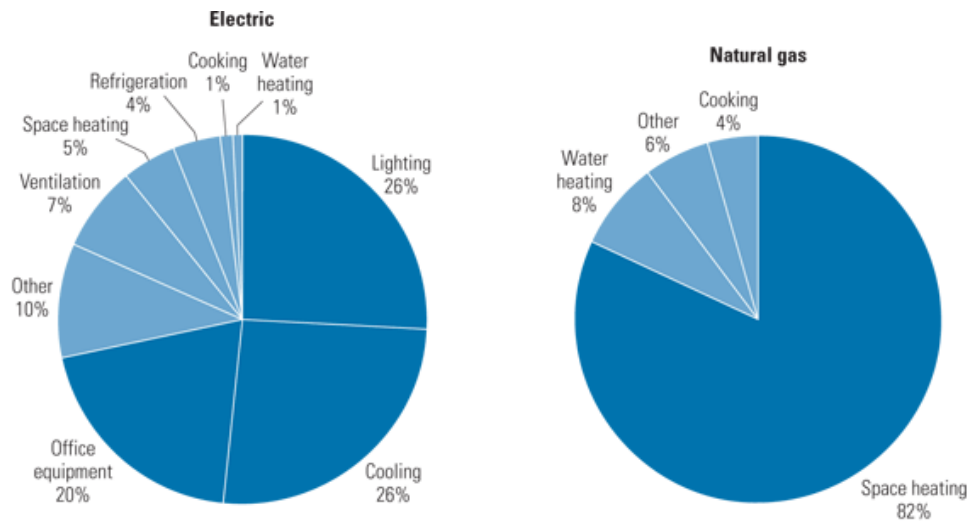
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



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

Typical End-Use Utility Profile for Educational Facilities



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

4.0 BENCHMARKING

TRC has previously benchmarked this building, the results of which have been provided to NPS. The results are summarized below. Copies of the benchmarking report are included 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)
46.3*	47**

* Calculated by CHA using Utility Data provided by NPS

** Provided by TRC

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

5.0 ENERGY CONSERVATION MEASURES

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

- Energy conservation measures (ECMs) are energy savings recommendations that typically require a financial investment. For these areas of opportunity, CHA prepared detailed calculations, as summarized in this section and in Appendix C. In general, additional savings may exist from reductions in maintenance activities associated with new equipment or better controls; however for conservatism, maintenance savings are not accounted for in this report; instead the only savings which are reported are those derived directly from reductions in energy which can be tracked by the utility bills.
- Operational and Maintenance measures (O&M) consist of low- or no-cost operational opportunities, which if implemented would have positive impacts on overall building operation, comfort levels, and/or energy usage. There are no estimated savings, costs or paybacks associated with the O&M measures included as part of this study.

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Install Condensing Boiler for Shoulder Month Operation

Presently, the building is heated by eight (8) 85% efficient non-condensing hot water boilers. New high-turndown condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96% with low entering return water temperatures. To implement this ECM, one high efficiency condensing boiler will be installed to operate as the primary boiler during the shoulder season. Some piping and wiring modifications will be needed. New dedicated boiler venting would also need to be installed either through the roof or sidewall. The proposed boiler should operate in condensing mode during the majority of the shoulder season and therefore will offer a dramatic efficiency increase during this time over the existing boilers.

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

ECM-1 Install Condensing Boiler for Shoulder Month Operation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
91,760	-	-	1,484	1,395	(0.6)	-	65.8	65.8

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

This measure is recommended.

5.2 ECM-2 Install Premium Efficiency Motors

The heating hot water pump motors include two (2) 20 HP, 91% efficient motors in addition to two (2) 7.5 HP, 85.5% efficient motors. These motors are considered to be energy efficient for their respective sizes but not considered to be premium efficiency. Premium efficiency 20 HP motors are 93% efficient, while 7.5 HP motors are 91% efficient.

The savings of this measure are calculated from the motor efficiency improvement for the motors operating at full load. Each set of motors operates in lead/lag, therefore the lag motor is assumed to have fewer run hours than the lead motor.

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

ECM-2 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
5,447	1.1	2,468	-	380	0.3	-	14.3	14.3

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

This measure is recommended.

5.3 ECM-3 Install Window A/C Controller

There are approximately (30) 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
5,800	-	45,377	-	6,262	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.

5.4.1 ECM-4A Install Basic Controls

The building uses hot water boilers that are currently controlled by a Heat Timer system. Hot water temperature is maintained at 180 F with no regard to space or outdoor air temperature. Classrooms are overheated as a result and the teachers open the windows in an attempt to cool the rooms down. The Heat Timer system could be re-programmed or replaced to improve the boiler operation.

A Basic Control system will provide automatic control of the boiler(s) to produce only enough hot water needed to heat the building, based on a single or multiple averaging space thermostats 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	-	-	3,052	2,868	0.3	-	7.4	7.4

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

This measure is recommended.

5.4.2 ECM-4B Install Full DDC Controls

Currently, the classroom unit ventilators are not controlled and provide full heating whenever the boilers are operational. This leads to overheating of the spaces which results in the teachers opening the windows.

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
673,619	-	-	5,444	5,117	(0.9)	-	131.6	131.6

* 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

5.5 ECM-5 Domestic Hot Water System Improvements

The existing domestic hot water heating system consists of one (1) natural gas fired boiler which circulated DHW through six (6) 119 gallon storage tanks. The DHW boiler 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 two (2) high efficiency condensing heaters with 100 gallon capacity each.

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
35,718	-	-	984	925	(0.4)	-	38.6	38.6

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

This measure is recommended.

5.6 ECM-6 Install Vending Misers

The building presently has two (2) cold beverage vending machines.

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-6 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
560	-	5,906	-	815	13.5	-	0.7	0.7

* 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 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. Faucets with low-flow push valves were not considered for replacement.

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

ECM-7 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water				
\$	kW	kWh	Therms	kGal	\$	\$	Years	Years
241,867	-	-	-	527	3,982	(0.5)	-	60.7

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

This measure is not recommended due to the high capital cost.

5.8.1 ECM-L1 Lighting Replacement / Upgrades

The existing lighting system consists of mostly T8 linear fluorescent fixtures which until recently represented the most efficient lighting technology available. 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
226,257	48.2	143,636	-	21,145	0.0	-	10.7	10.7

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

This measure is not recommended in lieu of ECM L3.

5.8.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Presently, all interior lighting fixtures are controlled 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 5.8.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
23,220	-	62,255	-	7,906	2.7	3,010	2.9	2.6

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

This measure is not recommended in lieu of ECM L3.

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

This measure is a combination of ECM-L1 and ECM-L2; recommending replace/upgrade the current lighting fixtures to more efficient ones and installing occupancy sensors on the new lights. Interactive effects of the higher efficiency lights and occupancy sensors lead the energy and cost savings for this measure to not be cumulative or equivalent to the sum of replacing the lighting fixtures alone and installing occupancy sensors without the lighting upgrade. The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
249,477	48.2	168,818	-	24,343	0.1	3,010	10.2	10.1

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

This measure is recommended.

5.9 Additional O&M Opportunities

This list of operations and maintenance (O&M) - type measures represent low-cost or no-cost opportunities, which if implemented will have a positive impact on the overall building operations, comfort and/or energy consumption. The recommended O&M measures for this building are as follows:

- Install Covers on Window Air Conditioners
- Clean Window AC filters before each season
- 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, with more detailed program information in Appendix D.

6.1.4 Energy Savings Improvement Plan

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

ESIP allows local units to use “energy savings obligations” (ESO) to pay for the capital costs of energy improvements to their facilities. ESIP loans have a maximum loan term of 15 year. ESOs are not considered “new general obligation debt” of a local unit and do not count against debt limits or require voter approval. They may be issued as refunding

bonds or leases. Savings generated from the installation of energy conservation measures pay the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

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

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs. Refer to Appendix D for more information on this program.

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 | ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

The building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The amount of available roof area determines how large of a solar array can be installed on any given roof. The table below summarizes the approximate roof area available on the building and the associated solar array size that can be installed.

Available Roof Area (Ft ²)	Potential PV Array Size (kW)
35,800	280

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 – 280 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	
1,120,000	280	349,710	0	48,328	54,205	23.2	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.

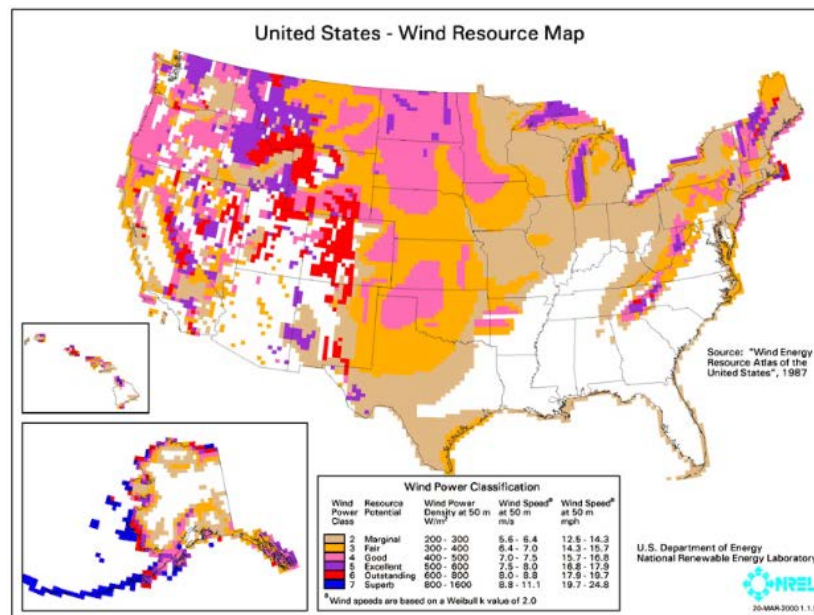
A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually 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 in this building.

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 to the location of the building.

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
248	172	219	Y	Y

This measure is not recommended because the building does not have enough onsite generation to cover the electrical load required for curtailment.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of \$36,989/yr with an overall payback of 11.1 years, if the recommended ECMs are implemented.

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
222,569	5,520	36,989	11.1

The following projects should be considered for implementation:

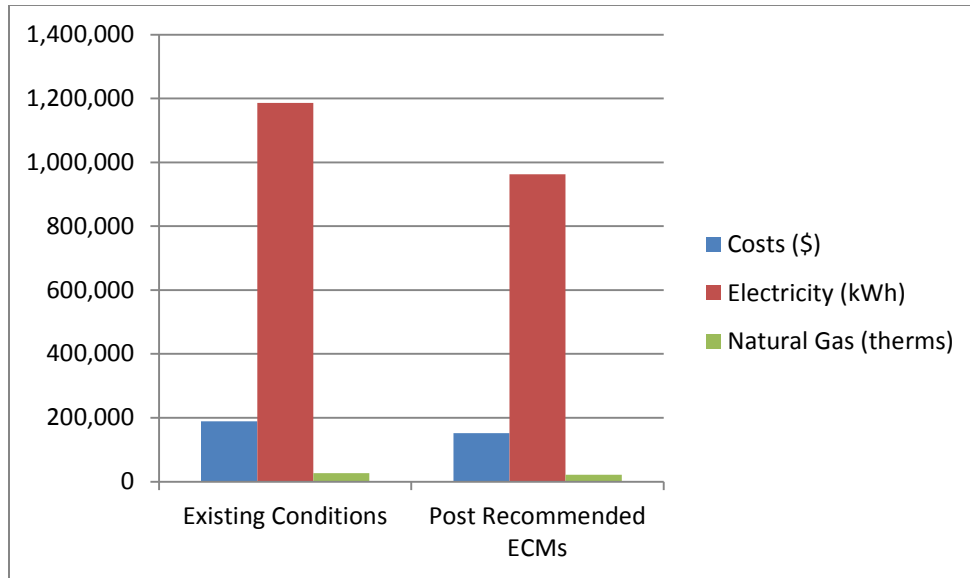
- Install Condensing Boiler for Shoulder Month Operation
- Install Premium Efficiency Motors
- Install Window A/C Controller
- Install Basic Controls
- Domestic Hot Water System Improvements
- Install Vending Machine Controls
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 280 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	189,203	152,214	20%
Electricity (kWh)	1,185,600	963,031	19%
Natural Gas (therms)	26,929	21,409	20%
Site EUI (kbtu/SF/Yr)	46.3	37.3	



