THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

LAFAYETTE STREET SCHOOL

205 Lafayette St., Newark NJ 07105

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

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CHA PROJECT NO. 27999

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REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±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
Lafayette Street School	205 Lafayette St., Newark NJ 07105	68,118	1908

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)	Fuel Oil Savings (gal)	Total Savings ($)	Payback (years)
Lafayette Street School	126,538	(25,777)	22,278	67,528	3.5

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 Seals	1,383	210	6.6	0	6.6	Y
2A	Heating Fuel Conversion (Fuel Switch)	48,557	43,390	1.1	0	1.1	Y
2B**	Condensing Boiler Replacement w/ HW Reset	2,903,104	4,638	625.9	12,000	623.3	N
3	Install Piping Insulation	529	180	2.9	0	2.9	Y
4	Window A/C Controllers	1,000	746	1.3	0	1.3	Y
5A	Basic Controls	21,309	2,302	9.3	0	9.3	Y
5B**	Full DDC Controls	250,000	3,970	63.0	0	63.0	N
6	Domestic Hot Water System Improvements	21,139	580	36.5	50	36.4	Y
7	Vending Machine Controls	1,200	2,232	0.5	0	0.5	Y
8	Install Low Flow Plumbing Fixtures	242,860	1,385	175.3	0	175.3	N
L1**	Lighting Replacements / Upgrades	131,696	15,285	8.6	0	8.6	N
L2**	Install Lighting Controls (Occupancy Sensors)	12,150	5,207	2.3	1,575	2.0	N
L3	Lighting Replacements with Controls	143,846	17,889	8.0	1,575	8.0	Y
	Total**	**481,823**	**68,913**	**7.0**	**1,625**	**7.0**	
	Total (Recommended)	**238,963**	**67,528**	**3.5**	**1,625**	**3.5**	

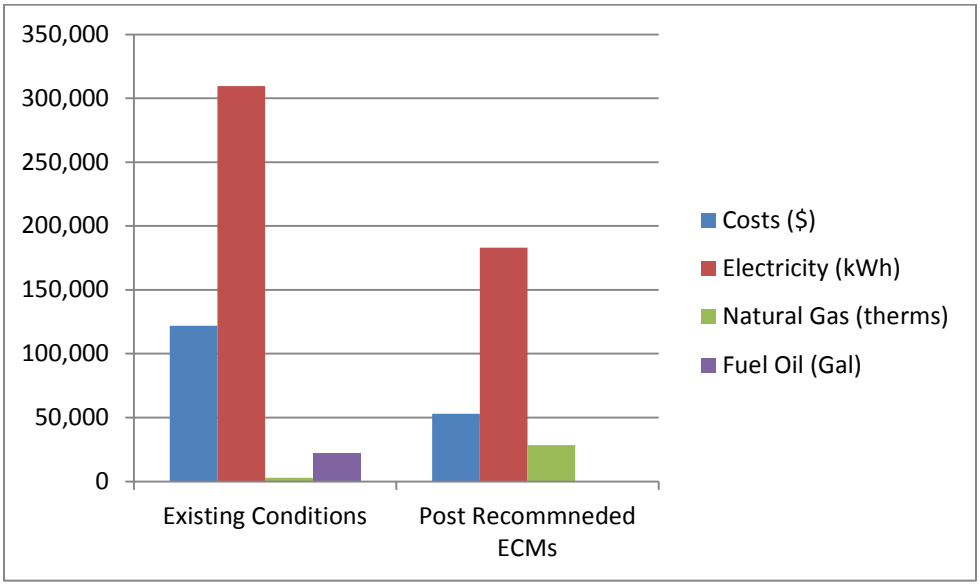
* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 20 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	121,974	53,078	56%
Electricity (kWh)	309,600	183,062	41%
Natural Gas (therms)	2,779	28,556	-938%
Fuel Oil (Gal)	22,278	0	100%
Site EUI (kbtu/SF/Yr)	65.4	51.1	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

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

Building Name: Lafayette Street School (Index No. 77)
Address: 205 Lafayette Street, Newark NJ, 07105
Gross Floor Area: 68,118 Square feet
Number of Floors: 4
Year Built: 1908
Additions: N/A

Description of Spaces: Classrooms, offices, cafeteria, auditorium, gymnasium, library, storage rooms, toilet rooms and mechanical rooms.
Description of Occupancy: The school serves 607 students from Pre-K to 8th grade.
Number of Computers: The school has approximately 50 desktop and laptop computers.
Building Usage: Hours of operation are 7:00 AM – 11:00 PM Monday through Friday, with various after-school activities. Generally 80 hours per week, 10 months per year
Construction Materials: Structural steel framing with concrete and brick exterior walls with no insulation. The interior walls are a combination of brick and plaster.
Roof: Flat roof area is structural steel framing with metal decking and has a black rubber membrane. Pitched portion maybe wood framed construction and has asphalt shingles. The attic was not accessible during the facility visit.
Windows: Aluminum Framed, double pane windows, appear to be in good condition. No Window related ECMs are considered
Exterior Doors: FRP doors having steel frames. In general the seals around the doors appeared to be in poor condition and should be replaced.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Heating is provided by two (2) Superior steam boilers fired on No.2 fuel oil. These boilers were installed in 1974 and are in decent condition Condensate return is collected into a

central tank, mixed with feed water (if necessary) and pumped back to each boiler. The steam pressure is maintained at 1-2 PSIG and is distributed to perimeter steam radiators. Oil is more expensive than natural gas on a per-btu basis; replacing the boiler burners with equivalent natural gas fired burners could save utility cost. This ECM is included.

Furthermore, steam heating is fairly inefficient compared to that of hot water heating when using high efficiency condensing hot water boilers. A calculation for converting the steam system to hot water and installing high efficiency condensing hot water boilers has been evaluated.

Note: The existing steam boilers have surpassed their useful service life according to ASHRAE. CHA has included an ECM to replace the entire heating system with hot water which is shown in Section 5; however if the district does not wish to pursue this ECM and rather replace the boilers in kind (Steam to Steam), the estimated ballpark cost would be $286,000.

Cooling: Only about 5% of the building is cooled (by) using window air conditioners ranging from 5,000 to 24,000 BTU/hr. 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.

Ventilation: This building has no operable mechanical ventilation systems with the exception of the kitchen hood exhaust fan and associated make-up air handling unit, which were not operating at the time of our site visit. The original ventilation system consists of large ventilation shafts equipped with steam coils and steam driven fans to circulate the air. Although the fans have not been active in years, the large shaft steam coils are still supplied with steam. An O & M measure has been included to shut these coils off. The kitchen ventilation system consists of a York air handling unit having a steam coil that is interlocked to a sidewall exhaust fan that ventilates the hood. These fans are controlled by a manual switch and are automatically disabled by a timer, should the kitchen staff forget to shut the fans off.

Exhaust: Toilet room exhaust consists of roof mounted gravity ventilators ducted to each room and operable windows. The kitchen hood has a dedicated exhaust fan, but is not used.

Controls Systems

The original control system appears to be pneumatic; however this system has not been operational for years. A Honeywell programmable boiler controller is connected to the boilers; however they are manually operated when outdoor air temperatures drop below 28F. Classrooms are generally overheated (80-85 F) and teachers regulate the heat by opening or closing the windows. If controls were present in the building, the school would benefit from a reduction in energy consumption associated with heating the building. This ECM is included

Domestic Hot Water Systems

A single Ruud 100 gallon gas fired water heater provides hot water to all toilet room lavatories and kitchen scullery sinks. This water heater was installed in 2007. A fractional horsepower pump re-circulates the hot water as controlled by an aquastat. There is roughly 50 feet of uninsulated domestic hot water piping in the boiler room which results in excessive heat loss in the system. Another way to save energy in the DHW system would be to replace the existing DHW heater with one of smaller storage capacity, but higher recovery rate. Modern high

efficiency condensing domestic hot water heaters provide near instantaneous DHW generation with the least amount of fuel consumption.

Kitchen Equipment

The school has a full cooking kitchen that includes gas fired griddles, steamers and ovens. There is no dishwasher used. Refrigeration equipment includes several side-by-side refrigerator and freezer units. These units appear to be new, energy star rated.

Plumbing Systems

Plumbing fixtures include water closets, urinals, lavatories, mop sinks and kitchen scullery sinks All toilet room fixtures are high flow, having 3.5 GPF flush valves or higher. Lavatory sinks are equipped with metering type faucets. Boiler make-up water may influence higher than normal water usage. 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 vending machines which contribute to the plug load in the building. The installation of vending machine occupancy sensors has been evaluated in an effort to reduce the plug load in the building.

Lighting Systems

The majority of the lighting is T-8 32 watt pendant and troffer fixtures. The auditorium is illuminated by decorative lighting with CFL lamps. The gym is illuminated by similar T-8 lamped pendent mounted fixtures. All lighting is controlled by wall mounted switches or breakers. Custodians on staff noted that the lighting typically remains on through-out the cleaning shift, which ends at 11 pm. Exterior lighting consist of 250W metal halide pole mounted fixtures operated using day-lighting sensors. 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

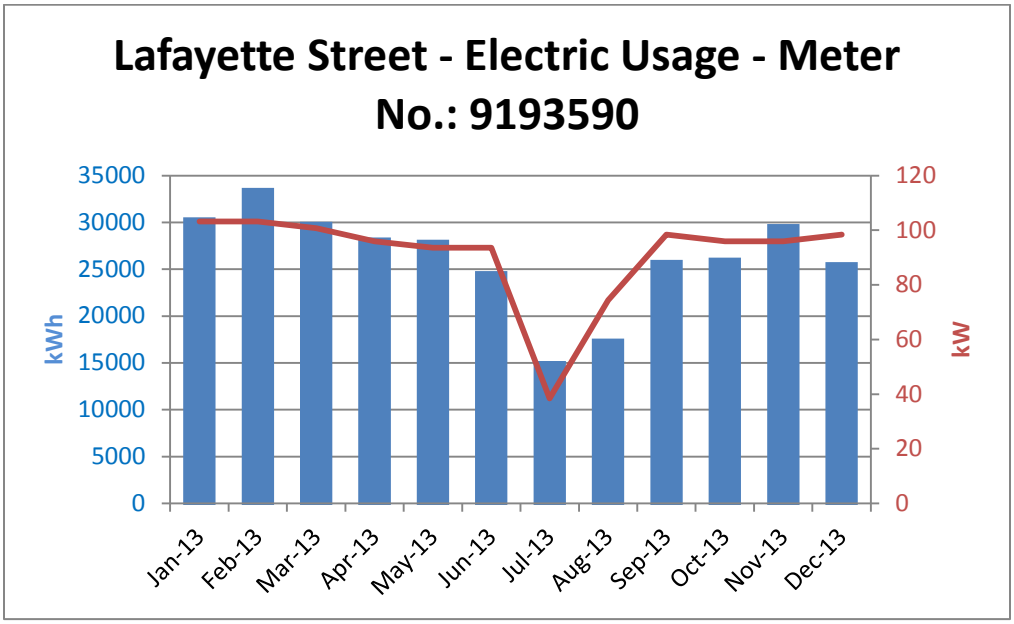
Utilities used by the building are delivered and supplied by the following utility companies:

	Electric	Natural Gas	Fuel Oil
Deliverer	PSEG	PSEG	Varies
Supplier	PSEG	PSEG	Varies

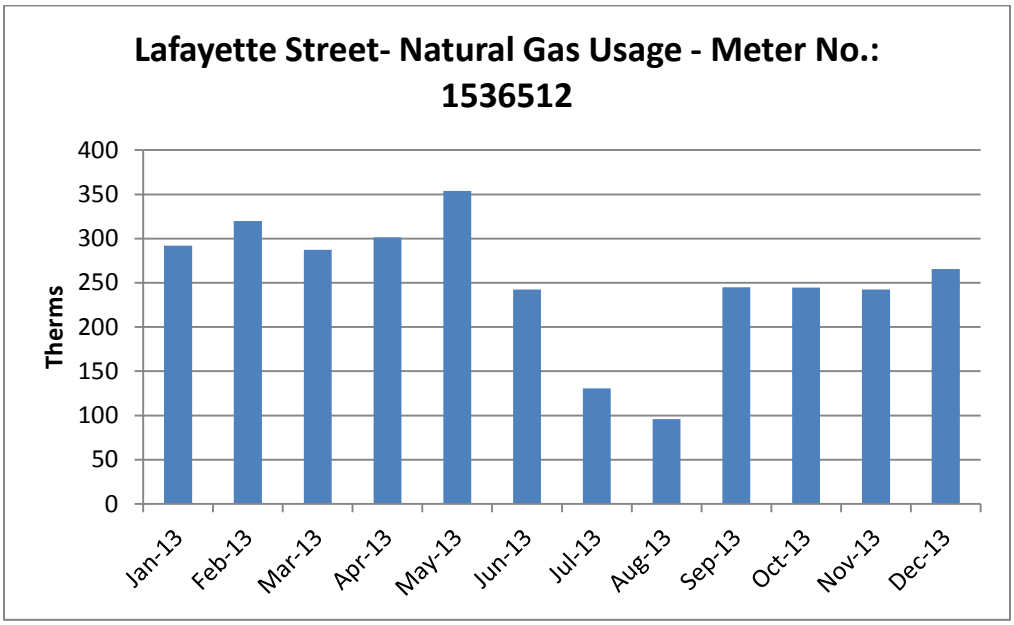
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	309,600	kWh
Annual Cost	46,953	$
Blended Unit Rate	0.15	$/kWh
Supply Rate	0.14	$/kWh
Demand Rate	4.28	$/kW
Peak Demand	103.2	kW
Natural Gas		
Annual Consumption	2,779	Therms
Annual Cost	2,763	$
Unit Rate	0.99	$/therm
Fuel Oil		
Annual Consumption	22,278	Gal
Annual Cost	72,258	$
Unit Rate	3.24	$/gal

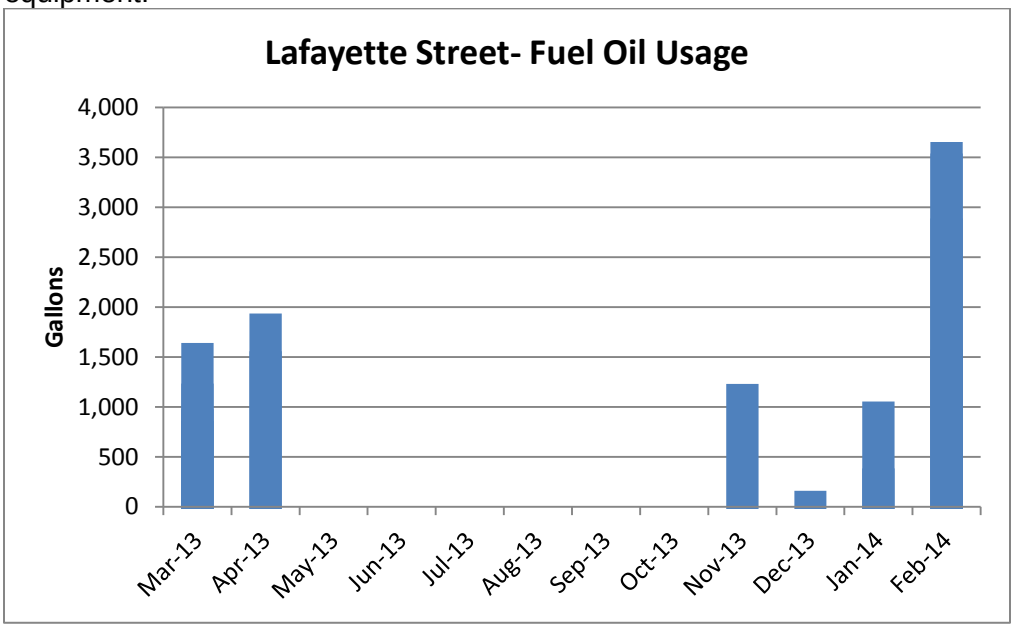
Blended Rate: Average rate charged determined by the annual cost / annual usage
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)



The electricity in the building is fairly typical of what would be expected in a building such as this one; without any significant cooling in the building, the electrical use remains pretty constant throughout the year except in the summer when school is not in session.



