THE NEWARK PUBLIC SCHOOLS

Group 2 Buildings

Harriet Tubman School

504 South 10th Street, Newark, NJ 07103

LOCAL GOVERNMENT ENERGY AUDIT PROGRAM

FOR

NEW JERSEY

BOARD OF PUBLIC UTILITIES

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CHA PROJECT NO. 27998

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REPORT DISCLAIMER

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

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

List of Common Energy Audit Abbreviations

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

1.0 EXECUTIVE SUMMARY

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

Building Name	Address	Square Feet	Construction Date
Harriet Tubman School	504 South 10th Street, Newark, NJ 07103	50,653	1888,1896,1974

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)
Harriet Tubman School	156,166	6,887	30,498	3.4

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

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

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
1	Replace Door Sweeps & Seals	2,305	649	3.6	0	3.6	Y
2	Convert Building from Steam to HW and Install High Efficiency Boilers	1,320,890	1,957	675.0	2,625	673.7	N
3	Install Window A/C Controllers	1,500	1,313	1.1	0	1.1	Y
4	Install VAV boxes and VFD to classroom Rooftop unit	44,241	8,344	5.3	4,495	4.8	Y
5A	Install Basic Controls	21,309	4,926	4.3	0	4.3	Y
5B**	Install Full DDC Controls	315,096	10,712	29.4	0	29.4	N
6	Install Walk-in Cooler Controls	20,625	394	52.4	0	52.4	N
7	Upgrade Plumbing Fixtures	276,407	1,569	176.2	0	176.2	N
L1**	Lighting Replacements / Upgrades	12,015	12,713	0.9	2,000	0.8	N
L2**	Install Lighting Controls (Occupancy Sensors)	21,330	4,616	4.6	2,765	4.0	N
L3	Lighting Replacements with Controls	33,345	15,266	2.2	4,765	1.9	Y
	Total**	**1,720,621**	**34,417**	**50.0**	**11,885**	**49.6**	
	Total (Recommended)	**102,700**	**30,498**	**3.4**	**9,260**	**3.1**	

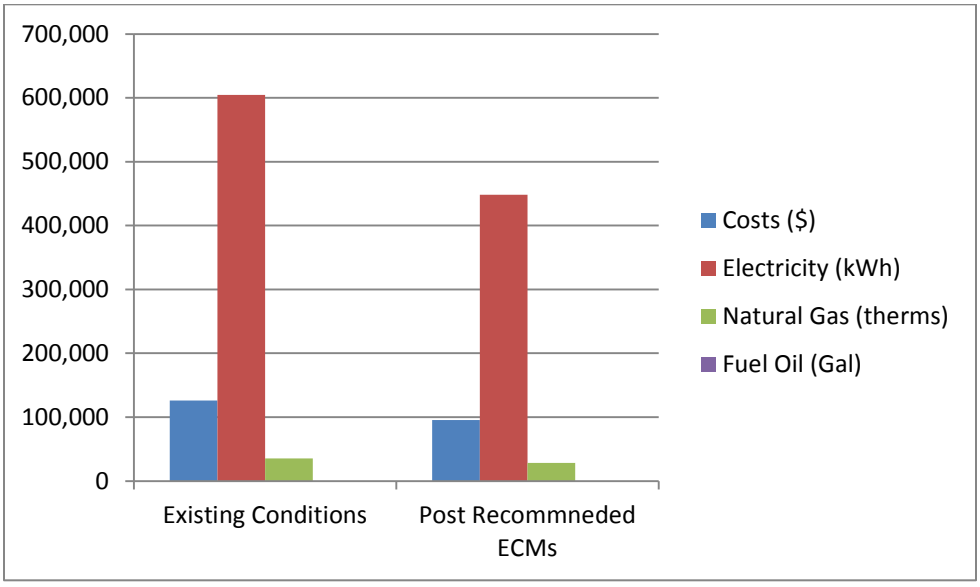
* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 110 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	125,837	95,339	24%
Electricity (kWh)	604,461	448,295	26%
Natural Gas (therms)	35,371	28,484	19%
Site EUI (kbtu/SF/Yr)	110.5	89.7	



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: Harriet Tubman School
Address: 504 South 10th Street 07103
Gross Floor Area: 50,653
Number of Floors: 4
Year Built: 1888.1896,1974

Description of Spaces: Classrooms, offices, cafeteria, storage rooms, toilet rooms and mechanical rooms.
Description of Occupancy: The school serves about 350 students from pre-K to 6th grade. There are about 50 school faculty and staff members.
Number of Computers: The school has approximately 60 desktop and laptop computers.
Building Usage: School hours are 8:20 AM – 2:55 PM Monday through Friday, with various after-school activities. The two-shift custodian hours are from 6:30 AM to 11:00 PM.
Construction Materials: The old section built in 1888 and 1896 has brick construction and painted plaster internal walls. The new section built in 1974 has concrete masonry blocks and the interior walls are painted CMU.
Façade: Brick veneer
Roof: The old section of the school has a pitched roof covered with asphalt shingles. The new section has a steel structure roof with insulation covered with rubber membrane and stone ballasts. The roof was in good condition and no ECMs associated with roof replacement or repair was evaluated.
Windows: The old section has retrofitted double pane windows. The retrofitted double pane windows are the original windows with one additional layer of glass added to it. The section has

double pane aluminum frame windows. Windows are in good condition and no ECMs associated with window replacement were evaluated.
Exterior Doors: The school has steel doors. Sweeps on exterior doors were in poor condition and can be replaced

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The old section of the school is heated by one Weil-McLain steam boiler. The heating capacity of this boiler is unknown due to the missing nameplate and the age of this old boiler. Currently, this boiler is manually controlled due to the failure of the Johnson Controls METASYS automation control system. According to the school staff, the burner is manually turned off when the building is too hot and manually turned on when the building is cold. The condensate is 100% returned to the boilers by using a condensate tank and two condensate return pumps. Each pump is driven by a ¾ HP Marathon electric motor. The old section of the school is heated by steam radiators. Steam heating is fairly inefficient as compared to that of hot water heating when using high efficiency condensing boilers. Converting the school from a steam heating system to a hot water and installing a gas fired condensing boiler was evaluated.

The new section of the school is heated by using three McQuay roof top units (RTU) equipped with gas fired furnace. Two RTUs (RTU-2 and 3) on the higher roof serve the gymnasium area and the third one (RTU-1) on the lower roof serves the classrooms, restrooms and offices in the new section. In addition to the RTUs, electric baseboard heaters and unit heaters are used as supplemental heat in the classrooms, kitchen and storage rooms. Each classroom has an electric baseboard heater, the kitchen has two electric unit heaters and the storage room typically has one electric unit heater. The gas furnace in RTU-1 has a rated maximum energy input of 312 MBH and the gas furnaces in RTU-2 and 3 have a rated maximum energy input of 400 MBH. These units are in good condition and are not past their useful life expectancy. No ECMs were evaluated to replace these RTUs as a result.

Cooling: The majority areas in the old section of the school are not cooled with an exception of a few rooms. The main office room, principle office and some classrooms are cooled by using window AC units. A typical window AC unit has a rated cooling capacity of 24 MBH. The window A/Cs are manually operated and are assumed to be operating when no occupants are present. A window A/C controller ECM is included to ensure these units aren't operating continuously.

The new section of the school is cooled by the three constant volume McQuay RTUs. RTU-1 serving the classrooms has a rated cooling capacity of 15 ton. RTU-2 and RTU-3 are identical RTUs serving the gymnasium and gym storage rooms. Each one has a cooling capacity of 20 ton.

Ventilation: The old section of the building is not ventilated by mechanical equipment. According to school staff, teachers open windows to introduce fresh air into the building. The new section of the building is ventilated by three RTUs which have fresh air intake openings. RTU-1 supplies 5,500 CFM air to the classroom. RTU-2/3 each supplies 5,000 CFM air to the gymnasium and associated rooms. Discussions with the school staff, it is believed that each RTU brings in about 20% of the supply air as fresh air.

Exhaust: The kitchen in the new section of the building has an about 5' by 12' kitchen hood. The cooking hours are typically from 7:00 AM to 2:00 PM. The capacity of the fan motor is unknown due to the inaccessibility to the motor. There are also four exhaust fans on the flat

room serving the restrooms and storage rooms. The fans and motors are all enclosed in the ductwork. Therefore, the capacities of exhaust fans are.

Normally a kitchen exhaust controller would be recommended anytime a kitchen has an exhaust system; however kitchen staff indicated that the exhaust fan is never used; therefore there would be no savings associated with this measure.

Controls Systems

The heating system in the old section of the building has a Johnson Controls METASYS control system. However, after discussions with the facility staff, it was noted that this control system had failed to work properly and the facility staff is currently turning on/off the boilers manually based on the feeling of the room temperature. The new section of the building is controlled by pneumatic thermostats and electric thermostats. An air compressor located in a small mechanical room next to the kitchen is utilized to provide compressed air for the pneumatic thermostats. The air compressor is equipped with two 1/3 HP electric motors and stores 80 pisg compressed air in an approximately 20 gallon tank. The pneumatic thermostats are used to control the electric baseboard heaters and unit heaters in the new section, however, it is noted that most of them have failed to work after discussing with school staff. The McQuay RTUs have some McQuay non-programmable electric thermostats in the gym and some rooms. However, it is found that some of them have been disconnected and some of them are not working properly.

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

Domestic Hot Water Systems

The old section of the building is served by one gas fired State domestic hot water heater. The heater has a rated 360 MBH energy input. The heaters maintain the water temperature at 120 ^{o}F. The new section of the building has A.O.Smith gas fired domestic hot water heater and an about 200 gallon storage tank. The heater has a rated energy input of 420 MBH and energy output of 344.1 MBH which results in a nameplate efficiency of 82%. Based on the DHW heaters being in good condition no ECMs were evaluated for the domestic water system.

Kitchen Equipment

The kitchen has six Vulcan electric ovens. Also, it has a Bally 6’ by 12’ walk-in refrigerator, a Bally 6’ by 12’ walk-in freezer and one Victory regular refrigerator. The walk-in cooler is run continuously based on dry bulb temperature. An ECM is evaluated to install a control system which is based on wet bulb temperature and is more efficient.

Plumbing Systems

The restrooms contain older style toilets and urinals that utilize a higher volume of water per flush than currently available new units. Similarly, the sinks do not have low-flow aerators installed on the faucets and, therefore, use more water than would be discharged using newer technology.

An ECM is included to evaluate the water savings potential of installing low- flow water closet and urinals.

Plug Load

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

Lighting Systems

The building has a mixture of T-8 fluorescent lighting and some incandescent lights. The majority lighting fixtures in the building are T8 fluorescent fixtures. Some storage rooms are still using 100 W incandescent light bulbs. All the lights in this building are controlled by manual switches or key switches. After discussion with facility staff, it was noted that the classroom lights are typically turned off after the janitor cleaning the rooms and the hallway lights are on 24/7.

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

3.0 UTILITIES

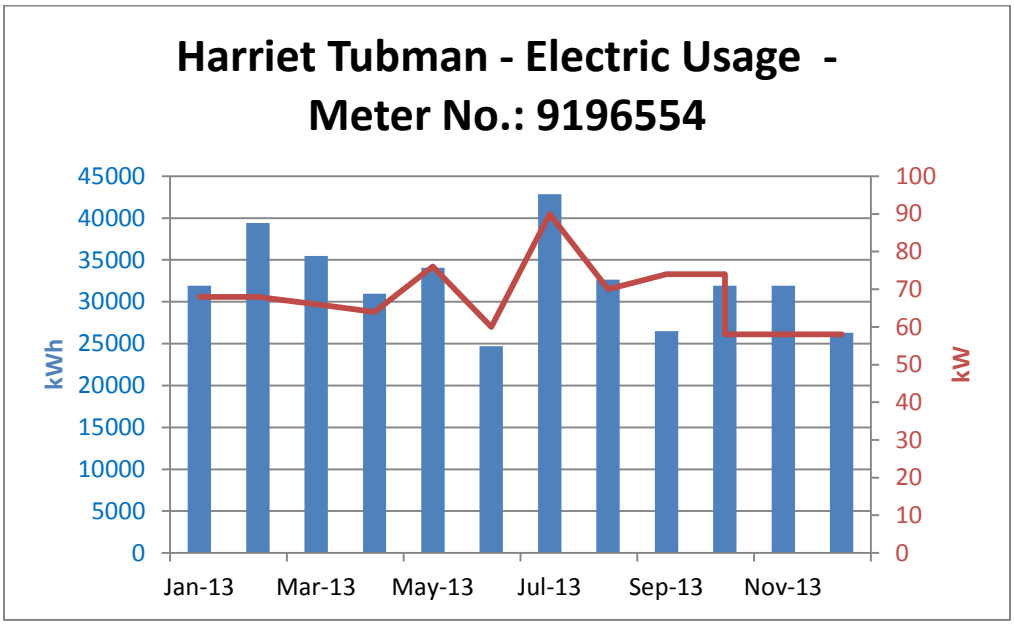
Utilities used by the building are delivered and supplied by the following utility companies:

	Electric	Natural Gas
Deliverer	PSEG	PSEG
Supplier	Nextera Energy Services	PSEG

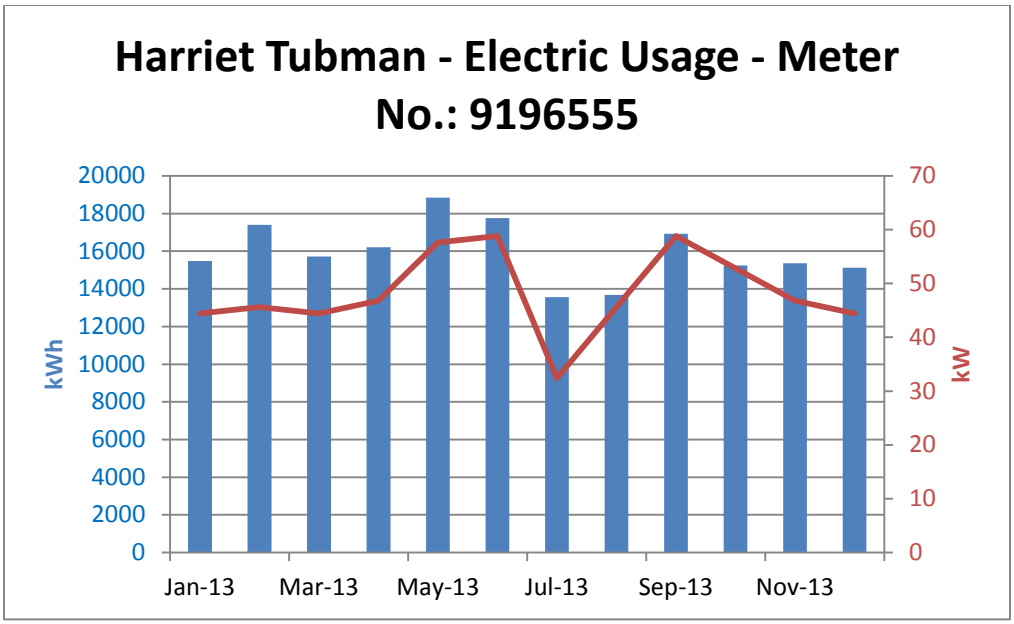
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	604,461	kWh
Annual Cost	90,861	$
Blended Unit Rate	$0.15	$/kWh
Supply Rate	$0.14	$/kWh
Demand Rate	$4.28	$/kW
Peak Demand	148.8	kW
Natural Gas		
Annual Consumption	35,371	Therms
Annual Cost	34,976	$
Unit Rate	$0.99	$/therm

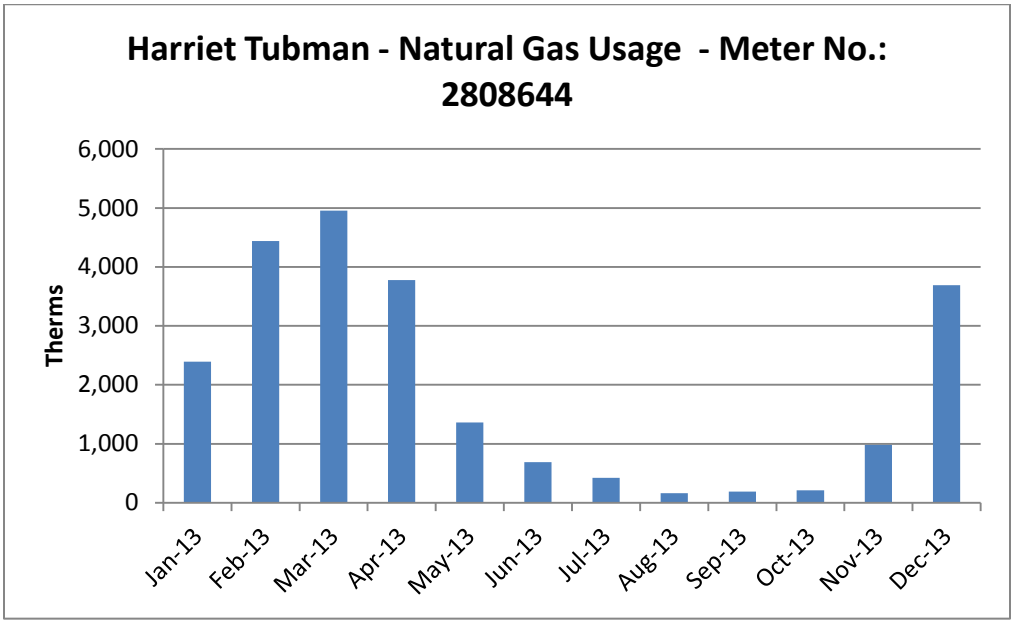
Blended Rate: Average rate charged determined by the annual cost / annual usage
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)



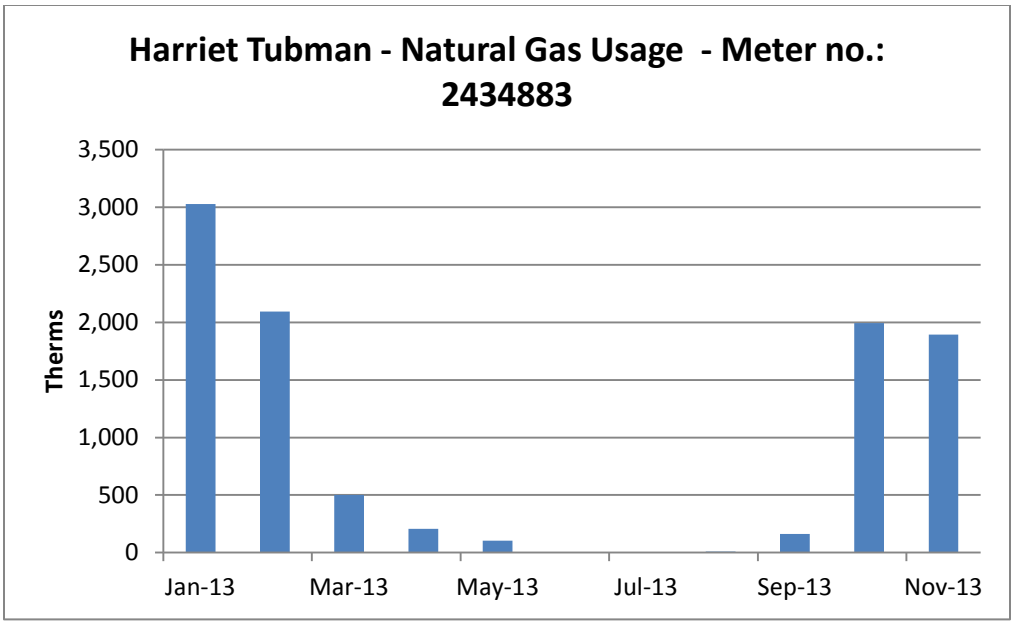
This electric meter for Harriet Tubman fluctuates usage from month to month with higher usage in the summer and winter months and lower usage in the shoulder months. It is assumed that this meter is the main meter for the original school.