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

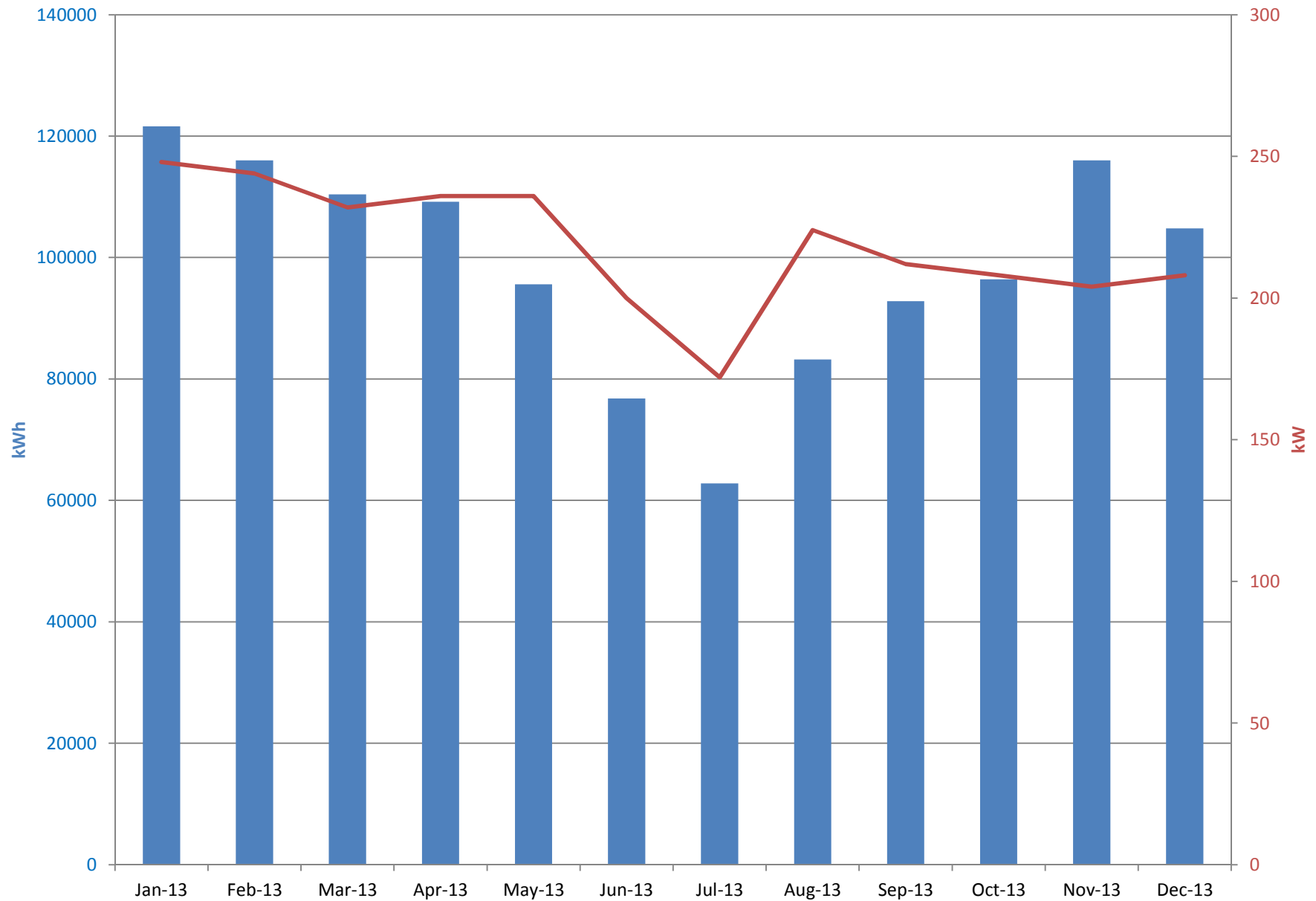
West Side High School - Electric Usage

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption (\$)	Blended Rate (\$/kWh)	Consumption Rate (\$/kWh)	Demand Rate (\$/kW)
1/21/2012	2/17/2012	100800	220	14,407.58	10,425.85	3,214.68	767.05	13,640.53	0.14	0.14	3.49
2/18/2012	3/20/2012	117600	232	15,786.57	11,291.30	3,686.37	808.9	14977.67	0.13	0.13	3.49
3/21/2012	4/19/2012	102400	228	13,939.78	9,885.24	3,259.60	794.94	13144.84	0.14	0.13	3.49
4/20/2012	5/18/2012	106000	232	14,355.36	10,185.80	3,360.67	808.89	13546.47	0.14	0.13	3.49
5/19/2012	6/19/2012	110800	244	16,349.35	9,909.11	5,589.51	850.73	15498.62	0.15	0.14	3.49
6/20/2012	7/19/2012	90800	208	13,807.51	8,283.41	4,798.89	725.21	13082.3	0.15	0.14	3.49
7/20/2012	8/17/2012	87600	164	12,881.08	7,966.92	4,342.36	571.8	12309.28	0.15	0.14	3.49
8/18/2012	9/18/2012	92000	248	14,300.78	8,264.18	5,171.92	864.68	13436.1	0.16	0.15	3.49
9/19/2012	11/15/2012	199600	240	25,885.23	17,605.22	6,648.28	1,631.73	24,253.50	0.13	0.12	6.80
11/16/2012	12/18/2012	126800	244	15,462.10	10,513.41	4,097.96	850.73	14611.37	0.12	0.12	3.49
12/19/2012	1/18/2013	117200	244	14,652.23	9,924.03	3,869.28	858.92	13793.31	0.13	0.12	3.52
1/19/2013	2/18/2013	121600	248	15,107.66	10,330.40	3,898.25	879.01	14228.65	0.12	0.12	3.54
2/19/2013	3/20/2013	116000	244	14,707.00	10,201.00	3,641.17	864.83	13842.17	0.13	0.12	3.54
3/21/2013	4/19/2013	110400	232	14,222.20	9,916.43	3,483.47	822.3	13399.9	0.13	0.12	3.54
4/20/2013	5/20/2013	109200	236	14,297.89	10,011.74	3,449.67	836.48	13461.41	0.13	0.12	3.54
5/20/2013	6/19/2013	95600	236	15,312.71	9,296.43	3,189.82	2,826.46	12486.25	0.16	0.13	11.98
6/19/2013	7/19/2013	76800	200	12,871.24	7,784.17	4,378.19	708.88	12162.36	0.17	0.16	3.54
7/20/2013	8/19/2013	62800	172	10,449.89	6,525.32	3,314.93	609.64	9840.25	0.17	0.16	3.54
8/20/2013	9/18/2013	83200	224	13,080.59	7,512.96	2,884.89	2,682.74	10397.85	0.16	0.12	11.98
9/19/2013	10/17/2013	92800	212	12,311.47	8,379.84	3,180.22	751.41	11560.06	0.13	0.12	3.54
10/18/2013	11/15/2013	96400	208	12,735.26	8,704.92	3,293.10	737.24	11998.02	0.13	0.12	3.54
11/16/2013	12/18/2013	116000	204	15,084.36	10,474.80	3,886.50	723.06	14361.3	0.13	0.12	3.54
12/19/2013	1/17/2014	104800	208	13,662.06	9,463.44	3,461.38	737.24	12924.82	0.13	0.12	3.54

West Side High School, Newark Evening (at West 403 S. Orange Ave., 07103	Start Date	End Date	Months
Account Number 2147483647	1/21/2012	1/17/2014	23
Meter Number 778017878			

ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:			1/17/2014
Total Usage	1,185,600	kwh	
Total Charges	\$163,842		
Blended Rate	\$0.138	\$/kWh	
Consumption Rate	\$0.127	\$/kWh	
Demand Rate	\$5.02	\$/kW	
Max Demand	248.0	kW	
Min Demand	172.0	kW	
Avg Demand	218.7	kW	

West Side High School - Electric Usage - Meter No.: 778017878



West Side High School - Natural Gas Usage

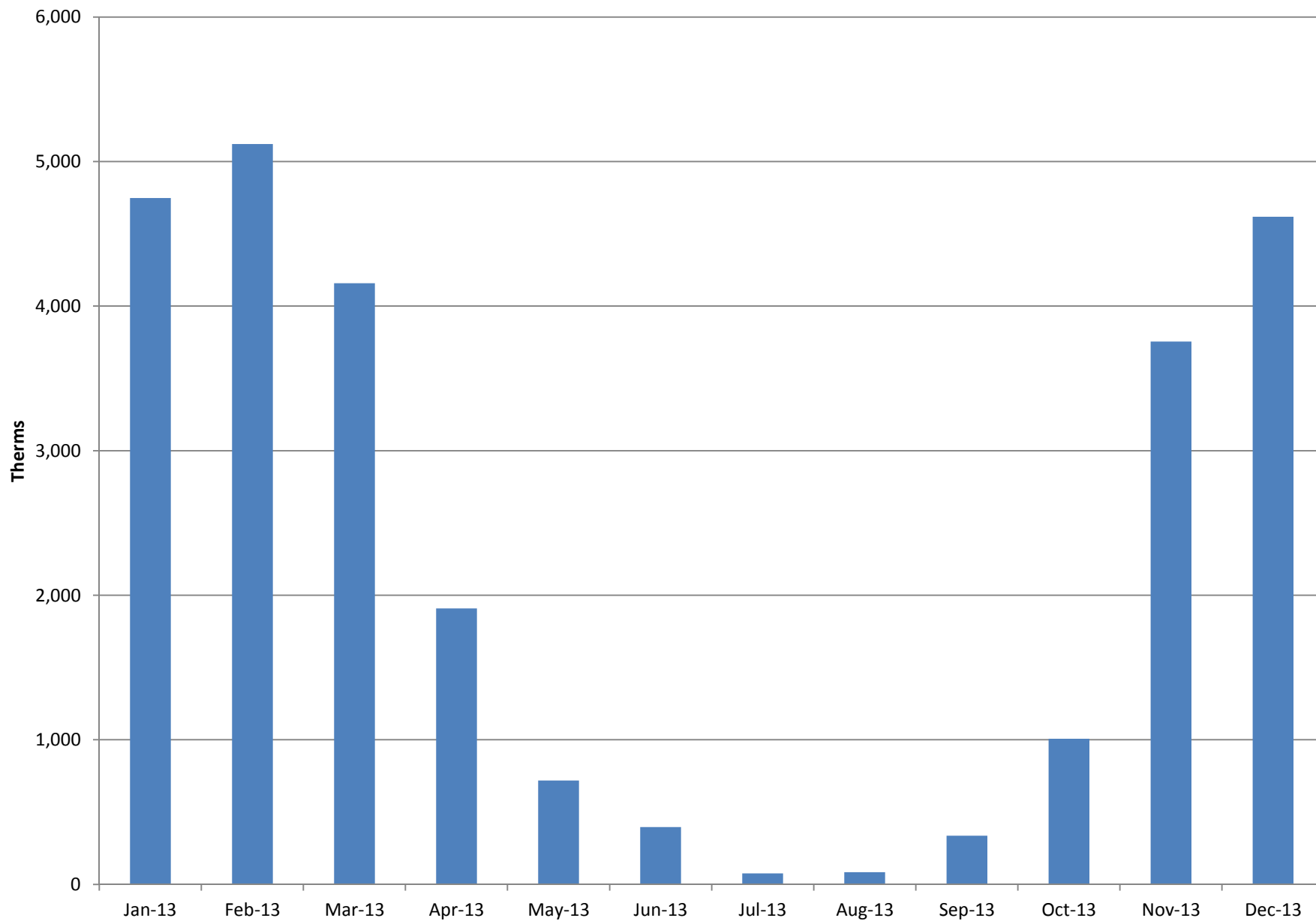
Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	\$/therm
41	John F. Kennedy	4200805804	2415423	1/5/2012	2/2/2012	5,096.85	4,906.29	0.96
41	John F. Kennedy	4200805804	2415423	2/3/2012	3/5/2012	5,106.79	4,299.19	0.84
41	John F. Kennedy	4200805804	2415423	3/6/2012	4/3/2012	2,431.70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

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

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

Annual Usage	26,929	Therms	
Annual Cost	\$25,361		
Rate	\$0.94	\$/Therm	Bill missing. Two month average used

West Side High School - Natural Gas Usage - Meter No.: 2415423



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

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

Supplier	Telephone & Web Site	*Customer Class
AEP Energy, Inc. 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	C/I ACTIVE
Alpha Gas and Electric, LLC 641 5 th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	R/C ACTIVE
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877)-30-AMBIT (877) 302-6248 www.ambitenergy.com	R/C ACTIVE
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Amerigreen Energy, Inc. 1463 Lamberton Road Trenton, NJ 08611	888-423-8357 www.amerigreen.com	R/C ACTIVE
AP Gas & Electric, LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apge.com	R/C/I ACTIVE
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergylc.com	R/C/I ACTIVE
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(888) 978-9974 www.group.barclays.com	C ACTIVE
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	C/I ACTIVE
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	R/C/I ACTIVE

Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	888-565-4490 www.4choiceenergy.com	R/C ACTIVE
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(888) CLR-VIEW (800) 746-4702 www.clearviewenergy.com	R/C/I ACTIVE
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674 www.commerceenergy.com	R ACTIVE
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	C/I ACTIVE
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(866) 237-7693 www.constellation.com	R/C/I ACTIVE
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	R ACTIVE
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	C ACTIVE
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	C/I ACTIVE
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 348-4193 www.directenergy.com	R ACTIVE
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	R/C ACTIVE
Dominion Retail, Inc. d/b/a Dominion Energy Solutions 395 Route #70 West Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.dom.com/products	R/C ACTIVE

DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	C/I ACTIVE
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	R/C/I ACTIVE
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	R/C ACTIVE
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2 nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	R/C ACTIVE
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	C/I ACTIVE
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	R/C/I ACTIVE
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	C/I ACTIVE
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	C/I ACTIVE
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	C/I ACTIVE
Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	C/I ACTIVE

Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	C/I ACTIVE
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	R/C ACTIVE
HOP Energy, LLC d/b/a Metro Energy, HOP Fleet Fueling, HOP Energy Fleet Fueling 1011 Hudson Avenue Ridgefield, NJ 07657	(877) 390-7155 www.hopenergy.com	R/C/I ACTIVE
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	C ACTIVE
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	R/C ACTIVE
Independence Energy Group, LLC 3711 Market Street, 10 th Fl. Philadelphia, PA 19104	(877) 235-6708 www.chooseindependence.com	R/C ACTIVE
Integrus Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrusenergy.com	C/I ACTIVE
Keil & Sons, Inc. d/b/a Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	(877) 797-8786 www.systrumenergy.com	R/C/I ACTIVE
Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE

Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	C/I ACTIVE
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	R/C/I ACTIVE
MXenergy Electric Inc. 900 Lake Street Ramsey, NJ 07446	(800) 785-4374 www.mxenergy.com	R/C/I ACTIVE
NATGASCO, Inc. 532 Freeman St. Orange, NJ 07050	(973) 678-1800 x. 251 www.supremeenergyinc.com	R/C ACTIVE
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	R/C/I ACTIVE
New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	R/C ACTIVE
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	C/I ACTIVE
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	R/C/I ACTIVE
Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	R/C/I ACTIVE
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	C/I ACTIVE
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	R/C/I ACTIVE

PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	C/I ACTIVE
Public Power & Utility of New Jersey, LLC 39 Old Ridgebury Rd. Suite 14 Danbury, CT 06810	(888) 354-4415 www.ppandu.com	R/C/I ACTIVE
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com/pjm	R/C/I ACTIVE
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	R/C/I ACTIVE
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	R/C/I ACTIVE
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	C/I ACTIVE
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082	R/C/I ACTIVE
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, N.J. 08007	(800) 695-0666 www.sjnaturalgas.com	R/C ACTIVE
Spark Energy, L.P. 2105 CityWest Blvd., Ste 100 Houston, Texas 77042	(800) 441-7514 www.sparkenergy.com	R/C/I ACTIVE
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	C/I ACTIVE
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	R/C/I ACTIVE
Stream Energy 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 39-8150 www.streamenergy.net	R ACTIVE

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

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

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

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

Consolidated Edison Solutions, Inc. Cherry Tree Corporate Center 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-665-0955 www.conedsolutions.com	C/I ACTIVE
Constellation NewEnergy-Gas Division, LLC 900A Lake Street, Suite 2 Ramsey, NJ 07466	(800) 900-1982 www.constellation.com	C/I ACTIVE
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	888-925-9115 www.directenergy.com	C/I ACTIVE
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-348-4193 www.directenergy.com	R ACTIVE
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	R/C/I ACTIVE
UGI Energy Services, Inc. d/b/a GASMARK 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	C/I ACTIVE
Global Energy Marketing, LLC 129 Wentz Avenue Springfield, NJ 07081	800-542-0778 www.globalp.com	C/I ACTIVE
Great Eastern Energy 116 Village Blvd., Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.com	C/I ACTIVE
Greenlight Energy 330 Hudson Street, Suite 4 Hoboken, NJ 07030	718-204-7467 www.greenlightenergy.us	C ACTIVE
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	C/I ACTIVE
Hess Small Business Services, LLC One Hess Plaza Woodbridge, NJ 07095	888-494-4377 www.hessenergy.com	C/I ACTIVE
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	R/C ACTIVE

Hudson Energy Services, LLC 7 Cedar Street Ramsey, NJ 07446	877- Hudson 9 www.hudsonenergyservices.com	C ACTIVE
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	877-887-6866 www.idtenergy.com	R/C ACTIVE
Integrus Energy Services – Natural Gas, LLC 99 Wood Avenue South Suite #802 Iselin, NJ 08830	800-536-0151 www.integrusenergy.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

[Back to main supplier information page](#)

APPENDIX B

Equipment Inventory

Actual	Estimated
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[illegible]

Cost of Electricity:

\$0.127	\$/kWh
\$5.02	\$/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	Break Room	Staff Lounge	27	S 32 C F 1 (ELE)	F41LL	32	0.86	SW	2600	2,246	C-OCC	
20LED	Electrical Room	Linen/Utility/Wet/Janitor/Electrical	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	780	75	NONE	
50LED	119	Classrooms	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
50LED	116 - Custodial Office	Offices	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
18LED	115	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2600	1,165	C-OCC	
18LED	Athletic Office	Offices	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2600	1,165	C-OCC	
50LED	113	Classrooms	10	W 32 P F 2 (ELE)	F42LL	60	0.60	SW	2600	1,560	C-OCC	
50LED	115 Team Room	Storage	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	520	31	NONE	
50LED	Security	Offices	8	W 32 P F 2 (ELE)	F42LL	60	0.48	SW	2600	1,248	C-OCC	
50LED	101	Classrooms	22	W 32 P F 2 (ELE)	F42LL	60	1.32	SW	2600	3,432	C-OCC	
50LED	102A - Conference Room	Conference	12	W 32 P F 2 (ELE)	F42LL	60	0.72	SW	1200	864	C-OCC	
50LED	102	Classrooms	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
50LED	102B	Classrooms	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
50LED	100 - Classroom	Classrooms	24	W 32 P F 2 (ELE)	F42LL	60	1.44	SW	2600	3,744	C-OCC	
18LED	103 - Classroom	Classrooms	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2600	1,747	C-OCC	
40LED	Main Office	Offices	10	T 28 R F 2 (ELE)	F42LL	60	0.60	SW	2600	1,560	C-OCC	
18LED	Dean Office	Offices	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2600	582	C-OCC	
50LED	Telephone Room	Linen/Utility/Wet/Janitor/Electrical	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	780	47	NONE	
18LED	Principle Office	Offices	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2600	1,747	C-OCC	
185LED	Main Entrance	Hallways	6	W 40 C F 4 (ELE)	F44ILL	112	0.67	SW	6240	4,193	NONE	
269	Audit	Offices	31	I300/1	I300/1	300	9.30	SW	2600	24,180	C-OCC	
130	Audit	Offices	8	DC 40 I 8	I75/2	150	1.20	SW	2600	3,120	C-OCC	
199LED	Audit	Offices	5	W 32 C F 1 (ELE)	F41LL	32	0.16	SW	2600	416	C-OCC	
40LED	Vice Principal Office	Offices	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
40LED	Custodial	Offices	4	T 28 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	C-OCC	
40LED	Lounge	Staff Lounge	6	T 28 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
50LED	Attendance Office	Offices	3	W 32 P F 2 (ELE)	F42LL	60	0.18	SW	2600	468	C-OCC	
40LED	105	Classrooms	10	T 28 R F 2 (ELE)	F42LL	60	0.60	SW	2600	1,560	C-OCC	
50LED	107	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
50LED	107A	Classrooms	5	W 32 P F 2 (ELE)	F42LL	60	0.30	SW	2600	780	C-OCC	
50LED	108	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2600	2,808	C-OCC	
40LED	110	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	112	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	111	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
18LED	Corridor	Hallways	35	T 32 R F 4 (ELE)	F44ILL	112	3.92	SW	6240	24,461	NONE	
50LED	Corridor	Hallways	26	W 32 P F 2 (ELE)	F42LL	60	1.56	SW	6240	9,734	NONE	
185LED	Corridor	Hallways	6	W 40 C F 4 (ELE)	F44ILL	112	0.67	SW	6240	4,193	NONE	
218ALED	Corridor	Hallways	2	W 32 C F 3 (ELE)	F46ILL	175	0.35	SW	6240	2,184	NONE	
18LED	120C	Classrooms	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2600	1,747	C-OCC	
18LED	120B	Classrooms	20	T 32 R F 4 (ELE)	F44ILL	112	2.24	SW	2600	5,824	C-OCC	
18LED	120A	Classrooms	16	T 32 R F 4 (ELE)	F44ILL	112	1.79	SW	2600	4,659	C-OCC	
22	Storage A	Storage	4	1T 34 R F 4 (MAG)	F44EE	144	0.58	SW	520	300	NONE	
46LED	Storage B	Storage	8	W 28 C F 2 (ELE)	F42LL	60	0.48	SW	520	250	NONE	
40LED	Weight Room	Gymnasium	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	NONE	
40LED	Head Custodial Office	Offices	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	NONE	
50LED	Head Custodial Office	Offices	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	2600	156	NONE	
105LED	321	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	320	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	319	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	300	Classrooms	8	W 32 P F 1	F41LL	32	0.26	SW	2600	666	C-OCC	
105LED	301	Classrooms	8	W 32 P F 1	F41LL	32	0.26	SW	2600	666	C-OCC	
105LED	302	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	303	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	304	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	305	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	307	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	308	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	306	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	308B	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	310	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	311	Classrooms	14	W 32 P F 1	F41LL	32	0.45	SW	2600	1,165	C-OCC	
105LED	312	Classrooms	16	W 32 P F 1	F41LL	32	0.51	SW	2600	1,331	C-OCC	
105LED	313	Classrooms	16	W 32 P F 1	F41LL	32	0.51	SW	2600	1,331	C-OCC	
105LED	314	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	315	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
105LED	316	Classrooms	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
20LED	Corridor 3	Hallways	44	S 32 C F 1 (ELE)	F41LL	32	1.41	SW	6240	8,786	NONE	
160	Corridor 3	Hallways	12	B 34 C F 2	F42EE	72	0.86	SW	6240	5,391	NONE	
40LED	317	Classrooms	6	T 28 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	C-OCC	
40LED	322	Classrooms	3	T 28 R F 2 (ELE)	F42LL	60	0.18	SW	2600	468	C-OCC	
104LED	Boys Restroom	Restroom	2	S 32 P F 1	F41LL	32	0.06	SW	3120	200	NONE	

Cost of Electricity:

\$0.127	\$/kWh
\$5.02	\$/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
104LED	Girls Restroom	Restroom	2	S 32 P F 1	F41LL	32	0.06	SW	3120	200	NONE	
185ALED	Kitchen	Cafeteria	35	W 40 C F 4 (ELE) x2	F44ILL	224	7.84	SW	2000	15,680	C-OCC	
185LED	Kitchen	Cafeteria	4	W 40 C F 4 (ELE)	F44ILL	112	0.45	SW	2000	896	C-OCC	
198LED	Media Center	Classrooms	19	2T 17 R F 2 (ELE)	F22LL	31	0.59	SW	2600	1,531	C-OCC	
18LED	Media Center	Classrooms	50	T 32 R F 4 (ELE)	F44ILL	112	5.60	SW	2600	14,560	C-OCC	
32LED	326	Classrooms	36	1T 32 R F 2 (ELE)	F42LL	60	2.16	SW	2600	5,616	C-OCC	
18LED	Media Center Office	Offices	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2600	874	C-OCC	
18LED	Media Center Office	Offices	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2600	1,165	C-OCC	
20LED	Corridor 2	Hallways	72	S 32 C F 1 (ELE)	F41LL	32	2.30	SW	6240	14,377	NONE	
160	Corridor 2	Hallways	12	B 34 C F 2	F42EE	72	0.86	SW	6240	5,391	NONE	
40LED	224	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	223	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	222	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	220	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	221	Classrooms	12	T 28 R F 2 (ELE)	F42LL	60	0.72	SW	2600	1,872	C-OCC	
40LED	217	Classrooms	14	T 28 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
40LED	218	Classrooms	14	T 28 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
40LED	219	Classrooms	14	T 28 R F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
105LED	Guidance	Offices	36	W 32 P F 1	F41LL	32	1.15	SW	2600	2,995	C-OCC	
105LED	Vice Principal Guidance Office	Offices	12	W 32 P F 1	F41LL	32	0.38	SW	2600	998	C-OCC	
50LED	215	Classrooms	36	W 32 P F 2 (ELE)	F42LL	60	2.16	SW	2600	5,616	C-OCC	
50LED	214	Classrooms	14	W 32 P F 2 (ELE)	F42LL	60	0.84	SW	2600	2,184	C-OCC	
40LED	213	Classrooms	2	T 28 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	C-OCC	
105LED	212	Classrooms	2	W 32 P F 1	F41LL	32	0.06	SW	2600	166	C-OCC	
105LED	211	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	210	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	209	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	208	Classrooms	8	W 32 P F 1	F41LL	32	0.26	SW	2600	666	C-OCC	
105LED	207	Classrooms	8	W 32 P F 1	F41LL	32	0.26	SW	2600	666	C-OCC	
105LED	206	Classrooms	8	W 32 P F 1	F41LL	32	0.26	SW	2600	666	C-OCC	
185LED	205 - VP	Offices	2	W 40 C F 4 (ELE)	F44ILL	112	0.22	SW	2600	582	C-OCC	
105LED	204	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	203	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
105LED	202	Classrooms	10	W 32 P F 1	F41LL	32	0.32	SW	2600	832	C-OCC	
185LED	201A	Storage	1	W 40 C F 4 (ELE)	F44ILL	112	0.11	SW	520	58	NONE	
104LED	Boys Restroom	Restroom	2	S 32 P F 1	F41LL	32	0.06	SW	3120	200	NONE	
104LED	Girls Restroom	Restroom	2	S 32 P F 1	F41LL	32	0.06	SW	3120	200	NONE	
	Total		1,299				85.98			260,785		