The natural gas usage is fairly constant throughout the year, but drops during the summer while no students are present. This is expected as the majority of natural gas is consumed by the domestic hot water heater, with some also used for the kitchen equipment.



Fuel oil is only used by the boilers in the building for space heating. The boilers appear to operate from October – April. The graph above only indicates the months with which oil was purchased, therefore the actual usage might be slightly different.

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

See Appendix A for a detailed utility analysis.

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

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	School Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.14	$0.12	Y
Natural Gas	$/Therm	$0.99	$0.95	Y
Fuel Oil	$/Gal	3.24	$3.62	N

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

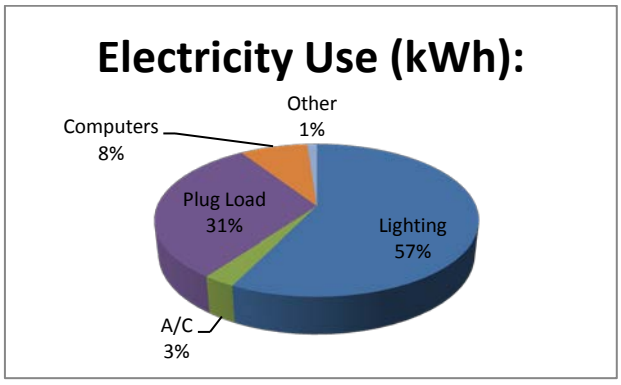
Additional information on selecting a third party energy supplier is available here:

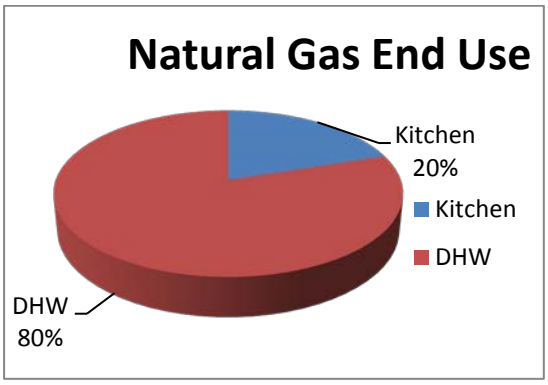
http://www.state.nj.us/bpu/commercial/shopping.html.

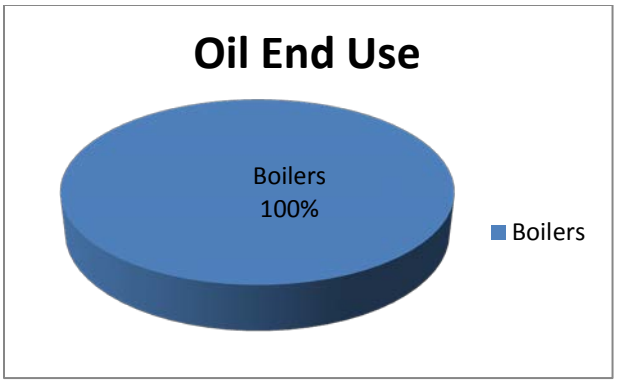
See Appendix A for a list of third-party energy suppliers licensed by the Board of Public Utilities to sell within the building's service area.

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

Site End-Use Utility Profile

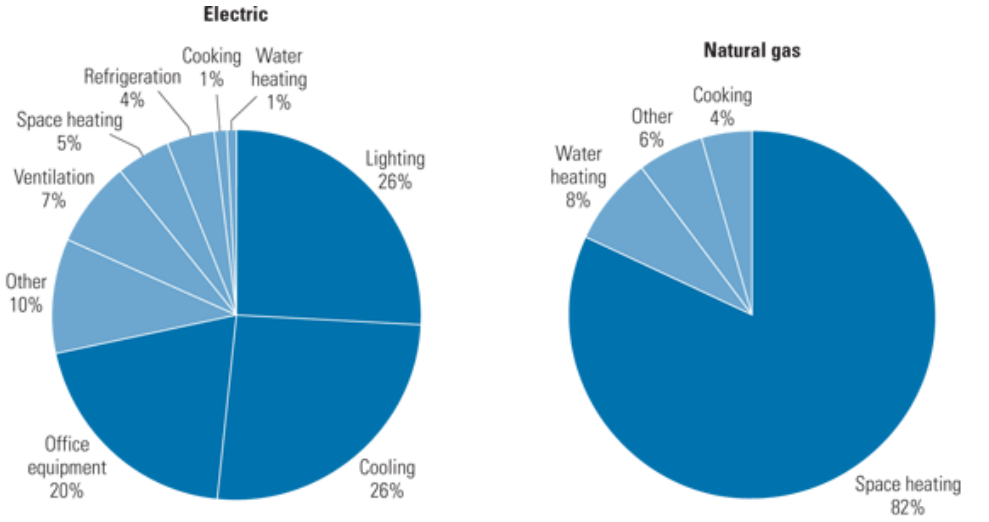






Most of the electricity consumed by educational facilities is used to for lighting, cooling, and plug loads such as computers and copiers; most of the natural gas is used for space heating. Each school's energy profile is different, and the following charts represent typical utility profiles for K-12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

Typical End-Use Utility Profile for Educational Facilities



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

4.0 BENCHMARKING

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

The EPA Portfolio Manager benchmarking tool provides a site and source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/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)
65.4*	38**

* 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

The seals around exterior doors fail over time. This leads to infiltration of unconditioned outside air or exfiltration of conditioned air resulting in increased heating energy usage. 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
1,383	0	0	212	210	6.5	0	6.6	6.6

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

Note: Savings for this measure are presented in natural gas as ECM-2A is recommended (fuel conversion).

This measure is recommended.

5.2.1 ECM-2A Heating Fuel Conversion (Fuel Switch)

The existing burners are No. 2 fuel oil with Hi/Low/Hi operation and produce maximum combustion efficiencies in the 78-80% range. New modulating) natural gas burners are available that minimally operate at 80%, and can operate as high as 85%. For the purpose of this calculation, 85% efficiency is used to remain conservative. No. 2 oil is also significantly more expensive than natural gas on a per-btu basis. This ECM assesses the replacement of the existing No. 2 oil burners with new modulating natural gas fired burners.

To implement this ECM, the old burners would be removed and replaced with new burners. Piping and wiring modifications would be needed.

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

ECM-2A Heating Fuel Conversion (Fuel Switch)

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Fuel Oil	Total				
$	kW	kWh	Therms	Gal	$		$	Years	Years
48,557	0	0	(29,082)	22,278	43,390	(30.1)	0	1.1	1.1

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

This measure is recommended.

5.2.2 ECM-2B Convert Steam System to Hot Water

This ECM evaluates the conversion of the existing oil fired steam boilers to high efficiency condensing hot water boilers which will also enable additional savings through hot water temperature reset based on outdoor air temperature.

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-2B Convert Steam System to Hot Water

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,903,104	0	0	4,685	4,638	(0.8)	12,000	625.9	623.3

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

Note: Savings for this measure are shown in natural gas; as a fuel switch would be recommended in addition to converting the steam system to hot water.

This measure is not recommended in lieu of ECM-2A and due to the high capital cost as well as long payback period. The steam system should be replaced with a hydronic system if a major system component fails in the future; such as distribution piping.

5.3 ECM-3 Install Insulation on Piping

It was observed that some domestic hot water piping in the boiler room was not insulated which results in undesired heat loss from the bare copper pipes.

Implementation of this ECM will entail wrapping the existing bare metal pipe with an approved high performance fiberglass insulation jacketing material.

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

ECM-3 Install Insulation on Piping

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
529	0	0	182	180	15.7	0	2.9	2.9

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

Note: Savings for this measure are presented in natural gas as ECM-2A is recommended (fuel conversion).

This measure is recommended.

5.4 ECM-4 Install Window A/C Controller

Only about 5% of the building is cooled by window a/c units which can be occasionally left on by occupants when they leave the room.

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-4 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
1,000	0	4,909	0	746	10.2	0	1.3	1.3

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

This measure is recommended.

5.5.1 ECM-5A Install Basic Controls

The building uses steam boilers that are currently controlled manually by the building operators. Steam pressure is maintained 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.

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	2,325	2,302	6.1	0	9.3	9.3

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

Note: Savings for this measure are presented in natural gas as ECM-2A is recommended (fuel conversion).

This measure is recommended.

5.5.2 ECM-5B Install 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, economizer (free cooling), demand control ventilation, exhaust fan TOD optimization, and holiday TOD optimization. It also allows for remote access and control of the building's systems.

Energy savings are seen from temperature reduction during the day and night as well as other controls sequences mentioned above.

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

ECM-5B Install 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
250,000	0	0	4,010	3,970	0.0	0	63.0	63.0

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

Note: Savings for this measure are presented in natural gas as ECM-2A is recommended (fuel conversion).

This measure is not recommended in lieu of ECM-5A and due to the long payback associated with this measure.

5.6 ECM-6 Domestic Hot Water System Improvements

The existing domestic hot water heating system consists of one (1) natural gas fired 100 gallon tank type water heater. The amount of stored water is oversized for this type of school which only uses hot water at hand sinks.

Implementation of this ECM will entail replacing the existing DHW heater with a high efficiency condensing water heater in its place. The tank size of the existing system will be reduced which will result in a combined savings from reducing the storage losses as well as reducing the overall fuel consumption.

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

ECM-6 Domestic Hot Water System Improvements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
21,139	0	0	586	580	0.3	50	36.5	36.4

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

This measure is recommended.

5.7 ECM-7 Install Vending Misers

The building has four (4) cold beverage and two (2) snack vending machines in the school.

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

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

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

ECM-7 Install Vending Misers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,200	0	14,685	0	2,232	26.9	0	0.5	0.5

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

This measure is recommended.

5.8 ECM-8 Install Low Flow Plumbing Fixtures

This ECM evaluates replacing the existing high flow urinals and toilets with low flow equivalents. The faucets in this school are high flow but have metering-type faucets which only allow water flow for a few seconds; therefore are not recommended for replacement.

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, will conserve water which will result in lower annual water and sewer charges.

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

ECM-8 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water	Total				
$	kW	kWh	kGal	$		$	Years	Years
242,860	0	0	183	1,385	(0.9)	0	175.3	175.3

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

This measure is not recommended due to the high capital cost and long payback period.

5.9.1 ECM-L1 Lighting Replacement / Upgrades

The existing lighting system consists of mostly T8 linear fluorescent fixtures which until recently represented the most efficient lighting technology available. Exterior lighting includes 250W wall mounted area light fixtures. Recent technological improvements in light emitting diode (LED) technologies have driven down the initial costs making it a viable option for installation.

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

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

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
131,696	31.8	89,815	0	15,285	0.2	0	8.6	8.6

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

This measure is not recommended in lieu of ECM L3.

5.9.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Presently, all interior lighting fixtures are controlled 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 5.9.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
12,150	0	34,258	0	5,207	3.3	1,575	2.3	2.0

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

This measure is not recommended in lieu of ECM L3.

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

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

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
143,846	31.8	106,944	0	17,889	0.2	1,575	8.0	8.0

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

This measure is recommended.

5.10 Additional O&M Opportunities

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

- Install Covers on Window Air Conditioners
- Clean Window AC filters before each season
- Perform a steam trap assessment yearly to ensure steam traps are functioning properly.
- Shut the steam off to the ventilation shaft coils.
- 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 when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance
- Educate students and staff about how their behavior affects energy use. Create student energy patrols to monitor and inform administration when energy is being wasted.
- During the winter, Custodians should ensure all windows are closed as part of cleaning routine

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

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

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

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

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

The building 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% IRR for the Pay for Performance Program, all ECM's identified in this report have been included in the incentive calculations. The results for the building are shown in Appendix C, along with more detailed program information.

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)
3,728	20

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of $155/SREC for 2013 and this number was utilized in the cash flow for this report.