This electric meter follows the same trend as the previous one. However, the usage is less. Based on less usage it is believed that this meter serves the gym addition.



This natural gas meter for Harriet Tubman fluctuates usage from month to month with higher usage in the winter months and lower usage in the shoulder months and summer. The low consumption in the summer is representative of the domestic hot water system and it is assumed this is the main meter for the original school.



This meter doesn't have any consumption in the summer months. The high usage in the winter months is representative of the gym wing rooftop units. This meter is the gym addition.

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

See Appendix A for a utility analysis.

Under New Jersey's energy deregulation law, the supply portion of the electric (or natural gas) bill is separated from the delivery portion. The supply portion is open to competition, and customers can shop around for the best price for their energy suppliers. The electric and natural gas distribution utilities will still deliver the gas/ electric supplies through their wires and pipes – and respond to emergencies, should they arise – regardless of where those supplies are purchased. Purchasing the energy supplies from a company other than your electric or gas utility is purely an economic decision; it has no impact on the reliability or safety of the service.

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	School Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.14	$0.12	Y
Natural Gas	$/Therm	$0.99	$0.95	Y

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

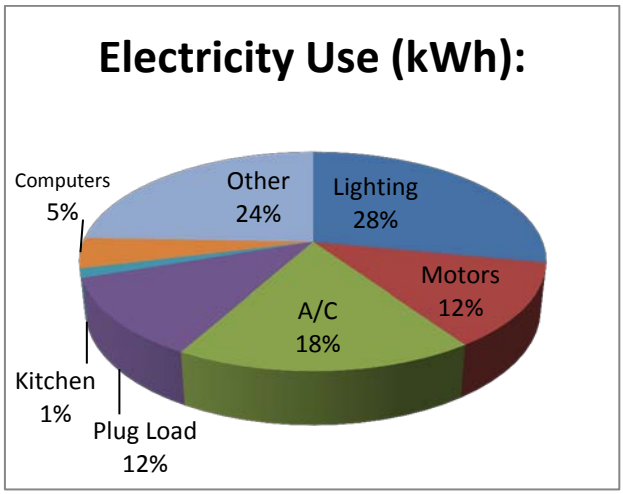
Additional information on selecting a third party energy supplier is available here:

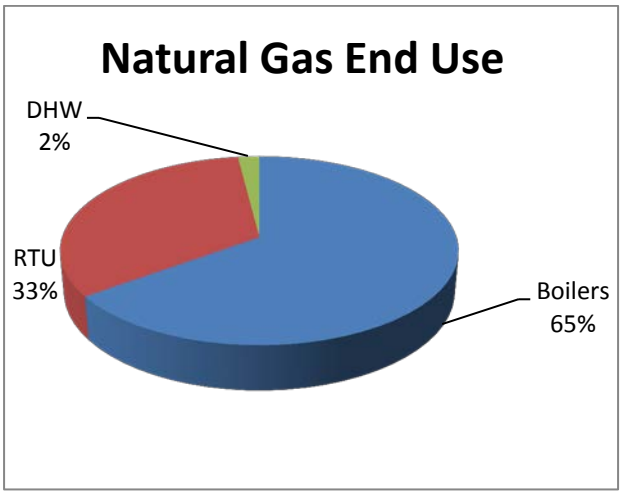
http://www.state.nj.us/bpu/commercial/shopping.html.

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

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

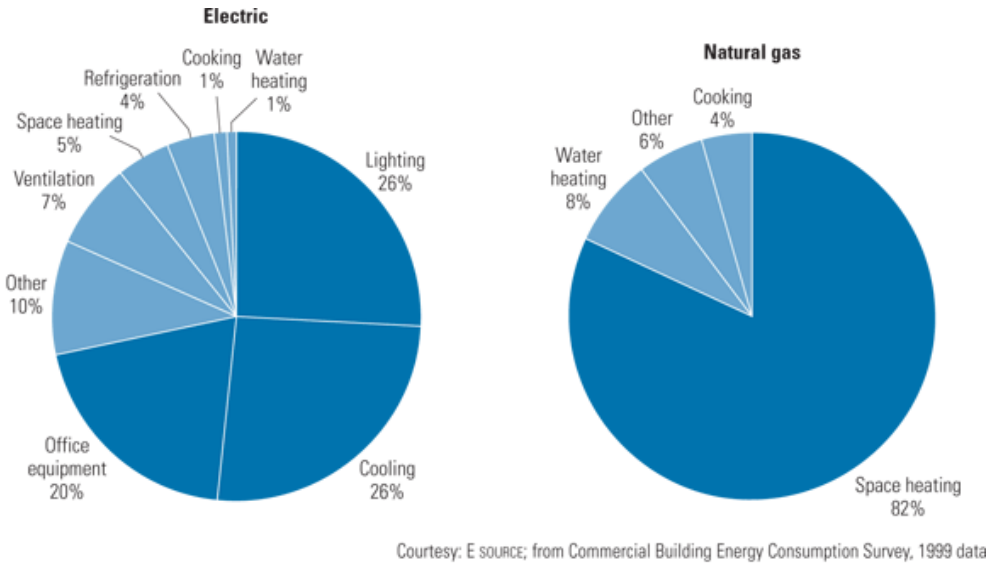
Site End-Use Utility Profile





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

Typical End-Use Utility Profile for Educational Facilities



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

4.0 BENCHMARKING

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

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

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

Site EUI kBtu/ft^2/yr	Energy Star Rating (1-100)
110.5*	29**

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

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

5.0 ENERGY CONSERVATION MEASURES

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

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

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

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Replace Door Sweeps and Seals

Exterior doors throughout the school have door sweeps and seals which have deteriorated over time. Presently, gaps exist which allow for infiltration of outdoor air during the winter months, wasting steam heat generated by the boiler system and therefore natural gas.

. This measure calls for the replacement of all exterior door seals. Replacement of these seals will result in a reduction of the buildings heating and cooling loads, therefore providing natural gas and electricity savings. The linear footage of gap and wind speed is used to estimate the infiltration rate, which is then multiplied by the BIN weather data and the equipment efficiencies to determine the annual energy savings.

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

ECM-1 Replace Door Sweeps and Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
2,305	0	0	656	649	3.2	0	3.6	3.6

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

This measure is recommended.

5.2 ECM-2 Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers

The old section of the school is heated by (1) one Weil-McLain steam boiler. Steam is created and flows through steam piping to steam radiators. The boiler is nearing its useful life and the steam piping is estimated to be existing to the building.

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

In lieu of replacing the boilers in kind, this ECM evaluates replacing the steam system in its entirety with a more efficient hot water system. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. To implement this ECM, the old steam boilers, distribution piping, venting and terminal units would be removed and the new hot water boilers, distribution piping and primary pumps put in their place. Significant piping and wiring modifications would be needed. New dedicated boiler venting would also need to be installed either through the roof or

sidewall. Asbestos abatement may need to be performed prior to any work and the cost for this is not included in the payback analysis.

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

ECM-2 Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,320,890	0	0	1,979	1,957	(1.0)	2,625	675.0	673.7

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

This measure is not recommended due to the high capital cost as well as long payback period, however this ECM should be considered based on the life cycle cost savings as the current boilers and heating system are well beyond their useful life.

5.3 ECM-3 Install Window A/C Controller

There are approximately eight (8) window air conditioners located throughout the school serving various spaces throughout the school.

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

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

ECM-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
1,500	0	8,585	0	1,313	12.1	0	1.1	1.1

* 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 ECM-4 Install VAV boxes and VFD to classroom Rooftop unit

The rooftop unit in the gymnasium wing that serves the classroom area and offices. The unit is constant volume. If the school changes to an air volume flow VAV system, the average air volume flow will be lower and need of electrical energy for of air distribution and heat for supply air heating is reduced. With a decreased average air volume flow the average efficiency of heat recovery will be improved, which also contributes to a decreased need of supply air heating.

This ECM evaluates installing VAV boxes in the classroom and office areas and adding a VFD to the supply and return fan motor.

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

ECM-4 Install VAV boxes and VFD to classroom Rooftop unit

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
44,241	0	46,496	1,248	8,344	1.8	4,495	5.3	4.8

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

This measure is recommended.

5.5.1 ECM-5A Install Basic Controls

The building uses steam boilers that are currently controlled manually by the building operators. Steam pressure is maintained at 3 psi most of the day with no regard to space temperature. Classrooms are overheated as a result and the teachers open the windows in an attempt to cool the rooms down. No night temperature set-back is implemented, unless the operator remembers to turn the boilers off before their shift ends. This highly inefficient method of operation consumes excessive fuel (natural gas).

A Basic Control system will provide automatic control of the boiler(s) to produce only enough steam (or hot water) needed to heat the building, based on a single or multiple averaging space thermostats and outdoor air temperatures. This system will not provide for independent room temperature control, but could be expanded in the future to provide this function, if desired using thermostatic radiator control valves. This system could also provide basic boiler and space temperature monitoring, trending and remote notification of boiler failure.

ECM-5A Install Basic Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
21,309	0	0	4,982	4,926	2.5	0	4.3	4.3

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

This measure is recommended.

5.5.2 ECM-5B Install Full DDC Controls

A Full Direct Digital Control (DDC) building automation system consists of automatic control of individual space heating and ventilation equipment, and provides monitoring, trending and alarms which notify an operator when a piece of equipment fails or

operates outside a given set-point. This system allows for the implementation of energy efficient strategies, such as: time of day (TOD) optimization, set point optimization, staggered start, night setback, temporary daytime setback, economizer (free cooling), demand control ventilation, exhaust fan shut down, and holiday TOD optimization. It also allows for remote access and control of the building's systems. This ECM is recommended only if the building HVAC system is to be fully renovated to include new boilers, pumps and ventilation equipment as it will optimize the energy savings potential of the new systems.

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

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

ECM-5B 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
315,096	0	0	10,833	10,712	(0.5)	0	29.4	29.4

* 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-5A and due to the high cost of implementation

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

Presently there are two (1) walk-in coolers and one (1) walk-in freezer which are each approximately 6'x12'.

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

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

ECM-6 Install Walk-in Cooler / Freezer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
20,625	0	2,574	0	394	(0.7)	0	52.4	52.4

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

This measure is not recommended due to the relatively low cost savings.

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	Total				
$	kW	kWh	Therms	kGal	$	%	$	Years	Years
276,407	0	0	0	208	1,569	(0.9)	0	176.2	176.2

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

These measures are not recommended due to the long payback.

5.8.1 ECM-L1 Lighting Replacement / Upgrades

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

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

a given space. A more comprehensive engineering study should be performed to determine correct lighting levels.

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

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
12,015	28.9	82,357	0	12,713	16.6	2,000	0.9	0.8

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

This measure is not recommended in lieu of ECM L3.

5.8.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

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

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in Section 5.8.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
21,330	0	33,863	0	4,616	2.6	2,765	4.6	4.0

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

This measure is not recommended in lieu of ECM L3.

5.8.3 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
33,345	28.9	101,085	0	15,266	6.6	4,765	2.2	1.9

* 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
- Clear surface above unit ventilators of materials, plants, or books
- Set computers monitors to turn off and computers to sleep mode when not in use
- Look for the ENERGY STAR® label when purchasing Window AC units or Kitchen Appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train custodians to turn off lights and set HVAC temperatures to minimum levels when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance
- Educate students and staff about how their behavior affects energy use. Create student energy patrols to monitor and inform administration when energy is being wasted.
- During the winter, Custodians should ensure all windows are closed as part of cleaning routine
- Insulate DHW pipes in kitchen electric meter room.

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

The Direct Install Program applies to smaller facilities that have a peak electrical demand of 200 kW or less in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric utility companies.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 70% of the costs for lighting, HVAC, motors, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can reduce the implementation cost of energy conservation projects.

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

The program pays a maximum amount of $75,000 per building, and up to $250,000 per customer per year. Installations must be completed by an approved Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this energy audit. The incentive is reimbursed to the Owner upon successful replacement and payment of the equipment.

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

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

This building may be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed to offset the cost of energy conservation projects for facilities that pay the Societal Benefits Charge (SBC) and whose demand (kW) in any of the preceding 12 months exceeds 100 kW. This demand minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations and *is not applicable to public schools*. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). Additionally, the overall return on investment (ROI) must exceed 10%. If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The ERP must include a detailed energy audit of the desired ECMs, energy savings calculations (using building modeling software) and inputting of all utility bills into the EPA Portfolio Manager website.

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

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

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

Electric

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

Gas

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

Incentive cap: 25% of total project cost

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

Electric

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

Gas

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

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

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

6.1.4 Energy Savings Improvement Plan

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

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

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

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
13,950	110.0

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 – 110 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
440,000	110.0	143,367	0	21,505	22,222	20.5	10.1	FS

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

7.1.2 Solar Thermal Hot Water Generation

Active solar thermal systems use solar collectors to gather the sun's energy to heat a fluid. An absorber in the collector (usually black colored piping) converts the sun's energy into heat. The heat is transferred to circulating water, antifreeze, or air for immediate use or is storage for later utilization. Applications for active solar thermal energy include supplementing domestic hot water, heating swimming pools, space heating or preheating air in residential and commercial buildings.

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

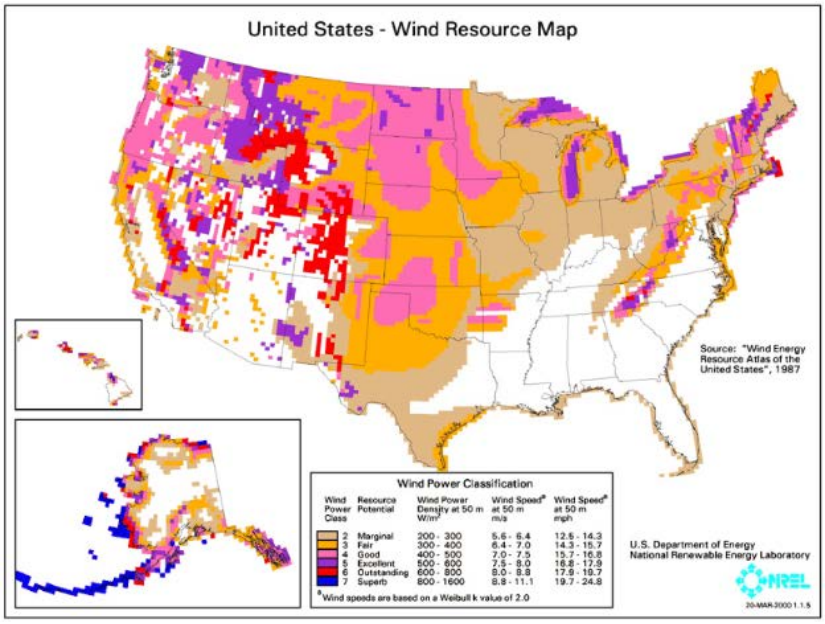
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping).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

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

7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind

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



This measure is not recommended.

7.3 Combined Heat and Power Plant

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

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter; however thermal

usage during the summer months does not exist. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. CHP is not recommended due to the building's limited summer thermal demand.

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

7.4 Demand Response Curtailment

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

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

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

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
148.8	90.4	116.2	N	Y

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

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of $30,498/yr with an overall payback of 3.4 years, if the recommended ECMs are implemented.

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings ($)	Payback (years)
156,166	6,887	30,498	3.4

The following projects should be considered for implementation:

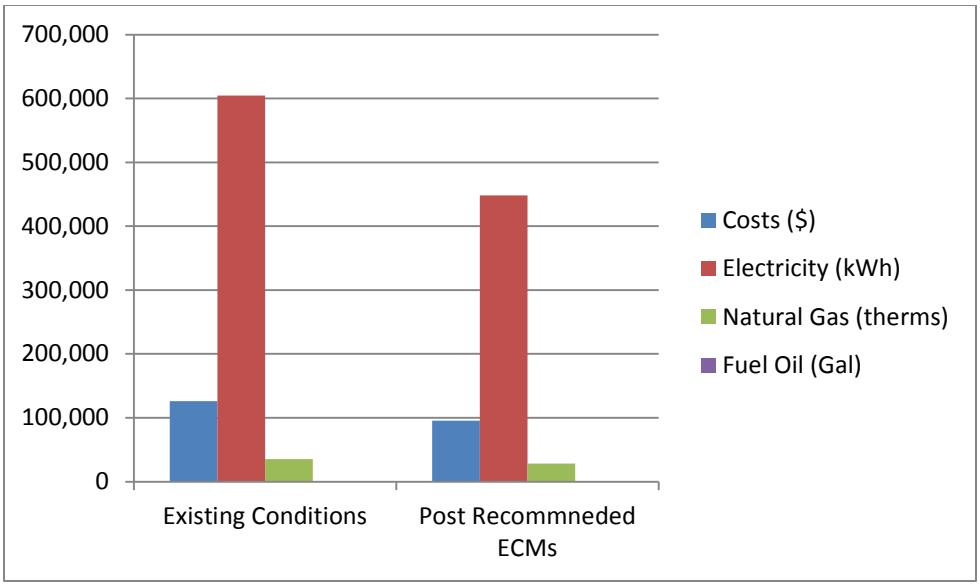
- Install Basic DDC Controls
- Install Window A/C Controller
- Install VAV boxes and VFD to classroom Rooftop unit
- Install Door Sweeps and Seals
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 110 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	125,837	95,339	24%
Electricity (kWh)	604,461	448,295	26%
Natural Gas (therms)	35,371	28,484	19%
Site EUI (kbtu/SF/Yr)	110.5	89.7	