APPENDIX C

ECM Calculations

Newark Public Schools
CHA Project Number: 27999

Rate of Discount (used for NPV)	3.0%
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Utility Costs	Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$ 0.138 \$/kW blended		0.000420205	145,501	Electric	Natural Gas	Fuel Oil
\$ 0.127 \$/kW supply	1,185,600	0.000420205		\$ 163,842	\$ 25,361	\$ -
\$ 5.02 \$/kW	248.0	0				
\$ 0.94 \$/Therm	26,929	0.00533471				
\$ 7.55 \$/kgals	583	0				
\$ - \$/Gal	-	-				

West Side High School

[illegible]

	City:		Newark, NJ				
	Occupied Hours/Week		70	70	70	70	50
	Enthalpy h (Btu/lb)	Bin Hours	Building Operating	Auditorium Hours	Gymnasium Hours	Library Occupied	Classrooms Occupied
102.5							
97.5	35.4	31	3	3	3	3	2
92.5	37.4	36	13	13	13	13	9
87.5	39.0	131	25	25	25	25	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	198
67.5	27.2	854	386	386	386	386	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	15.0	491	205	205	205	205	146
42.5	14.5	666	273	273	273	273	196
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	282	105	105	105	105	75
17.5	5.0	126	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.02
Labor:	1.24
Equipment:	1.12

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

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

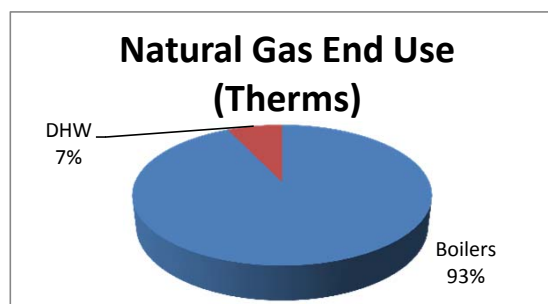
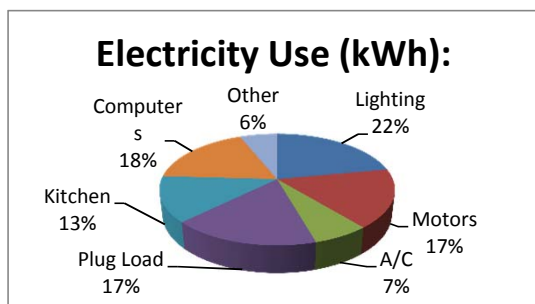
Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	78 F

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

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
1,185,600	Total	Based on utility analysis
260,785	Lighting	From Lighting Calculations
201,157	Motors	Estimated
77,924	A/C	See Window AC Calculation
203,701	Plug Load	Estimated
156,501	Kitchen	Estimated
212,478	Computers	Estimated
73,054	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
26,929	Total	Based on utility analysis
25,012	Boilers	Therms/SF x Square Feet Served
1,917	DHW	Based on utility analysis

22%
 17%
 7%
 17%
 13%
 18%
 6%

93%
 7%



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

ECM-1: Install Condensing Boiler for Shoulder Month Operation

Description: This ECM evaluates the installation of a high efficiency condensing gas boiler for the shoulder season. The existing boiler system has an 80% (per NJBPU protocols) and the proposed boiler efficiency is 96% (average seasonal efficiency). Electrical power consumption due to pumps is considered to be the same for both the proposed system and the baseline system.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 0.94	/ Therm	Natural Gas
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	1,000,000	btu/hr	
Heating Combustion Efficiency	80%		NJBPU protocols
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	75	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	1,000,000	btu/hr	
Efficiency	96%		100% condensing mode only
SAVINGS			
Fuel Savings	1,484	Therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 1,395		

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

West Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Install Condensing Boiler for Shoulder Month Operation - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Aerco BMK1000 w/ condensate neutralizer	1	EA	\$ 20,000	\$ 8,000		\$ 20,540	\$ 9,968	\$ -	\$ 30,508	Vendor Estimate
Primary pump	1	EA	\$3,000.0	\$1,500.00		\$ 3,081	\$ 1,869	\$ -	\$ 4,950	RS Means 2012
Flue Installation	100	LF	\$ 150.0	\$ 50.00		\$ 15,405	\$ 6,230	\$ -	\$ 21,635	RS Means 2012
Controls	1	EA	\$1,500.0	\$1,500.00		\$ 1,541	\$ 1,869	\$ -	\$ 3,410	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 1,500	\$ 2,500		\$ 1,541	\$ 3,115	\$ -	\$ 4,656	RS Means 2012
Miscellaneous HW Piping	1	LS	\$ 5,000	\$ 2,500		\$ 5,135	\$ 3,115	\$ -	\$ 8,250	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

\$ 73,408	Subtotal
\$ 18,352	25% Contingency
\$ 91,760	Total

Newark Public Schools
CHA Project Number: 27999
West 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
\$ - 5.62

Energy
Cost
\$/kWh
\$ - 0.12

Multipliers		
Material	Labor	Equipment
1.03	1.25	1.12

Cost Estimates

		Existing		Coincidence		IF _{req}		Existing		New		Demand		Demand		Annual		\$ kWh		\$ kWh		Estimated		Payback		Unit Costs					Subtotal Costs					Total Cost	Remarks
#	Description	Location	HP	Factor	Factor	Y/N	Factor	Efficiency _e	Efficiency _n	ΔkW	kW	Savings	\$	Hours	Savings	\$	Savings	Savings	Total \$	Cost	Years	Materials	Labor	Equipment	Materials	Labor	Equipment	Materials	Labor	Equipment							
1	HW Pump-1	Boiler Room	20	0.7%	0.74	N	1.0	91.0%	93.0%	0.4	0.261	\$ - 16	2,200	582	\$ 74	\$ 90	\$ 1,749	19.5	\$ 1,218	\$ 400	\$ -	\$ 1,251	\$ 498	\$ -	\$ 1,749												
2	HW Pump-2	Boiler Room	20	0.7%	0.74	N	1.0	91.0%	93.0%	0.4	0.261	\$ - 16	2,200	582	\$ 74	\$ 90	\$ 1,749	19.5	\$ 1,218	\$ 400	\$ -	\$ 1,251	\$ 498	\$ -	\$ 1,749												
3	HW Pump-3	Boiler Room	7.5	0.7%	0.74	N	1.0	85.5%	91.0%	0.4	0.293	\$ - 18	2,200	653	\$ 83	\$ 100	\$ 974	9.7	\$ 621	\$ 270	\$ -	\$ 638	\$ 336	\$ -	\$ 974												
4	HW Pump-4	Boiler Room	7.5	0.7%	0.74	N	1.0	85.5%	91.0%	0.4	0.293	\$ - 18	2,200	653	\$ 83	\$ 100	\$ 974	9.7	\$ 621	\$ 270	\$ -	\$ 638	\$ 336	\$ -	\$ 974												
		Total	55							1.5	1.11	\$ - 67		2,468	\$ 313	\$ 390	\$ 5,447																				

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

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

EQUIPMENT	AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)
Window A/C 16	Classrooms and Offices (24,000 btu/h)	384,000
Window A/C 12	Classrooms and Offices (18,000 btu/h)	216,000
Window A/C 2	Classrooms and Offices (12,000 btu/h)	24,000

Total btu/h of all window A/C Units: 624,000 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	\$0.138 / kWh	
Average run hours per Week	80 Hours	
Space Balance Point	55 F	
Space Temperature Setpoint	65 deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	624,000 Btu / Hr	Total BTU/hr of A/C units
Average EER	10.7	
Existing Annual Electric Usage	77,924 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	32,547	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	45,377 kWh
Annual Cost Savings	\$6,262
Total Project Cost	\$5,800
Simple Payback	1 years

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

Total	8,760	1,336	42%	558
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Newark Public Schools
CHA Project Number: 27999
West 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	30	EA	\$ 150	\$ -	\$ -	\$ 4,622	\$ -	\$ -	\$ 4,622	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 4,622	Subtotal
\$ 1,155	25% Contingency
\$ 5,800	Total

Newark Public Schools
CHA Project Number: 27999
West 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	80	F	Th	Heating Season Facility Temp	80	F	
Weekly Occupied Hours	70	hrs	H	Weekly Occupied Hours	70	hrs	
Heating Season Setback Temp	72	F	Sh	Heating Season Setback Temp	65	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	1,000,000	Btu/hr	Caph	Connected Heating Load Capacity	1,000,000	Btu/hr	
Equivalent Full Load Heating	900	hrs	EFLHh	Equivalent Full Load Heating Hours	500	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	1,495	Therms ³		Natural Gas Savings	1,557	Therms ³	
Cooling Electricity Savings	0	kWh		Cooling Electricity Savings	0	kWh	

\$0.14 \$/kWh Blended
\$0.94 \$/Therm

COMBINED SAVINGS	
Natural Gas Savings	3,052 Therms
Cooling Electricity Savings	0 kWh
Total Cost Savings	\$ 2,868
Estimated Total Project Cost	\$ 21,309
Simple Payback	7.4 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
 West 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
West Side High School

ECM-3B: 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:

145,501	Sq Footage	\$0.14	\$/kWh Blended
N	Cooling	\$0.94	\$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	80	hrs
Heating Season Setback Temp	75	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	1,000,000	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	1,026	Therms
Cooling Electricity Savings	0	kWh

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	1,185,600	kWh
Existing Facility Total Gas usage	26,929	Therms
Existing Facility Cooling Electric usage	-	kWh ¹
Existing Facility Heating Natural Gas usage	25,012	Therms ²
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	2,501	Therms
SAVINGS		
Electric Savings	0	kWh
Natural Gas Savings	2,501	Therms

Assumptions

- 0% of facility total electricity dedicated to Cooling; based on utility information
- 93% 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	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	65	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity		Mbtu/yr
Connected Heating Load Capacity	1,000,000	Btu/hr
Equivalent Full Load Heating Hours	500	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	1,916	Therms ³
Cooling Electricity Savings	0	kWh

COMBINED SAVINGS

Natural Gas Savings	5,444	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	\$ 5,117	
Estimated total Project Cost	\$673,619	
Simple Payback	131.6	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
West Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-3B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Unit Ventilator Controls	75	ea		\$ 4,000		\$ -	\$ 373,800	\$ -	\$ 373,800	Vendor Quote
Radiator Control (Group of 4)	15	ea		\$ 4,500		\$ -	\$ 84,105	\$ -	\$ 84,105	Vendor Quote
Exhaust Fan Control (Group of 4)	10	ea		\$ 3,300		\$ -	\$ 41,118	\$ -	\$ 41,118	Vendor Quote
Head End Controller & Programming	1	ls		\$ 32,000		\$ -	\$ 39,872	\$ -	\$ 39,872	Vendor Quote
New Unit Ventilator	0	ea	\$ 5,000	\$ 4,000		\$ -	\$ -	\$ -	\$ -	Engineering Estimate
New Exhaust Fan	0	ea	\$ 1,525	\$ 239		\$ -	\$ -	\$ -	\$ -	RS Means 2012
New Radiator	0	lf	\$ 43	\$ 21		\$ -	\$ -	\$ -	\$ -	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 538,895	Subtotal
\$ 134,724	25% Contingency
\$ 673,619	Total

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

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

Description: This ECM evaluates the energy savings associated with replacing a gas fired tank type water heater with a smaller capacity high efficiency tank type water heater