The system costs for PV installations were derived from recent solar contractor budgetary pricing in the state of New Jersey and include the total cost of the system installation (PV panels, inverters, wiring, ballast, controls). The cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a typical system. There are other considerations that have not been included in this pricing, such as the condition of the roof and need for structural reinforcement. Photovoltaic systems can be ground mounted if the roof is not suitable, however, this installation requires a substantial amount of open property (not wooded) and underground wiring, which adds more cost. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will most likely need to be replaced during the useful life of the PV system.

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

Photovoltaic (PV) Rooftop Solar Power Generation – 20 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
80,000	20	24,979	0	3,747	3,872	21.4	10.5	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.

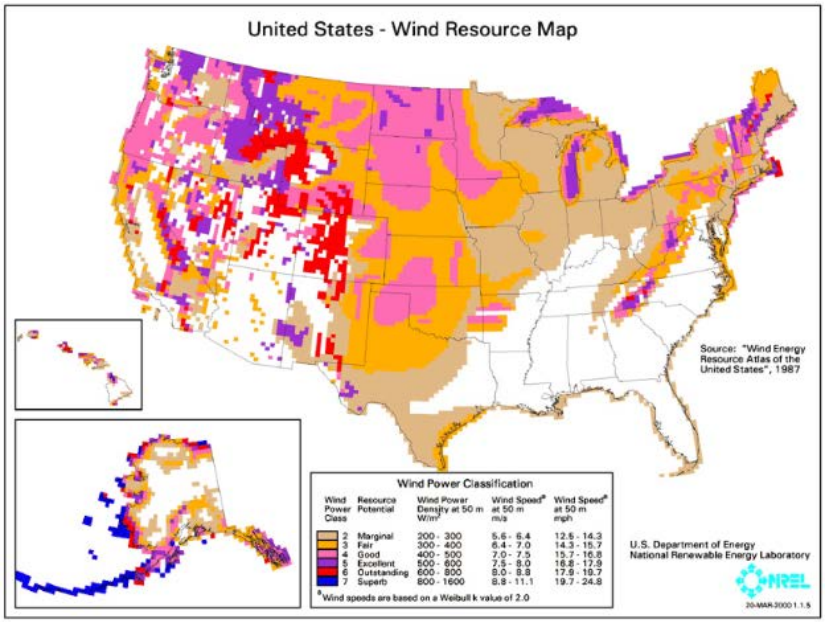
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). 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 because the location does not have good wind resource and is located in an urban environment.

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
103.2	38.4	91.0	Y	Y

This measure is not recommended because the building does not have adequate load to meet the required minimum load reduction.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of $67,528/yr with an overall payback of 3.5 years, if the recommended ECMs are implemented.

The potential annual energy, cost savings and payback are shown in the following table.

Electric Savings (kWh)	Natural Gas Savings (therms)	Fuel Oil Savings (Gal)	Total Savings ($)	Payback (years)
126,538	(25,777)	22,278	67,528	3.5

The following projects should be considered for implementation:

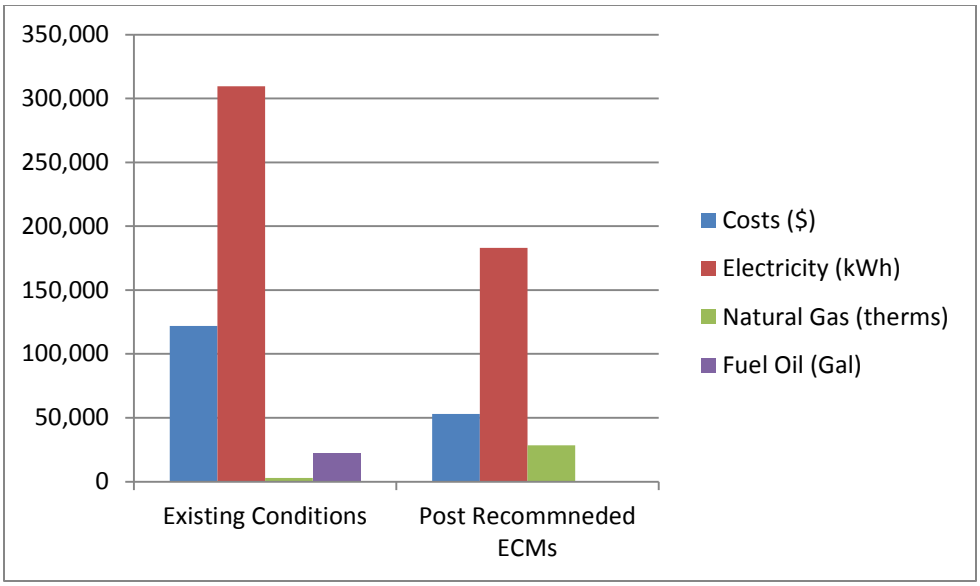
- Replace Door Seals
- Heating Fuel Conversion (Fuel Switch)
- Install Piping Insulation
- Window A/C Controllers
- Basic Controls
- Domestic Hot Water System Improvements
- Vending Machine Controls
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 20 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	121,974	53,078	56%
Electricity (kWh)	309,600	183,062	41%
Natural Gas (therms)	2,779	28,556	-938%
Fuel Oil (Gal)	22,278	0	100%
Site EUI (kbtu/SF/Yr)	65.4	51.1	



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

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

Newark Public Schools LGEA
CHA Project# 27999

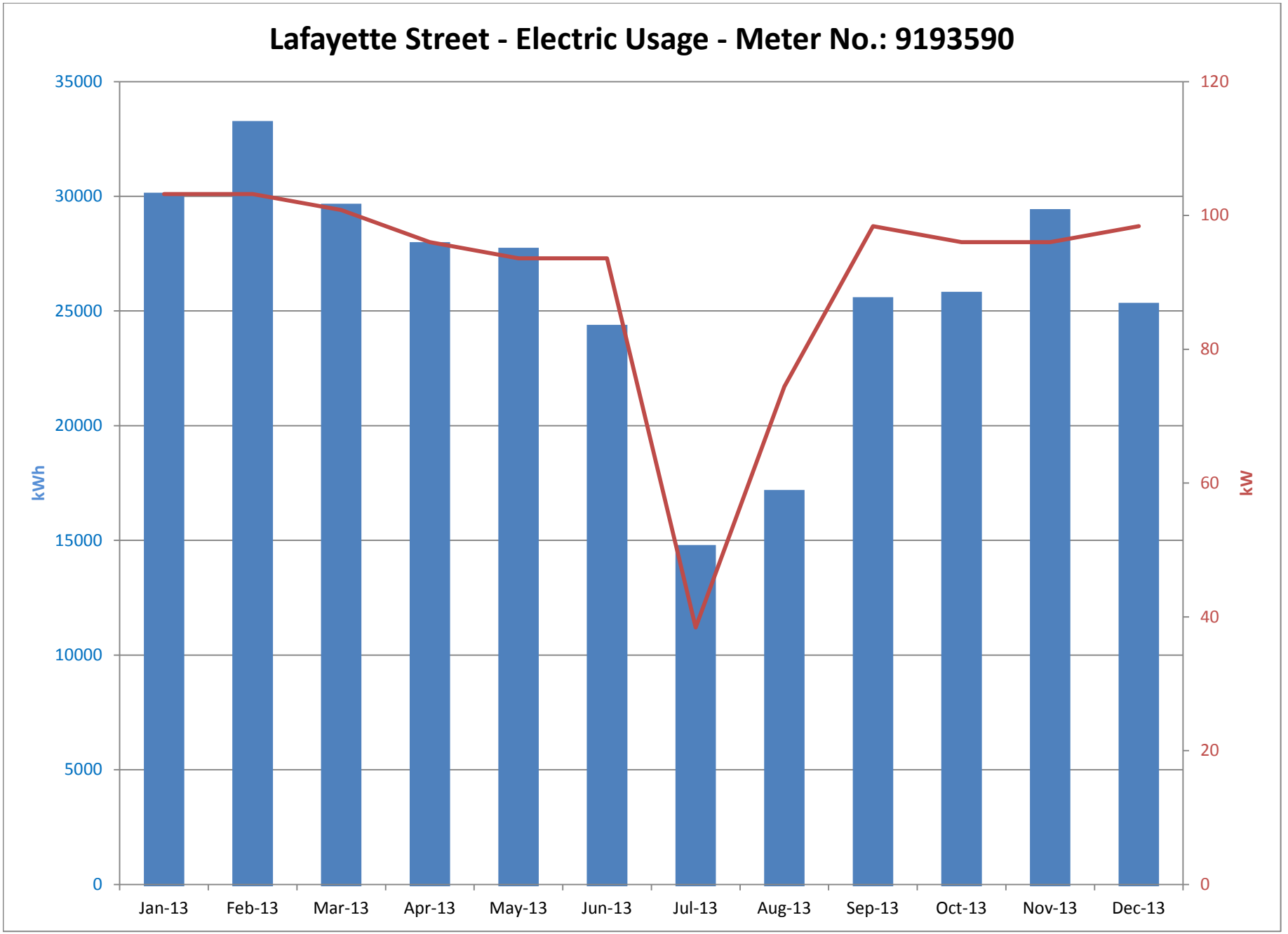
Lafayette Street - Electric Usage

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Cha	Delivery Charge	Demand Charge	Consumption ($)	Blended Rate ($/kWh)	Consumption Rate ($/kWh)	Demand Rate ($/kW)
1/5/2012	2/2/2012	29520	93.6	5,475.00	0	950.85	396.54	5078.46	0.19	0.17	4.24
2/3/2012	3/5/2012	30240	93.6	5,610.00	0	973.94	396.54	5213.46	0.19	0.17	4.24
3/6/2012	4/2/2012	26400	98.4	4,895.00	0	850.82	416.87	4478.13	0.19	0.17	4.24
4/3/2012	5/3/2012	23760	96	4,405.00	0	766.17	406.7	3998.3	0.19	0.17	4.24
5/4/2012	6/4/2012	26160	91.2	4,855.00	0	1,729.00	386.37	4468.63	0.19	0.17	4.24
6/5/2012	7/3/2012	22800	91.2	4,233.90	2,215.07	1,632.46	386.37	3847.53	0.19	0.17	4.24
7/4/2012	8/2/2012	16320	48	3,027.36	1,788.48	1,035.53	203.35	2824.01	0.19	0.17	4.24
8/3/2012	8/30/2012	14400	45.6	2,739.79	1,606.03	940.58	193.18	2546.61	0.19	0.18	4.24
8/31/2012	10/2/2012	28080	96	3,937.98	2,582.01	949.26	406.71	3531.27	0.14	0.13	4.24
10/3/2012	11/2/2012	26640	93.6	3,776.75	2,485.53	894.68	396.54	3380.21	0.14	0.13	4.24
11/3/2012	12/3/2012	22320	98.4	3,301.11	2,137.25	746.99	416.87	2884.24	0.15	0.13	4.24
12/4/2012	1/3/2013	25680	98.4	3,609.77	2,331.81	860.67	417.29	3192.48	0.14	0.12	4.24
1/4/2013	2/1/2013	30000	103.2	4,153.15	2,689.72	1,021.69	441.74	3711.41	0.14	0.12	4.28
2/2/2013	3/5/2013	33120	103.2	4,488.66	2,982.10	1,064.81	441.75	4046.91	0.14	0.12	4.28
3/6/2013	4/4/2013	29520	100.8	4,118.87	2,737.87	949.53	431.47	3687.4	0.14	0.12	4.28
4/5/2013	5/3/2013	27840	96	3,973.91	2,667.25	895.73	410.93	3562.98	0.14	0.13	4.28
5/4/2013	6/4/2013	27600	93.6	4,910.81	2,691.37	1,818.79	400.65	4510.16	0.18	0.16	4.28
6/5/2013	7/3/2013	24240	93.6	4,566.69	2,435.22	1,730.82	400.65	4166.04	0.19	0.17	4.28
7/4/2013	8/2/2013	14640	38.4	2,782.88	1,715.49	903.02	164.37	2618.51	0.19	0.18	4.28
8/3/2013	9/4/2013	17040	74.4	3,143.50	1,538.71	1,286.32	318.47	2825.03	0.18	0.17	4.28
9/5/2013	10/2/2013	25440	98.4	3,588.71	2,297.23	870.27	421.21	3167.5	0.14	0.12	4.28
10/3/2013	10/31/2013	25680	96	3,610.71	2,318.90	880.88	410.93	3,199.78	0.14	0.12	4.28
11/1/2013	12/3/2013	29280	96	4,058.68	2,643.98	1,003.77	410.93	3647.75	0.14	0.12	4.28
12/4/2013	1/3/2014	25200	98.4	3,556.60	2,275.56	859.84	421.2	3135.4	0.14	0.12	4.28

Lafayette Street		Start Date	End Date	Months
205 Lafayette St., 07105		1/5/2012	1/3/2014	23
Account Number	2147483647			
Meter Number	9193590			

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

Total Usage	309,600	**kwh**
Total Charges	$46,953	
Blended Rate	$0.152	**$/kWh**
Consumption Rat	$0.137	**$/kWh**
Demand Rate	$4.28	**$/kW**
Max Demand	103.2	**kW**
Min Demand	38.4	**kW**
Avg Demand	91.0	**kW**


Lafayette Street - Electric Usage - Meter No.: 9193590
kWh
kW
35000
30000
25000
20000
15000
10000
5000
0
120
100
80
60
40
20
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# 27999