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

Newark Public Schools LGEA
CHA Project# 27998

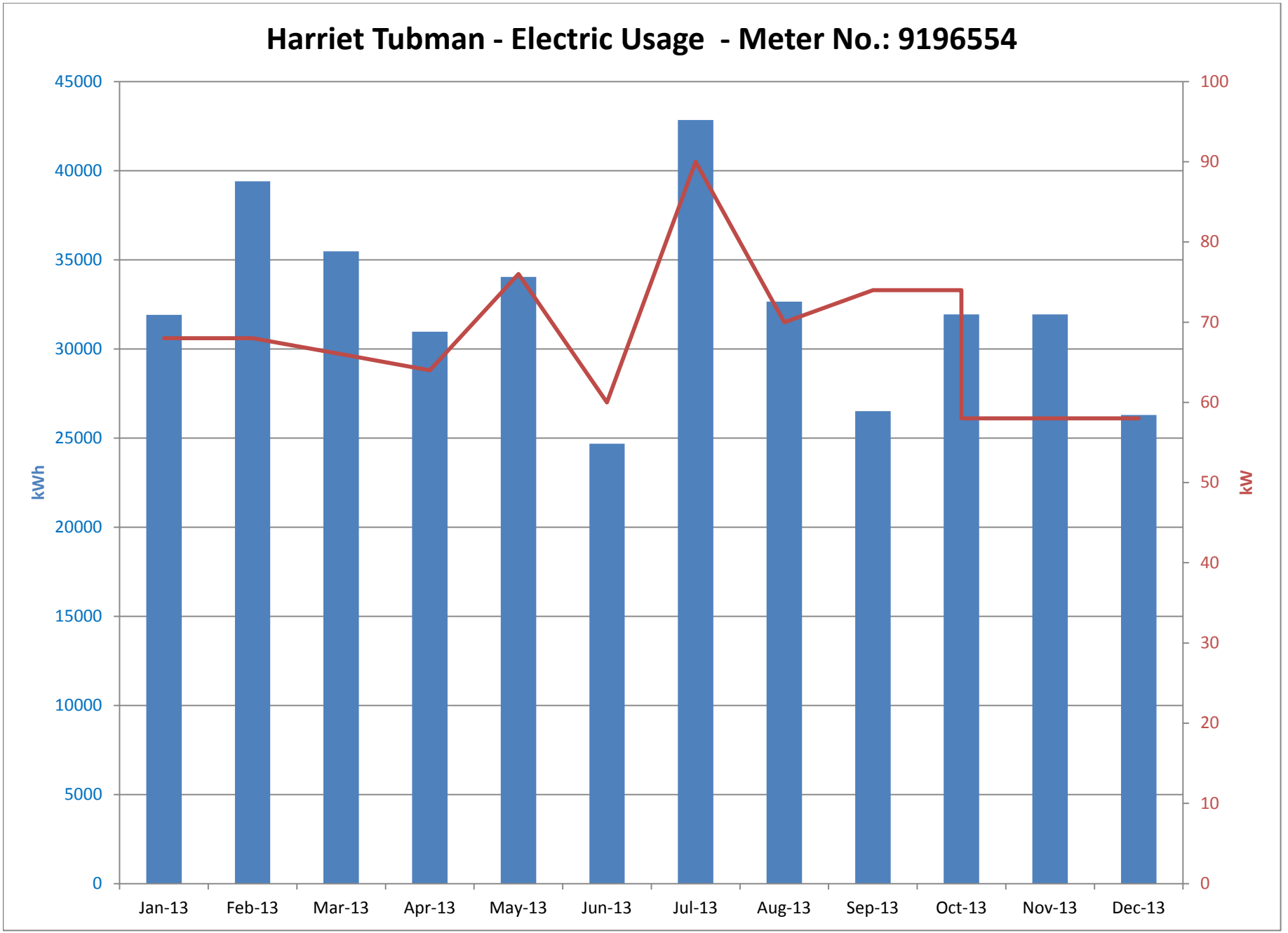
Harriet Tubman - Electric Usage (1)

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption ($)	Blended Rate ($/kWh)	Consumption Rate ($/kWh)	Demand Rate ($/kW)
1/5/2012	2/2/2012	27800	66	4,700.00	0	895.71	279.61	4,420.39	$ 0.17	$ 0.16	$ 4.24
2/3/2012	3/5/2012	39998	62	6,760.00	0	1,504.36	262.66	6497.34	$ 0.17	$ 0.16	$ 4.24
3/6/2012	4/3/2012	33253	80	5,620.00	0	1,193.83	338.92	5281.08	$ 0.17	$ 0.16	$ 4.24
4/4/2012	5/4/2012	33158	80	5,605.00	0	1,159.93	338.92	5266.08	$ 0.17	$ 0.16	$ 4.24
5/5/2012	6/4/2012	29704	68	5,020.00	0	1,876.97	288.08	4731.92	$ 0.17	$ 0.16	$ 4.24
6/5/2012	7/3/2012	25639	60	4,340.78	2,473.41	1,613.18	254.19	4086.59	$ 0.17	$ 0.16	$ 4.24
7/4/2012	8/31/2012	54256	58	8,938.21	5,218.24	3,228.53	491.44	8,446.77	$ 0.16	$ 0.16	$ 8.47
9/1/2012	12/3/2012	65338	70	9,610.99	6,481.26	2,350.21	779.52	8831.47	$ 0.15	$ 0.14	$ 11.14
12/4/2012	1/3/2013	27833	58	3,949.68	2,631.44	1,072.27	245.97	3703.71	$ 0.14	$ 0.13	$ 4.24
1/4/2013	2/1/2013	31909	68	4,500.46	2,933.96	1,275.42	291.08	4209.38	$ 0.14	$ 0.13	$ 4.28
2/2/2013	3/5/2013	39402	68	5,313.88	3,548.22	1,474.59	291.07	5022.81	$ 0.13	$ 0.13	$ 4.28
3/6/2013	4/4/2013	35480	66	4,879.92	3,268.98	1,328.43	282.51	4597.41	$ 0.14	$ 0.13	$ 4.28
4/5/2013	5/3/2013	30964	64	4,348.33	2,956.58	1,117.80	273.95	4074.38	$ 0.14	$ 0.13	$ 4.28
5/4/2013	6/5/2013	34043	76	5,694.24	3,201.26	2,167.66	325.32	5368.92	$ 0.17	$ 0.16	$ 4.28
6/6/2013	7/3/2013	24684	60	4,250.05	2,409.38	1,583.84	256.83	3993.22	$ 0.17	$ 0.16	$ 4.28
7/4/2013	8/2/2013	42848	90	6,554.79	3,659.59	2,509.95	385.25	6169.54	$ 0.15	$ 0.14	$ 4.28
8/3/2013	9/3/2013	32657	70	5,171.68	2,948.93	1,923.12	299.63	4872.05	$ 0.16	$ 0.15	$ 4.28
9/4/2013	10/2/2013	26508	74	3,634.84	2,393.67	924.41	316.76	3318.08	$ 0.14	$ 0.13	$ 4.28
10/3/2013	10/31/2013	24532	74	3,437.81	2,215.24	905.81	316.76	3121.05	$ 0.14	$ 0.13	$ 4.28
10/31/2013	12/2/2013	31933	58	4,398.61	2,883.55	1,266.79	248.27	4150.34	$ 0.14	$ 0.13	$ 4.28
11/1/2013	12/3/2013	31933	58	4,398.61	2,883.55	1,266.79	248.27	4150.34	$ 0.14	$ 0.13	$ 4.28
12/4/2013	1/3/2014	26288	58	3,684.70	2,373.81	1,062.62	248.27	3436.43	$ 0.14	$ 0.13	$ 4.28

Harriet Tubman		Start Date	End Date	Months
504 S. 10th St. , 07103		1/5/2012	1/3/2014	23
Account Number	2147483647			
Meter Number	9196554			

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

Total Usage	413,181	**kwh**
Total Charges	$60,268	
Blended Rate	$0.15	**$/kWh**
Consumption Rate	$0.14	**$/kWh**
Demand Rate	$4.28	**$/kW**
Max Demand	90.0	**kW**
Min Demand	58.0	**kW**
Avg Demand	68.0	**kW**


Harriet Tubman - Electric Usage - Meter No.: 9196554
kWh
kW
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
100
90
80
70
60
50
40
30
20
10
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13

Newark Public Schools LGEA
CHA Project# 27998

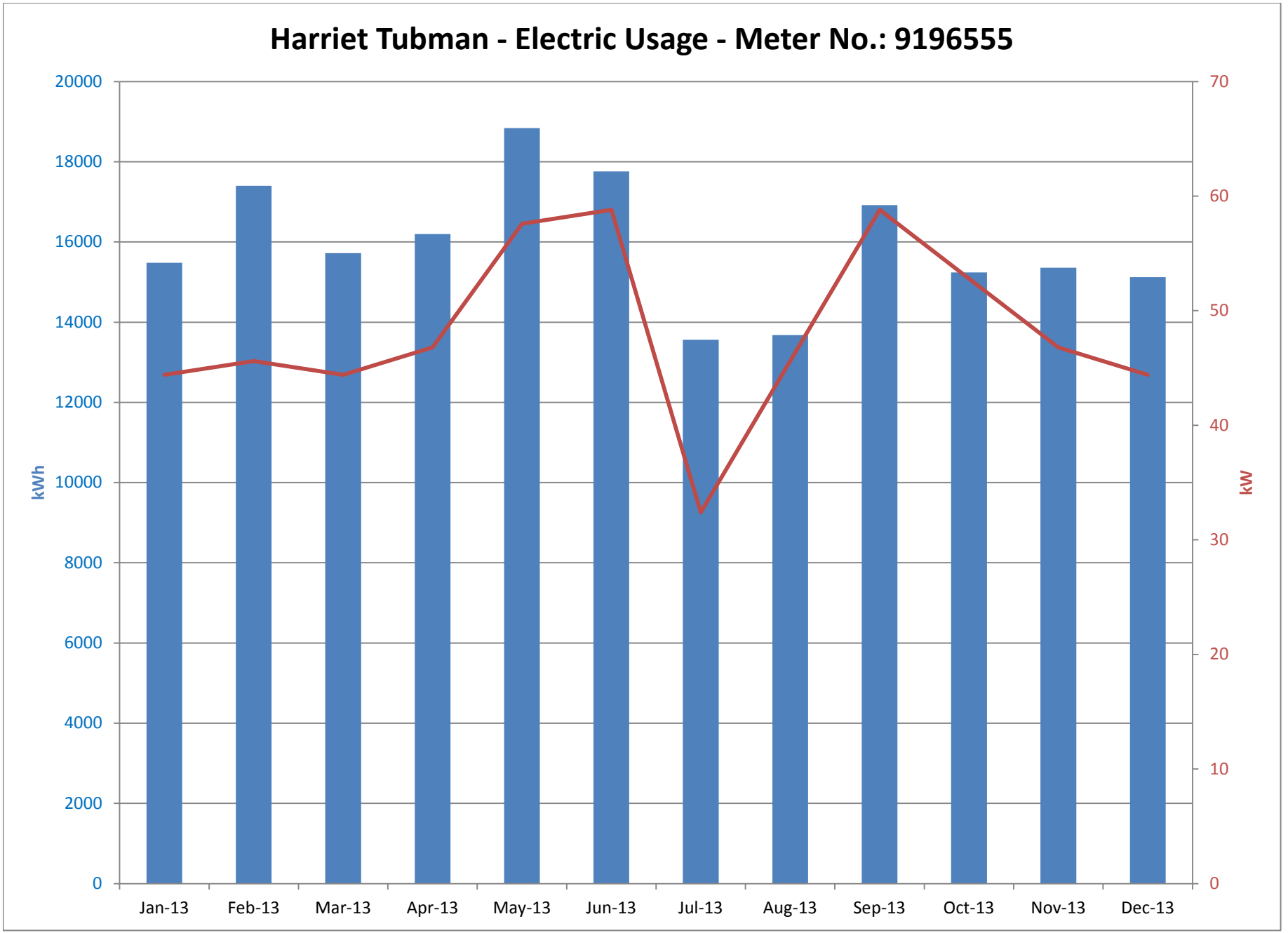
Harriet Tubman - Electric Usage (2)

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption ($)	Blended Rate ($/kWh)	Consumption Rate ($/kWh)	Demand Rate ($/kW)
1/5/2012	2/2/2012	14520	43.2	2,485.00	0	469.92	183.01	2,301.99	$ 0.17	$ 0.16	$ 4.24
2/3/2012	3/5/2012	15480	43.2	2,650.00	0	500.7	183.02	2466.98	$ 0.17	$ 0.16	$ 4.24
3/6/2012	4/3/2012	13920	42	2,385.00	0	450.69	177.93	2207.07	$ 0.17	$ 0.16	$ 4.24
4/4/2012	5/4/2012	14400	42	2,470.00	0	466.08	177.93	2292.07	$ 0.17	$ 0.16	$ 4.24
5/5/2012	6/4/2012	15120	42	2,585.00	0	916.95	177.93	2407.07	$ 0.17	$ 0.16	$ 4.24
6/5/2012	7/3/2012	14040	44.4	2,450.52	1,348.07	914.35	188.1	2262.42	$ 0.17	$ 0.16	$ 4.24
7/4/2012	8/2/2012	10680	22.8	1,840.95	1,132.90	611.46	96.59	1,744.36	$ 0.17	$ 0.16	$ 4.24
8/3/2012	8/30/2012	11280	34.8	2,026.68	1,148.75	730.5	147.43	1879.25	$ 0.18	$ 0.17	$ 4.24
8/31/2012	12/3/2012	47400	57.6	6,632.99	4,361.91	1,600.02	671.06	5961.93	$ 0.14	$ 0.13	$ 11.65
12/4/2012	1/3/2013	14160	44.4	1,993.20	1,328.38	476.53	188.29	1804.91	$ 0.14	$ 0.13	$ 4.24
1/4/2013	2/1/2013	15480	44.4	2,142.71	1,423.36	529.3	190.05	1952.66	$ 0.14	$ 0.13	$ 4.28
2/2/2013	3/5/2013	17400	45.6	2,356.29	1,599.66	561.44	195.19	2161.1	$ 0.14	$ 0.12	$ 4.28
3/6/2013	4/4/2013	15720	44.4	2,184.03	1,486.34	507.64	190.05	1993.98	$ 0.14	$ 0.13	$ 4.28
4/5/2013	5/3/2013	16200	46.8	2,272.28	1,548.94	523.01	200.33	2071.95	$ 0.14	$ 0.13	$ 4.28
5/4/2013	6/5/2013	18840	57.6	3,207.94	1,767.63	1,193.75	246.56	2961.38	$ 0.17	$ 0.16	$ 4.28
6/6/2013	7/3/2013	17760	58.8	3,113.37	1,670.09	1,191.59	251.69	2861.68	$ 0.18	$ 0.16	$ 4.28
7/4/2013	8/2/2013	13560	32.4	2,296.23	1,345.99	811.55	138.69	2157.54	$ 0.17	$ 0.16	$ 4.28
8/3/2013	9/3/2013	13680	45.6	2,351.77	1,235.30	921.28	195.19	2156.58	$ 0.17	$ 0.16	$ 4.28
9/4/2013	10/2/2013	16920	58.8	2,359.80	1,527.88	580.22	251.7	2108.1	$ 0.14	$ 0.12	$ 4.28
10/3/2013	10/31/2013	15240	52.8	2,126.69	1,376.17	524.51	226.01	1900.68	$ 0.14	$ 0.12	$ 4.28
11/1/2013	12/3/2013	15360	46.8	2,115.94	1,387.01	528.6	200.33	1915.61	$ 0.14	$ 0.12	$ 4.28
12/4/2013	1/3/2014	15120	44.4	2,073.06	1,365.34	517.67	190.05	1883.01	$ 0.14	$ 0.12	$ 4.28

Harriet Tubman		Start Date	End Date	Months
504 S. 10th St. , 07103		1/5/2012	1/3/2014	23
Account Number	2147483647			
Meter Number	9196555			

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

Total Usage	191,280	**kwh**
Total Charges	$30,593	
Blended Rate	$0.16	**$/kWh**
Consumption Rate	$0.14	**$/kWh**
Demand Rate	$4.28	**$/kW**
Max Demand	58.8	**kW**
Min Demand	32.4	**kW**
Avg Demand	48.2	**kW**


Harriet Tubman - Electric Usage - Meter No.: 9196555
kWh
kW
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
70
60
50
40
30
20
10
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13

Newark Public Schools LGEA
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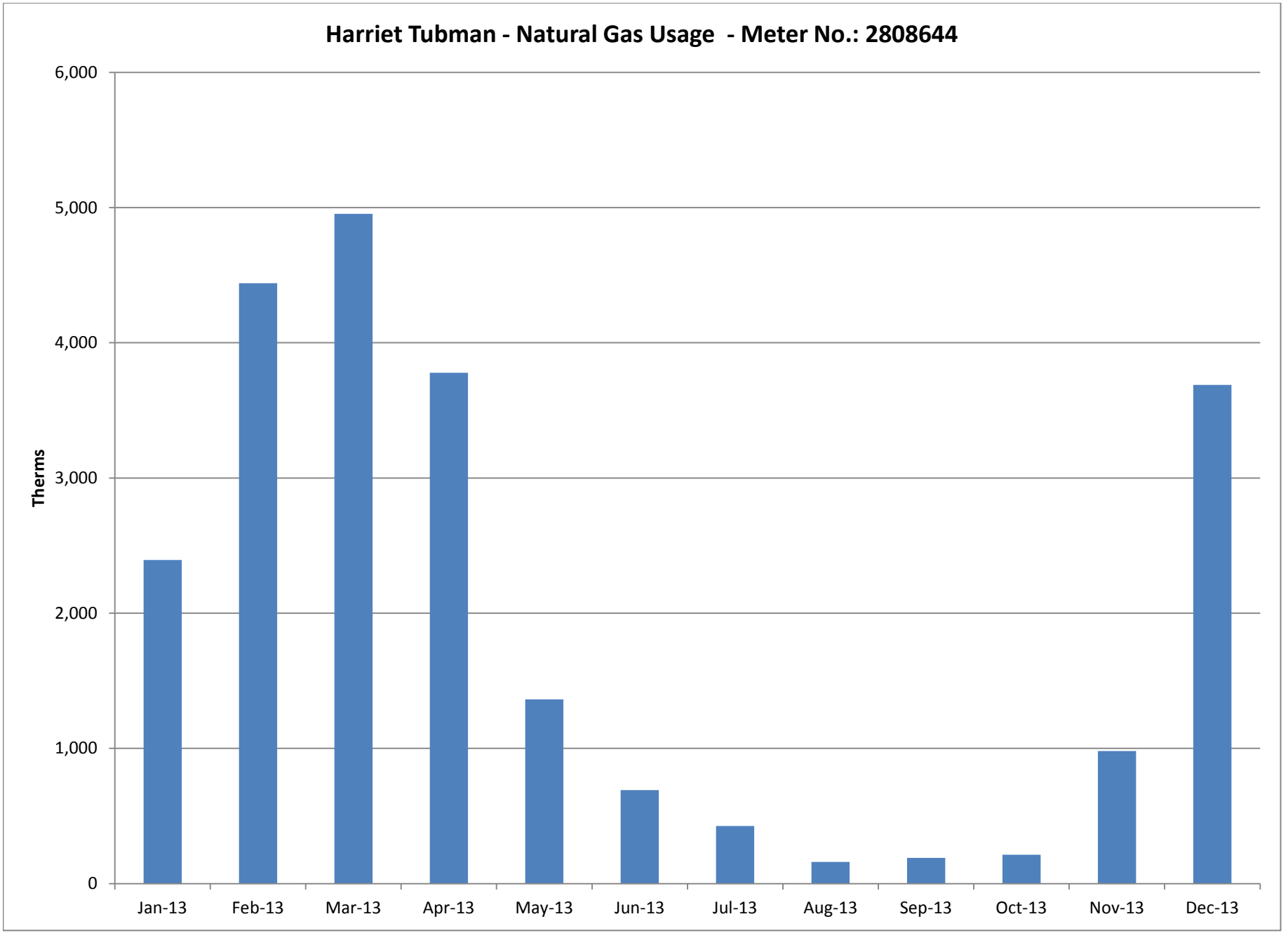
Harriet Tubman- Natural Gas Usage (1)