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	160	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	191,700	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	153,360	MBTU/yr	
Existing Tank Size	714	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)	10.2	MBH	
Annual Standby Hot Water Load	89,228	MBTU/yr	
New Tank Size	200	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)	2.9	MBH	
Annual Standby Hot Water Load	25,441	MBTU/yr	
Total Annual Hot Water Demand	89,573	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		AO Smith Cyclone
Proposed Fuel Use	933	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$0.94	\$/Therm	
Existing Operating Cost of DHW	\$1,802	\$/yr	
Proposed Operating Cost of DHW	\$877	\$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	984	\$925

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

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

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

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Gas-Fired DHW Heater Removal		LS				\$ -	\$ -	\$ -	\$ -	RS Means 2012
High Efficiency Gas-Fired DHW Heater	2	EA	\$ 5,500	\$ 4,500		\$ 11,297	\$ 11,214	\$ -	\$ 22,511	RS Means 2012
Miscellaneous Electrical	2	LS	\$ 300	\$ 500		\$ 616	\$ 1,246	\$ -	\$ 1,862	RS Means 2012
Venting Kit	2	EA	\$ 450	\$ 650		\$ 924	\$ 1,620	\$ -	\$ 2,544	RS Means 2012
Miscellaneous Piping and Valves	2	LS	\$ 200	\$ 500		\$ 411	\$ 1,246	\$ -	\$ 1,657	RS Means 2012

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

\$ 28,574	Subtotal
\$ 7,144	25% Contingency
\$ 35,718	Total

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

ECM-6: 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: \$0.138 \$/kWh blended

Energy Savings Calculations:

Existing	
Cold Beverage Vending Machine Electric usage	7,008 kWh ^{1,4,7}
Snack Vending Machine Electric usage	- kWh ^{2,5,7}
Dual Vending Machine Electric Usage	- kWh ^{3,6,7}
Total Vending Machine Electric Usage	7,008 kWh

Proposed	
Cold Beverage Vending Machine Electric usage	1,103 kWh ⁸
Snack Vending Machine Electric usage	0 kWh
Dual Vending Machine Electric Usage	0 kWh
Total Vending Machine Electric Usage	1,103 kWh

Vending Machine Controls Usage Savings	5,906 kWh
Total cost savings	\$ 815
Estimated Total Project Cost	\$ 560⁹
Simple Payback	1 years

Assumptions

1	2	Number of cold beverage vending machines
2	0	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
West Side High School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-6: Install Vending Machine Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Vending Miser	2	EA	\$ 200	\$ 15	\$ -	\$ 411	\$ 37	\$ -	\$ 448	Vendor Estimation
						\$ -	\$ -	\$ -	\$ -	

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

\$ 448	Subtotal
\$ 112	25% Contingency
\$ 560	Total

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

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Urinals in Building to be replaced	51	
Average Flushes / Urinal (per Day)	7.4	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	51	
Proposed Gallons / Flush	0.125	Gal

SAVINGS		
Current Urinal Water Use	344.93	kGal / year
Proposed Urinal Water Use	17.25	kGal / year
Water Savings	327.68	kGal / year
Cost Savings	\$2,474	/ year

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

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

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Toilets in Building	25	
Average Flushes / Toilet (per Day)	9.9	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	25	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	314.93	kGal / year
Proposed Toilet Water Use	115.17	kGal / year
Water Savings	199.76	kGal / year
Cost Savings	\$1,508	/ year

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

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-7 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	51	EA	\$ 1,200	\$ 1,000	\$ -	\$ 62,852	\$ 63,546	\$ -	\$ 126,398	Vendor Estimate
Low-Flow Toilet	25	EA	\$ 1,400	\$ 1,000	\$ -	\$ 35,945	\$ 31,150	\$ -	\$ 67,095	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 193,493	Subtotal
\$ 48,373	25% Contingency
\$ 241,867	Total

Newark Public Schools
CHA Project Number: 27999
West 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)	145,501
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)	\$163,842	\$25,361
Existing Usage (from utility)	1,185,600	26,929
Proposed Savings	222,569	5,520
Existing Total MMBtus	6,739	
Proposed Savings MMBtus	1,312	
% Energy Reduction	19.5%	
Proposed Annual Savings	\$36,989	

	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	\$1.12
Incentive #3	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.11	\$1.12

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$7,275
Incentive #2	\$24,483	\$6,199	\$30,682
Incentive #3	\$24,483	\$6,199	\$30,682
Total All Incentives	\$48,965	\$12,398	\$68,639

Total Project Cost	\$410,072
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	Allowable Incentive	
% Incentives #1 of Utility Cost*	3.8%	\$7,275
% Incentives #2 of Project Cost**	7.5%	\$30,682
% Incentives #3 of Project Cost**	7.5%	\$30,682
Total Eligible Incentives***	\$68,639	
Project Cost w/ Incentives	\$341,433	

Project Payback (years)	
w/o Incentives	w/ Incentives
11.1	9.2

* 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 Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 40 R F(U) lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/Space) * (Annual Hours)	No. of Fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control 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	Break Room	27	S 32 C F 1 (ELE)	F41LL	32	0.9	SW	2600	2,246	27	4 ft LED Tube	200732x1	15	0.4	SW	2,600	1,053	1,193	0.5	\$	179.21	\$	3,164.40	\$0	17.7	17.7
20LED	Electrical Room	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	780	75	3	4 ft LED Tube	200732x1	15	0.0	SW	780	35	40	0.1	\$	8.12	\$	351.60	\$0	43.3	43.3
50LED	119	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	SW	2,600	312	312	0.1	\$	46.85	\$	710.80	\$0	15.2	15.2
50LED	116 - Custodial Office	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	SW	2,600	312	312	0.1	\$	46.85	\$	710.80	\$0	15.2	15.2
18LED	115	4	T 32 R F 4 (ELE)	F44LL	112	0.4	SW	2600	1,165	4	T 74 R LED	RTLED50	50	0.2	SW	2,600	520	645	0.2	\$	96.83	\$	945.00	\$0	9.8	9.8
18LED	Athletic Office	4	T 32 R F 4 (ELE)	F44LL	112	0.4	SW	2600	1,165	4	T 74 R LED	RTLED50	50	0.2	SW	2,600	520	645	0.2	\$	96.83	\$	945.00	\$0	9.8	9.8
50LED	113	10	W 32 P F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560	10	4 ft LED Tube	200732x2	30	0.3	SW	2,600	780	780	0.3	\$	117.13	\$	1,777.00	\$0	15.2	15.2
50LED	115 Team Room	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	520	31	1	4 ft LED Tube	200732x2	30	0.0	SW	520	16	16	0.0	\$	3.79	\$	177.70	\$0	46.9	46.9
50LED	Security	8	W 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	1,248	8	4 ft LED Tube	200732x2	30	0.2	SW	2,600	624	624	0.2	\$	93.71	\$	1,421.60	\$0	15.2	15.2
50LED	101	22	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2600	3,432	22	4 ft LED Tube	200732x2	30	0.7	SW	2,600	1,716	1,716	0.7	\$	257.69	\$	3,909.40	\$0	15.2	15.2
50LED	102A - Conference Room	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	1200	864	12	4 ft LED Tube	200732x2	30	0.4	SW	1,200	432	432	0.4	\$	75.55	\$	2,132.40	\$0	27.9	27.9
50LED	102	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	SW	2,600	312	312	0.1	\$	46.85	\$	710.80	\$0	15.2	15.2
50LED	102B	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	SW	2,600	312	312	0.1	\$	46.85	\$	710.80	\$0	15.2	15.2
50LED	100 - Classroom	24	W 32 P F 2 (ELE)	F42LL	60	1.4	SW	2600	3,744	24	4 ft LED Tube	200732x2	30	0.7	SW	2,600	1,872	1,872	0.7	\$	281.12	\$	4,264.80	\$0	15.2	15.2
18LED	103 - Classroom	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	2600	1,747	6	T 74 R LED	RTLED50	50	0.3	SW	2,600	780	967	0.4	\$	145.24	\$	1,417.50	\$0	9.8	9.8
40LED	Main Office	10	T 28 R F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560	10	T 38 R LED	RTLED38	38	0.4	SW	2,600	988	572	0.2	\$	85.90	\$	2,362.50	\$0	27.5	27.5
18LED	Dean Office	2	T 32 R F 4 (ELE)	F44LL	112	0.2	SW	2600	582	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	322	0.1	\$	48.41	\$	472.50	\$0	9.8	9.8
50LED	Telephone Room	1	W 32 P 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	\$	4.78	\$	177.70	\$0	37.2	37.2
18LED	Principal Office	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	2600	1,747	6	T 74 R LED	RTLED50	50	0.3	SW	2,600	780	967	0.4	\$	145.24	\$	1,417.50	\$0	9.8	9.8
18LED	Main Entrance	6	W 40 C F 4 (ELE)	F44LL	112	0.7	SW	6240	4,193	6	T 74 R LED	RTLED50	50	0.3	SW	6,240	1,872	2,321	0.4	\$	317.21	\$	1,417.50	\$0	4.5	4.5
269	Audit	31	I3001	I3001	300	9.3	SW	2600	24,180	31	CF42W	CF42W1-L	48	1.5	SW	2,600	3,869	20,311	7.8	\$	3,050.12	\$	3,766.50	\$0	1.2	1.2
130	Audit	8	DC 40 I 8	I752	150	1.2	SW	2600	3,120	8	CF 26	CFQ26W1-L	27	0.2	SW	2,600	562	2,558	1.0	\$	384.19	\$	162.00	\$0	0.4	0.4
199LED	Audit	5	W 32 C F 1 (ELE)	F41LL	32	0.2	SW	2600	416	5	4 ft LED Tube	200732x1	15	0.1	SW	2,600	195	221	0.1	\$	33.19	\$	586.00	\$0	17.7	17.7
40LED	Vice Principal Office	4	T 28 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	T 38 R LED	RTLED38	38	0.2	SW	2,600	395	229	0.1	\$	34.36	\$	945.00	\$0	27.5	27.5
40LED	Custodial	4	T 28 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	T 38 R LED	RTLED38	38	0.2	SW	2,600	395	229	0.1	\$	34.36	\$	945.00	\$0	27.5	27.5
40LED	Lounge	6	T 28 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	T 38 R LED	RTLED38	38	0.2	SW	2,600	593	343	0.1	\$	51.54	\$	1,417.50	\$0	27.5	27.5
50LED	Attendance Office	3	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	468	3	4 ft LED Tube	200732x2	30	0.1	SW	2,600	234	234	0.1	\$	35.14	\$	533.10	\$0	15.2	15.2
40LED	105	10	T 28 R F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560	10	T 38 R LED	RTLED38	38	0.4	SW	2,600	988	572	0.2	\$	85.90	\$	2,362.50	\$0	27.5	27.5
50LED	107	18	W 32 P 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	\$	210.84	\$	3,198.60	\$0	15.2	15.2
50LED	107A	5	W 32 P 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	\$	58.57	\$	888.50	\$0	15.2	15.2
50LED	108	18	W 32 P 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	\$	210.84	\$	3,198.60	\$0	15.2	15.2
40LED	110	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	SW	2,600	1,186	686	0.3	\$	103.08	\$	2,835.00	\$0	27.5	27.5
40LED	112	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	SW	2,600	1,186	686	0.3	\$	103.08	\$	2,835.00	\$0	27.5	27.5
40LED	111	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	SW	2,600	1,186	686	0.3	\$	103.08	\$	2,835.00	\$0	27.5	27.5
18LED	Corridor	35	T 32 R F 4 (ELE)	F44LL	112	0.9	SW	6240	2,461	35	T 74 R LED	RTLED50	50	0.5	SW	6,240	1,872	13,541	2							