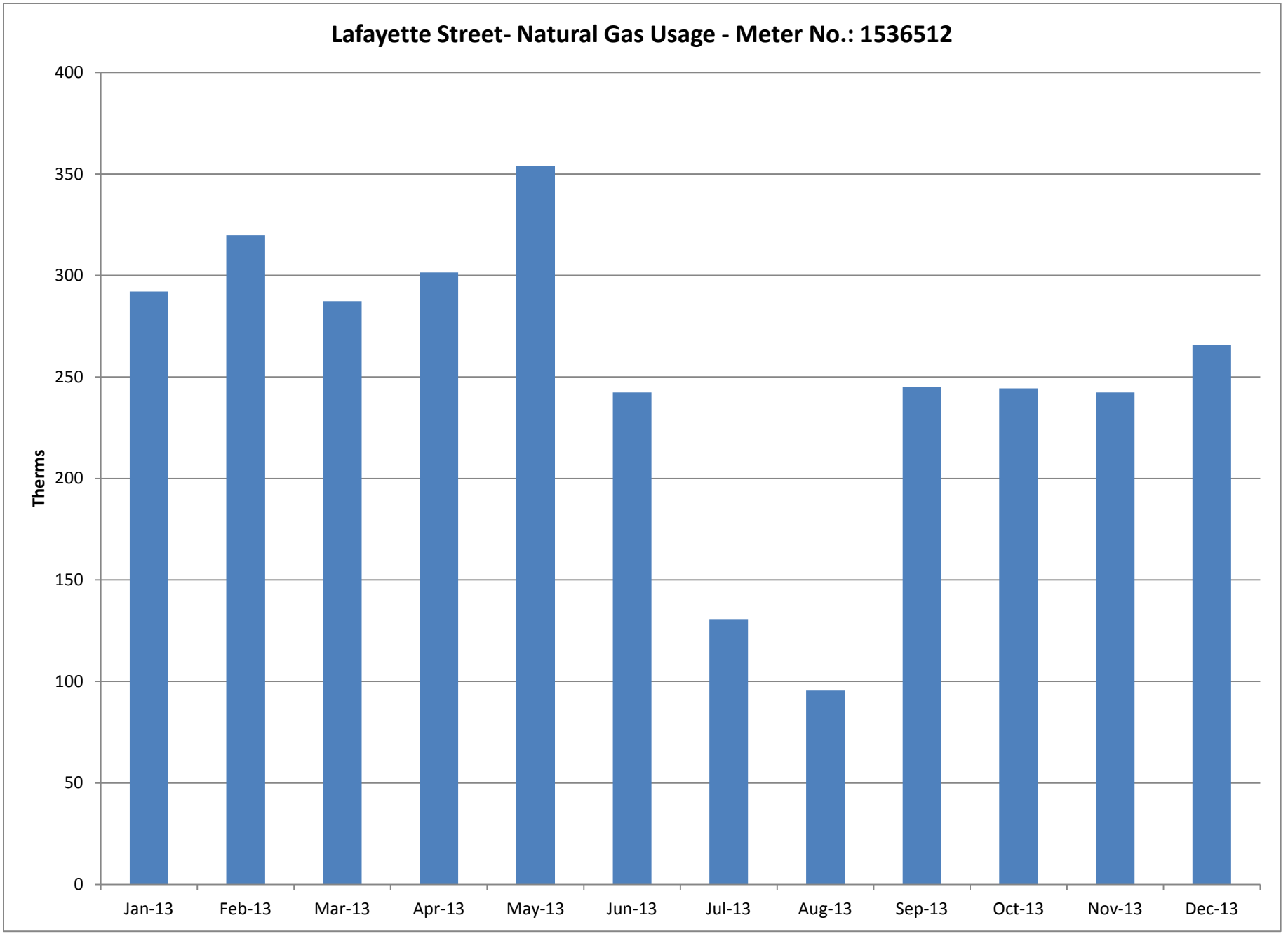
Lafayette Street - Natural Gas Usage

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	$/therm
42	Lafayette Street	6932139200	1536512	1/5/2012	2/2/2012	388.71	382.47	0.98
42	Lafayette Street	6932139200	1536512	2/3/2012	3/5/2012	379.79	348.48	
42	Lafayette Street	6932139200	1536512	3/6/2012	4/2/2012	211.81	185.1	0.87
42	Lafayette Street	6932139200	1536512	4/3/2012	5/3/2012	239.16	201.64	0.84
42	Lafayette Street	6932139200	1536512	5/4/2012	6/4/2012	225.81	188.56	0.84
42	Lafayette Street	6932139200	1536512	6/5/2012	7/3/2012	159.79	143.39	0.90
42	Lafayette Street	6932139200	1536512	7/4/2012	8/2/2012	98.74	96.33	0.98
42	Lafayette Street	6932139200	1536512	8/3/2012	8/30/2012	92.35	93.03	1.01
42	Lafayette Street	6932139200	1536512	8/31/2012	10/2/2012	222.48	200.42	0.90
42	Lafayette Street	6932139200	1536512	10/3/2012	11/2/2012	243.82	240.81	0.99
42	Lafayette Street	6932139200	1536512	11/3/2012	12/3/2012	395.52	413.97	1.05
42	Lafayette Street	6932139200	1536512	12/4/2012	1/3/2013	265.19	275.76	1.04
42	Lafayette Street	6932139200	1536512	1/4/2013	2/1/2013	292.1	295.19	1.01
42	Lafayette Street	6932139200	1536512	2/2/2013	3/5/2013	319.82	324.63	1.02
42	Lafayette Street	6932139200	1536512	3/6/2013	4/4/2013	287.33	278.53	0.97
42	Lafayette Street	6932139200	1536512	4/5/2013	5/3/2013	301.48	303.28	1.01
42	Lafayette Street	6932139200	1536512	5/4/2013	6/4/2013	353.97	360.46	1.02
43	Lafayette Street	6932139200	1536512	6/5/2013	7/3/2013	242.34	247.10	1.02
42	Lafayette Street	6932139200	1536512	7/4/2013	8/2/2013	130.7	133.73	1.02
42	Lafayette Street	6932139200	1536512	8/3/2013	9/4/2013	95.82	97.76	1.02
42	Lafayette Street	6932139200	1536512	9/5/2013	10/2/2013	244.86	234.66	0.96
42	Lafayette Street	6932139200	1536512	10/3/2013	10/31/2013	244.41	237.68	0.97
42	Lafayette Street	6932139200	1536512	11/1/2013	12/3/2013	242.41	230.84	0.95
42	Lafayette Street	6932139200	1536512	12/4/2013	1/3/2014	265.7	266.47	1.00

		Start Date	End Date	# Months
Lafayette Street				
Account Number	6932139200	1/5/2012	1/3/2014	23
Meter Number	1536512			

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

Annual Usage	3,021	**Therms**
Annual Cost	$3,010	
Rate	$1.00	**$/Therm**


Lafayette Street- Natural Gas Usage - Meter No.: 1536512
Therms
400
350
300
250
200
150
100
50
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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Lafayette Street - Fuel Oil Usage

Index No	Current Name	Address NJIT PSS	Ticket Number	Delivery Date	Gallons	Delivery $	$/Gallon
42	Lafayette Street	205 Lafayette St., 07105	74759342	11/2/2011	4,007.00	12,658.00	3.16
42	Lafayette Street	205 Lafayette St., 07105	74761419	11/22/2011	1,502.00	4,650.00	3.10
42	Lafayette Street	205 Lafayette St., 07105	74762748	12/9/2011	1,500.00	4,543.00	3.03
42	Lafayette Street	205 Lafayette St., 07105	74764071	12/20/2011	1,768.00	5,106.00	2.89
42	Lafayette Street	205 Lafayette St., 07105	74765165	12/30/2011	1,414.00	4,318.00	3.05
42	Lafayette Street	205 Lafayette St., 07105	74765973	1/6/2012	1,500.00	4,805.00	3.20
42	Lafayette Street	205 Lafayette St., 07105	74766801	1/20/2012	1,622.00	5,169.00	3.19
42	Lafayette Street	205 Lafayette St., 07105	7476801	1/23/2012	2,499.00	7,911.00	3.17
42	Lafayette Street	205 Lafayette St., 07105	74768431	1/30/2012	1,125.00	3,631.00	3.23
42	Lafayette Street	205 Lafayette St., 07105	74769036	2/3/2012	500	1,603.00	3.21
42	Lafayette Street	205 Lafayette St., 07105	74769972	2/14/2012	2,200.00	7,327.00	3.33
42	Lafayette Street	205 Lafayette St., 07105	74770931	2/21/2012	1,597.00	5,323.00	3.33
42	Lafayette Street	205 Lafayette St., 07105	74772139	2/28/2012	1,200.00	4,112.00	3.43
42	Lafayette Street	205 Lafayette St., 07105	74772771	3/6/2012	1,013.00	3,408.00	3.36
42	Lafayette Street	205 Lafayette St., 07105	74773344	3/27/2012	1,500.00	5,017.00	3.34
42	Lafayette Street	205 Lafayette St., 07105	74775953	4/17/2012	954	3,083.00	3.23
42	Lafayette Street	205 Lafayette St., 07105	74776630	10/16/2012	1,600.00	5,481.00	3.43
42	Lafayette Street	205 Lafayette St., 07105	74788530	11/7/2012	1,600.00	5,195.00	3.25
42	Lafayette Street	205 Lafayette St., 07105	74790087	11/21/2012	1,400.00	4,820.00	3.44
42	Lafayette Street	205 Lafayette St., 07105	74790790	11/28/2012	1,200.00	4,115.00	3.43
42	Lafayette Street	205 Lafayette St., 07105	74791467	12/5/2012	1,040.00	3,359.00	3.23
42	Lafayette Street	205 Lafayette St., 07105	74792148	12/11/2012	985	3,092.00	3.14
42	Lafayette Street	205 Lafayette St., 07105	74792672	12/18/2012	1,130.00	3,600.00	3.19
42	Lafayette Street	205 Lafayette St., 07105	74794444	1/2/2013	2,000.00	6,335.00	3.17
42	Lafayette Street	205 Lafayette St., 07105	74795222	1/8/2013	1,860.00	5,933.00	3.19
42	Lafayette Street	205 Lafayette St., 07105	74796021	1/15/2013	109	368	3.38
42	Lafayette Street	205 Lafayette St., 07105	74796925	1/23/2013	1,658.00	5,579.00	3.36
42	Lafayette Street	205 Lafayette St., 07105	74798044	1/29/2013	1,022.00	3,442.00	3.37
42	Lafayette Street	205 Lafayette St., 07105	74799030	2/5/2013	1,943.00	6,768.00	3.48
42	Lafayette Street	205 Lafayette St., 07105	74800051	2/12/2013	942	3,330.00	3.54
42	Lafayette Street	205 Lafayette St., 07105	74800900	2/19/2013	2,268.00	7,950.00	3.51
42	Lafayette Street	205 Lafayette St., 07105	74801872	2/26/2013	1,201.00	4,075.00	3.39
42	Lafayette Street	205 Lafayette St., 07105	74802603	3/6/2013	1,180.00	3,855.00	3.27
42	Lafayette Street	205 Lafayette St., 07105	74803537	3/12/2013	1,587.00	5,199.00	3.28
42	Lafayette Street	205 Lafayette St., 07105	74804382	3/19/2013	926	2,982.00	3.22
42	Lafayette Street	205 Lafayette St., 07105	74805196	3/26/2013	806	2,540.00	3.15
42	Lafayette Street	205 Lafayette St., 07105	74805993	4/3/2013	1,883.00	6,127.00	3.25
42	Lafayette Street	205 Lafayette St., 07105	74807498	4/23/2013	1,504.00	4,414.00	2.93
42	Lafayette Street	205 Lafayette St., 07105	74821824	11/26/2013	1,177.00	3,710.00	3.15
42	Lafayette Street	205 Lafayette St., 07105	74823278	12/10/2013	108	340	3.15
42	Lafayette Street	205 Lafayette St., 07105	74825655	1/7/2014	332	1,031.00	3.11
42	Lafayette Street	205 Lafayette St., 07105	74827679	1/15/2014	332	1,032.00	3.11
42	Lafayette Street	205 Lafayette St., 07105	74828581	1/25/2014	1,000.00	3,294.00	3.29
42	Lafayette Street	205 Lafayette St., 07105	74830809	2/5/2014	2,835.00	9,517.00	3.36
42	Lafayette Street	205 Lafayette St., 07105	74832311	2/11/2014	3,600.00	11,780.00	3.27
42	Lafayette Street	205 Lafayette St., 07105	74833457	2/18/2014	3,486.00	11,464.00	3.29

Newark Public Schools LGEA
CHA Project# 27999

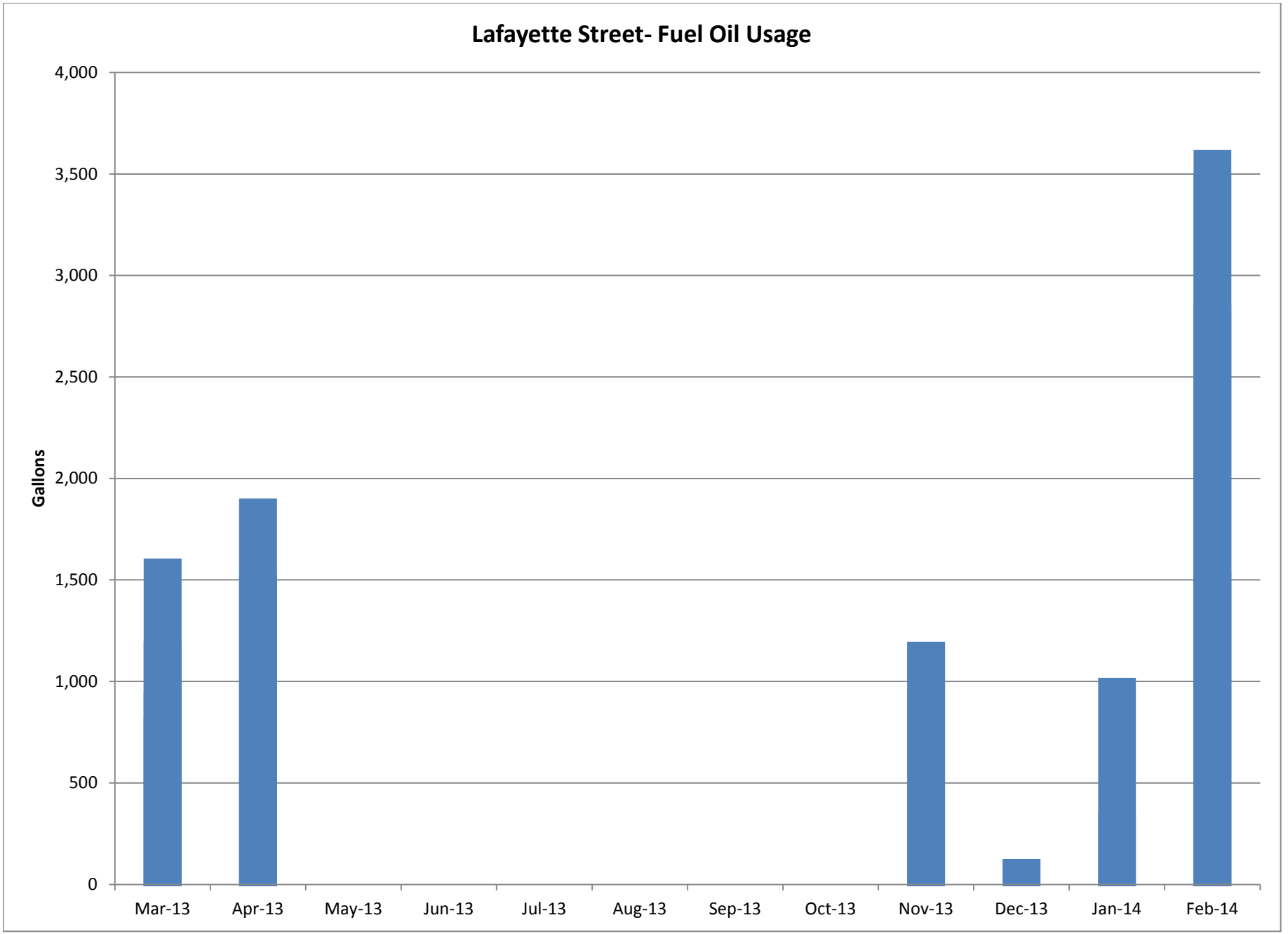
Lafayette Street - Fuel Oil Usage

42	Lafayette Street	205 Lafayette St., 07105	74834303	2/26/2014	1,522.00	4,973.00	3.27

Lafayette Street		Start Date	End Date	# Months
Address	205 Lafayette St., 07105	11/2/2011	2/26/2014	27