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	$/therm
37	Harriet Tubman	6677899004	2808644	2/3/2012	3/5/2012	3,208.13	2,793.62	0.87
37	Harriet Tubman	6677899004	2808644	3/6/2012	4/3/2012	1,563.06	1,100.66	0.70
37	Harriet Tubman	6677899004	2808644	4/4/2012	5/4/2012	1,149.73	842.84	0.73
37	Harriet Tubman	6677899004	2808644	5/5/2012	6/4/2012	318.15	330.02	1.04
37	Harriet Tubman	6677899004	2808644	6/5/2012	7/3/2012	204.58	265.72	1.30
37	Harriet Tubman	6677899004	2808644	7/4/2012	8/31/2012	327.07	483.55	1.48
37	Harriet Tubman	6677899004	2808644	9/1/2012	12/3/2012	3,303.87	3,849.57	1.17
37	Harriet Tubman	6677899004	2808644	12/4/2012	1/3/2013	2,394.11	2,545.03	1.06
37	Harriet Tubman	6677899004	2808644	1/4/2013	2/1/2013	4,441.07	4,107.93	0.92
37	Harriet Tubman	6677899004	2808644	2/2/2013	3/5/2013	4,954.26	4,746.39	0.96
37	Harriet Tubman	6677899004	2808644	3/6/2013	4/4/2013	3,779.03	2,826.42	0.75
37	Harriet Tubman	6677899004	2808644	4/5/2013	5/3/2013	1,362.88	1,189.64	0.87
37	Harriet Tubman	6677899004	2808644	5/4/2013	6/5/2013	691.2	689.95	1.00
37	Harriet Tubman	6677899004	2808644	6/6/2013	7/3/2013	425.68	470.33	1.10
37	Harriet Tubman	6677899004	2808644	7/4/2013	8/2/2013	160.16	250.7	1.57
37	Harriet Tubman	6677899004	2808644	8/3/2013	9/3/2013	190.57	271.47	1.42
37	Harriet Tubman	6677899004	2808644	9/4/2013	10/1/2013	213.3	293.49	1.38
37	Harriet Tubman	6677899004	2808644	10/2/2013	10/31/2013	979.85	1,480.60	1.51
37	Harriet Tubman	6677899004	2808644	11/1/2013	12/3/2013	3,688.27	3,583.39	0.97
37	Harriet Tubman	6677899004	2808644	12/4/2013	1/3/2014	2,398.69	2,691.64	1.12

Harriet Tubman		Start Date	End Date	# Months
Account Number	6677899004	2/3/2012	1/3/2014	23
Meter Number	2808644			

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

Annual Usage	23,285	**Therms**
Annual Cost	$22,602	
Rate	$0.97	**$/Therm**


Harriet Tubman - Natural Gas Usage - Meter No.: 2808644
Therms
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13

Newark Public Schools LGEA
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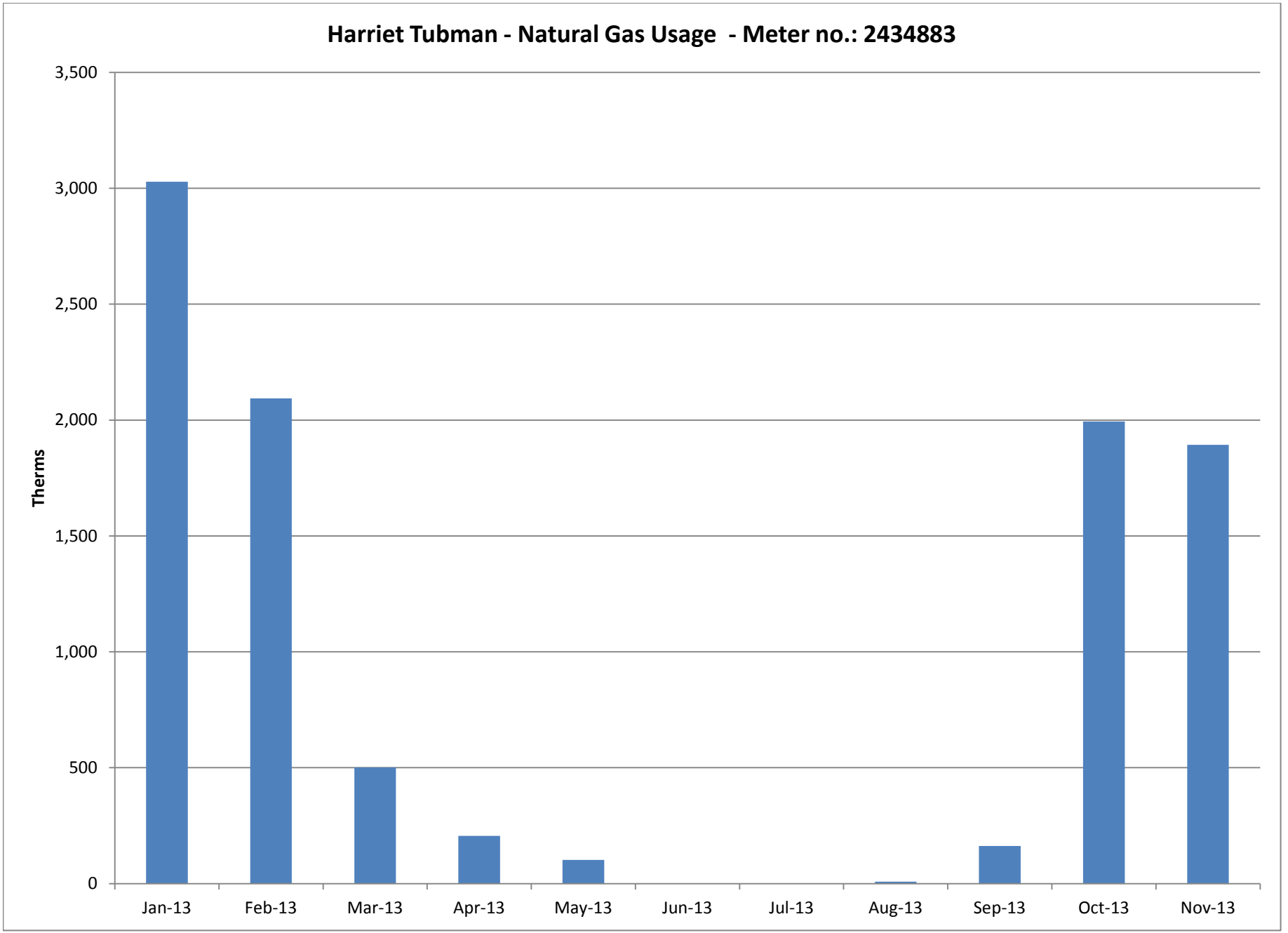
Harriet Tubman- Natural Gas Usage (2)

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	$/therm
37	Harriet Tubman	6718486108	2434883	1/5/2012	2/2/2012	1,750.22	1,757.29	1.00
37	Harriet Tubman	6718486108	2434883	2/3/2012	3/5/2012	2,892.23	2,720.88	0.94
37	Harriet Tubman	6718486108	2434883	3/6/2012	4/3/2012	950.51	792.41	0.83
37	Harriet Tubman	6718486108	2434883	4/4/2012	5/4/2012	537.86	439.75	0.82
37	Harriet Tubman	6718486108	2434883	5/5/2012	6/4/2012	17.77	24.79	1.40
37	Harriet Tubman	6718486108	2434883	6/5/2012	7/3/2012	0	10.76	#DIV/0!
37	Harriet Tubman	6718486108	2434883	7/4/2012	8/2/2012	1.05	11.69	11.13
37	Harriet Tubman	6718486108	2434883	8/3/2012	8/31/2012	0	10.76	#DIV/0!
37	Harriet Tubman	6718486108	2434883	9/1/2012	12/3/2012	944.92	1,027.31	1.09
37	Harriet Tubman	6718486108	2434883	12/4/2012	1/3/2013	1,510.84	1,628.32	1.08
37	Harriet Tubman	6718486108	2434883	1/4/2013	2/1/2013	2,097.41	2,177.32	1.04
37	Harriet Tubman	6718486108	2434883	2/2/2013	3/5/2013	3,028.28	3,163.93	1.04
37	Harriet Tubman	6718486108	2434883	3/6/2013	4/4/2013	2,093.38	1,958.29	0.94
37	Harriet Tubman	6718486108	2434883	4/5/2013	5/3/2013	501.07	490	0.98
37	Harriet Tubman	6718486108	2434883	5/4/2013	6/5/2013	205.43	266.22	1.30
37	Harriet Tubman	6718486108	2434883	6/6/2013	7/3/2013	102.72	133.11	1.30
37	Harriet Tubman	6718486108	2434883	7/4/2013	8/2/2013	0	0	#DIV/0!
37	Harriet Tubman	6718486108	2434883	8/3/2013	9/3/2013	0	0	#DIV/0!
37	Harriet Tubman	6718486108	2434883	9/4/2013	10/1/2013	8.53	110.32	12.93
37	Harriet Tubman	6718486108	2434883	10/2/2013	10/31/2013	162.24	251.84	1.55
37	Harriet Tubman	6718486108	2434883	11/1/2013	12/3/2013	1,994.31	1,912.22	0.96
37	Harriet Tubman	6718486108	2434883	12/4/2013	1/3/2014	1,892.69	1,910.34	1.01

Harriet Tubman		Start Date	End Date	# Months
Account Number	6718486108	1/5/2012	1/3/2014	23
Meter Number	2434883			

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

Annual Usage	12,086	**Therms**
Annual Cost	$12,374	
Rate	$1.02	**$/Therm**


Harriet Tubman - Natural Gas Usage - Meter no.: 2434883
Therms
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13

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

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

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

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

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

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

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

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

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

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

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

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

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

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

New Jersey Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	866-568-0290 www.NJGandE.com	**R/C** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power & Gas, LLC d/b/a North American Power 197 Route 18 South Ste. 3000 East Brunswick, NJ 08816	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
Palmco Energy NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	800-363-7499 www.pepco-services.com	**C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	855-32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	800-266-6020 www.southjerseyenergy.com	**C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	800-695-0666 www.sjnaturalgas.com	**R/C** **ACTIVE**
Spark Energy Gas, L.P. 2105 CityWest Blvd, Ste 100 Houston, Texas 77042	800-411-7514 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	855-466-2842 www.spragueenergy.com	**C/I** **ACTIVE**

Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-640-6457 www.stuyfuel.com	**C** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(973) 494-8097 www.streamenergy.net	**R/C** **ACTIVE**
Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**
Woodruff Energy US LLC 73 Water Street, P.O. Box 777 Bridgeton, NJ 08302	856-455-1111 800-557-1121 www.woodruffenergy.com	**C/I** **ACTIVE**
Xoom Energy New Jersey, LLC 744 Broad Street Newark, NJ 07102	888-997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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APPENDIX B

Equipment Inventory

Newark Public Schools
CHA Project# 27998
Harriet Tubman Elementary School

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
B-1	1	Weil Mclain	HO-44-13	-	Heating / Natural Gas	15 Psi (est. 80%)	MER	School	2000	11	Unknown Capacity
DHW-1	1	O-State	SBF70360NEASME	J99280609	Hot Water / Natural Gas	360,000 BTU input, 70 Gal (80%)	MER	School	2003	1	
RTU-1	1	McQuay	RPS 015 CSA	FB0U06080054200	Hot Water / Natural Gas	312,000 BTU in, 5,500 CFM, 15-ton	Roof	Classroom Wing of New Addition	2006	17	
DHW-2	1	A.O. Smith	HW-420-200	1201M001745	Heating / Natural Gas	420,000 MBH input, 344,400 BTU	Closet	Kitchen	2012	10	EER Unknown
RTU-2	1	McQuay	RPS 020 CSA	FB0U06080059000	Rooftop Unit / Natural Gas	400,000 BTU in, 5,000 CFM, 20-ton	Roof	Kitchen	2006	17	EER Unknown
RTU-3	1	McQuay	RPS 020 CSA	FB0U06080059300	Rooftop Unit / Natural Gas	400,000 BTU in, 5,000 CFM, 20-ton	Roof	Gymnasium	2006	17	EER Unknown
Window AC	8	Various	Various	Various	Window Air Conditioning Unit / Electric	18,000 - 24,000 btu/h (10.7 EER)	Various Classrooms and Offices	Various Classrooms and Offices	2005	7	

Energy Audit of Harriet Tubman Elementary School
CHA Project No. 27998
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$4.28 **$/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
40LED	MER1	Boiler Room	3	T 32 R F 2 (ELE)	F42LL	60	0.18	SW	1820	328	NONE	
220	MER1	Boiler Room	5	S 17 C F 1(ELE)	F21ILL	20	0.10	SW	1820	182	NONE	
220	MER2	Boiler Room	3	S 17 C F 1(ELE)	F21ILL	20	0.06	SW	1820	109	NONE	
20LED	MER2	Boiler Room	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	1820	175	NONE	
39	MER2	Boiler Room	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	1820	60	NONE	
34LED	Stair	Stairway	1	1T 32 C F 4 (ELE)	F44ILL	112	0.11	SW	6240	699	NONE	
40LED	Gym Storage	Storage Areas	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1000	120	C-OCC	
20LED	Gym Storage	Storage Areas	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	C-OCC	
146LED	Gym / Cafetorium	Gymnasium	20	High Bay MH 400	MH400/1	458	9.16	SW	2912	26,674	NONE	
20LED	Office	Offices	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	2400	154	C-OCC	
40LED	Room 1	Classrooms	24	T 32 R F 2 (ELE)	F42LL	60	1.44	SW	2400	3,456	C-OCC	
220	TR	Restroom	1	S 17 C F 1(ELE)	F21ILL	20	0.02	SW	2400	48	C-OCC	
40LED	Corridor	Hallways	17	T 32 R F 2 (ELE)	F42LL	60	1.02	SW	6240	6,365	NONE	
20LED	Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
40LED	Boys TR	Restroom	3	T 32 R F 2 (ELE)	F42LL	60	0.18	SW	2400	432	C-OCC	
40LED	Girls TR	Restroom	3	T 32 R F 2 (ELE)	F42LL	60	0.18	SW	2400	432	C-OCC	
40LED	Mens TR	Restroom	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
40LED	Room 2	Classrooms	23	T 32 R F 2 (ELE)	F42LL	60	1.38	SW	2400	3,312	C-OCC	
39	TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
40LED	Room 3	Classrooms	23	T 32 R F 2 (ELE)	F42LL	60	1.38	SW	2400	3,312	C-OCC	
39	TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
20LED	Service Closet	Janitor	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	3000	96	C-OCC	
40LED	Girls TR	Restroom	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
40LED	Custodial Office	Offices	8	T 32 R F 2 (ELE)	F42LL	60	0.48	SW	2400	1,152	C-OCC	
40LED	Corridor	Hallways	6	T 32 R F 2 (ELE)	F42LL	60	0.36	SW	6240	2,246	NONE	
40LED	Vest	Hallways	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	6240	749	NONE	
40LED	Room 24	Classrooms	24	T 32 R F 2 (ELE)	F42LL	60	1.44	SW	2400	3,456	C-OCC	
39	TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
40LED	Lobby	Hallways	7	T 32 R F 2 (ELE)	F42LL	60	0.42	SW	6240	2,621	NONE	
40LED	Corridor	Hallways	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	6240	1,498	NONE	
40LED	Corridor	Hallways	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	6240	1,498	NONE	
40LED	Media Ceneter	Classrooms	20	T 32 R F 2 (ELE)	F42LL	60	1.20	SW	2400	2,880	C-OCC	
20LED	Girls TR	Restroom	12	S 32 C F 1 (ELE)	F41LL	32	0.38	SW	2400	922	C-OCC	
40LED	Nurse	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	Waiting	Offices	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
40LED	Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	Corridor	Hallways	13	T 32 R F 2 (ELE)	F42LL	60	0.78	SW	6240	4,867	NONE	
20LED	Boys TR	Restroom	10	S 32 C F 1 (ELE)	F41LL	32	0.32	SW	2400	768	C-OCC	
39	Janitor Closet	Janitor	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	3000	99	C-OCC	
40LED	Lobby	Hallways	7	T 32 R F 2 (ELE)	F42LL	60	0.42	SW	6240	2,621	NONE	
40LED	Main Office	Offices	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	C-OCC	
40LED	Office	Offices	6	T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2400	864	C-OCC	
34LED	Office	Offices	8	1T 32 C F 4 (ELE)	F44ILL	112	0.90	SW	2400	2,150	C-OCC	
65	Storage	Storage Areas	1	I 100	I100/1	100	0.10	SW	1000	100	C-OCC	
20LED	Vault	Storage Areas	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	1000	192	C-OCC	
40LED	Kitchen	Kitchen	31	T 32 R F 2 (ELE)	F42LL	60	1.86	SW	3000	5,580	C-OCC	
39	Men's TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
39	Women's TR	Restroom	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	2400	79	C-OCC	
20LED	Meter Room	Mechanical Room	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	1000	64	NONE	
40LED	Backroom	Mechanical Room	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1000	120	NONE	
20LED	Vest	Hallways	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	6240	399	NONE	
40LED	Storage	Storage Areas	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1000	120	C-OCC	
20LED	Gym Storage	Storage Areas	4	S 32 C F 1 (ELE)	F41LL	32	0.13	SW	1000	128	C-OCC	
20LED	Girl's Locker	Locker	2	S 32 C F 1 (ELE)	F41LL	32	0.06	SW	2400	154	C-OCC	
40LED	201 Classroom	Classrooms	21	T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
40LED	202 Classroom	Classrooms	20	T 32 R F 2 (ELE)	F42LL	60	1.20	SW	2400	2,880	C-OCC	
40LED	203 Classroom	Classrooms	21	T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
40LED	204 Classroom	Classrooms	21	T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
40LED	Corridor	Hallways	8	T 32 R F 2 (ELE)	F42LL	60	0.48	SW	6240	2,995	NONE	
40LED	215 Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
40LED	218 Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
40LED	Vest	Hallways	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	6240	1,498	NONE	
40LED	216 Teacher Room	Break/Lunch Rooms	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	217	Classrooms	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	2400	144	C-OCC	
40LED	UN- Parent Liaison	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	213 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	210 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	205 Classroom	Classrooms	18	T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
40LED	207 Classroom	Classrooms	18	T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
34LED	206 Library	Classrooms	12	1T 32 C F 4 (ELE)	F44ILL	112	1.34	SW	2400	3,226	C-OCC	
34LED	208 Classroom	Classrooms	12	1T 32 C F 4 (ELE)	F44ILL	112	1.34	SW	2400	3,226	C-OCC	

Energy Audit of Harriet Tubman Elementary School
CHA Project No. 27998
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$4.28 **$/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
40LED	Corridor	Hallways	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	6240	3,370	NONE	
40LED	301 Classroom	Classrooms	16	T 32 R F 2 (ELE)	F42LL	60	0.96	SW	2400	2,304	C-OCC	
40LED	303 Computers	Classrooms	21	T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
40LED	302 Classroom	Classrooms	16	T 32 R F 2 (ELE)	F42LL	60	0.96	SW	2400	2,304	C-OCC	
40LED	304 Classroom	Classrooms	21	T 32 R F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
40LED	Corridor	Hallways	8	T 32 R F 2 (ELE)	F42LL	60	0.48	SW	6240	2,995	NONE	
40LED	Corridor	Hallways	8	T 32 R F 2 (ELE)	F42LL	60	0.48	SW	6240	2,995	NONE	
40LED	315 Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
40LED	319 Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
40LED	Vest	Hallways	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	6240	1,498	NONE	
40LED	316 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	318 Storage	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1000	60	C-OCC	
40LED	317 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	313 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	310 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	305 Classroom	Classrooms	18	T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
40LED	307 Classroom	Classrooms	18	T 32 R F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
34LED	306 Library	Classrooms	12	1T 32 C F 4 (ELE)	F44ILL	112	1.34	SW	2400	3,226	C-OCC	
34LED	308 Classroom	Classrooms	12	1T 32 C F 4 (ELE)	F44ILL	112	1.34	SW	2400	3,226	C-OCC	
35LED	401 Classroom	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	C-OCC	
35LED	403 Classroom	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	C-OCC	
40LED	Corridor	Hallways	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	6240	3,370	NONE	
35LED	402 Classroom	Classrooms	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.62	SW	2400	3,888	C-OCC	
35LED	404 Classroom	Classrooms	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.62	SW	2400	3,888	C-OCC	
20LED	410 Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
40LED	409 Office	Offices	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
40LED	406 Office	Offices	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
20LED	405 Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
20LED	412 Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
20LED	413 Storage	Storage Areas	1	S 32 C F 1 (ELE)	F41LL	32	0.03	SW	1000	32	C-OCC	
40LED	414 Office	Offices	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
40LED	415 Teachers Room	Break/Lunch Rooms	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2400	576	C-OCC	
39	416 Storage	Storage Areas	1	2' 17 W F 2 (ELE)	F22ILL	33	0.03	SW	1000	33	C-OCC	
	Total		**792**				**58.28**			**169,503**		