		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	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control device	Annual Hours	Annual kWh	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual \$ Saved (kWh Saved) * (\$/kWh)	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
20LED	Break Room	27	S 32 C F 1 (ELE)	F41LL	32	0.9	SW	2600	2,246.4	27	S 32 C F 1 (ELE)	F41LL	32	0.9	C-OCC	3000	2,592.0	-345.6	0.0	\$43.89	\$270.00	\$35.00			-5.4			
20LED	Electrical Room	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	780	74.9	3	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	780	74.9	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
50LED	119	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1820	436.8	187.2	0.0	\$23.77	\$270.00	\$35.00	11.4	9.9				
50LED	116 - Custodial Office	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	288.0	336.0	0.0	\$42.67	\$270.00	\$35.00	6.3	5.5				
18LED	115	4	T 32 R F 4 (ELE)	F44LL	112	0.4	SW	2600	1,164.8	4	T 32 R F 4 (ELE)	F44LL	112	0.4	C-OCC	1820	515.4	349.4	0.0	\$44.38	\$270.00	\$35.00	6.1	5.3				
18LED	Athletic Office	4	T 32 R F 4 (ELE)	F44LL	112	0.4	SW	2600	1,164.8	4	T 32 R F 4 (ELE)	F44LL	112	0.4	C-OCC	1200	337.6	627.2	0.0	\$79.65	\$270.00	\$35.00	3.4	3.0				
50LED	113	10	W 32 P F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560.0	10	W 32 P F 2 (ELE)	F42LL	60	0.6	C-OCC	1820	1,092.0	468.0	0.0	\$59.44	\$270.00	\$35.00	4.5	4.0				
50LED	115 Team Room	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	520	31.2	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	520	31.2	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
50LED	Security	8	W 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	1,248.0	8	W 32 P F 2 (ELE)	F42LL	60	0.5	C-OCC	1200	576.0	672.0	0.0	\$85.34	\$270.00	\$35.00	3.2	2.8				
50LED	101	22	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2600	3,432.0	22	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1820	2,402.4	1,029.6	0.0	\$130.76	\$270.00	\$35.00	2.1	1.8				
50LED	102A - Conference Room	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	1200	864.0	12	W 32 P F 2 (ELE)	F42LL	60	0.7	C-OCC	840	604.8	259.2	0.0	\$32.92	\$270.00	\$35.00	8.2	7.1				
50LED	102	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1820	436.8	187.2	0.0	\$23.77	\$270.00	\$35.00	11.4	9.9				
50LED	102B	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1820	436.8	187.2	0.0	\$23.77	\$270.00	\$35.00	11.4	9.9				
50LED	100 - Classroom	24	W 32 P F 2 (ELE)	F42LL	60	1.4	SW	2600	3,744.0	24	W 32 P F 2 (ELE)	F42LL	60	1.4	C-OCC	1820	2,620.8	1,123.2	0.0	\$142.65	\$270.00	\$35.00	1.9	2.2				
18LED	103 - Classroom	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	2600	1,747.2	6	T 32 R F 4 (ELE)	F44LL	112	0.7	C-OCC	1820	1,223.0	524.2	0.0	\$66.57	\$270.00	\$35.00	4.1	3.5				
40LED	Main Office	10	T 28 R F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560.0	10	T 28 R F 2 (ELE)	F42LL	60	0.6	C-OCC	1200	720.0	840.0	0.0	\$106.68	\$270.00	\$35.00	2.5	2.2				
18LED	Dean Office	2	T 32 R F 4 (ELE)	F44LL	112	0.2	SW	2600	582.4	2	T 32 R F 4 (ELE)	F44LL	112	0.2	C-OCC	1200	268.8	313.6	0.0	\$39.83	\$270.00	\$35.00	6.8	5.9				
50LED	Telephone Room	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	780	46.8	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	780	46.8	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
18LED	Principal Office	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	2600	1,747.2	6	T 32 R F 4 (ELE)	F44LL	112	0.7	C-OCC	1200	806.4	940.8	0.0	\$119.48	\$270.00	\$35.00	2.3	2.0				
185LED	Main Entrance	6	W 40 C F 4 (ELE)	F44LL	112	0.7	SW	6240	4,193.3	6	W 40 C F 4 (ELE)	F44LL	112	0.7	NONE	6240	4,193.3	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
269	Audit	31	I3001	I3001	300	9.3	SW	2600	24,180.0	31	I3001	I3001	300	9.3	C-OCC	1200	11,160.0	13,020.0	0.0	\$1,653.54	\$270.00	\$35.00	0.2	0.1				
130	Audit	8	DC 40 I 8	I75/2	150	1.2	SW	2600	3,120.0	8	DC 40 I 8	I75/2	150	1.2	C-OCC	1200	1,440.0	1,680.0	0.0	\$213.36	\$270.00	\$35.00	1.3	1.1				
199LED	Audit	5	W 32 C F 1 (ELE)	F41LL	32	0.2	SW	2600	416.0	5	W 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	1200	192.0	224.0	0.0	\$28.45	\$270.00	\$35.00	9.5	8.3				
40LED	Vice Principal Office	4	T 28 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	T 28 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	288.0	336.0	0.0	\$42.67	\$270.00	\$35.00	6.3	5.5				
40LED	Custodial	4	T 28 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624.0	4	T 28 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	288.0	336.0	0.0	\$42.67	\$270.00	\$35.00	6.3	5.5				
40LED	Lounge	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	C-OCC	3000	1,080.0	-144.0	0.0	-\$18.29	\$270.00	\$35.00		-12.8				
50LED	Attendance Office	3	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	468.0	3	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	216.0	252.0	0.0	\$32.00	\$270.00	\$35.00	8.4	7.3				
40LED	105	10	T 28 R F 2 (ELE)	F42LL	60	0.6	SW	2600	1,560.0	10	T 28 R F 2 (ELE)	F42LL	60	0.6	C-OCC	1820	1,092.0	468.0	0.0	\$59.44	\$270.00	\$35.00	4.5	4.0				
50LED	107	18	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	2600	2,808.0	18	W 32 P F 2 (ELE)	F42LL	60	0.7	C-OCC	1820	1,965.6	842.4	0.0	\$106.98	\$270.00	\$35.00	2.5	2.2				
50LED	107A	5	W 32 P F 2 (ELE)	F42LL	60	0.3	SW	2600	780.0	5	W 32 P F 2 (ELE)	F42LL	60	0.3	C-OCC	1820	546.0	234.0	0.0	\$29.72	\$270.00	\$35.00	9.1	7.9				
50LED	108	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2600	2,808.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1820	1,965.6	842.4	0.0	\$106.98	\$270.00	\$35.00	2.5	2.2				
40LED	110	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872.0	12	T 28 R F 2 (ELE)	F42LL	60	0.7	C-OCC	1820	1,310.4	561.6	0.0	\$71.32	\$270.00	\$35.00	3.8	3.3				
40LED	112	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872.0	12	T 28 R F 2 (ELE)	F42LL	60	0.7	C-OCC	1820	1,310.4	561.6	0.0	\$71.32	\$270.00	\$35.00	3.8	3.3				
40LED	111	12	T 28 R F 2 (ELE)	F42LL	60	0.7	SW	2600	1,872.0	12	T 28 R F 2 (ELE)	F42LL	60	0.7	C-OCC	1820	1,310.4	561.6	0.0	\$71.32	\$270.00	\$35.00	3.8	3.3				
18LED	Corridor	35	T 32 R F 4 (ELE)	F44LL	112	0.9	SW	2600	24,460.8	35	T 32 R F 4 (ELE)	F44LL	112	0.9	NONE	6240	24,460.8	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
50LED	Corridor	26	W 32 P F 2 (ELE)	F42LL	60	1.6	SW	6240	9,734.4	26	W 32 P F 2 (ELE)	F42LL	60	1.6	NONE	6240	9,734.4	0.0	0.0	\$0.00	\$0.00	\$0.00			#DIV/0!			
185LED	Corridor	6	W 40 C F 4 (ELE)	F44LL	112	0.7	SW	6240	4,193.3	6	W 40 C F 4 (ELE)	F44																

		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	No. of Fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space * (Number of Fixtures)	Retrofit Control device	Annual Hours	Annual kWh	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 for renovations to lighting system	Lighting Incentive Measures	Simple Payback Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
20LED	Break Room	27	S 32 C F 1 (ELE)	F411L	32	0.9	SW	2600	2,246	27	4 ft LED Tube	200732x1	15	0.4	C-OCC	3,000	1,215	1,031	0.5	\$ 158.64	\$ 3,434.40	\$ 35	21.6	21.4				
20LED	Electrical Room	3	S 32 C F 1 (ELE)	F411L	32	0.1	SW	780	75	3	4 ft LED Tube	200732x1	15	0.0	NONE	780	35	40	0.1	\$ 8.12	\$ 351.60	\$ -	43.3	43.3				
50LED	119	4	W 32 P F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,820	218	406	0.1	\$ 58.74	\$ 980.80	\$ 35	16.7	16.1				
50LED	116 - Custodial Office	4	W 32 P F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,820	218	480	0.1	\$ 68.19	\$ 980.80	\$ 35	14.4	13.9				
18LED	115	4	T 32 R F 4 (ELE)	F441L	112	0.4	SW	2600	1,165	4	T 74 R LED	RTLED50	50	0.2	C-OCC	1,820	364	801	0.2	\$ 116.64	\$ 1,215.00	\$ 35	10.4	10.1				
18LED	Athletic Office	4	T 32 R F 4 (ELE)	F441L	112	0.4	SW	2600	1,165	4	T 74 R LED	RTLED50	50	0.2	C-OCC	1,820	364	801	0.2	\$ 116.64	\$ 1,215.00	\$ 35	9.2	8.9				
50LED	113	10	W 32 P F 2 (ELE)	F421L	60	0.6	SW	2600	1,560	10	4 ft LED Tube	200732x2	30	0.3	C-OCC	1,820	546	1,014	0.3	\$ 146.85	\$ 2,047.00	\$ 35	13.9	13.7				
50LED	115 Team Room	1	W 32 P F 2 (ELE)	F421L	60	0.1	SW	520	31	1	4 ft LED Tube	200732x2	30	0.0	NONE	520	16	16	0.0	\$ 3.79	\$ 177.70	\$ -	46.9	46.9				
50LED	Security	8	W 32 P F 2 (ELE)	F421L	60	0.5	SW	2600	1,248	8	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,820	288	960	0.2	\$ 136.38	\$ 1,691.60	\$ 35	12.4	12.1				
50LED	101	22	W 32 P F 2 (ELE)	F421L	60	1.3	SW	2600	3,432	22	4 ft LED Tube	200732x2	30	0.7	C-OCC	1,820	1,201	2,231	0.7	\$ 323.07	\$ 4,179.40	\$ 35	12.9	12.8				
50LED	102A - Conference Room	12	W 32 P F 2 (ELE)	F421L	60	0.7	SW	1200	864	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	840	302	562	0.4	\$ 93.01	\$ 2,402.40	\$ 35	25.8	25.5				
50LED	102	4	W 32 P F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,820	218	406	0.1	\$ 58.74	\$ 980.80	\$ 35	16.7	16.1				
50LED	102B	4	W 32 P F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,820	218	406	0.1	\$ 58.74	\$ 980.80	\$ 35	16.7	16.1				
50LED	100 - Classroom	24	W 32 P F 2 (ELE)	F421L	60	1.4	SW	2600	3,744	24	4 ft LED Tube	200732x2	30	0.7	C-OCC	1,820	1,310	2,434	0.7	\$ 352.44	\$ 4,534.80	\$ 35	12.9	12.8				
18LED	103 - Classroom	6	T 32 R F 4 (ELE)	F441L	112	0.7	SW	2600	1,747	6	T 74 R LED	RTLED50	50	0.3	C-OCC	1,820	546	1,201	0.4	\$ 174.96	\$ 1,887.50	\$ 35	9.6	9.4				
40LED	Main Office	10	T 28 R F 2 (ELE)	F421L	60	0.6	SW	2600	1,560	10	T 38 R LED	RTLED38	38	0.4	C-OCC	1,200	456	1,104	0.2	\$ 153.46	\$ 2,632.50	\$ 35	17.2	16.9				
18LED	Dean Office	2	T 32 R F 4 (ELE)	F441L	112	0.2	SW	2600	582	2	T 74 R LED	RTLED50	50	0.1	C-OCC	1,200	120	462	0.1	\$ 66.19	\$ 742.50	\$ 35	11.2	10.7				
50LED	Telephone Room	1	W 32 P F 2 (ELE)	F421L	60	0.1	SW	780	47	1	4 ft LED Tube	200732x2	30	0.0	NONE	780	23	23	0.0	\$ 4.78	\$ 177.70	\$ -	37.2	37.2				
18LED	Principle Office	1	T 32 R F 4 (ELE)	F441L	112	0.7	SW	2600	1,747	6	T 74 R LED	RTLED50	50	0.3	C-OCC	1,200	360	1,387	0.4	\$ 198.58	\$ 1,687.50	\$ 35	8.5	8.3				
185LED	Main Entrance	6	W 40 C F 4 (ELE)	F441L	112	0.7	SW	6240	4,193	6	T 74 R LED	RTLED50	50	0.3	NONE	6,240	1,872	2,321	0.4	\$ 317.21	\$ 1,417.50	\$ -	4.5	4.5				
269	Audit	31	I300	I300I	300	9.3	SW	2600	24,180	31	CF42W	CF42I-L	48	1.5	C-OCC	1,200	1,786	22,394	7.8	\$ 3,314.68	\$ 4,036.50	\$ 35	1.2	1.2				
130	Audit	8	DC 40 I 8	I75Z	150	1.2	SW	2600	3,120	8	CF 26	CFQ26I-L	27	0.2	C-OCC	1,200	259	2,861	1.0	\$ 422.60	\$ 432.00	\$ 35	1.0	0.9				
199LED	Audit	5	W 32 C F 1 (ELE)	F411L	32	0.2	SW	2600	416	5	4 ft LED Tube	200732x1	15	0.1	C-OCC	1,200	90	326	0.1	\$ 46.52	\$ 856.00	\$ 35	18.4	17.6				
40LED	Vice Principal Office	4	T 28 R F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	T 38 R LED	RTLED38	38	0.2	C-OCC	1,200	182	442	0.1	\$ 61.38	\$ 1,215.00	\$ 35	19.8	19.2				
40LED	Custodial	4	T 28 R F 2 (ELE)	F421L	60	0.2	SW	2600	624	4	T 38 R LED	RTLED38	38	0.2	C-OCC	1,200	182	442	0.1	\$ 61.38	\$ 1,215.00	\$ 35	19.8	19.2				
40LED	Lounge	6	T 28 R F 2 (ELE)	F421L	60	0.4	SW	2600	936	6	T 38 R LED	RTLED38	38	0.2	C-OCC	3,000	684	252	0.1	\$ 39.96	\$ 1,687.50	\$ 35	42.2	41.4				
50LED	Attendance Office	3	W 32 P F 2 (ELE)	F421L	60	0.2	SW	2600	468	3	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,200	108	360	0.1	\$ 51.14	\$ 803.10	\$ 35	15.7	15.0				
40LED	105	10	T 28 R F 2 (ELE)	F421L	60	0.6	SW	2600	1,560	10	T 38 R LED	RTLED38	38	0.4	C-OCC	1,820	692	868	0.2	\$ 123.54	\$ 2,632.50	\$ 35	21.3	21.0				
50LED	107	18	W 32 P F 2 (ELE)	F421L	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	\$ 264.33	\$ 3,468.60	\$ 35	13.1	13.0				
50LED	107A	5	W 32 P F 2 (ELE)	F421L	60	0.3	SW	2600	780	5	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,820	273	507	0.2	\$ 73.43	\$ 1,158.50	\$ 35	15.8	15.3				
50LED	108	18	W 32 P F 2 (ELE)	F421L	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	\$ 264.33	\$ 3,468.60	\$ 35	13.1	13.0				
40LED	110	12	T 28 R F 2 (ELE)	F421L	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	C-OCC	1,820	830	1,042	0.3	\$ 148.25	\$ 3,105.00	\$ 35	20.9	20.7				
40LED	112	12	T 28 R F 2 (ELE)	F421L	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	C-OCC	1,820	830	1,042	0.3	\$ 148.25	\$ 3,105.00	\$ 35	20.9	20.7				
40LED	111	12	T 28 R F 2 (ELE)	F421L	60	0.7	SW	2600	1,872	12	T 38 R LED	RTLED38	38	0.5	C-OCC	1,820	830	1,042	0.3	\$ 148.25	\$ 3,105.00	\$ 35	20.9	20.7				
18LED	Corridor	35	T 32 R F 4 (ELE)	F441L	112	3.9	SW	2600	24,461	35	T 74 R LED	RTLED50	50	1.8	NONE	6,240	10,920	13,544	2.2	\$ 1,858.40	\$ 1,858.75	\$ -	4.5	4.5				
50LED	Corridor	26	W 32 P F 2 (ELE)	F421L	60	1.6	SW	6240	9,734	26	4 ft LED Tube	200732x2	30	0.8	NONE	6,240	4,867	6,240	0.2	\$ 65.12	\$ 4,820.20	\$ -	6.9	6.7				
185LED	Corridor	6	W 40 C F 4 (ELE)	F441L	112	0.7	SW	6240	4,193	6	T 74 R LED	RTLED50	50	0.3	NONE	6,240	1,											