FUEL OIL USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING: 2/26/2014

Annual Usage	22,278	**Gallons**
Annual Cost	$72,258	
Rate	$3.24	**$/Gallon**


Lafayette Street- Fuel Oil Usage
Gallons
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14

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 Schools
CHA Project# 27999
Lafayette Street 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)
B-1	1	Superior	N4AA5280A	7570-12729	Steam Boiler / Oil	8088 LB/Hr	Boiler Room	School	1908	0
B-2	1	Superior	N4AA5280A	7544-12707	Steam Boiler / Oil	8088 LB/Hr	Boiler Room	School	1908	0
DHW Heater	1	Rheem-Ruud	G100-200	URNG 1100G03C47	DHW Heater	100 Gal	Boiler Room	TR Sinks	1995	0
DHW Storage Tank	1	AO Smith	TJV 120M	1239M001052	DHW Tank	119 Gal	Boiler Room	TR Sinks	Not Installed Yet	0
MUA-1	1	York	CS113SVLP	92-804431A	Makeup Air Handler	Est 1 HP SF	Basement	Auditorium	1992	0
MUA-2	1	York	Unknown	NA	Makeup Air Handler	Est 1 HP SF	Basement	Kitchen	1992	0
Window A/C	6	Various	Various	NA	Air Conditioner	18,000 BTU / 9 EER	Various	Offices	Various	

Energy Audit of Newark Public Schools - Lafayette Street Elementary School
CHA Project No.27999
Existing Lighting & Audit Input

Cost of Electricity: **$0.137** **$/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
50LED	401	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	World Language	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	Grade 7 Math	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	403	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	8th Grade Writing	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	Reading Room	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	407	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	409	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
105LED	Gymnasium	Gymnasium	3	W 32 F 1	F41LL	32	0.10	SW	1600	154	NONE	
105LED	Gymnasium	Gymnasium	12	W 32 F 1	F41LL	32	0.38	SW	1600	614	NONE	
105LED	Gym Back Room	Storage	2	W 32 F 1	F41LL	32	0.06	SW	3200	205	NONE	
50LED	Gym Office	Office	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	3000	360	NONE	
105LED	Gym Office Restroom	Restroom	1	W 32 F 1	F41LL	32	0.03	SW	4300	138	NONE	
50LED	413	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	411	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
105LED	Boys Room	Restroom	2	W 32 F 1	F41LL	32	0.06	SW	4300	275	NONE	
105LED	Restroom	Restroom	1	W 32 F 1	F41LL	32	0.03	SW	4300	138	NONE	
18LED	Hallway	Hallways	13	T 32 R F 4 (ELE)	F44ILL	112	1.46	SW	6240	9,085	NONE	
40LED	Stairwell	Hallways	6	T 32 R F 2 (ELE)	F42LL	60	0.36	SW	6240	2,246	NONE	
105LED	Stairwell	Hallways	3	W 32 F 1	F41LL	32	0.10	SW	6240	599	NONE	
18LED	Guidance	Office	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	3000	672	NONE	
50LED	312	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	314	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	310 Computer	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	318 Computer	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	313	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	311	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
105LED	Boys Room	Restroom	3	W 32 F 1	F41LL	32	0.10	SW	4300	413	NONE	
105LED	Girls Room	Restroom	3	W 32 F 1	F41LL	32	0.10	SW	4300	413	NONE	
105LED	Restroom	Restroom	1	W 32 F 1	F41LL	32	0.03	SW	4300	138	NONE	
18LED	Hallway	Hallways	16	T 32 R F 4 (ELE)	F44ILL	112	1.79	SW	6240	11,182	NONE	
50LED	309	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	307	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	305	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	303	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	306	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	304	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	Custodial	Custodial	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	2125	128	NONE	
50LED	302	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	301	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
267	Auditorium	Auditorium	9	CFL Chandelier	CF26/6-L	162	1.46	SW	1200	1,750	NONE	
105LED	Backstage	Auditorium	4	W 32 F 1	F41LL	32	0.13	SW	1200	154	NONE	
105LED	Back Left	Auditorium	1	W 32 F 1	F41LL	32	0.03	SW	1200	38	NONE	
105LED	Back Right	Auditorium	1	W 32 F 1	F41LL	32	0.03	SW	1200	38	NONE	
50LED	201	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	203	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	Main Office	Office	12	W 32 P F 2 (ELE)	F42LL	60	0.72	SW	3000	2,160	NONE	
50LED	Principals Office	Office	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	3000	360	NONE	
5LED	Faculty Lounge	Office	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.12	SW	3000	360	NONE	
18LED	Faculty Lounge	Office	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3000	3,024	NONE	
5LED	Faculty Mens Room	Restroom	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.06	SW	4300	258	NONE	
5LED	Faculty Womens Room	Restroom	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.06	SW	4300	258	NONE	
50LED	207	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	209	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	208	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	214	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	210	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
50LED	212	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	215	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
18LED	Vice Principal	Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	3000	1,008	NONE	
50LED	213	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	Boys Room	Restroom	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	4300	516	NONE	
50LED	Girls Room	Restroom	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	4300	516	NONE	
50LED	211	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024	C-OCC	
50LED	Restroom	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	4300	258	NONE	
105LED	Exit	Hallways	1	W 32 F 1	F41LL	32	0.03	SW	6240	200	NONE	
105LED	Cafeteria	Cafeteria	42	W 32 F 1	F41LL	32	1.34	SW	2000	2,688	NONE	
105LED	Kitchen Storage	Cafeteria	3	W 32 F 1	F41LL	32	0.10	SW	2000	192	NONE	
50LED	110	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	
18LED	Hallway	Hallways	15	T 32 R F 4 (ELE)	F44ILL	112	1.68	SW	6240	10,483	NONE	
50LED	108	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592	C-OCC	

Energy Audit of Newark Public Schools - Lafayette Street Elementary School
CHA Project No.27999
Existing Lighting & Audit Input

Cost of Electricity: **$0.137** **$/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
50LED	113	Classrooms	12	W 32 P F 2 (ELE)	F42LL	60	0.72	SW	2400	1,728		C-OCC	
18LED	Social Worker	Office	7	T 32 R F 4 (ELE)	F44ILL	112	0.78	SW	3000	2,352		NONE	
50LED	111	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024		C-OCC	
105LED	Boys Room	Restroom	3	W 32 F 1	F41LL	32	0.10	SW	4300	413		NONE	
105LED	Girls Room	Restroom	3	W 32 F 1	F41LL	32	0.10	SW	4300	413		NONE	
50LED	Restroom	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	4300	258		NONE	
50LED	107	Classrooms	21	W 32 P F 2 (ELE)	F42LL	60	1.26	SW	2400	3,024		C-OCC	
18LED	Exit	Hallways	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	6240	699		NONE	
105LED	AHU Room	Mechanical Room	8	W 32 F 1	F41LL	32	0.26	SW	1640	420		NONE	
50LED	AHU Room	Mechanical Room	3	W 32 P F 2 (ELE)	F42LL	60	0.18	SW	1640	295		NONE	
105LED	Custodial	Custodial	2	W 32 F 1	F41LL	32	0.06	SW	2125	136		NONE	
105LED	Boiler Room	Boiler Room	7	W 32 F 1	F41LL	32	0.22	SW	1200	269		NONE	
227	Boiler Room	Boiler Room	1	70 W MH Wall Pack	MH70/1	95	0.10	SW	1200	114		NONE	
50LED	109	Classrooms	18	W 32 P F 2 (ELE)	F42LL	60	1.08	SW	2400	2,592		C-OCC	
50LED	103	Classrooms	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	2400	576		C-OCC	
50LED	Nurses Office	Office	4	W 32 P F 2 (ELE)	F42LL	60	0.24	SW	3000	720		NONE	
50LED	104	Classrooms	8	W 32 P F 2 (ELE)	F42LL	60	0.48	SW	2400	1,152		C-OCC	
50LED	102	Classrooms	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	2400	288		C-OCC	
50LED	101-B	Classrooms	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	2400	288		C-OCC	
50LED	Storage	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.84	SW	3200	2,688		NONE	
50LED	Restroom	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.06	SW	4300	258		NONE	
50LED	Back Storage	Storage	2	W 32 P F 2 (ELE)	F42LL	60	0.12	SW	3200	384		NONE	
50LED	Storage	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.84	SW	3200	2,688		NONE	
	Total		**1,046**				**64.18**			**177,318**			

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
CHA Project #27999

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
$ 0.152	$/kWh blended			0.000420205	68,118	$ 46,953	$ 2,763	$ 72,258
$ 0.137	$/kWh supply		309,600	0.000420205				
$ 4.28	$/kW		103.2	0				
$ 3.24	$/Gallon #2		22,278	0.00841661				
$ 0.99	$/Therm		2,778	0.00533471				
$ 7.55	$/kgals		10,000	0				

Lafayette Street

Recommend ? Y or N		Item	Savings						Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings						ROI	NPV	IRR
			kW	kWh	therms	#2 Gal	Water kgal	$								kW	kWh	therms	#2 Gal	kgal/yr	$			
Y	ECM-1	Replace Door Seals	0.0	0	212	0	0	210	$ 1,383	6.6	15.0	1.1	$ -	N	6.6	0.0	0	3,186	0	0	$ 10,323	6.5	$1,127	12.7%
Y	ECM-2a	Heating Fuel Conversion (Fuel Switch)	0.0	0	(29,082)	22,278	0	43,390	$ 48,557	1.1	15	32.4	$ -	N	1.1	0.0	0	(436,229)	334,170	0	$ (1,413,383)	(30.1)	$469,425	89.4%
N	ECM-2b	Condensing Boiler Replacement w/ HW Reset	0.0	0	4,685	0	0	4,638	$ 2,903,104	625.9	30	25.0	$ 12,000	N	623.3	0.0	0	140,549	0	0	$ 455,379	(0.8)	($2,800,195)	-13.8%
Y	ECM-3	Install Piping Insulation	0.0	0	182	0	0	180	$ 529	2.9	15.0	1.0	$ -	N	2.9	0.0	0	2,725	0	0	$ 8,829	15.7	$1,618	33.5%
Y	ECM-4	Window A/C Controllers	0.0	4,909	0	0	0	746	$ 1,000	1.3	15.0	2.1	$ -	N	1.3	0.0	73,628	0	0	0	$ 11,191	10.2	$7,907	74.6%
Y	ECM-5a	Basic Controls	0.0	0	2,325	0	0	2,302	$ 21,309	9.3	20	12.4	$ -	N	9.3	0.0	0	46,504	0	0	$ 150,673	6.1	$12,938	8.8%
N	ECM-5b	Full DDC Controls	0.0	0	4,010	0	0	3,970	$ 250,000	63.0	20.0	21.4	$ -	N	63.0	0.0	0	80,201	0	0	$ 259,851	0.0	($190,937)	-9.1%
Y	ECM-6	Domestic Hot Water System Improvements	0.0	0	586	0	0	580	$ 21,139	36.5	15.0	3.1	$ 50	N	36.4	0.0	0	8,785	0	0	$ 28,465	0.3	($14,167)	-9.5%
Y	ECM-7	Vending Machine Controls	0.0	14,685	0	0	0	2,232	$ 1,200	0.5	15.0	6.2	$ -	N	0.5	0.0	220,275	0	0	0	$ 33,482	26.9	$25,447	186.0%
N	ECM-8	Install Low Flow Plumbing Fixtures	0.0	0	0	0	183	1,385	$ 242,860	175.3	16.0	0.0	$ -	N	175.3	0.0	0	0	0	2,935	$ 22,161	(0.9)	($225,462)	-20.1%
N	ECM-L1	Lighting Replacements / Upgrades	31.8	89,815	0	0	0	15,285	$ 131,696	8.6	10.0	37.7	$ -	N	8.6	318.0	898,150	0	0	0	$ 152,851	0.2	($1,311)	2.8%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	34,258	0	0	0	5,207	$ 12,150	2.3	10.0	14.4	$ 1,575	N	2.0	0.0	342,580	0	0	0	$ 52,072	3.3	$33,844	48.3%
Y	ECM-L3	Lighting Replacements with Controls (Occupany Sensors)	31.8	106,944	0	0	0	17,889	$ 143,846	8.0	10.0	44.9	$ 1,575	N	8.0	318.0	1,069,440	0	0	0	$ 178,887	0.2	$10,324	4.4%
		Total (Does Not Include ECM-2B, ECM-5B, ECM-L1 & ECM-L2)	**31.8**	**126,538**	**(25,777)**	**22,278**	**183**	**$ 68,913**	**$ 481,823**	**7.0**	**15**	**103**	**$ 1,625**		**7.0**	**318**	**1,363,343**	**(375,029)**	**334,170**	**2,935**	**$ (969,373)**	**(3.0)**	**342486.5922**	**11.6%**
		Recommended Measures (highlighted green above)	**31.8**	**126,538**	**(25,777)**	**22,278**	**0**	**$ 67,528**	**$ 238,963**	**3.5**	**15.0**	**103**	**$ 1,625**		**3.5**	**318**	**1,363,343**	**(375,029)**	**334,170**	**$ -**	**$ (991,534)**	**(5.1)**	**$568,812**	**27.7%**
		% of Existing	**31%**	**41%**	**-928%**	**100%**	**2%**																	