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
CHA Project Number: 27998

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
					Electric	Natural Gas	Fuel Oil
$ 0.153	$/kWh blended		0.000420205	50,653			
$ 0.136	$/kWh supply	604,461	0.000420205		$ 90,861	$ 34,976	
$ 4.28	$/kW	148.8	0				
$ 0.99	$/Therm	35,371	0.00533471				
$ 7.55	$/kgals		0				
	$/Gal						

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Recommend? Y or N		Item	Savings kW	kWh	therms	No. 2 Oil gal	Water kgal	$	Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings kW	kWh	therms	kgal/yr	$	ROI	NPV	IRR
Y	ECM-1	Replace Door Sweeps & Seals	0.0	0	656	0	0	649	$ 2,305	3.6	15	3.5	$ -	N	3.6	0.0	0	9,843	0	$ 9,733	3.2	$5,441	27.4%
N	ECM-2	Convert Building from Steam to HW and Install High Efficiency	0.0	0	1,979	0	0	1,957	$ 1,320,890	675.0	25	10.6	$ 2,625	N	673.7	0.0	0	49,476	0	$ 48,922	(1.0)	($1,284,189)	-17.4%
Y	ECM-3	Install Window A/C Controller	0.0	8,585	0	0	0	1,313	$ 1,500	1.1	15	3.6	$ -	N	1.1	0.0	128,778	0	0	$ 19,690	12.1	$14,171	87.5%
Y	ECM-4	Install VAV boxes and VFD to classroom Rooftop unit	0.0	46,496	1,248	0	0	8,344	$ 44,241	5.3	15.0	26.2	$ 4,495	N	4.8	0.0	697,439	18,727	0	$ 125,157	1.8	$59,862	19.6%
Y	ECM-5A	Install Basic Controls	0.0	0	4,982	0	0	4,926	$ 21,309	4.3	15.0	26.6	$ -	N	4.3	0.0	0	74,732	0	$ 73,897	2.5	$37,502	21.9%
N	ECM-5B	Install Full DDC Control	0.0	0	10,833	0	0	10,712	$ 315,096	29.4	15.0	57.8	$ -	N	29.4	0.0	0	162,502	0	$ 160,685	(0.5)	($187,212)	-7.4%
N	ECM-6	Install Walk-in Cooler Controls	0.0	2,574	0	0	0	394	$ 20,625	52.4	15.0	1.1	$ -	N	52.4	0.0	38,608	0	0	$ 5,903	(0.7)	($15,927)	-12.7%
N	ECM-7	Install Low Flow Plumbing Fixtures	0.0	0	0	0	208	1,569	$ 276,407	176.2	15.0	0.0	$ -	N	176.2	0.0	0	0	3,116	$ 23,529	(0.9)	($257,682)	-21.7%
N	ECM-L1	Lighting Replacements / Upgrades	28.9	82,357	0	0	0	12,713	$ 12,015	0.9	15.0	34.6	$ 2,000	N	0.8	433.9	1,235,349	0	0	$ 211,174	16.6	$141,754	126.9%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	33,863	0	0	0	4,616	$ 21,330	4.6	15.0	14.2	$ 2,765	N	4.0	0.0	507,951	0	0	$ 77,666	2.6	$36,546	23.9%
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	28.9	101,085	0	0	0	15,266	$ 33,345	2.2	15.0	42.5	$ 4,765	N	1.9	433.9	1,516,269	0	0	$ 254,127	6.6	$153,668	53.3%
		Total (Does Not Include 5B, ECM-L1 & ECM-L2)	**28.9**	**158,740**	**8,866**	**0**	**208**	**$ 34,417**	**$ 1,720,621**	**50.0**	**16.3**	**114**	**$ 11,885**		**49.6**	**434**	**2,381,094**	**152,777**	**3,116**	**$ 560,958**	**(0.7)**	**($1,276,419)**	**-11.0%**
		Recommended Measures (highlighted green above)	**28.9**	**156,166**	**6,887**	**0**	**0**	**$ 30,498**	**$ 102,700**	**3.4**	**15.0**	**102**	**$ 9,260**	**0**	**3.1**	**434**	**2,342,486**	**103,302**	-	**$ 482,604**	**3.7**	**$270,645**	**32.1%**
		% of Existing	**19%**	**26%**	**25%**	**#DIV/0!**	**#DIV/0!**																

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

Multipliers	
Material:	1.027
Labor:	1.248
Equipment:	1.124

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

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

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

Newark Board of Education - NJBPU
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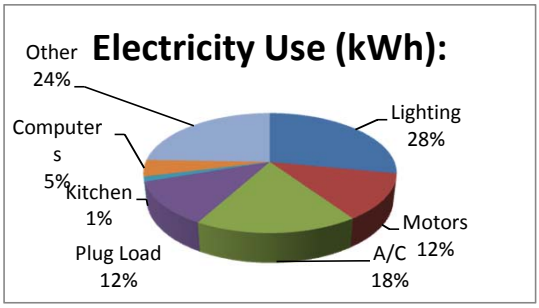
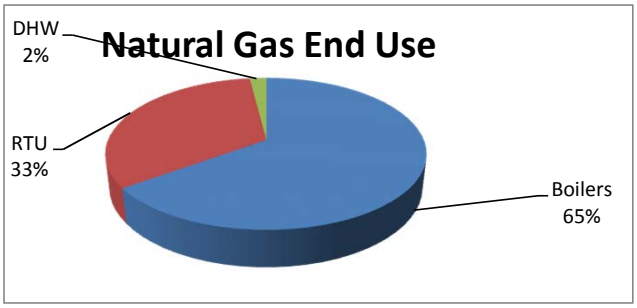
Utility End Use Analysis			
Electricity Use (kWh):		**Notes/Comments:**	
604,461	Total	Based on utility analysis	
169,503	Lighting	From Lighting Calculations	0.280420639
75,000	Motors	Estimated	0.124077484
106,396	A/C	See Window AC Calculation	0.176017522
70,914	Plug Load	Estimated	0.117318073
8,000	Kitchen	Estimated	0.013234932
27,000	Computers	Estimated	0.044667894
147,648	Other	Remaining	0.244263455
Natural Gas Use (Therms):		**Notes/Comments:**	
35,371	Total	Based on utility analysis	
22,991	Boilers	Therms/SF x Square Feet Served	0.65
11,672	RTU	Based on utility analysis	0.33
707	DHW	Based on utility analysis	0.02





Newark Board of Education - NJBPU
CHA Project Number: 27998
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ECM-1: Replace Door Sweeps & Seals

Description: This ECM evaluates the thermal and electrical savings associate with adding door seals and sweeps to prevent infiltration of cold (hot) outdoor air.

Heating System Efficiency	80%		Ex Occupied Clng Temp.	85	*F	Ex Occupied Htg Temp.	80	*F
Cooling System Efficiency	0.00	kW/ton	Ex Unoccupied Clng Temp.	85	*F	Ex Unoccupied Htg Temp.	80	*F
Linear Feet of Door Edge	200	LF	Cooling Occ Enthalpy Setpoint	27.5	Btu/lb	Electricity	$ 0.15	$/kWh
Existing Infiltration Factor*	1.5	cfm/LF	Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb	Natural Gas	$ 0.99	$/therm
Proposed Infiltration Factor*	0.45	cfm/LF						

*Infiltration Factor per Carrier Handbook of Air Conditioning System Design based on average door seal gap calculated below.

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	Unoccupied	Occupied	Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L
102.5	0.0	0	0	0	37,125	37,125	11,138	11,138	0	0	0	0
97.5	35.4	6	3	4	-10,675	-10,675	-3,202	-3,202	0	0	0	0
92.5	37.4	31	13	18	-13,368	-13,368	-4,010	-4,010	0	0	0	0
87.5	35.0	131	55	76	-10,104	-10,104	-3,031	-3,031	0	0	0	0
82.5	33.0	500	208	292	0	0	0	0	0	0	0	0
77.5	31.5	620	258	362	810	810	243	243	0	0	6	2
72.5	29.9	664	277	387	2,430	2,430	729	729	0	0	20	6
67.5	27.2	854	356	498	4,050	4,050	1,215	1,215	0	0	43	13
62.5	24.0	927	386	541	5,670	5,670	1,701	1,701	0	0	66	20
57.5	20.3	600	250	350	7,290	7,290	2,187	2,187	0	0	55	16
52.5	18.2	730	304	426	8,910	8,910	2,673	2,673	0	0	81	24
47.5	16.0	491	205	286	10,530	10,530	3,159	3,159	0	0	65	19
42.5	14.5	656	273	383	12,150	12,150	3,645	3,645	0	0	100	30
37.5	12.5	1,023	426	597	13,770	13,770	4,131	4,131	0	0	176	53
32.5	10.5	734	306	428	15,390	15,390	4,617	4,617	0	0	141	42
27.5	8.7	334	139	195	17,010	17,010	5,103	5,103	0	0	71	21
22.5	7.0	252	105	147	18,630	18,630	5,589	5,589	0	0	59	18
17.5	5.4	125	52	73	20,250	20,250	6,075	6,075	0	0	32	9
12.5	3.7	47	20	27	21,870	21,870	6,561	6,561	0	0	13	4
7.5	2.1	34	14	20	23,490	23,490	7,047	7,047	0	0	10	3
2.5	1.3	1	0	1	25,110	25,110	7,533	7,533	0	0	0	0
-2.5	0.0	0	0	0	26,730	26,730	8,019	8,019	0	0	0	0
-7.5	0.0	0	0	0	28,350	28,350	8,505	8,505	0	0	0	0
TOTALS		**8,760**	**3,650**	**5,110**					**0**	**0**	**937**	**281**

Existing Door Infiltration	**300**	**cfm**
Existing Unoccupied Door Infiltration	**300**	**cfm**
Proposed Door Infiltration	**90**	**cfm**
Proposed Unoccupied Door Infiltration	**90**	**cfm**

Savings	**656**	**therms**	**$ 649**
	0	**kWh**	**$ -**
			$ 649

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap (in)	gap location	LF of gap	% door w/ gap	Average gap for door (in)
1	3	7	20	0.25	bottom/seam	3	15%	0.0375
2	3	7	20	0.25	bottom/seam	3	15%	0.0375
3	3	7	20	0.25	bottom/seam	3	15%	0.0375
4	3	7	20	0.25	bottom/seam	3	15%	0.0375
5	3	7	20	0.125	bottom/seam	3	15%	0.01875
6	3	7	20	0.125	bottom/seam	3	15%	0.01875
7	3	7	20	0.125	bottom/seam	3	15%	0.01875
8	3	7	20	0.0625	bottom/seam	3	15%	0.009375
9	3	7	20	0.25	bottom/seam	3	15%	0.0375
10	3	7	20	0.25	bottom/seam	3	15%	0.0375
Total	**30**	**70**	**200**	**0.194**		**30**	**15%**	**0.029**

Note: Doors labeled 'a', 'b', etc. are a part of the same door assembly.

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ECM-1: Replace Door Sweeps & Seals - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Door Weatherization Seals & Sweeps	10	EA	$ 40	$ 115	$ -	$ 411	$ 1,433	$ -	$ 1,844	RS Means 2012
						$ -	$ -	$ -	$ -	

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

$ 1,844	Subtotal
$ 461	25% Contingency
$ 2,305	**Total**

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ECM-2: Convert Building from Steam to HW and Install High Efficiency Boilers

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

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.99	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	2,000,000	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	75	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	2,000,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	1,979		NJ Protocols Calculation
Fuel Cost Savings	$ 1,957		

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

Algorithms

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

Definition of Variables

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

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

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

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

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

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

EFF_B = Efficiency of baseline heaters (AFUE %)

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

Furnaces and Boilers

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

Sources:

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

Adjusted Heating Degree Days by Building Type

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

Heating Degree Days and Outdoor Design Temperature by Zone

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

Newark Board of Education - NJBPU
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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-2: Convert Building from Steam to HW and Install High Efficiency Boilers - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Hydronic Heating System (piping, radiator & UVs)	30,898	SF	$ 15	$ 15		$ 477,374	$ 579,338	$ -	$ 1,056,712	2012 RS Means Square Foot Construction Costs
						$ -	$ -	$ -	$ -	

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

$ 1,056,712	Subtotal
$ 264,178	25% Contingency
$ 1,320,890	**Total**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

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	$0.153	/ kWh	
Average run hours per Week	80	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	72	deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	192,000	Btu / Hr	Total BTU/hr of all window units
Average EER	10.7		
Existing Annual Electric Usage	16,679	kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	8,094	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Electrical Usage Savings	8,585	kWh
Annual Cost Savings	$1,313	
Total Project Cost	$1,500	
Simple Payback	1.1	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	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	**930**	49%	**451**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

ECM-3: Window A/C Controller - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	$ -	$ -	$ -	
Window AC Controller	8	EA	$ 150	$ -	$ -	1232.4	$ -	$ -	$ 1,232	Estimated
						$ -	$ -	$ -	$ -	

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

$	1,232	Subtotal
$	308	25% Contingency
$	**1,500**	**Total**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

ECM-4: Install VAV boxes and VFD to classroom Rooftop unit

Utility Costs

Blended Electric Rate	$0.15	/ kWh
Blended Natural Gas Rate	$0.99	/ Therm

Supply & Return Fan Inputs

Supply Fans:		
Fan ID	RTU-1	
Fan HP	20	HP
Estimated Load Factor @ Full Flow	98%	LF
Motor Efficiency	93.6%	Eff.
Average kW =	15.62	kW
Design Air Flow	5,500	CFM_{des}

Return Fans:		
Fan ID	RTU-1	
Fan HP	15	HP
Estimated Load Factor @ Full Flow	98%	LF
Motor Efficiency	92.4%	Eff.
Average kW =	11.87	kW
Design Air Flow	4,500	CFM_{des}

Airflow, Setpoint, & Efficiency Inputs

	Total CFM	O.A. CFM	O.A. %	
Design Total CFM	5,500	1,650	30%	
Actual Avg CFM	5,500	1,650	30%	
SA Enthalpy, Cooling	24.0	BTU/lbma		
Setpoint Cooling	74.0			
Setpoint, Heating	74.0	°F		
Summer RA Enthalpy	28.9	BTU/lbma		
Winter RA Temp	55.0	°F		
Balance Point	55.0	°F		
Chiller Plant Efficiency	1.000	kW/Ton		(Includes Ancillary Equipment)
Steam Heat Content	961	BTU/lbma		(Includes distribution & stand-by losses)

Fan#	Fan HP	CFM	CFM OA	% Speed	Proposed % Speed Night time
1	20	5,500	5,500	74	37
1	20	5,500	5,500		

City:	Newark					
		Occupied	Un Occ	Occupied	Occupied	Occupied
Temp	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5	0	0	0	0	0	0
97.5	6	4	2	1	0	0
92.5	31	18	13	4	2	1
87.5	131	78	53	19	7	2
82.5	500	298	202	72	26	9
77.5	620	369	251	90	32	11
72.5	664	395	269	96	34	12
67.5	854	508	346	123	44	16
62.5	927	552	375	134	48	17
57.5	600	357	243	87	31	11
52.5	730	435	295	106	38	13
47.5	491	292	199	71	25	9
42.5	656	390	266	95	34	12
37.5	1,023	609	414	148	53	19
32.5	734	437	297	106	38	14
27.5	334	199	135	48	17	6
22.5	252	150	102	36	13	5
17.5	125	74	51	18	6	2
12.5	47	28	19	7	2	1
7.5	34	20	14	5	2	1
2.5	1	1	0	0	0	0
-2.5	0	0	0	0	0	0
-7.5	0	0	0	0	0	0
	8,760	5,214	3,546			

Savings Calculations:

8,760

			Existing									Proposed								Savings		
Avg. DB Bin Temp °F	OA Enthalpy Btu/lb	Un-Occupied Bin HOURS	Total Supply CFM	Winter MA Temp	Summer MA Enthalpy	Cooling Load MBH	Heating Load MBH	Cooling ton day	Heating lbs	Fan Power kW	Fan Energy kWh	VAV Load %	Total Supply CFM	Cooling Load MBH	Heating Load MBH	Cooling ton day	Heating lbs	Fan Power kW	Fan Energy kWh	Annual Cooling ton day	Annual Heating lbs	Annual Fan Energy kWh
97	40.0	0	5,500	68	32.2	204	-	0	-	27.5	-	100%	5,500	204	0	0	-	27.5	-	-	-	-
92	38.3	2	5,500	66	31.7	191	-	2	-	27.5	67	95%	5,225	182	0	2	-	24.8	60	0	-	7
87	35.9	13	5,500	65	31.0	173	-	8	-	27.5	345	85%	4,675	147	0	6	-	19.9	249	1	-	96
82	33.8	53	5,500	63	30.4	158	-	29	-	27.5	1,458	75%	4,125	118	0	22	-	15.5	820	7	-	638
77	32.0	202	5,500	62	29.8	144	-	101	-	27.5	5,563	65%	3,575	94	0	66	-	13.7	2,782	35	-	2,782
72	30.3	251	5,500	60	29.3	132	-	115	-	27.5	6,899	55%	3,025	72	0	63	-	13.7	3,449	52	-	3,449
67	27.4	269	5,500	59	28.5	110	-	103	-	27.5	7,388	45%	2,475	50	0	46	-	13.7	3,694	57	-	3,694
62	24.5	346	5,500	57	27.6	0	-	0	-	27.5	9,502	35%	1,925	0	0	0	-	13.7	4,751	-	-	4,751
57	21.7	375	5,500	56	26.7	0	-	0	-	27.5	10,314	35%	1,925	0	0	0	-	13.7	5,157	-	-	5,157
52	19.0	243	5,500	54	25.9	0	118	0	29,872	27.5	6,676	35%	1,925	0	41	0	10,455	13.7	3,338	-	19,417	3,338
47	16.5	295	5,500	53	25.2	0	127	0	39,084	27.5	8,123	35%	1,925	0	44	0	13,679	13.7	4,061	-	25,405	4,061
42	14.4	199	5,500	51	24.6	0	136	0	28,131	27.5	5,463	45%	2,475	0	61	0	12,659	13.7	2,732	-	15,472	2,732
37	12.3	266	5,500	50	23.9	0	145	0	40,046	27.5	7,299	55%	3,025	0	80	0	22,025	13.7	3,650	-	18,021	3,650
32	7.7	414	5,500	48	22.5	0	154	0	66,288	27.5	11,383	65%	3,575	0	100	0	43,088	13.7	5,691	-	23,201	5,691
27	6.5	297	5,500	47	22.2	0	163	0	50,316	27.5	8,167	75%	4,125	0	122	0	37,737	15.5	4,594	-	12,579	3,573
22	5.3	135	5,500	45	21.8	0	172	0	24,149	27.5	3,716	75%	4,125	0	129	0	18,112	15.5	2,090	-	6,037	1,626
17	4.1	102	5,500	44	21.5	0	181	0	19,166	27.5	2,804	85%	4,675	0	153	0	16,291	19.9	2,026	-	2,875	778
12	2.9	51	5,500	42	21.1	0	189	0	9,976	27.5	1,391	85%	4,675	0	161	0	8,480	19.9	1,005	-	1,496	386
7	1.7	19	5,500	41	20.7	0	198	0	3,927	27.5	523	95%	5,225	0	188	0	3,731	24.8	472	-	196	51
2	0.5	14	5,500	39	20.4	0	207	0	2,969	27.5	378	95%	5,225	0	197	0	2,820	24.8	341	-	148	37
-3	-0.7	0	5,500	38	20.0	0	216	0	91	27.5	11	100%	5,500	0	216	0	91	27.5	11	-	-	-
-8	-1.9	3	5,500	36	19.7	0	225	0	703	27.5	82	100%	5,500	0	225	0	703	27.5	82	-	-	-
Total		3,549				**1,112**	**2,232**	**357**	**314,719**		**97,553**		**84,425**	**866**	**1,719**	**205**	**189,872**		**51,057**	**152**	**124,848**	**46,496**