APPENDIX D

New Jersey Board of Public Utilities Incentives

- i. Smart Start**
 - ii. Direct Install**
 - iii. Pay for Performance (P4P)**
 - iv. Energy Savings Improvement Plan (ESIP)**
-

I. SMART START



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SBC CREDIT PROGRAM



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, there are unique opportunities to upgrade the energy efficiency of the project.

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings impacted by Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have been added for high efficiency food service equipment.

Visit the Sandy web page for details and important links.

New Jersey SmartStart Buildings can provide a range of support — at no cost to you — for 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. To receive an incentive, 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.

PAST PROGRAMS**TOOLS AND RESOURCES****PROGRAM UPDATES****CONTACT US**

Apply for pre-approval by submitting an application for the type of equipment you have or plan to install. The application should be accompanied by a related worksheet, where applicable, manufacturer's specification sheet (refer to the specific program requirements on the background 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, or advise you of upgrades in equipment that will save energy costs and/or increase your incentive.)

Support for Custom Energy-Efficiency Measures

Custom measures allows program participants the opportunity to receive an incentive for 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, and 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. Fiscal year financial incentives will be limited to a maximum of \$500,000 per customer utility account and are available as long as permits are obtained.

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Equipment Incentives

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings impacted by Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have been added for high efficiency food service equipment.

Visit the Sandy web page for details and important links.

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 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 specific information 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 F)

PAST PROGRAMS**TOOLS AND RESOURCES****PROGRAM UPDATES****CONTACT US****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)
 A/C Economizing Controls (\$85 - \$170 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)
 Gas furnaces (\$300-\$400 per unit)
 Gas infrared heaters - indoor only (\$300 - \$500 per unit)
 Boiler economizing controls (\$1,200 - \$2,700 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

Gas water heaters ≤ 50 gallons (\$50 per unit)
 Gas-fired water heaters > 50 gallons (\$1.00 - \$2.00 per MBH)
 Tankless water heaters replacing a free standing water heater > 82 energy factor (\$300 per heater)
 Gas-fired booster water heaters (\$17 - \$35 per MBH)

Premium Motors

Three-phase motors (\$45 - \$700 per motor) (**Incentive was discontinued effective March 1, 2013 except for buildings impacted by Hurricane Sandy. Approved applications will have the standard timeframe from the program commitment date to complete the installation.**)

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

Fractional (< 1 HP) Electronic Commutated Motors (ECM) (\$40 per for replacement of existing shaded-pole motor in refrigerated/freezer case)

Prescriptive Lighting

New Linear Fluorescent

T-12, HID and Incandescent to T-5 and T-8 (\$25 - \$200 per fixture) (**Note: T12 replacements are only available for buildings impacted by Hurricane Sandy**)

New Induction (\$70 per replaced HID fixture)

New LED

Screw-in/Plug-in (\$10 - \$20 per lamp)

Refrigerator/Freezer Case (\$30 - \$65 per fixture)

Outdoor pole/arm/wall-mounted luminaires (\$100 - \$175 per fixture)

Display case (\$30 per case)

Shelf-mounted display and task (\$15 per linear foot)

Wall-wash, desk, recessed (\$20 - \$35 per fixture)

Parking garage luminaires (\$100 per fixture)

Track or Mono-Point directional (\$50 per fixture)

Stairwell and Passageway luminaires (\$40 per fixture)

High-Bay, Low-Bay (\$150 per fixture)

Bollard (\$50 per fixture)

luminaires for Ambient Lighting of Interior Commercial Space
Linear panels (\$50 per fixture)

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

New Pulse-Start Metal Halide (\$25 per fixture)

Linear Fluorescent Retrofit (\$10 - \$20 per fixture)

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

Note: Incentives for T-12 to T-5 and T-8 lamps with electronic ballast in facilities (\$10 per fixture, 1-4 lamps) and T-5/T-8 high bay fixtures (\$16 - per fixture) were discontinued effective March 1, 2013 for T-12 retrofits replacements except for buildings impacted by Hurricane Sandy. Approved applications will have the standard timeframe of one year from the project commitment date to complete the installation

Lighting Controls

Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

Daylight dimmers (\$25 per fixture controlled, \$50 per fixture for office applications only)

Occupancy controlled hi-low fluorescent controls (\$25 per fixture controlled)

HID or Fluorescent Hi-Bay Controls

Occupancy hi-low (\$35 per fixture controlled)

Daylight dimming (\$45 per fixture controlled)

Refrigeration

Covers and Doors

Energy-Efficient doors for open refrigerated doors/covers (\$100 per door)

Aluminum Night Curtains for open refrigerated cases (\$3.50 per linear foot)

Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

Food Service Equipment

Cooking

Combination Electric Oven/Steamer (\$1,000 per oven)
 Combination Gas Oven/Steamer (\$750 per oven)
 Electric Convection Oven (\$350 per oven)
 Gas Convection Oven (\$500 per oven)
 Gas Rack Oven (\$1,000 single, \$2,000 double)
 Gas Conveyor Oven (\$500 small deck, \$750 large deck)
 Electric Fryer (\$200 per vat)
 Gas Fryer (\$749 per vat)
 Electric Large Vat Fryer (\$200 per vat)
 Gas Large Vat Fryer (\$500 per vat)
 Electric Griddle (\$300 per griddle)
 Gas Griddle (\$125 per griddle)
 Electric Steam Cooker (\$1,250 per steamer)
 Gas Steam Cooker (\$2,000 per steamer)

Holding

Full Size Insulated Cabinets (\$300 per cabinet)
 Three Quarter Size Insulated Cabinets (\$250 per cabinet)
 Half Size Insulated Cabinets (\$200 per cabinet)

Cooling

Glass Door Refrigerators (\$75 - \$150 per unit)
 Solid Door Refrigerators (\$50 - \$200 per unit)
 Glass Door Freezers (\$200 - \$1,000 per unit)
 Solid Door Freezers (\$100 - \$600 per unit)
 Ice Machines (\$50 - \$500 per unit)

Cleaning

Dishwashers (\$400 - \$1,500 per unit)

Other Equipment Incentives*

Performance Lighting (\$1.00 per watt per square foot below program incentive threshold, currently 5% more energy efficient than ASHRAE 2007 for New Construction only.)

Custom electric and gas equipment incentives (not prescriptive)

*Equipment incentives are calculated based on type, efficiency, size, and application and are evaluated on a case-by-case basis. Contact us for details.

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II. DIRECT INSTALL



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NEW JERSEY'S CLEAN ENERGY PROGRAM

DIRECT Install

Let us pay up to 70% of your energy efficiency upgrade.

Sometimes, the biggest challenge to improving energy efficiency is knowing where to and how to get through the process. Created specifically for existing small to medium facilities, Direct Install is a turnkey solution that makes it easy and affordable to upgrade high efficiency equipment. Direct Install is designed to cut your facility's energy costs replacing lighting, HVAC and other outdated operational equipment with energy efficient alternatives. The program pays up to 70% of retrofit costs, dramatically improving your payback on the project. There is a \$125,000 incentive cap on each project.

ELIGIBILITY



Existing small to mid-sized commercial and industrial facilities with a peak electric demand that did not exceed 200 kW in any of the preceding 12 months are eligible to participate in Direct Install. Applicants will submit the last 12 months of electric utility bills indicating that they are below the demand threshold and have occupied the building during that time. Buildings must be located in New Jersey and served by the state's public, regulated electric or natural gas utility companies.

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

Lighting
Heating, Cooling & Ventilation (HVAC)
Refrigeration
Motors
Natural Gas
Variable Frequency Drives



Measures eligible for Direct Install are limited to specific equipment categories, types and capacities. Boilers may not exceed 500,000 Btuh and furnaces may not exceed 140,

III. PAY FOR PERFORMANCE (P4P)



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NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

EXISTING BUILDINGS

PARTICIPATION STEPS

APPLICATIONS AND
FORMS

APPROVED PARTNERS

NEW CONSTRUCTION

FAQS

BECOME A PARTNER

COMBINED HEAT & POWER AND
FUEL CELLSLOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

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Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

Take a comprehensive, whole-building approach to saving energy in your existing facility. Earn incentives that are directly linked to your savings. Pay for Performance relies on a



program partners who provide technical services under direct contract to you. Acting as your energy expert, your partner will develop a whole-building energy reduction plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for full implementation of energy efficient measures and a construction schedule for installation.

Eligibility

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

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

ENERGY STAR Portfolio Manager

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



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

Incentives

**OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS**

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

EDA PROGRAMS

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

SBC CREDIT PROGRAM

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

PAST PROGRAMS

TOOLS AND RESOURCES

Incentive #3 - Completion of Post-Construction Benchmarking Report - A completed report verifying energy reductions based on one year of post-

PROGRAM UPDATES

implementation results. Incentives for electricity and natural gas savings will be based on actual savings, provided that the minimum performance threshold of savings has been achieved.

CONTACT US



A detailed Incentive Structure document is available on the applications and form

Steps to Participation

[Click here](#) for a step-by-step description of the program.

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PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2013 - June 30, 2014

Utility Serving Applicant: ☐ Atlantic City Electric ☐ Jersey Central Power & Light ☐ PSE&G
☐ New Jersey Natural Gas ☐ Elizabethtown Gas ☐ Rockland Electric Co. ☐ South Jersey Gas
☐ Other Electric Service Provider (please specify): _____
☐ Other Fuel Provider: _____ ☐ Oil: _____ ☐ Other (Please specify): _____

Instructions

1. Read the program material to determine project qualification.
2. Read the Participation Agreement and sign where indicated.
3. Fill out all applicable spaces on this form.
4. Provide a copy of the customer's company W-9 form.
5. Provide the most recent consecutive 12 month period of utility bills for the project.