	City:	Newark, NJ				
	Occupied Hours/Week	70	70	70	70	50
		Building Operating	Auditorium Occupied	Gymnasium Occupied	Library Occupied	Classrooms Occupied
Temp	Enthalpy h (Btu/lb)	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5							
97.5	35.4	6	3	3	3	3	2
92.5	37.4	31	13	13	13	13	9
87.5	35.0	131	55	55	55	55	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	198
67.5	27.2	854	356	356	356	356	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	16.0	491	205	205	205	205	146
42.5	14.5	656	273	273	273	273	195
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	252	105	105	105	105	75
17.5	5.4	125	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							
		8,760					

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

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

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

Newark Board of Education - NJBPU
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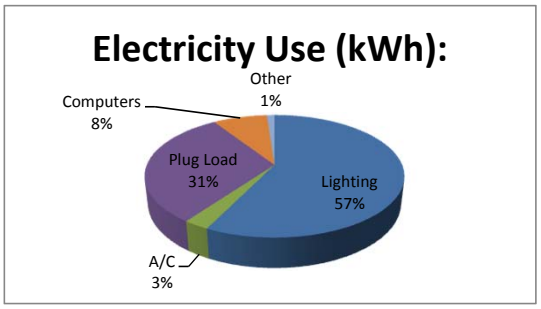
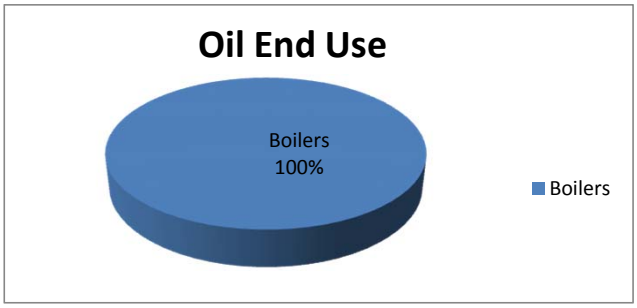
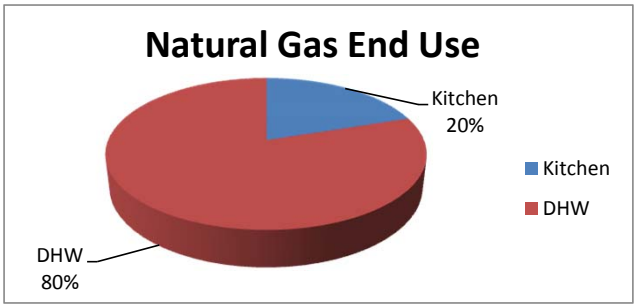
Lafayette Street

Utility End Use Analysis		
Electricity Use (kWh):		**Notes/Comments:**
309,600	Total	Based on utility analysis
177,318	Lighting	From Lighting Calculations
	Motors	Estimated
8,429	A/C	See Window AC Calculation
95,365	Plug Load	Estimated
	Kitchen	Estimated
25,000	Computers	Estimated
3,488	Other	Remaining
Oil Use (#2 Gal):		**Notes/Comments:**
22,278	Total	Based on utility analysis
22,278	Boilers	Total Oil Bill, only serves boilers
0	DHW	Based on utility analysis

Natural Gas Use (Therms):		**Notes/Comments:**
2,779	Total	Based on utility analysis
556	Kitchen	Estimated
2,223	DHW	Based on utility analysis







Newark Board of Education - NJBPU
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Lafayette Street

ECM-1: Install Door Seals

Existing: Lack of door seals result in excessive heat loss and infiltration
Proposed: Install door seals and/or weather-stripping to reduce air infiltration

Heating System Efficiency	80%		Ex Occupied Clng Temp.	74	*F	Ex Occupied Htg Temp.	80	*F
Cooling System Efficiency	0.00	kW/ton	Ex Unoccupied Clng Temp.	80	*F	Ex Unoccupied Htg Temp.	75	*F
Linear Feet of Door Edge	72	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.

No significant cooling in building

					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	13,365	13,365	4,010	4,010	0	0	0	0
97.5	35.4	6	3	4	-3,843	-3,843	-1,153	-1,153	0	0	0	0
92.5	37.4	31	13	18	-4,812	-4,812	-1,444	-1,444	0	0	0	0
87.5	35.0	131	55	76	-3,638	-3,638	-1,091	-1,091	0	0	0	0
82.5	33.0	500	208	292	-2,696	-2,696	-809	-809	0	0	0	0
77.5	31.5	620	258	362	-1,967	0	-590	0	0	0	0	0
72.5	29.9	664	277	387	875	292	262	87	0	0	4	1
67.5	27.2	854	356	498	1,458	875	437	262	0	0	12	4
62.5	24.0	927	386	541	2,041	1,458	612	437	0	0	20	6
57.5	20.3	600	250	350	2,624	2,041	787	612	0	0	17	5
52.5	18.2	730	304	426	3,208	2,624	962	787	0	0	26	8
47.5	16.0	491	205	286	3,791	3,208	1,137	962	0	0	21	6
42.5	14.5	656	273	383	4,374	3,791	1,312	1,137	0	0	33	10
37.5	12.5	1,023	426	597	4,957	4,374	1,487	1,312	0	0	59	18
32.5	10.5	734	306	428	5,540	4,957	1,662	1,487	0	0	48	14
27.5	8.7	334	139	195	6,124	5,540	1,837	1,662	0	0	24	7
22.5	7.0	252	105	147	6,707	6,124	2,012	1,837	0	0	20	6
17.5	5.4	125	52	73	7,290	6,707	2,187	2,012	0	0	11	3
12.5	3.7	47	20	27	7,873	7,290	2,362	2,187	0	0	4	1
7.5	2.1	34	14	20	8,456	7,873	2,537	2,362	0	0	3	1
2.5	1.3	1	0	1	9,040	8,456	2,712	2,537	0	0	0	0
-2.5	0.0	0	0	0	9,623	9,040	2,887	2,712	0	0	0	0
-7.5	0.0	0	0	0	10,206	9,623	3,062	2,887	0	0	0	0
TOTALS		**8,760**	**3,650**	**5,110**					**0**	**0**	**303**	**91**

Existing Door Infiltration	**108**	**cfm**
Existing Unoccupied Door Infiltration	**108**	**cfm**
Proposed Door Infiltration	**32**	**cfm**
Proposed Unoccupied Door Infiltration	**32**	**cfm**

Savings	**212**	**therms**	**$ 210**
	0	**kWh**	**$ -**
			$ 210

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap (in)	gap location	LF of gap	% door w/ gap	Average gap for door (in)
1	7	7	28	0.25	all sides	21	75%	0.1875
2	7	7	28	0.25	all sides	21	75%	0.1875
3	3	7	20	0.25	all sides	15	75%	0.1875
4	3	7	20	0.25	all sides	15	75%	0.1875
Total	**20**	**28**	**96**	**0.250**		**72**	**75%**	**0.188**

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

Newark Board of Education - NJBPU
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Lafayette Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Install Door Seals - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Door Weatherization Seals & Sweeps	6	EA	$ 40	$ 115	$ -	$ 246	$ 860	$ -	$ 1,106	RS Means 2012
						$ -	$ -	$ -	$ -	

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 1,106	Subtotal
$ 277	25% Contingency
$ 1,383	**Total**

Site Name - NJBPU
CHA Project #27999
Lafayette Street School

ECM-2a: Heating Fuel Conversion

Existing Fuel #2 Oil
Proposed Fuel Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 3.24	/ Gal #2	Based on Utility Analysis
Proposed Fuel Cost	$ 0.99	/ Therm	Based on Utility Analysis
Baseline Fuel Use	22,278	Gals #2	Based on historical utility data
Existing Boiler Plant Efficiency	80%		Estimated or Measured
Baseline Boiler Load	2,471,967	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 138.7 Mbtu/Gals #2
Baseline Fuel Cost	$ 72,181		
Proposed Boiler Plant Efficiency	85%		New Burner Efficiency
Proposed Fuel Use	29,082	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 28,791		
Calculated Gas Penalty	(29,082)	Therms	
Estimated Annual Savings	22,278	Gals #2	

*Note to engineer: Link savings back to summary sheet in appropriate column.

Newark Board of Education - NJBPU
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Lafayette Street

ECM-2a: Hot Water Boiler Reset Control

Notes:

1. Building heat is proposed to be provided by condensing gas-fired hot water boilers.
2. Boiler currently does not have hot water reset control, boiler water temprature remains constant throughout the year.
3. Recommend installation of condensing boiler and controls to allow for automatic boiler water reset based on OA temperature.
4. This measure has been interracted with the 'Boiler Replacement' measure.

BOILER WATER TEMPERATURE RESET:

85.0%	…BOILER COMBUSTION EFFICIENCY (OLDEFF)
5.0%	…BOILER/PIPING RADIANT& MISC. HEAT LOSSES (OLDLOSS)
80	…AMBIENT ROOM TEMPERATURE (AMBTEMP)
180	...CURRENT BOILER AVERAGE TEMPERATURE (OLDTEMP)
150	...NEW BOILER AVERAGE TEMPERATURE (NEWTEMP)
30	...AVERAGE REDUCTION IN BOILER TEMP (AVGRED) = (OLDTEMP-NEWTEMP)
0.75%	...REDUCTION IN COMBUSTION LOSSES BY RESET (COMBRED) = AVGRED/40/100
1.50%	...REDUCTION IN RADIANT LOSSES (RADRED)=(OLDLOSS-(OLDLOSS*(NEWTEMP-AMBTEMP)/(OLDTEMP-AMBTEMP)))
2.25%	...NET IMPROVEMENT IN BOILER FUEL-TO-HEAT EFFICIENCY (NETEFF) = COMBRED+RADRED
THERMS	...TYPE OF FUEL (GAS MCF, OIL GAL, COAL TONS)
$ 3.24	... COST / UNIT OF FUEL
100,000	...BTUs / UNIT (BTUs/UNIT)
29082	...ANNUAL TOTAL FUEL CONSUMPTION FROM BILLS (TOTFUEL)
0.00	…ESTIMATED NON-BOILER FUEL CONSUMPTION (OTHFUEL)
29081.96	...ANNUAL BOILER FUEL CONSUMPTION (HEATFUEL) = TOTFUEL-OTHFUEL
80.0%	…CURRENT BOILER FUEL-TO-HEAT EFFICIENCY (CEFF) = OLDEFF-OLDLOSS
82.3%	…RETROFIT BOILER FUEL-TO-HEAT EFFICIENCY (REFF) = CEFF+NETEFF
795.56	...CALCULATED ANNUAL FUEL SAVINGS (FUELSAVE) = ANNFUEL - (ANNFUEL*CEFF/REFF)

795.56 THERMS SAVINGS

FUELSAVE * COST/UNIT OF FUEL ========== **$2,577.60** **COST SAVINGS**

Newark Board of Education - NJBPU
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Lafayette Street

ECM-2a: Heating Fuel Conversion - 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.		
8,000 MBH Replacement NG Burner	2	EA	$ 10,000	$ 1,400		$ 20,540	$ 3,489	$ -	$ 24,029	RS Means 2012
Boiler Controllers	1	EA	$ 5,500	$ 1,000		$ 5,649	$ 1,246	$ -	$ 6,895	RS Means 2012
Reprogram DDC system	1	EA	$ 100.0	$ 350.00		$ 103	$ 436	$ -	$ 539	RS Means 2012
Miscellaneous Electrical	1	LS	$ 500	$ 250		$ 514	$ 312	$ -	$ 825	RS Means 2012
Natural Gas Piping	150	LF	$ 32.5	$ 6.5	$ 2.0	$ 5,007	$ 1,215	$ 337	$ 6,559	RS Means 2012
						$ -	$ -	$ -	$ -	

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 38,846	Subtotal
$ 9,711	25% Contingency
$ 48,557	**Total**

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ECM-2b: Boiler Replacement

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.99	/ Therm	Natural Gas
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	761,969	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	14	F	
Proposed Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	761,969	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	4,039		NJ Protocols Calculation
Fuel Cost Savings	$ 3,999		

Algorithms

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

Definition of Variables

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

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

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

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

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

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

EFF_B = Efficiency of baseline heaters (AFUE %)

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

Furnaces and Boilers

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

Sources:

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

Adjusted Heating Degree Days by Building Type

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

Heating Degree Days and Outdoor Design Temperature by Zone

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

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ECM-2b: Hot Water Boiler Reset Control

Notes:

1. Building heat is proposed to be provided by condensing gas-fired hot water boilers.
2. Boiler currently does not have hot water reset control, boiler water temprature remains constant throughout the year.
3. Recommend installation of condensing boiler and controls to allow for automatic boiler water reset based on OA temperature.
4. This measure has been interracted with the 'Boiler Replacement' measure.