VAV CONVERSION - SAVINGS SUMMARY

	Electric Demand	Electric Usage	Nat Gas Usage	Maint.	Total Cost
	(kW)	(kWh)	(Therms)	($)	($)
Savings	**0**	**46,496**	**1,248**	**$0**	**$0**
Savins $	**0**	**$7,109**	**$1,235**		
		$8,344			

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4: Install VAV boxes and VFD to classroom Rooftop unit - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
20 HP VFD	1	Ea	$ 2,336	$ 772		$ 2,399	$ 962	$ -	$ 3,361	RS Means 2012
20 HP Motor	1	Ea	$ 861	$ 110		$ 884	$ 137	$ -	$ 1,022	RS Means 2012
15 HP VFD	1	Ea	$ 3,465	$ 772		$ 3,559	$ 962	$ -	$ 4,520	RS Means 2013
15 HP Motor	1	Ea	$ 1,050	$ 135		$ 1,078	$ 169	$ -	$ 1,247	RS Means 2014
Electrical - misc.	5	ls	$ 300	$ 200		$ 1,541	$ 1,246	$ -	$ 2,787	Engineering Estimate
VAV boxes	5	Ea	$ 1,500	$ 1,000		$ 7,703	$ 6,230	$ -	$ 13,933	RS Means 2012
Controls	5	Ea	$ 250	$ 250		$ 1,284	$ 1,558	$ -	$ 2,841	RS Means 2012
Sheetmetal modification (per box)	5	ls	$ 500	$ 500		$ 2,568	$ 3,115	$ -	$ 5,683	Engineering Estimate

$ 35,393	Subtotal
$ 8,848	25% Contingency
$ 44,241	**Total**

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

Newark Board of Education - NJBPU
CHA Project Number: 27998
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ECM-5A: Basic Controls

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

Day Setback

EXISTING CONDITIONS			
Heating			
Heating Season Facility Temp	80	F	Th
Weekly Occupied Hours	70	hrs	H
Heating Season Setback Temp	75	F	Sh
Heating Season % Savings per	3%		Ph
Annual Boiler Capacity		Mbtu/yr	
Connected Heating Load	2,000,000	Btu/hr	Caph
Equivalent Full Load Heating	900	hrs	EFLHh
Heating Equipment Efficiency	80%		AFUEh
Cooling			
Cooling Season Facility Temp	-	F	Tc
Weekly Occupied Hours	-	hrs	H
Cooling Season Setback Temp	-	F	Sc
Cooling Season % Savings per			Pc
Connected Cooling Load	-	Tons	Capc
Equivalent Full Load Cooling	-	hrs	EFLHc
Cooling Equipment EER	-		AFUEc
	No Significant Cooling in Bldg		
SAVINGS			
Natural Gas Savings	1,868	Therms[3]	
Cooling Electricity Savings	0	kWh	

Nighttime Setback

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	65	F
Heating Season % Savings per	3%	
Annual Boiler Capacity		Mbtu/yr
Connected Heating Load Capacity	2,000,000	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	80%	
Cooling		
Cooling Season Facility Temp	-	F
Weekly Occupied Hours	-	hrs
Cooling Season Setback Temp	-	F
Cooling Season % Savings per		
Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling Hours	-	hrs
Cooling Equipment EER	-	
	No Significant Cooling in Bldg	
SAVINGS		
Natural Gas Savings	3,114	Therms[3]
Cooling Electricity Savings	0	kWh

$0.15	$/kWh Blended
$0.99	$/Therm

COMBINED SAVINGS		
Natural Gas Savings	4,982	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	$ 4,926	
Estimated Total Project Cost	$ 21,309	
Simple Payback	4.3	Yrs

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

Algorithms

Cooling Energy Savings (kWh) = $(((T_c*(H+5)+S_c*(168-(H+5)))/168)$ $T_c)*(P_c*Cap_{hp}*12*EFLH_c/EER_{hp})$

Heating Energy Savings (kWh) = $(((T_h*(H+5)+S_h*(168-(H+5)))/168)$- $T_h)*(P_h*Cap_{hp}*12*EFLH_h/EER_{hp})$

Heating Energy Savings (Therms) = $(T_h-(T_h*(H+5)+S_h*(168-$ $(H+5)))/168)*(P_h*Cap_h*EFLH_h/AFUE_h/100{,}000)$

Definition of Variables

T_h = Heating Season Facility Temp. (°F)
T_c = Cooling Season Facility Temp. (°F)
S_h = Heating Season Setback Temp. (°F)
S_c = Cooling Season Setup Temp. (°F)
H = Weekly Occupied Hours
Cap_{hp} = Connected load capacity of heat pump/AC (Tons) – Provided on Application.
Cap_h = Connected heating load capacity (Btu/hr) – Provided on Application.
$EFLH_c$ = Equivalent full load cooling hours
$EFLH_h$ = Equivalent full load heating hours
P_h = Heating season percent savings per degree setback
P_c = Cooling season percent savings per degree setup
$AFUE_h$ = Heating equipment efficiency – Provided on Application.
EER_{hp} = Heat pump/AC equipment efficiency – Provided on Application

Occupancy Controlled Thermostats

Component	Type	Value	Source
T_h	Variable		Application
T_c	Variable		Application
S_h	Fixed	T_h-5°	
S_c	Fixed	T_c+5°	
H	Variable		Application; Default of 56 hrs/week
Cap_{hp}	Variable		Application
Cap_h	Variable		Application
$EFLH_c$	Fixed	381	1
$EFLH_h$	Fixed	900	PSE&G
P_h	Fixed	3%	2
P_c	Fixed	6%	2
$AFUE_h$	Variable		Application
EER_{hp}	Variable		Application

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

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-5A: 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 Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

ECM-5B: 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, monitoiring and alarming of all HVAC equipment. Specific energy savings sequences would include optium 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:

50,653	Sq Footage	$0.15	$/kWh Blended
N	Cooling	$0.99	$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	75	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	3,000,000	Btu/hr
Equivalent Full Load Heating Hours	900	hrs
Heating System Efficiency	80%	
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	2,802	Therms
Cooling Electricity Savings	0	kWh

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	604,461	kWh
Existing Facility Total Gas usage	35,371	Therms
Existing Facility Cooling Electric usage	-	kWh[1]
Existing Facility Heating Natural Gas usage	33,602	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	3,360	Therms
SAVINGS		
Electric Savings	0	**kWh**
Natural Gas Savings	3,360	**Therms**

Assumptions

1 0% of facility total electricity dedicated to Cooling; based on utility information
2 95% of facility total natural gas dedicated to Heating; based on utility information
3 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	3,000,000	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	80%	
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	4,671	Therms[3]
Cooling Electricity Savings	0	kWh

COMBINED SAVINGS		
Natural Gas Savings	10,833	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	$ 10,712	
Estimated Total Project Cost	$ 315,096	
Simple Payback	29.4	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 Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-5B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Unit Ventilator Controls	10	ea	$ 2,250	$ 2,250		$ 23,108	$ 28,035	$ -	$ 51,143	Vendor Quote
Radiator Control (Group of 4)	25	ea	$ 2,250	$ 2,250		$ 57,769	$ 70,088	$ -	$ 127,856	Vendor Quote
Exhaust Fan Control (Group of 4)	5	ea	$ 1,750	$ 1,750		$ 8,986	$ 10,903	$ -	$ 19,889	Vendor Quote
Head End Controller & Programming	1	ls	$ 16,000	$ 16,000		$ 16,432	$ 19,936	$ -	$ 36,368	Vendor Quote
Packaged RTU s	3	ea		$ 4,500		$ -	$ 16,821	$ -	$ 16,821	
						$ -	$ -	$ -	$ -	

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

$ 252,077	Subtotal
$ 63,019	25% Contingency
$ 315,096	**Total**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

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

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

Utility Cost

$0.15 $/kWh Blended

EXISTING CONDITIONS			
Walk-In Freezer(s)			
Existing Freezer Controls?	N		
Quantity of Walk-In Freezers	1		
Nameplate Amps of Freezer Evaporator Fan	5		AmpsEF
Nameplate Volts of Freezer Evaporator Fan	120		VoltsEF
Phase of Evaporator Fan	1		PhaseEF
Power Factor of Evaporator Fan	0.55		PFEF
Operating Hours	8,760	hrs	
Load Reduction	65%		LR
Electricity Savings (Evaporator Fan)	1,778	kWh	kWhEF
Electricity Savings (Evaporator Fan Reduced Heat)	796	kWh	kWhRH
Total Walk-In Freezer(s) Electricity Savings	2,574	kWh	
Walk-In Cooler(s)			
Existing Cooler Controls?	N		
Quantity of Walk-In Coolers	0		
Nameplate Amps of Cooler Evaporator Fan	0		
Nameplate Volts of Cooler Evaporator Fan	0		
Phase of Evaporator Fan	0		
Power Factor of Evaporator Fan	0.55		
Operating Hours	8,760	hrs	
Load Reduction	65%		
Electricity Savings (Evaporator Fan)	-	kWh	
Electricity Savings (Evaporator Fan Reduced Heat)	-	kWh	
Total Walk-In Cooler(s) Electricity Savings	-	kWh	
SAVINGS			
Total Electricity Savings	**2,574**	**kWh**	
Total Cost Savings	**$ 394**		
Estimated Cost	$ 20,625		
Simple Payback	52.4	**years**	

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

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

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

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

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Turnkey Walk-In Controller & Equipment	1	EA	$ 10,000	$ 5,000	$ -	$ 10,270	$ 6,230	$ -	$ 16,500	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$ 16,500	Subtotal
$ 4,125	25% Contingency
$ 20,625	**Total**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

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	21	
Average Flushes / Urinal (per Day)	3	(per occupant)
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	21	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	$1,200	RS Means 2012
Proposed Installation Cost of new urinal & valve	$1,000	RS Means 2012
Total cost of new urinals & valves		

SAVINGS		
Current Urinal Water Use	57.49	kGal / year
Proposed Urinal Water Use	2.87	kGal / year
Water Savings	54.61	kGal / year
Cost Savings	$412	/ year

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

Newark Board of Education - NJBPU
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Harriet Tubman

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	63	
Average Flushes / Toilet (per Day)	3	(per occupant)
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	63	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	241.45	kGal / year
Proposed Toilet Water Use	88.30	kGal / year
Water Savings	153.15	kGal / year
Cost Savings	$1,156	/ year

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Low-Flow Urinal	21	EA	$ 1,200	$ 1,000	$ -	$ 25,880	$ 26,166	$ -	$ 52,046	Vendor Estimate
Low-Flow Toilet	63	EA	$ 1,400	$ 1,000	$ -	$ 90,581	$ 78,498	$ -	$ 169,079	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$ 221,126	Subtotal
$ 55,281	25% Contingency
$ 276,407	**Total**

Newark Board of Education - NJBPU
CHA Project Number: 27998
Harriet Tubman

New Jersey Pay For Performance Incentive Program

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

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)	50,653
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$90,861	$34,976
Existing Usage (from utility)	604,461	35,371
Proposed Savings	156,166	6,887
Existing Total MMBtus	5,600	
Proposed Savings MMBtus	1,222	
% Energy Reduction	**21.8%**	
Proposed Annual Savings	$30,498	

	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	$1.24
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.24

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$2,533
Incentive #2	$17,178	$8,545	$25,723
Incentive #3	$17,178	$8,545	$25,723
Total All Incentives	**$34,356**	**$17,090**	**$53,979**

Total Project Cost	$102,700

		Allowable Incentive
% Incentives #1 of Utility Cost*	2.0%	$2,533
% Incentives #2 of Project Cost**	25.0%	$25,675
% Incentives #3 of Project Cost**	25.0%	$25,675
Total Eligible Incentives***	**$53,883**	
Project Cost w/ Incentives	$48,817	

Project Payback (years)	
w/o Incentives	w/ Incentives
3.4	1.6

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

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

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

Energy Audit of Harriet Tubman Elementary School
CHA Project No. 27998
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
40LED	MER1	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	1820	328	3	T 59 R LED	RTLED38	38	0.1	SW	1,820	207	120	0.1	$ 19.77	$ -	$0	0.0	0.0
220	MER1	5	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1820	182	5	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1,820	182	-	0.0	$ -	$ -	$0		#DIV/0!
220	MER2	3	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1820	109	3	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1,820	109	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	MER2	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1820	175	3	4 ft LED Tube	200732x1	15	0.0	SW	1,820	82	93	0.1	$ 15.27	$ 217.80	$0	14.3	14.3
39	MER2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1820	60	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1,820	60	-	0.0	$ -	$ -	$0		#DIV/0!
34LED	Stair	1	1T 32 C F 4 (ELE)	F44ILL	112	0.1	SW	6240	699	1	4 ft LED Tube	200732x2	30	0.0	SW	6,240	187	512	0.1	$ 73.97	$ 145.20	$0	2.0	2.0
40LED	Gym Storage	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 59 R LED	RTLED38	38	0.1	SW	1,000	76	44	0.0	$ 8.26	$ -	$0	0.0	0.0
20LED	Gym Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 6.38	$ 145.20	$0	22.8	22.8
146LED	Gym / Cafetorium	20	High Bay MH 400	MH400/1	458	9.2	SW	2912	26,674	20	BAYLED78W	BAYLED78W	93	1.9	SW	2,912	5,416	21,258	7.3	$ 3,272.95	$ -	$2,000	0.0	-0.6
20LED	Office	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	SW	2,400	72	82	0.0	$ 12.87	$ 145.20	$0	11.3	11.3
40LED	Room 1	24	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,456	24	T 59 R LED	RTLED38	38	0.9	SW	2,400	2,189	1,267	0.5	$ 199.87	$ -	$0	0.0	0.0
220	TR	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2,400	48	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Corridor	17	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	6240	6,365	17	T 59 R LED	RTLED38	38	0.6	SW	6,240	4,031	2,334	0.4	$ 337.36	$ -	$0	0.0	0.0
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.19	$ 72.60	$0	22.8	22.8
40LED	Boys TR	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	432	3	T 59 R LED	RTLED38	38	0.1	SW	2,400	274	158	0.1	$ 24.98	$ -	$0	0.0	0.0
40LED	Girls TR	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	432	3	T 59 R LED	RTLED38	38	0.1	SW	2,400	274	158	0.1	$ 24.98	$ -	$0	0.0	0.0
40LED	Mens TR	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	SW	2,400	182	106	0.0	$ 16.66	$ -	$0	0.0	0.0
40LED	Room 2	23	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,312	23	T 59 R LED	RTLED38	38	0.9	SW	2,400	2,098	1,214	0.5	$ 191.55	$ -	$0	0.0	0.0
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Room 3	23	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,312	23	T 59 R LED	RTLED38	38	0.9	SW	2,400	2,098	1,214	0.5	$ 191.55	$ -	$0	0.0	0.0
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Service Close	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96	1	4 ft LED Tube	200732x1	15	0.0	SW	3,000	45	51	0.0	$ 7.83	$ 72.60	$0	9.3	9.3
40LED	Girls TR	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	SW	2,400	182	106	0.0	$ 16.66	$ -	$0	0.0	0.0
40LED	Custodial Office	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,152	8	T 59 R LED	RTLED38	38	0.3	SW	2,400	730	422	0.2	$ 66.62	$ -	$0	0.0	0.0
40LED	Corridor	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,246	6	T 59 R LED	RTLED38	38	0.2	SW	6,240	1,423	824	0.1	$ 119.07	$ -	$0	0.0	0.0
40LED	Vest	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	6240	749	2	T 59 R LED	RTLED38	38	0.1	SW	6,240	474	275	0.0	$ 39.69	$ -	$0	0.0	0.0
40LED	Room 24	24	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,456	24	T 59 R LED	RTLED38	38	0.9	SW	2,400	2,189	1,267	0.5	$ 199.87	$ -	$0	0.0	0.0
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Lobby	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,621	7	T 59 R LED	RTLED38	38	0.3	SW	6,240	1,660	961	0.2	$ 138.91	$ -	$0	0.0	0.0
40LED	Corridor	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	SW	6,240	948	549	0.1	$ 79.38	$ -	$0	0.0	0.0
40LED	Corridor	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	SW	6,240	948	549	0.1	$ 79.38	$ -	$0	0.0	0.0
40LED	Media Cenete	20	T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2400	2,880	20	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,824	1,056	0.4	$ 166.56	$ -	$0	0.0	0.0
20LED	Girls TR	12	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2400	922	12	4 ft LED Tube	200732x1	15	0.2	SW	2,400	432	490	0.2	$ 77.22	$ 871.20	$0	11.3	11.3
40LED	Nurse	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	Waiting	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	SW	2,400	182	106	0.0	$ 16.66	$ -	$0	0.0	0.0
40LED	Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	Corridor	13	T 32 R F 2 (ELE)	F42LL	60	0.8	SW	6240	4,867	13	T 59 R LED	RTLED38	38	0.5	SW	6,240	3,083	1,785	0.3	$ 257.98	$ -	$0	0.0	0.0
20LED	Boys TR	10	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	768	10	4 ft LED Tube	200732x1	15	0.2	SW	2,400	360	408	0.2	$ 64.35	$ 726.00	$0	11.3	11.3
39	Janitor Closet	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	3000	99	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	3,000	99	-	0.0	$ -	$ -	$0		#DIV/0!
40LED	Lobby	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,621	7	T 59 R LED	RTLED38	38	0.3	SW	6,240	1,660	961	0.2	$ 138.91	$ -	$0	0.0	0.0
40LED	Main Office	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	$ 74.95	$ -	$0	0.0	0.0
40LED	Office	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2400	864	6	T 59 R LED	RTLED38	38	0.2	SW	2,400	547	317	0.1	$ 49.97	$ -	$0	0.0	0.0
34LED	Office	8	1T 32 C F 4 (ELE)	F44ILL	112	0.9	SW	2400	2,150	8	4 ft LED Tube	200732x2	30	0.2	SW	2,400	576	1,574	0.7	$ 248.33	$ 1,161.60	$0	4.7	4.7
65	Storage	1	I 100	I100/1	100	0.1	SW	1000	100	1	CF 26	CFQ26/1-L	27	0.0	SW	1,000	27	73	0.1	$ 13.70	$ 36.00	$0	2.6	2.6
20LED	Vault	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	1000	192	6	4 ft LED Tube	200732x1	15	0.1	SW	1,000	90	102	0.1	$ 19.14	$ 435.60	$0	22.8	22.8
40LED	Kitchen	31	T 32 R F 2 (ELE)	F42LL	60	1.9	SW	3000	5,580	31	T 59 R LED	RTLED38	38	1.2	SW	3,000	3,534	2,046	0.7	$ 313.96	$ -	$0	0.0	0.0
39	Men's TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
39	Women's TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2,400	79	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Meter Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	SW	1,000	30	34	0.0	$ 6.38	$ 145.20	$0	22.8	22.8
40LED	Backroom	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 59 R LED	RTLED38	38	0.1	SW	1,000	76	44	0.0	$ 8.26	$ -	$0	0.0	0.0
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399	2	4 ft LED Tube	200732x1	15	0.0	SW	6,240	187	212	0.0	$ 30.67	$ 145.20	$0	4.7	4.7
40LED	Storage	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 59 R LED	RTLED38	38	0.1	SW	1,000	76	44	0.0	$ 8.26	$ -	$0	0.0	0.0
20LED	Gym Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128	4	4 ft LED Tube	200732x1	15	0.1	SW	1,000	60	68	0.1	$ 12.76	$ 290.40	$0	22.8	22.8
20LED	Girl's Locker	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	SW	2,400	72	82	0.0	$ 12.87	$ 145.20	$0	11.3	11.3
40LED	201 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,915	1,109	0.5	$ 174.89	$ -	$0	0.0	0.0
40LED	202 Classroom	20	T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2400	2,880	20	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,824	1,056	0.4	$ 166.56	$ -	$0	0.0	0.0
40LED	203 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,915	1,109	0.5	$ 174.89	$ -	$0	0.0	0.0
40LED	204 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,915	1,109	0.5	$ 174.89	$ -	$0	0.0	0.0
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	SW	6,240	1,897	1,098	0.2	$ 158.76	$ -	$0	0.0	0.0
40LED	215 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.13	$ -	$0	0.0	0.0
40LED	218 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.13	$ -	$0	0.0	0.0
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	SW	6,240	948	549	0.1	$ 79.38	$ -	$0	0.0	0.0
40LED	216 Teacher Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	217	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	144	1	T 59 R LED	RTLED38	38	0.0	SW	2,400	91	53	0.0	$ 8.33	$ -	$0	0.0	0.0
40LED	UN- Parent Liaison	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	213 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	210 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	205 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	950	0.4	$ 149.91	$ -	$0	0.0	0.0
40LED	207 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	950	0.4	$ 149.91	$ -	$0	0.0	0.0
34LED	206 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	SW	2,400	864	2,362	1.0	$ 372.49	$ 1,742.40	$0	4.7	4.7
34LED	208 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	SW	2,400	864	2,362	1.0	$ 372.49	$ 1,742.40	$0	4.7	4.7
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,370	9	T 59 R LED	RTLED38	38	0.3	SW	6,240	2,134	1,236	0.2	$ 178.60	$ -	$0	0.0	0.0
40LED	301 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	T 59 R LED	RTLED38	38	0.6	SW	2,400	1,459	845	0.4	$ 133.25	$ -	$0	0.0	0.0
40LED	303 Computers	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,915	1,109	0.5	$ 174.89	$ -	$0	0.0	0.0
40LED	302 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	T 59 R LED	RTLED38	38	0.6	SW	2,400	1,459	845	0.4	$ 133.25	$ -	$0	0.0	0.0
40LED	304 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	SW	2,400	1,915	1,109	0.5	$ 174.89	$ -	$0	0.0	0.0
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	SW	6,240	1,897	1,098	0.2	$ 158.76	$ -	$0	0.0	0.0
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	SW	6,240	1,897	1,098	0.2	$ 158.76	$ -	$0	0.0	0.0
40LED	315 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.13	$ -	$0	0.0	0.0
40LED	319 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.13	$ -	$0	0.0	0.0
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	SW	6,240	948	549	0.1	$ 79.38	$ -	$0	0.0	0.0
40LED	316 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	318 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	SW	1,000	38	22	0.0	$ 4.13	$ -	$0	0.0	0.0
40LED	317 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	313 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	310 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	305 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	950	0.4	$ 149.91	$ -	$0	0.0	0.0
40LED	307 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	950	0.4	$ 149.91	$ -	$0	0.0	0.0
34LED	306 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	SW	2,400	864	2,362	1.0	$ 372.49	$ 1,742.40	$0	4.7	4.7
34LED	308 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	SW	2,400	864	2,362	1.0	$ 372.49	$ 1,742.40	$0	4.7	4.7
35LED	401 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 59 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	$ 236.22	$ -	$0	0.0	0.0
35LED	403 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 59 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	$ 236.22	$ -	$0	0.0	0.0
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,370	9	T 59 R LED	RTLED38	38	0.3	SW	6,240	2,134	1,236	0.2	$ 178.60	$ -	$0	0.0	0.0
35LED	402 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	2,246	0.9	$ 354.32	$ -	$0	0.0	0.0
35LED	404 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888	18	T 59 R LED	RTLED38	38	0.7	SW	2,400	1,642	2,246	0.9	$ 354.32	$ -	$0	0.0	0.0
20LED	410 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.19	$ 72.60	$0	22.8	22.8
40LED	409 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	SW	2,400	182	106	0.0	$ 16.66	$ -	$0	0.0	0.0
40LED	406 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	SW	2,400	182	106	0.0	$ 16.66	$ -	$0	0.0	0.0
20LED	405 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.19	$ 72.60	$0	22.8	22.8
20LED	412 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.19	$ 72.60	$0	22.8	22.8
20LED	413 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	$ 3.19	$ 72.60	$0	22.8	22.8
40LED	414 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
40LED	415 Teachers Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	211	0.1	$ 33.31	$ -	$0	0.0	0.0
39	416 Storage	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1000	33	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1,000	33	-	0.0	$ -	$ -	$0		#DIV/0!
	Total	792				58.3			169,503	792			3,486	29.4			87,147	82,357	28.9	$12,713	$12,015	$2,000		
																	Demand Savings			28.9	$1,486			
																	kWh Savings			82,357	$11,227			
																	Total savings				$12,713		0.9	0.8