6. Provide brief description of facility.
7. Partner must submit the application package via e-mail, mail or fax **DIRECTLY** to the Market Manager – see back of this form.

Approval of this Application is not an approval of the project's scope of work. Scope of work is only approved upon approval of the Energy Reduction Plan. See application and program guidelines for more information.

Customer/Owner Information (payment will be made to entity entered here)

Company Name		Project Contact/Title	
Company Address		City	State Zip
Phone/Fax	E-mail	Federal ID/SSN	

Partner Information

Company Name		Project Contact/Title	
Company Address		City	State Zip
Phone	Fax	E-mail	

Project Information

Project Name			
Building Address		City	State Zip
Utility Account Number(s): Electric		Gas	
* Note: Please use the back of this page for additional utility accounts if quantity exceeds space allotment.			
Annual Peak kW Demand	Building Type		Number of Buildings
Size of Building(s) (gross sq/ft)		Direct, Master or Sub Metered	

Funding

☐ Check the box if an Energy Savings Improvement Program (ESIP) will be a source of funding. ESIP allows government agencies to pay for energy related improvements using the value of the resulting energy savings.

Do you expect to receive funding under any other efficiency programs? ☐ No ☐ Yes If Yes, please specify below:

Utility Program #1 – Utility: _____	Program Name: _____
Utility Program #2 – Utility: _____	Program Name: _____
Federal Program #1 – Organization: _____	Program Name: _____
Federal Program #2 – Organization: _____	Program Name: _____
Other Program – Organization: _____	Program Name: _____

Additional Project information

Additional Utility Account(s)

Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number

Additional Comments:

Complete this application form and send it directly to the Commercial/Industrial Market Manager by e-mail, mail or fax.

New Jersey's Clean Energy Program
c/o TRC Energy Services-P4P
900 Route 9 North, Suite 404 • Woodbridge, NJ 07095

Phone: 866-657-6278 • Fax: 732-855-0422
E-mail: P4P@NJCleanEnergy.com

Visit our website: NJCleanEnergy.com/P4P

New Jersey SmartStart Buildings[®] is a registered trademark. Use of the mark without the permission of the New Jersey Board of Public Utilities, Office of Clean Energy is prohibited.

*Incentives/Requirements subject to change.



002-FY14-04/14

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – 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.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this Program.

Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Projects with a contract threshold of \$14,187 (increasing to \$15,444 effective July 1, 2014) are required to pay no less than prevailing wage rate to workers employed in the performance of any construction undertaken in connection with Board of Public Utilities financial assistance, or undertaken to fulfill any condition of receiving Board of Public Utilities financial assistance, including the performance of any contract to construct, renovate or otherwise prepare a facility, the operations of which are necessary for the receipt of Board of Public Utilities financial assistance. By submitting an application, or accepting program incentives, applicant agrees to adhere to New Jersey Prevailing Wage requirements, as applicable.

Program – The Commercial and Industrial Energy-Efficient Construction Program (New Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above.

Program Manager – TRC Energy Services.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy-efficient

measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Program Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Program Manager on or before June 30, 2014 in order to be eligible for the fiscal year July 1, 2013-June 30, 2014 incentives. The Program Manager will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Program Manager's approval letter is not eligible for an incentive. The Program Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Gas Heating, Unitary HVAC or Motors having an incentive amount less than \$5,000 that were installed within 12 months of receipt of the application. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Program Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Program Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post-Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Program Manager's initial approval letter.

Please refer to the program guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Program Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures

installed under this Program, either prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Program Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to \$500,000 per utility account in a calendar year. Contact the Program Manager regarding any questions.

Tax Liability – The Program Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers must supply their federal tax identification number or social security number to the Program Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Program Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE PROGRAM MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Program Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Program Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Program Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Program Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Program Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

CUSTOMER'S SIGNATURE
PARTNER SIGNATURE
By signing, I certify that I have read, understand and agree to the Participation Agreement listed above.

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)



Your Power to Save

At Home, for Business, and for the Future

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HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT



COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLS

LOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

TOOLS AND RESOURCES

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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 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 make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The ESIP provides all government agencies in New Jersey with a flexible tool to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements.

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

Local Government
School Districts (K-12)

All RFPs must be submitted to the Board for approval at ESIP@bpu.state.nj.us.

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

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.

The NJ Board of Public Utilities sponsored Sustainable Jersey in the creation of an ESIP Guidebook that explains how to implement the program. The guidebook also includes a list of successful projects and a list of helpful resources.

FIRST STEP – ENERGY AUDIT

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit as prescribed in P.L.2012 c.55.

ENERGY REDUCTION PLANS

If you have an ESIP plan that needs to be submitted 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](#))

ESIP PROGRAM

Final version 42413

BPU RULES

1. Public Entity must decide if they will use an ESCO or DIY method or Hybrid thereof prior to issuing the RFP and the RFP must state the intended method. A change in the project procurement model after the RFP closing date will be cause for immediate rejection and disqualification of potential Clean Energy program incentives.
2. RFP procedures shall be adhered to as per the legislation, including the use of BPU approved forms. Any alteration of the forms, without prior approval from the BPU shall be grounds for rejection.
3. RFP must include copy of an audit (ASHRAE Level II w/Level III for lighting) and audit must be prepared by a firm classified by DPMC in the 036 discipline.
4. All firms, including professional services, whether using ESCO or DIY model, must be DPMC classified.
5. If an Architect is engaged by the public entity, the architectural fees are the responsibility of the public entity and must be paid directly to the firm. These fees may be included in the energy cost savings analysis and payback.

ESCO's may contract directly with an architectural firm, in which case the architectural firm serves as a subcontractor to the ESCO and the project related service costs may be included within the project's economic model.

6. Public entity shall conduct pre-bid meetings and site visits per existing statutes.

In the interest of open public bidding transparency, it is a requirement of the BPU that all proposers must attend the pre-proposal bid meeting.

7. There shall be no negative cash flow in any year of the program.
section 7 (1)(a)
"the energy savings resulting from the program will be sufficient to cover the cost of the program's energy conservation measures."
8. SREC values are not permitted to be used in the energy cost savings calculations.
9. Capital cost avoidance values are not to be used in the energy savings calculations.
10. Operational and Maintenance (O&M) cost savings may be permitted in the cost savings calculations, but only with supporting documentation.
11. Blended utility rates shall not be permitted. Use the actual utility tariff or local contracted rates if there is a third party supplier.

For the RFP proposals, the public entity shall define the utility rates in the RFP

12. Contracted third party utility rates may only be used for the term of the contract (5 yr. maximum)
Subsequent years are to be projected at the utility tariff rates plus the annual BPU escalation rates.
13. Public entity shall conduct M&V (measurement and verification) at the one (1) year operational date and shall provide a copy of the M&V report to the Board of Public Utilities.

For the RFP proposals, the ESCO shall provide the cost for the one (1) year M&V only. For comparative purposes, the one year M&V pricing shall be indicated on the proposal Form VI, under the “Annual Service Costs” column. Additional M&V costs are at the discretion of the local unit and are not to be included in the proposal.

14. The decisions made by BPU staff regarding compliance or other issues that arise in connection with the RFP procurement process shall be considered a final decision of the BPU. Any appeal will need to be through the New Jersey Superior Court, Appellate Division.
15. For the RFP proposals only, Demand Response (DR) revenues claimed by ESCO’s can only be projected for a maximum period of three (3) years. DR revenue projections beyond three years will not be permitted. DR revenues must be included and presented under the “Energy Rebates/Incentives” column of FORM VI.
16. ESCO “fees” proposed during the RFP phase of the project cannot increase post-award. ESCO’s are required to maintain the fee percentages through final contract negotiations and construction of the Board approved Energy Savings Plan
17. Public Bid openings shall be held on the due date of the proposal submissions. The public entity shall announce the name of the bidder and the total dollar amount. After award of a contract, all proposals received will be made available by the owner for public inspection
18. Rejection of bids by the public entity shall be conducted in accordance with the appropriate sections of the applicable legislation, as stated in Title 40A:11-13.2. Additionally all proposals must be returned to the respective ESCO’s upon rejection.
19. Field changes that exceed 5% of the project cost require BPU approval.
20. Energy Savings Plans (ESP) that is dependent upon incentives from the Clean Energy Program must review the current program requirements, at the time of application, for each incentive to insure eligibility. If any program incentive is denied, resubmission of all ESIP related forms will be necessary to remain ESIP qualified.

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

NEWARK PUBLIC SCHOOL DISTRICT WEST SIDE HIGH SCHOOL

Cost of Electricity	\$0.138	/kWh
Electricity Usage	1,185,600	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
\$1,120,000	280.0	349,710	0	\$48,328	0	\$48,328	\$0	\$54,205	23.2	10.9

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

Area Output*

5,124 m²
55,150 ft²

Perimeter Output*

794 m
2,606 ft

Available Roof Space for PV:

(Area Output - 5 ft x Perimeter) x 85%
35,800 ft²

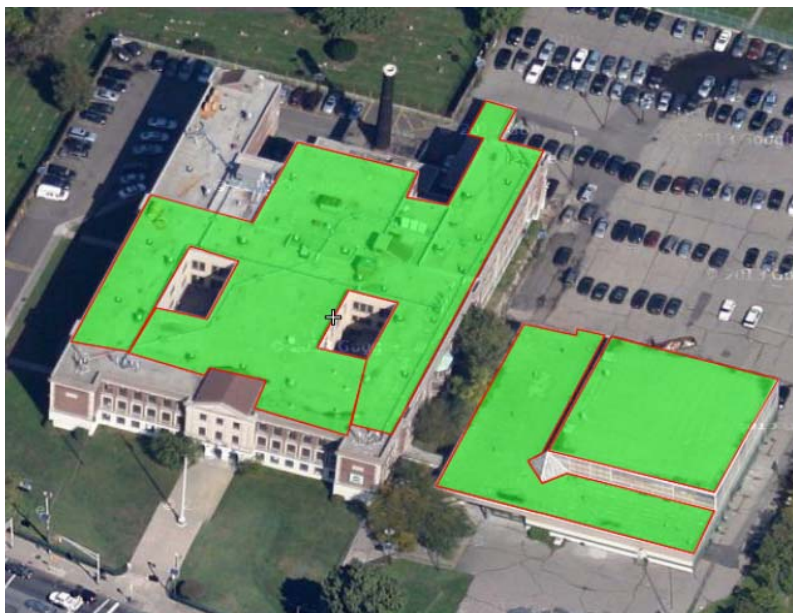
Approximate System Size:

Is the roof flat? (Yes/No) Yes

8 watt/ft²
286,401 DC watts
280 kW Enter into PV Watts

PV Watts Inputs***

Enter into PV Watts (always 20 if flat, if
Array Tilt Angle 20 pitched - enter estimated roof angle)
Array Azimuth 180 Enter into PV Watts (default)
Zip Code 07106 Enter into PV Watts
DC/AC Derate Factor 0.83 Enter into PV Watts



PV Watts Output

349,710 annual kWh calculated in PV Watts program

% Offset Calc

Usage 1,185,600 (from utilities)
PV Generation 349,710 (generated using PV Watts)
% offset 29%

* <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:	280.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	232.4 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	13.8 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.78	20453	2822.51
2	3.54	23565	3251.97
3	4.35	31198	4305.32
4	4.95	33069	4563.52
5	5.69	38394	5298.37
6	5.86	37138	5125.04
7	5.73	37079	5116.90
8	5.47	35028	4833.86
9	4.91	31380	4330.44
10	3.99	27219	3756.22
11	2.68	18269	2521.12
12	2.35	16918	2334.68
Year	4.36	349710	48259.98

*

[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 heating hot water boilers



2: 20 HP Hot water pump motors



3: Existing boiler controls



4: DHW boiler with storage tank bank



5: Sample lighting fixture in kitchen



6: Sample lighting fixtures in gymnasium

APPENDIX G

EPA Benchmarking Report



ENERGY STAR[®] Statement of Energy Performance

47

ENERGY STAR[®]
Score¹

West Side High School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 161,744
Built: 1925

For Year Ending: April 30, 2013
Date Generated: May 14, 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

West Side High School
405 South Orange Ave.
Newark, New Jersey 07103

Property Owner

,
() -

Primary Contact

,
() -

Property ID: 3877111

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

84.2 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	4,374,185 (32%)
Natural Gas (kBtu)	9,239,335 (68%)

National Median Comparison

National Median Site EUI (kBtu/ft ²)	82.2
National Median Source EUI (kBtu/ft ²)	141.5
% Diff from National Median Source EUI	2%

Source EUI

144.9 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	1,044
---	-------

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)**