BOILER WATER TEMPERATURE RESET:

90.0%	…BOILER COMBUSTION EFFICIENCY (OLDEFF)
5.0%	…BOILER/PIPING RADIANT& MISC. HEAT LOSSES (OLDLOSS)
80	…AMBIENT ROOM TEMPERATURE (AMBTEMP)
180	...CURRENT BOILER AVERAGE TEMPERATURE (OLDTEMP)
150	...NEW BOILER AVERAGE TEMPERATURE (NEWTEMP)
30	...AVERAGE REDUCTION IN BOILER TEMP (AVGRED) = (OLDTEMP-NEWTEMP)
0.75%	...REDUCTION IN COMBUSTION LOSSES BY RESET (COMBRED) = AVGRED/40/100
1.50%	...REDUCTION IN RADIANT LOSSES (RADRED)=(OLDLOSS-(OLDLOSS*(NEWTEMP-AMBTEMP)/(OLDTEMP-AMBTEMP)))
2.25%	...NET IMPROVEMENT IN BOILER FUEL-TO-HEAT EFFICIENCY (NETEFF) = COMBRED+RADRED
THERMS	...TYPE OF FUEL (GAS MCF, OIL GAL, COAL TONS)
$ 3.24	... COST / UNIT OF FUEL
100,000	...BTUs / UNIT (BTUs/UNIT)
25043	...ANNUAL TOTAL FUEL CONSUMPTION FROM BILLS (TOTFUEL)
0.00	…ESTIMATED NON-BOILER FUEL CONSUMPTION (OTHFUEL)
25042.80	...ANNUAL BOILER FUEL CONSUMPTION (HEATFUEL) = TOTFUEL-OTHFUEL
85.0%	…CURRENT BOILER FUEL-TO-HEAT EFFICIENCY (CEFF) = OLDEFF-OLDLOSS
87.3%	…RETROFIT BOILER FUEL-TO-HEAT EFFICIENCY (REFF) = CEFF+NETEFF
645.80	...CALCULATED ANNUAL FUEL SAVINGS (FUELSAVE) = ANNFUEL - (ANNFUEL*CEFF/REFF)

645.80 THERMS SAVINGS

FUELSAVE * COST/UNIT OF FUEL ========== **$2,092.40** **COST SAVINGS**

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ECM-2b: Boiler Replacement - 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.		
Hydronic Heating System (piping, radiator & UVs)	68118	SF	$ 15	$ 15		$ 1,049,358	$ 1,273,125	$ -	$ 2,322,483	2012 RS Means Square Foot Construction Costs

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 2,322,483	Subtotal
$ 580,621	25% Contingency
$ 2,903,104	**Total**

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ECM-3: Install Piping Insulation (Bare Pipe)

Description Insulate heating system piping which are not currently insulated to reduce heat loss from piping and heat gain to the spaces.

Given

Fuel Energy Cost	=									$ 0.99	$/Therm (Nat'l Gas)	
Operation (Hours/Week)	=									168	Hours/Week	
Operation (Heating Weeks/Year)	=									41	Weeks/Year	
Operation (Hours/Year)	=									6888	Hours/Year	
Heating Media	=									Water		
Piping Material	=									Mild Steel		
Ambient Temperature	=									72	°F	
		Pipe #1		Pipe #2		Pipe #3		Pipe #4				
Pipe Diameter	=	1	00 inches	2	inches	4	0 inches	2	.00 inches			
Pipe Length	=	50.00	feet	0.00	feet	0.00	feet	0.00	feet			

Assumption

Min. Pipe Insulation Recommended	=	1.00	inches	1.50	inches	1.50	inches	1.50	inches			
Circulating Temperature	=									150	°F	
Heating Efficiency	=									80%		
Pipe Insulation Conductivity	=									0.29	Btu*in./(h*ft2*F)	

Formula

Piping Correction Factor = (Current Transmission Coefficient / Reference Transmission Coefficient)
Temperature Correction Factor = (Circulating Temperature - Ambient Temperature) / (Circulating Temperature - Reference Temperature)
Hourly Heat Loss per pipe size and length = (Heat loss per foot [from chart]) x (Piping Correction Factor) x (Temperature Correction Factor) x (Pipe Length)
Seasonal Heat Loss = (Hourly Heat Loss Total) x (Operating hours) / (Heating Efficiency) / (1,000 btu/Mbtu)

Energy Loss = (Seasonal Heat Loss) / (Conversion Factor [MBtu/Unit])
Energy Loss Cost = (Energy Loss) x (cost/unit)

Calculation

Existing

		Current Transmission Coefficient			Reference Transmission Coefficient							
Piping Correction Factor = (		2.00	/		2.00	) =				**1.00**		
		Circulating Temp.		Ambient Temp.		Circulating Temp.		Reference Temp.				
Temperature Correction Factor = (		150	-	72	) / (	150	-	80	) =	**1.11**		
		Heat Loss per foot		Piping CF		Temperature CF		Pipe Length				
Heat Loss Pipe #1 (Hourly)	= (	48.87	) x (	1.00	) x (	1.11	) x (	50.00	) =	2,723	Btuh	
Heat Loss Pipe #2 (Hourly)	= (	84.92	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
Heat Loss Pipe #3 (Hourly)	= (	151.61	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
Heat Loss Pipe #4 (Hourly)	= (	84.92	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
										2,723	**Btuh**	
		Hourly Heat Loss		operating Hours		Heating Efficiency		Factor				
Seasonal Heat Loss	= (	2,723	) x (	6,888	) / (	80%	) / (	1,000	) =	**23,443**	**Mbtu**	
		Seasonal Heat Loss		Btu/unit								
Existing Energy Loss	=	23,443	) / (	100	) =					**234**	**Therm**	
		Unit		Cost per Unit								
Existing Energy Loss Cost	= (	234	) x (	$ 0.99	) =					**$ 232**		

New

		Heat Loss per foot		Piping CF		Temperature CF		Pipe Length				
Heat Loss Pipe #1 (Hourly)	= (	11.00	) x (	1.00	) x (	1.11	) x (	50.00	) =	613	Btuh	
Heat Loss Pipe #2 (Hourly)	= (	13.00	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
Heat Loss Pipe #3 (Hourly)	= (	19.00	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
Heat Loss Pipe #4 (Hourly)	= (	13.00	) x (	1.00	) x (	1.11	) x (	0.00	) =	-	Btuh	
										613	**Btuh**	
		Hourly Heat Loss		operating Hours		Heating Efficiency		Factor				
Seasonal Heat Loss	= (	613	) x (	6,888	) / (	80%	) / (	1,000	) =	**5,277**	**Mbtu**	
		Seasonal Heat Loss		Btu/unit								
New Energy Loss	=	5,277	) / (	100	) =					**53**	**Therm**	
		Unit		Cost per Unit								
New Energy Loss Cost	= (	53	) x (	$ 0.99	) =					**$ 52**		

Result

Existing Heat Loss		**234**	**Therm**	**$**	**232**
New Heat Loss		**53**	**Therm**	**$**	**52**
Savings	**100%**	**182**	**Therm**	**$**	**180** **77.5%**

Conversion Factors

$/MCF (Nat'l Gas)	1	1,030,000	btu/MCF	MCF	Mbh/MCF	1,030	MMbh/MCF	####
$/CCF (Nat'l Gas)	2	103,000	btu/CCF	CCF	Mbh/CCF	103	MMbh/CCF	####
$/CF (Nat'l Gas)	3	1,030	btu/CF	CF	Mbh/CF	1.030	MMbh/CF	####
$/Therm (Nat'l Gas)	4	100,000	btu/Therm	Therm	Mbh/Therm	100	MMbh/Therm	####
$/gal (LP Gas)	5	91,500	btu/gallon	gallons	Mbh/gallon	91.5	MMbh/gallon	####
$/gal (Fuel Oil #2)	6	139,000	btu/gallon	gallons	Mbh/gallon	139	MMbh/gallon	####
$/lb Steam	7	975	btu/lb Steam	lb Steam	Mbh/lb Steam	0.975	MMbh/lb Steam	####
$/1000 lbs Steam	8	975,000	btu/1000 lbs Stear	1000 lbs Steam	Mbh/1000 lbs Steam	975	MMbh/1000 lbs S	####

This chart is not used but is left for future reference

Pipe Diameter	Initial Bare	Final (1) R=2	Final (2) ASHRAE standard	ASHRAE standard 40-80	Final (2) ASHRAE stnd x pipe length	Initial Bare x pipe length	
(I.d.)	BTU/hr/ft/°F	BTU/hr/ft/°F	BTU/hr/ft/°F	Relative thickness in inches	Btu/hr/°F		
1/2	0.27	0.18	0.15	0.75	30.0	54.0	44%
3/4	0.61	0.27	0.21	0.75	42.0	122.0	66%
1	0.77	0.30	0.23	0.75	46.0	154.0	70%
1 1/2	1.06	0.34	0.20	1.00	40.0	212.0	81%
2	1.30	0.36	0.21	1.00	42.0	260.0	84%
3	1.86	0.39	0.22	1.00	44.0	372.0	88%
4	2.30	0.41	0.22	1.00	44.0	460.0	90%
6	3.35	0.44	0.23	1.00	46.0	670.0	93%

Select one pipe length from below: 200
25 ft
50 ft
100 ft
150 ft
200 ft

Heat Transmission Coefficients					Water		Steam
	Cast Iron	Mild Steel	Copper	Cast Iron	1.40		2.00
Water	1.40	2.00	2.25	Mild Steel	2.00		2.50
Steam	2.00	2.50	3.00	Copper	2.25		3.00

Bare Heat Loss Chart							Temperatures	
2.00	120	150	180	210	240	280	1	120
1/2	14.9	29.4	59.3	85.7	112.0	147.2	2	150
3/4	19.8	39.3	72.5	104.8	137.1	180.1	3	180
1	24.7	48.9	88.8	128.4	168.0	220.8	4	210
1 1/2	34.0	67.2	123.9	179.3	234.7	308.5	5	240
2	42.9	84.9	151.8	219.7	287.6	378.1	6	280
2 1/2	51.7	102.1	180.5	261.4	342.2	450.0		
3	60.2	118.9	215.9	312.8	409.6	538.8		
4	77.0	151.6	271.6	393.7	515.8	678.6		
5	93.2	183.5	329.8	478.3	626.7	824.7		
6	108.9	214.7	387.1	561.6	736.1	968.7		
8	140.0	275.5	493.3	716.0	938.7	#####		

Minimum Insulation Chart							Insulation Thickness	
	120	150	180	210	240	280	1	0.5
1/2	1.0	1.0	1.0	1.5	1.5	1.5	2	1.0
3/4	1.0	1.0	1.0	1.5	1.5	1.5	3	1.5
1	1.0	1.0	1.0	1.5	1.5	2.0	4	2.0
1 1/2	1.0	1.0	1.0	2.0	2.0	2.5	5	2.5
2	1.0	1.5	1.5	2.0	2.0	3.0	6	3.0
2 1/2	1.0	1.5	1.5	2.0	2.0	3.0		
3	1.5	1.5	1.5	2.0	2.5	3.0		
4	1.5	1.5	1.5	2.0	3.0	3.0		
5	1.5	1.5	1.5	2.0	3.0	3.0		
6	1.5	2.0	2.0	3.0	3.0	3.0		
8	2.0	2.0	3.0	3.0	3.0	3.0		

Insulated Pipe Heat Loss Chart							Temperatures	
	120	150	180	210	240	280	1	120
1/2	7.5	8.0	10.0	12.6	16.0	18.5	2	150
3/4	8.5	10.0	14.0	16.1	19.0	21.0	3	180
1	10.0	11.0	16.0	18.3	21.0	23.7	4	210
1 1/2	11.5	14.0	18.0	20.2	22.0	25.3	5	240
2	13.0	13.0	17.0	20.0	25.0	27.0	6	280
2 1/2	15.0	14.5	20.0	22.4	27.0	28.0		
3	15.0	16.0	21.0	23.7	28.0	30.0		
4	16.0	19.0	22.0	25.6	29.0	34.0		
5	17.0	20.0	23.0	27.8	35.0	39.0		
6	18.0	21.0	24.0	29.4	38.0	42.0		
8	16.5	26.0	26.0	32.6	40.0	48.0		

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-3: Install Piping Insulation (Bare Pipe) - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Polyethylene Pipe Insulation (1" Pipe)	50	LF	$ 8.24			$ 423	$ -	$ -	$ 423	RS Means 2012

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 423	Subtotal
$ 106	25% Contingency
$ 529	**Total**

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EQUIPMENT		AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)
Window A/C	5x	Offices and Classrooms	90,000

Total Electric DX Cooling: *90,000* *btu/h*

ECM-4: Install Window A/C Controller

ECM Description Summary

Window A/Cs are not programmable and run the risk of operating when no occupants are present. A plug-in window A/C controller will turn off the A/C when no occupants are detected.