Energy Audit of Harriet Tubman Elementary School
CHA Project No. 27998
ECM-L2 Install Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
40LED	MER1	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	1820	327.6	3	T 32 R F 2 (ELE)	F42LL	60	0.2	NONE	1820	327.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
220	MER1	5	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1820	182.0	5	S 17 C F 1(ELE)	F21ILL	20	0.1	NONE	1820	182.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
220	MER2	3	S 17 C F 1(ELE)	F21ILL	20	0.1	SW	1820	109.2	3	S 17 C F 1(ELE)	F21ILL	20	0.1	NONE	1820	109.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	MER2	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1820	174.7	3	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	1820	174.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
39	MER2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1820	60.1	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	NONE	1820	60.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
34LED	Stair	1	1T 32 C F 4 (ELE)	F44ILL	112	0.1	SW	6240	698.9	1	1T 32 C F 4 (ELE)	F44ILL	112	0.1	NONE	6240	698.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Gym Storage	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	30.0	90.0	0.0	$12.27	$270.00	$35.00	22.0	19.2
20LED	Gym Storage	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	16.0	48.0	0.0	$6.54	$270.00	$35.00	41.3	35.9
146LED	Gym / Cafetorium	20	High Bay MH 400	MH400/1	458	9.2	SW	2912	26,673.9	20	High Bay MH 400	MH400/1	458	9.2	NONE	2912	26,673.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Office	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	153.6	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1400	89.6	64.0	0.0	$8.72	$270.00	$35.00	30.9	26.9
40LED	Room 1	24	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,456.0	24	T 32 R F 2 (ELE)	F42LL	60	1.4	C-OCC	1680	2,419.2	1,036.8	0.0	$141.34	$270.00	$35.00	1.9	1.7
220	TR	1	S 17 C F 1(ELE)	F21ILL	20	0.0	SW	2400	48.0	1	S 17 C F 1(ELE)	F21ILL	20	0.0	C-OCC	1200	24.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
40LED	Corridor	17	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	6240	6,364.8	17	T 32 R F 2 (ELE)	F42LL	60	1.0	NONE	6240	6,364.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
40LED	Boys TR	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	432.0	3	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	216.0	216.0	0.0	$29.45	$270.00	$35.00	9.2	8.0
40LED	Girls TR	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	432.0	3	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	216.0	216.0	0.0	$29.45	$270.00	$35.00	9.2	8.0
40LED	Mens TR	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1200	144.0	144.0	0.0	$19.63	$270.00	$35.00	13.8	12.0
40LED	Room 2	23	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,312.0	23	T 32 R F 2 (ELE)	F42LL	60	1.4	C-OCC	1680	2,318.4	993.6	0.0	$135.45	$270.00	$35.00	2.0	1.7
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$5.40	$270.00	$35.00	50.0	43.5
40LED	Room 3	23	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,312.0	23	T 32 R F 2 (ELE)	F42LL	60	1.4	C-OCC	1680	2,318.4	993.6	0.0	$135.45	$270.00	$35.00	2.0	1.7
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$5.40	$270.00	$35.00	50.0	43.5
20LED	Service Closet	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	3000	96.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	1500	48.0	48.0	0.0	$6.54	$270.00	$35.00	41.3	35.9
40LED	Girls TR	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1200	144.0	144.0	0.0	$19.63	$270.00	$35.00	13.8	12.0
40LED	Custodial Office	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,152.0	8	T 32 R F 2 (ELE)	F42LL	60	0.5	C-OCC	1400	672.0	480.0	0.0	$65.44	$270.00	$35.00	4.1	3.6
40LED	Corridor	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,246.4	6	T 32 R F 2 (ELE)	F42LL	60	0.4	NONE	6240	2,246.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Vest	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	6240	748.8	2	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	6240	748.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Room 24	24	T 32 R F 2 (ELE)	F42LL	60	1.4	SW	2400	3,456.0	24	T 32 R F 2 (ELE)	F42LL	60	1.4	C-OCC	1680	2,419.2	1,036.8	0.0	$141.34	$270.00	$35.00	1.9	1.7
39	TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$5.40	$270.00	$35.00	50.0	43.5
40LED	Lobby	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,620.8	7	T 32 R F 2 (ELE)	F42LL	60	0.4	NONE	6240	2,620.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Corridor	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,497.6	4	T 32 R F 2 (ELE)	F42LL	60	0.2	NONE	6240	1,497.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Corridor	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,497.6	4	T 32 R F 2 (ELE)	F42LL	60	0.2	NONE	6240	1,497.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Media Ceneter	20	T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2400	2,880.0	20	T 32 R F 2 (ELE)	F42LL	60	1.2	C-OCC	1680	2,016.0	864.0	0.0	$117.79	$270.00	$35.00	2.3	2.0
20LED	Girls TR	12	S 32 C F 1 (ELE)	F41LL	32	0.4	SW	2400	921.6	12	S 32 C F 1 (ELE)	F41LL	32	0.4	C-OCC	1200	460.8	460.8	0.0	$62.82	$270.00	$35.00	4.3	3.7
40LED	Nurse	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	Waiting	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1400	168.0	120.0	0.0	$16.36	$270.00	$35.00	16.5	14.4
40LED	Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	Corridor	13	T 32 R F 2 (ELE)	F42LL	60	0.8	SW	6240	4,867.2	13	T 32 R F 2 (ELE)	F42LL	60	0.8	NONE	6240	4,867.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Boys TR	10	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	768.0	10	S 32 C F 1 (ELE)	F41LL	32	0.3	C-OCC	1200	384.0	384.0	0.0	$52.35	$270.00	$35.00	5.2	4.5
39	Janitor Closet	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	3000	99.0	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1500	49.5	49.5	0.0	$6.75	$270.00	$35.00	40.0	34.8
40LED	Lobby	7	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,620.8	7	T 32 R F 2 (ELE)	F42LL	60	0.4	NONE	6240	2,620.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Main Office	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	C-OCC	1400	756.0	540.0	0.0	$73.62	$270.00	$35.00	3.7	3.2
40LED	Office	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2400	864.0	6	T 32 R F 2 (ELE)	F42LL	60	0.4	C-OCC	1400	504.0	360.0	0.0	$49.08	$270.00	$35.00	5.5	4.8
34LED	Office	8	1T 32 C F 4 (ELE)	F44ILL	112	0.9	SW	2400	2,150.4	8	1T 32 C F 4 (ELE)	F44ILL	112	0.9	C-OCC	1400	1,254.4	896.0	0.0	$122.15	$270.00	$35.00	2.2	1.9
65	Storage	1	I 100	I100/1	100	0.1	SW	1000	100.0	1	I 100	I100/1	100	0.1	C-OCC	250	25.0	75.0	0.0	$10.22	$270.00	$35.00	26.4	23.0
20LED	Vault	6	S 32 C F 1 (ELE)	F41LL	32	0.2	SW	1000	192.0	6	S 32 C F 1 (ELE)	F41LL	32	0.2	C-OCC	250	48.0	144.0	0.0	$19.63	$270.00	$35.00	13.8	12.0
40LED	Kitchen	31	T 32 R F 2 (ELE)	F42LL	60	1.9	SW	3000	5,580.0	31	T 32 R F 2 (ELE)	F42LL	60	1.9	C-OCC	1500	2,790.0	2,790.0	0.0	$380.35	$270.00	$35.00	0.7	0.6
39	Men's TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$5.40	$270.00	$35.00	50.0	43.5
39	Women's TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79.2	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1200	39.6	39.6	0.0	$5.40	$270.00	$35.00	50.0	43.5
20LED	Meter Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64.0	2	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	1000	64.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Backroom	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	NONE	1000	120.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399.4	2	S 32 C F 1 (ELE)	F41LL	32	0.1	NONE	6240	399.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Storage	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	30.0	90.0	0.0	$12.27	$270.00	$35.00	22.0	19.2
20LED	Gym Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128.0	4	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	250	32.0	96.0	0.0	$13.09	$270.00	$35.00	20.6	18.0
20LED	Girl's Locker	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	153.6	2	S 32 C F 1 (ELE)	F41LL	32	0.1	C-OCC	1200	76.8	76.8	0.0	$10.47	$270.00	$35.00	25.8	22.4
40LED	201 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	T 32 R F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$123.68	$270.00	$35.00	2.2	1.9
40LED	202 Classroom	20	T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2400	2,880.0	20	T 32 R F 2 (ELE)	F42LL	60	1.2	C-OCC	1680	2,016.0	864.0	0.0	$117.79	$270.00	$35.00	2.3	2.0
40LED	203 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	T 32 R F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$123.68	$270.00	$35.00	2.2	1.9
40LED	204 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	T 32 R F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$123.68	$270.00	$35.00	2.2	1.9
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995.2	8	T 32 R F 2 (ELE)	F42LL	60	0.5	NONE	6240	2,995.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	215 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$6.13	$270.00	$35.00	44.0	38.3
40LED	218 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$6.13	$270.00	$35.00	44.0	38.3
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,497.6	4	T 32 R F 2 (ELE)	F42LL	60	0.2	NONE	6240	1,497.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	216 Teacher Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	217	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	144.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1680	100.8	43.2	0.0	$5.89	$270.00	$35.00	45.8	39.9
40LED	UN- Parent Liaison	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	213 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	210 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	205 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	T 32 R F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
40LED	207 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	T 32 R F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
34LED	206 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,225.6	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	C-OCC	1680	2,257.9	967.7	0.0	$131.92	$270.00	$35.00	2.0	1.8
34LED	208 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,225.6	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	C-OCC	1680	2,257.9	967.7	0.0	$131.92	$270.00	$35.00	2.0	1.8
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,369.6	9	T 32 R F 2 (ELE)	F42LL	60	0.5	NONE	6240	3,369.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	301 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304.0	16	T 32 R F 2 (ELE)	F42LL	60	1.0	C-OCC	1680	1,612.8	691.2	0.0	$94.23	$270.00	$35.00	2.9	2.5
40LED	303 Computers	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	T 32 R F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$123.68	$270.00	$35.00	2.2	1.9
40LED	302 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304.0	16	T 32 R F 2 (ELE)	F42LL	60	1.0	C-OCC	1680	1,612.8	691.2	0.0	$94.23	$270.00	$35.00	2.9	2.5
40LED	304 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	T 32 R F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$123.68	$270.00	$35.00	2.2	1.9
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995.2	8	T 32 R F 2 (ELE)	F42LL	60	0.5	NONE	6240	2,995.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995.2	8	T 32 R F 2 (ELE)	F42LL	60	0.5	NONE	6240	2,995.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	315 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$6.13	$270.00	$35.00	44.0	38.3
40LED	319 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$6.13	$270.00	$35.00	44.0	38.3
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,497.6	4	T 32 R F 2 (ELE)	F42LL	60	0.2	NONE	6240	1,497.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	316 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	318 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	250	15.0	45.0	0.0	$6.13	$270.00	$35.00	44.0	38.3
40LED	317 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	313 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	310 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	305 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	T 32 R F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
40LED	307 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	T 32 R F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
34LED	306 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,225.6	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	C-OCC	1680	2,257.9	967.7	0.0	$131.92	$270.00	$35.00	2.0	1.8
34LED	308 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,225.6	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	C-OCC	1680	2,257.9	967.7	0.0	$131.92	$270.00	$35.00	2.0	1.8
35LED	401 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
35LED	403 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.01	$270.00	$35.00	2.5	2.2
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,369.6	9	T 32 R F 2 (ELE)	F42LL	60	0.5	NONE	6240	3,369.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	402 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888.0	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	C-OCC	1680	2,721.6	1,166.4	0.0	$159.01	$270.00	$35.00	1.7	1.5
35LED	404 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888.0	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	C-OCC	1680	2,721.6	1,166.4	0.0	$159.01	$270.00	$35.00	1.7	1.5
20LED	410 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
40LED	409 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1400	168.0	120.0	0.0	$16.36	$270.00	$35.00	16.5	14.4
40LED	406 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	T 32 R F 2 (ELE)	F42LL	60	0.1	C-OCC	1400	168.0	120.0	0.0	$16.36	$270.00	$35.00	16.5	14.4
20LED	405 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
20LED	412 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
20LED	413 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32.0	1	S 32 C F 1 (ELE)	F41LL	32	0.0	C-OCC	250	8.0	24.0	0.0	$3.27	$270.00	$35.00	82.5	71.8
40LED	414 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
40LED	415 Teachers Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1400	336.0	240.0	0.0	$32.72	$270.00	$35.00	8.3	7.2
39	416 Storage	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1000	33.0	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	250	8.3	24.8	0.0	$3.37	$270.00	$35.00	80.0	69.6
	Total	**792**				**58.3**			**169503.3**	**792.0**				**58.3**			**135640.0**	**33863.4**	**0.0**	**4616.5**	**21330.0**	**2765.0**		
																	Demand Savings			0.0	$0			
																	kWh Savings			33,863	$4,616			
																	Total Savings				$4,616		**4.6**	**4.0**

Energy Audit of Harriet Tubman Elementary School
CHA Project No. 27998
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kWspace) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kWspace) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
39	Women's TR	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	2400	79	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	1,200	40	40	0.0	$ 5.40	$ 270.00	$ 35	50.0	43.5
20LED	Meter Room	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	64	2	4 ft LED Tube	200732x1	15	0.0	NONE	1,000	30	34	0.0	$ 6.38	$ 145.20	$ -	22.8	22.8
40LED	Backroom	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 59 R LED	RTLED38	38	0.1	NONE	1,000	76	44	0.0	$ 8.26	$ -	$ -	0.0	0.0
20LED	Vest	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	6240	399	2	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	187	212	0.0	$ 30.67	$ 145.20	$ -	4.7	4.7
40LED	Storage	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 59 R LED	RTLED38	38	0.1	C-OCC	250	19	101	0.0	$ 16.03	$ 270.00	$ 35	16.8	14.7
20LED	Gym Storage	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	1000	128	4	4 ft LED Tube	200732x1	15	0.1	C-OCC	250	15	113	0.1	$ 18.90	$ 560.40	$ 35	29.7	27.8
20LED	Girl's Locker	2	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2400	154	2	4 ft LED Tube	200732x1	15	0.0	C-OCC	1,200	36	118	0.0	$ 17.78	$ 415.20	$ 35	23.4	21.4
40LED	201 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,341	1,683	0.5	$ 253.22	$ 270.00	$ 35	1.1	0.9
40LED	202 Classroom	20	T 32 R F 2 (ELE)	F42LL	60	1.2	SW	2400	2,880	20	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,277	1,603	0.4	$ 241.16	$ 270.00	$ 35	1.1	1.0
40LED	203 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,341	1,683	0.5	$ 253.22	$ 270.00	$ 35	1.1	0.9
40LED	204 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,341	1,683	0.5	$ 253.22	$ 270.00	$ 35	1.1	0.9
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	NONE	6,240	1,897	1,098	0.2	$ 158.76	$ -	$ -	0.0	0.0
40LED	215 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 8.01	$ 270.00	$ 35	33.7	29.3
40LED	218 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 8.01	$ 270.00	$ 35	33.7	29.3
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	NONE	6,240	948	549	0.1	$ 79.38	$ -	$ -	0.0	0.0
40LED	216 Teacher Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	217	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	144	1	T 59 R LED	RTLED38	38	0.0	C-OCC	1,680	64	80	0.0	$ 12.06	$ 270.00	$ 35	22.4	19.5
40LED	UN- Parent Liaison	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	213 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	210 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	205 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	1,443	0.4	$ 217.04	$ 270.00	$ 35	1.2	1.1
40LED	207 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	1,443	0.4	$ 217.04	$ 270.00	$ 35	1.2	1.1
34LED	206 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	605	2,621	1.0	$ 407.83	$ 2,012.40	$ 35	4.9	4.8
34LED	208 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	605	2,621	1.0	$ 407.83	$ 2,012.40	$ 35	4.9	4.8
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,370	9	T 59 R LED	RTLED38	38	0.3	NONE	6,240	2,134	1,236	0.2	$ 178.60	$ -	$ -	0.0	0.0
40LED	301 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	T 59 R LED	RTLED38	38	0.6	C-OCC	1,680	1,021	1,283	0.4	$ 192.93	$ 270.00	$ 35	1.4	1.2
40LED	303 Computers	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,341	1,683	0.5	$ 253.22	$ 270.00	$ 35	1.1	0.9
40LED	302 Classroom	16	T 32 R F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	T 59 R LED	RTLED38	38	0.6	C-OCC	1,680	1,021	1,283	0.4	$ 192.93	$ 270.00	$ 35	1.4	1.2
40LED	304 Classroom	21	T 32 R F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	T 59 R LED	RTLED38	38	0.8	C-OCC	1,680	1,341	1,683	0.5	$ 253.22	$ 270.00	$ 35	1.1	0.9
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	NONE	6,240	1,897	1,098	0.2	$ 158.76	$ -	$ -	0.0	0.0
40LED	Corridor	8	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	2,995	8	T 59 R LED	RTLED38	38	0.3	NONE	6,240	1,897	1,098	0.2	$ 158.76	$ -	$ -	0.0	0.0
40LED	315 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 8.01	$ 270.00	$ 35	33.7	29.3
40LED	319 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 8.01	$ 270.00	$ 35	33.7	29.3
40LED	Vest	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	6240	1,498	4	T 59 R LED	RTLED38	38	0.2	NONE	6,240	948	549	0.1	$ 79.38	$ -	$ -	0.0	0.0
40LED	316 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	318 Storage	1	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 59 R LED	RTLED38	38	0.0	C-OCC	250	10	51	0.0	$ 8.01	$ 270.00	$ 35	33.7	29.3
40LED	317 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	313 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	310 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	305 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	1,443	0.4	$ 217.04	$ 270.00	$ 35	1.2	1.1
40LED	307 Classroom	18	T 32 R F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	1,443	0.4	$ 217.04	$ 270.00	$ 35	1.2	1.1
34LED	306 Library	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	605	2,621	1.0	$ 407.83	$ 2,012.40	$ 35	4.9	4.8
34LED	308 Classroom	12	1T 32 C F 4 (ELE)	F44ILL	112	1.3	SW	2400	3,226	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	605	2,621	1.0	$ 407.83	$ 2,012.40	$ 35	4.9	4.8
35LED	401 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 59 R LED	RTLED38	38	0.5	C-OCC	1,680	766	1,826	0.6	$ 280.97	$ 270.00	$ 35	1.0	0.8
35LED	403 Classroom	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 59 R LED	RTLED38	38	0.5	C-OCC	1,680	766	1,826	0.6	$ 280.97	$ 270.00	$ 35	1.0	0.8
40LED	Corridor	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	6240	3,370	9	T 59 R LED	RTLED38	38	0.3	NONE	6,240	2,134	1,236	0.2	$ 178.60	$ -	$ -	0.0	0.0
35LED	402 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	2,739	0.9	$ 421.46	$ 270.00	$ 35	0.6	0.6
35LED	404 Classroom	18	T 32 R F 3 (ELE)	F43ILL/2	90	1.6	SW	2400	3,888	18	T 59 R LED	RTLED38	38	0.7	C-OCC	1,680	1,149	2,739	0.9	$ 421.46	$ 270.00	$ 35	0.6	0.6
20LED	410 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 4.72	$ 342.60	$ 35	72.5	65.1
40LED	409 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	C-OCC	1,400	106	182	0.0	$ 27.02	$ 270.00	$ 35	10.0	8.7
40LED	406 Office	2	T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	T 59 R LED	RTLED38	38	0.1	C-OCC	1,400	106	182	0.0	$ 27.02	$ 270.00	$ 35	10.0	8.7
20LED	405 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 4.72	$ 342.60	$ 35	72.5	65.1
20LED	412 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 4.72	$ 342.60	$ 35	72.5	65.1
20LED	413 Storage	1	S 32 C F 1 (ELE)	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	C-OCC	250	4	28	0.0	$ 4.72	$ 342.60	$ 35	72.5	65.1
40LED	414 Office	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
40LED	415 Teachers Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,400	213	363	0.1	$ 54.03	$ 270.00	$ 35	5.0	4.3
39	416 Storage	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	SW	1000	33	1	2' 17 W F 2 (ELE)	F22ILL	33	0.0	C-OCC	250	8	25	0.0	$ 3.37	$ 270.00	$ 35	80.0	69.6
	Total	**792**				**58.3**			**169,503**	**792**				**29.4**			**68,419**		**28.9**	**15,266**	**33,345**	**$4,765**		
																		Demand Savings		**28.9**	**$1,486**			
																		kWh Savings		**101,085**	**$13,781**			
																		Total Savings			**$15,266**		**2.2**	**1.9**

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

NJ SmartStart Buildings

Program Overview

With New Jersey SmartStart Buildings ...

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

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings im Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have 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 — 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. T you must submit an application form (and applicable worksheets) and receive an approv from the program before any equipment is installed (click here for complete Terms and (Upon receipt of an approval letter, you may proceed to install the equipment listed on yc approved application. Equipment installed prior to the date of the approval letter is not e an incentive. **Any customer and/or agent who purchases equipment prior to the re 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 constructi 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 c install. The application should be accompanied by a related worksheet, where applicabl manufacturer's specification sheet (refer to the specific program requirements on the ba application for specs needed for your project) for the equipment you are planning to inst (Program representatives will review your application package and approve it, reject it, a advise you of upgrades in equipment that will save energy costs and/or increase your in

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

Financial incentives are available for large and small projects. These incentives offset s maybe even all! — of the added cost to purchase qualifying energy-efficient equipment, provides significant long-term energy savings. Ranges of incentives are available for qu 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 ince equipment not listed here, contact a program representative. Fiscal year financial incent be limited to a maximum of $500,000 per customer utility account and are available as f permits.

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COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

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

Home » Commercial & Industrial » Programs » NJ SmartStart Buildings

Equipment Incentives

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings im Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have 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 types of equipment you are planning to install along with equipment specification sheets (refer to the specific program requirements on the back of the application for specificatic needed for your project) and a current utility bill(s).

In order to be eligible to receive financial incentives under this Program, Applicants mus receive electric and/or gas service from one of the regulated electric and/or gas utilities 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

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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 Measur
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 discor effective March 1, 2013 except for buildings impacted by Hurri Sandy. Approved applications will have the standard timefram year from the program commitment date to complete the instal**

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/freeze

Prescriptive Lighting

New Linear Fluorescent

- T-12, HID and Incandescent to T-5 and T-8 ($25 - $200 p 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 p 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 Spa *Linear panels ($50 per fixture)*
  - Fuel pump canopy ($100 per fixture)
  - LED retrofit kits (custom measures)
- New Pulse-Start Metal Hallide ($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. Appr applications will have the standard timeframe of one year from the pro 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 fixtu office applications only)
  - Occupancy controlled hi-low fluorescent controls ($25 per 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 per door)
  - Aluminum Night Curtains for open refrigerated cases ($3.5 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 prograi incentive threshold, currently 5% more energy efficient than ASHR/ 2007 for New Construction only.)
- Custom electric and gas equipment incentives (not prescriptive)

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

II. DIRECT INSTALL

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

PARTICIPATION STEPS

PARTICIPATING CONTRACTORS

SUSTAINABLE JERSEY

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

Direct Install

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 t and how to get through the process. Created specifically for existing small to mediun facilities, Direct Install is a turnkey solution that makes it easy and affordable to upgr high efficiency equipment. Direct Install is designed to cut your facility's energy costs replacing lighting, HVAC and other outdated operational equipment with energy effic alternatives. The program pays up to 70% of retrofit costs, dramatically improving yo payback on the project. There is a $125,000 incentive cap on each project.

ELIGIBILITY

Existing small to mid-sized commercial and industrial f with a peak electric demand that did not exceed 200 k any of the preceding 12 months are eligible to participa Direct Install. Applicants will submit the last 12 months electric utility bills indicating that they are below the de threshold and have occupied the building during that ti Buildings must be located in New Jersey and served b the state's public, regulated electric or natural gas utilit 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, type capacities. Boilers may not exceed 500,000 Btuh and furnaces may not exceed 140,

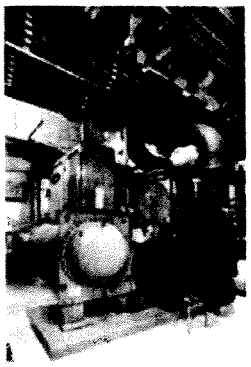
III. PAY FOR PERFORMANCE (P4P)

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 facilit earn incentives that are directly linked to your savings. Pay for Performance relies on a program partners who provide technical services under direct you. Acting as your energy expert, your partner will develop a reduction plan for each project with a whole-building technica component of a traditional energy audit, a financial plan for fu energy efficient measures and a construction schedule for ins



Eligibility

Existing commercial, industrial and institutional buildings with demand over 100 kW for any of the preceding twelve months to participate including hotels and casinos, large office buildir family buildings, supermarkets, manufacturing facilities, scho shopping malls and restaurants. Buildings that fall into the fol customer classes are not required to meet the 100 kW dema to participate in the program: hospitals, public colleges and universities, 501(c)(3) non-p affordable multifamily housing, and local governmental entities. Your energy reduction p 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, manuf water treatment and datacenter building types whose annual energy consumption is hea weighted on process loads. Details are available in the high energy intensity section of t 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 ir facilities and comparing it to similar buildings. That can be a big help in locating opportu cost-justified energy efficiency upgrades. And, based on our findings, you may be invite participate in the Building Performance with ENERGY STAR initiative and receive speci recognition as an industry leader in energy efficiency.

Incentives

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

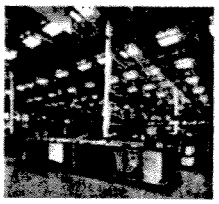
TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

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.



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

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

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.

Home | Residential | Commercial & Industrial | Renewable Energy
About Us | Press Room | Library | FAQs | Calendar | Newsletters | Contact Us | Site

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

BPU

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

*Incentives/Requirements subject to change.

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)

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

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

Energy Savings Improvement Program

A new State law allows government agencies to make energy related improvements to t facilities and pay for the costs using the value of energy savings that result from the imp 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 and reduce energy usage with minimal expenditure of new financial resources.

This Local Finance Notice outlines how local governments can develop and implement a 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 effic improvements. Local units should carefully consider all alternatives to develop an appro best meets their needs. Local units considering an ESIP should carefully review the Loc Notice, the law, and consult with qualified professionals to determine how they should a task.

The NJ Board of Public Utilities sponsored Sustainable Jersey in the creation of an ESIF Guidebook that explains how to implement the program. The guidebook also includes ca 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 ene 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, plea 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

Newark Public Schools
Harriet Tubman

Cost of Electricity	$0.15	/kWh
Electricity Usage	413,181	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$440,000	**110.0**	**143,367**	**0**	**$21,505**	**0**	**$21,505**	**$0**	**$22,222**	**20.5**	**10.1**

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

Area Output*

1,525 m2
16,412 ft2

Perimeter Output*

279 m
ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
13,950 ft2

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

8	watt/ft2	
111,604	DC watts	
110	kW	Enter into PV Watts

PV Watts Inputs***

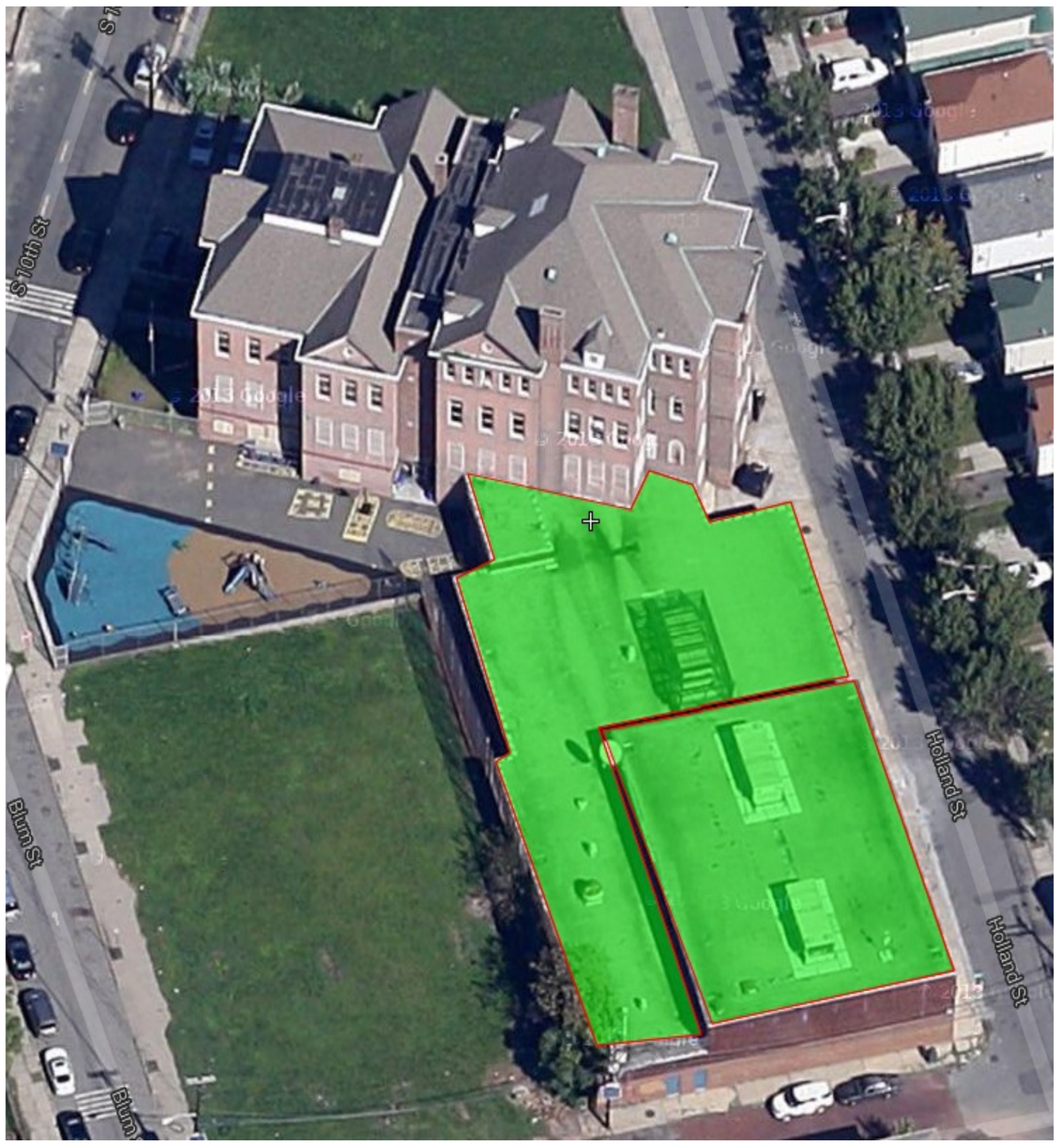
Array Tilt Angle	20	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	180	Enter into PV Watts (default)
Zip Code	07103	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output

143,367 annual kWh calculated in PV Watts program

% Offset Calc

Usage	413,181	(from utilities)
PV Generation	143,367	(generated using PV Watts)
% offset	35%	



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

AC Energy & Cost Savings

Cautions for Interpreting the Results

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

Station Identification

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

PV System Specifications

DC Rating:	110.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	91.3 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0 °
Array Azimuth:	180.0 °

Energy Specifications

Cost of Electricity:	15.0 ¢/kWh

Results

Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	2.65	7685	1152.75
2	3.47	9101	1365.15
3	4.83	13507	2026.05
4	5.28	13845	2076.75
5	5.93	15796	2369.40
6	6.32	15861	2379.15
7	5.87	14929	2239.35
8	5.55	14213	2131.95
9	5.04	12722	1908.30
10	4.14	11187	1678.05
11	2.82	7513	1126.95
12	2.46	7008	1051.20
Year	4.54	143367	21505.05

Output Hourly Performance Data

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

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

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

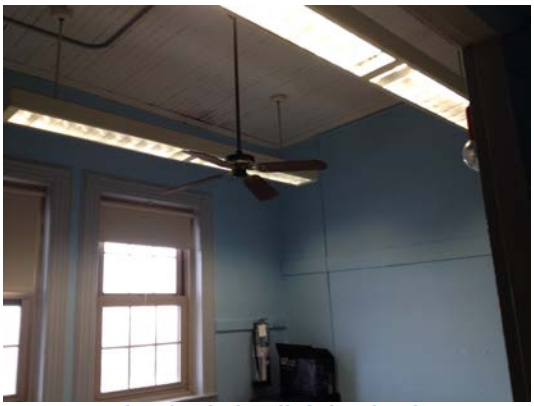
APPENDIX F

Photos

1: Existing door seals

2: Typical steam boiler

3: Existing window AC unit



L1: Example of existing lighting in classroom

L2: Example of existing lighting controls

APPENDIX G

EPA Benchmarking Report

ENERGY STAR® Statement of Energy Performance

29

ENERGY STAR® Score[1]

Harriet Tubman

Primary Property Function: K-12 School
Gross Floor Area (ft²): 57,095
Built: 1870

For Year Ending: April 30, 2013
Date Generated: April 23, 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	Property Owner	Primary Contact
Harriet Tubman 504 South 10th Street Newark, New Jersey 07103	Newark Public Schools 2 Cedar Street Newark, NJ 07102 (____)____-_____	Newark Public Schools 2 Cedar Street Newark, NJ 07102 9737337334 webmaster@nps.k12.nj.us

Property ID: 3603851

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
85.7 kBtu/ft²

Source EUI
154.7 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	3,127,976 (64%)
Electric - Grid (kBtu)	1,767,433 (36%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	71.4
National Median Source EUI (kBtu/ft²)	128.9
% Diff from National Median Source EUI	20%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	390

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

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

Professional Engineer Stamp (if applicable)