ASSUMPTIONS			Comments
Electric Cost	$0.152	/ kWh	
Average run hours per Week	60	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	65	deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	90,000	Btu / Hr	Total BTU/hr of equipment to be replaced.
Average EER	10.7		
Existing Annual Electric Usage	8,429	kWh	

Item	Value	Units	Comments
Proposed EER	10.7		
Proposed Annual Electric Usage	3,521	kWh	Savings result from reduced run hours

ANNUAL SAVINGS		
Annual Electrical Usage Savings	4,909	kWh
Annual Cost Savings	$746	
Total Project Cost	$1,000	
Simple Payback	1	years

OAT - DB Bin Temp F	Annual Hours	Existing Hours of Operation	Proposed % of time of operation	Proposed hrs of Operation
102.5	0	0	100%	0
97.5	6	2	89%	2
92.5	31	11	79%	9
87.5	131	47	68%	32
82.5	500	179	58%	103
77.5	620	221	47%	105
72.5	664	237	37%	87
67.5	854	305	26%	80
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	1,002	42%	419

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ECM-4: Install 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	5	EA	$ 150	$ -	$ -	770.25	$ -	$ -	$ 770	Est wireless A/C controller
						$ -	$ -	$ -	$ -	

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$	770	Subtotal
$	193	25% Contingency
$	**1,000**	**Total**

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ECM-5A: Basic Controls

Day Setback

EXISTING CONDITIONS			
Heating			
Heating Season Facility Temp	80	F	Th
Weekly Occupied Hours	70	hrs	H
Heating Season Setback Temp	72	F	Sh
Heating Season % Savings per	3%		Ph
Annual Boiler Capacity		Mbtu/yr	
Connected Heating Load	761,969	Btu/hr	Caph
Equivalent Full Load Heating	900	hrs	EFLHh
Heating Equipment Efficiency	80%		AFUEh
Cooling			
Cooling Season Facility Temp	74	F	Tc
Weekly Occupied Hours	70	hrs	H
Cooling Season Setback Temp	79	F	Sc
Cooling Season % Savings per	6%		Pc
Connected Cooling Load	-	Tons	Capc
Equivalent Full Load Cooling	381	hrs	EFLHc
Cooling Equipment EER	14.0		AFUEc
SAVINGS			
Natural Gas Savings	1,139	Therms[3]	
Cooling Electricity Savings	0	kWh	
Total Cost Savings	$ 3,690		
Estimated Total Project Cost	$ 10,655		
Simple Payback	2.9	**years**	

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	761,969	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	80%	
Cooling		
Cooling Season Facility Temp	74	F
Weekly Occupied Hours	70	hrs
Cooling Season Setback Temp	80	F
Cooling Season % Savings per	6%	
Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling Hours	381	hrs
Cooling Equipment EER	14.0	
SAVINGS		
Natural Gas Savings	1,186	Therms[3]
Cooling Electricity Savings	0	kWh
Total Cost Savings	$ 3,690	
Estimated Total Project Cost	$ 10,655	
Simple Payback	2.9	**years**

Algorithms

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

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

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

Definition of Variables

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

Occupancy Controlled Thermostats

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

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

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-5A: Basic Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Basic Controls	1	ea	$ 7,500	$ 7,500		$ 7,703	$ 9,345	$ -	$ 17,048	Engineers Estimate
						$ -	$ -	$ -	$ -	

Note: Cost estimates are for energy savings calculations only, do not use for procurement

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

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ECM-2B: Install Full DDC Controls

Summary: Presently boilers operate in manual mode. The proposed case involves installing full DDC controls to include morning warm-up, individual space regulation, temperature setback while unoccupied and scheduling

Building Information:

68,118	Sq Footage	$0.15	$/kWh Blended
N	Cooling	$3.24	$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	80	hrs
Heating Season Setback Temp	75	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	761,969	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	635	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	$ 2,058	
Estimated Total Project Cost	$ 21,309	

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	309,600	kWh
Existing Facility Total Gas usage	22,278	Therms
Existing Facility Cooling Electric usage	-	kWh[1]
Existing Facility Heating Natural Gas usage	20,050	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	4,010	Therms
SAVINGS		
Electric Savings	0	**kWh**
Natural Gas Savings	4,010	**Therms**
Total cost savings	$ 12,993	
Estimated Total Project Cost	$ 250,000	[4]

Assumptions

1 0% of facility total electricity dedicated to Cooling; based on utility information
2 90% of facility total natural gas dedicated to Heating; based on utility information
3 20% Typical Savings associated with installation of DDC controls
4 $250,000 Based on wireless DDC cost

COMBINED SAVINGS		
Natural Gas Savings	4,645	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	$ 15,051	
Estimated Total Project Cost	$ 271,309	
Simple Payback	18.0	Yrs

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Lafayette Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-2B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Radiator Controls (cost per [4] units)	38	ea	$ 2,250	$ 2,250		$ 87,809	$ 106,533	$ -	$ 194,342	Vendor Quote
Boiler Controls	2	ea	$ 1,750	$ 1,750		$ 3,595	$ 4,361	$ -	$ 7,956	Vendor Quote
Controls Head End/Programming	1	ea	$ 16,000	$ 16,000		$ 16,432	$ 19,936	$ -	$ 36,368	Vendor Quote

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 238,665	Subtotal
$ 59,666	25% Contingency
$ 298,331	**Total**

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ECM-6: Replace Gas-Fired DHW Heater w/ Tankless Condensing Gas-Fired DHW Heater

Summary:

The existing domestic hot water heating system consists of (1) large natural gas fired 100 gallon tank type water heater and a supplemental 119 gallon storage tank. The amount of stored water is grossly oversized for this type of school that only uses hot water at hand sinks. It is proposed to replace this system with one natural gas fired instantaneous domestic hot water heater. Energy savings will result from reduced hot water storage losses.

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	**232**	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	277,900	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	78%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	216,762	MBTU/yr	
Existing Tank Size	100	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	Per building personnel
Room Temperature	72	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.5	MBH	
Annual Standby Hot Water Load	13,031	MBTU/yr	
New Tank Size	50	Gallons	Based on AO Smith Cyclone, condensing DHW Heater
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	
Room Temperature	72	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.8	MBH	
Annual Standby Hot Water Load	6,826	MBTU/yr	
Total Annual Hot Water Demand	210,557	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on AO Smith Cyclone, condensing DHW Heater
Proposed Fuel Use	2,193	Therns	Standby Losses and inefficient DHW heater eliminated
Utility Cost	$0.99	$/Therm	
Existing Operating Cost of DHW	$2,751	$/yr	
Proposed Operating Cost of DHW	$2,171	$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	586	$580

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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.		
Gas-Fired DHW Heater Removal	1	LS		$ 50		$ -	$ 62	$ -	$ 62	RS Means 2012
High Efficiency Gas-Fired DHW Heater	1	EA	$ 5,500	$ 5,500		$ 5,649	$ 6,853	$ -	$ 12,502	Vendor Quote
Miscellaneous Electrical	1	LS	$ 500	$ 1,000		$ 514	$ 1,246	$ -	$ 1,760	RS Means 2012
Venting (SCH 40 CPVC)	1	LS	$ 500	$ 1,000		$ 514	$ 1,246	$ -	$ 1,760	RS Means 2012
Miscellaneous Piping and Valves	1	LS	$ 200	$ 500		$ 205	$ 623	$ -	$ 828	RS Means 2012

Note: Cost estimates are for energy savings calculations only, do not use for procurement

$ 16,911	Subtotal
$ 4,228	25% Contingency
$ 21,139	**Total**

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ECM-7: Install Vending Machine Controls

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

Unit Cost: $0.152 $/kWh blended

Energy Savings Calculations:

	Existing	
Cold Beverage Vending Machine Electric usage	14,016	kWh[1,4,7]
Snack Vending Machine Electric usage	3,504	kWh[2,5,7]
Dual Vending Machine Electric Usage	-	kWh[3,6,7]
Total Vending Machine Electric Usage	17,520	kWh
	Proposed	
Cold Beverage Vending Machine Electric usage	2,205	kWh[8]
Snack Vending Machine Electric usage	630	kWh
Dual Vending Machine Electric Usage	0	kWh
Total Vending Machine Electric Usage	2,835	kWh
Vending Machine Controls Usage Savings	**14,685**	**kWh**
Total cost savings	**$ 2,232**	
Estimated Total Project Cost	**$ 1,200**	[9]
Simple Payback	**1**	**years**

Assumptions

1	4	Number of cold beverage vending machines
2	2	Number of snack vending machines
3	0	Number of dual snack/beverage vending machines
4	400	Average wattage, typical of cold beverage machines based on prior project experience
5	200	Average wattage, typical of snack machines based on prior project experience
6	300	Average wattage, typical of dual snack/beverage machines based on prior project experience
7	8760	Hours per year vending machine plugged in
8	3150	Building Occupied Hours
9	0.50	Vending Machine Traffic Factor (0.75 for High Traffic, 0.5 for Medium, 0.25 for low)
10	$200	Estimated installed cost per vending machine

Note: Cost estimates are for energy savings calculations only, do not use for procurement

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Lafayette Street

ECM-8: Replace urinals and flush valves with low flow

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Urinals in Building to be replaced	21	
Average Flushes / Urinal (per Day)	3	
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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ECM-8: Replace toilets and flush valves with low flow

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Toilets in Building	53	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	53	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	203.12	kGal / year
Proposed Toilet Water Use	74.28	kGal / year
Water Savings	128.84	kGal / year
Cost Savings	$973	/ year

Newark Board of Education - NJBPU
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Lafayette Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Low-Flow Urinal	21	EA	$ 1,200	$ 1,000	$ -	$ 25,880	$ 26,166	$ -	$ 52,046	Vendor Estimate
Low-Flow Toilet	53	EA	$ 1,400	$ 1,000	$ -	$ 76,203	$ 66,038	$ -	$ 142,241	Vendor Estimate

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

$ 194,288	Subtotal
$ 48,572	25% Contingency
$ 242,860	**Total**

Newark Board of Education - NJBPU
CHA Project #27999
Lafayette Street Annex

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

- 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)	12,813
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)	$5,790	$1,396	
Existing Usage (from utility)	35,698	2,693	
Proposed Savings	24,770	188	Does not include fuel conversion
Existing Total MMBtus	391		
Proposed Savings MMBtus	103		
% Energy Reduction	**26.4%**		
Proposed Annual Savings	$4,680		Does not include fuel conversion

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

	Incentives $		
	Elec	Gas	Total
			$641
Incentive #1	$0	$0	$641
Incentive #2	$2,725	$234	$2,959
Incentive #3	$2,725	$234	$2,959
Total All Incentives	**$5,449**	**$469**	**$6,559**

Total Project Cost	$46,200

Does not include fuel conversion

		Allowable Incentive
% Incentives #1 of Utility Cost*	8.9%	$641
% Incentives #2 of Project Cost**	6.4%	$2,959
% Incentives #3 of Project Cost**	6.4%	$2,959
Total Eligible Incentives***	**$6,559**	
Project Cost w/ Incentives	$39,641	

Project Payback (years)	
w/o Incentives	w/ Incentives
9.9	8.5

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

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

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

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual $ Saved (kWh Saved) * ($/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive Prescriptive Lighting Measures	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered
50LED	401	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	World Language	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	Grade 7 Math	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	403	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	8th Grade Writing	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	Reading Room	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	407	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	409	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
105LED	Gymnasium	3	W 32 F 1	F41LL	32	0.1	SW	1600	154	3	4 ft LED Tube	200732x1	15	0.0	SW	1,600	72	82	0.1	$ 13.80	$ 217.80	$0	15.8	15.8
105LED	Gymnasium	12	W 32 F 1	F41LL	32	0.4	SW	1600	614	12	4 ft LED Tube	200732x1	15	0.2	SW	1,600	288	326	0.2	$ 55.19	$ 871.20	$0	15.8	15.8
105LED	Gym Back Room	2	W 32 F 1	F41LL	32	0.1	SW	3200	205	2	4 ft LED Tube	200732x1	15	0.0	SW	3,200	96	109	0.0	$ 16.65	$ 145.20	$0	8.7	8.7
50LED	Gym Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360	2	4 ft LED Tube	200732x2	30	0.1	SW	3,000	180	180	0.1	$ 27.74	$ 290.40	$0	10.5	10.5
105LED	Gym Office Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	SW	4,300	65	73	0.0	$ 10.89	$ 72.60	$0	6.7	6.7
50LED	413	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	411	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
105LED	Boys Room	2	W 32 F 1	F41LL	32	0.1	SW	4300	275	2	4 ft LED Tube	200732x1	15	0.0	SW	4,300	129	146	0.0	$ 21.78	$ 145.20	$0	6.7	6.7
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	SW	4,300	65	73	0.0	$ 10.89	$ 72.60	$0	6.7	6.7
18LED	Hallway	13	T 32 R F 4 (ELE)	F44ILL	112	1.5	SW	6240	9,085	13	T 74 R LED	RTLED50	50	0.7	SW	6,240	4,056	5,029	0.8	$ 730.43	$ -	$0	0.0	0.0
40LED	Stairwell	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	$ 119.62	$ -	$0	0.0	0.0
105LED	Stairwell	3	W 32 F 1	F41LL	32	0.1	SW	6240	599	3	4 ft LED Tube	200732x1	15	0.0	SW	6,240	281	318	0.1	$ 46.22	$ 217.80	$0	4.7	4.7
18LED	Guidance	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	3000	672	2	T 74 R LED	RTLED50	50	0.1	SW	3,000	300	372	0.1	$ 57.33	$ -	$0	0.0	0.0
50LED	312	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	314	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	310 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	318 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	313	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	311	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	SW	4,300	194	219	0.1	$ 32.66	$ 217.80	$0	6.7	6.7
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	SW	4,300	194	219	0.1	$ 32.66	$ 217.80	$0	6.7	6.7
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	SW	4,300	65	73	0.0	$ 10.89	$ 72.60	$0	6.7	6.7
18LED	Hallway	16	T 32 R F 4 (ELE)	F44ILL	112	1.8	SW	6240	11,182	16	T 74 R LED	RTLED50	50	0.8	SW	6,240	4,992	6,190	1.0	$ 898.99	$ -	$0	0.0	0.0
50LED	309	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	307	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	305	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	303	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	306	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	304	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	Custodial	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	128	1	4 ft LED Tube	200732x2	30	0.0	SW	2,125	64	64	0.0	$ 10.27	$ 145.20	$0	14.1	14.1
50LED	302	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	301	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
267	Auditorium	9	CFL Chandelier	CF26/6-L	162	1.5	SW	1200	1,750	9	CFL Chandelier	CF26/6-L	162	1.5	SW	1,200	1,750	-	0.0	$ -	$ -	$0		#DIV/0!
105LED	Backstage	4	W 32 F 1	F41LL	32	0.1	SW	1200	154	4	4 ft LED Tube	200732x1	15	0.1	SW	1,200	72	82	0.1	$ 14.67	$ 290.40	$0	19.8	19.8
105LED	Back Left	1	W 32 F 1	F41LL	32	0.0	SW	1200	38	1	4 ft LED Tube	200732x1	15	0.0	SW	1,200	18	20	0.0	$ 3.67	$ 72.60	$0	19.8	19.8
105LED	Back Right	1	W 32 F 1	F41LL	32	0.0	SW	1200	38	1	4 ft LED Tube	200732x1	15	0.0	SW	1,200	18	20	0.0	$ 3.67	$ 72.60	$0	19.8	19.8
50LED	201	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	203	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	Main Office	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	3000	2,160	12	4 ft LED Tube	200732x2	30	0.4	SW	3,000	1,080	1,080	0.4	$ 166.45	$ 1,742.40	$0	10.5	10.5
50LED	Principals Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360	2	4 ft LED Tube	200732x2	30	0.1	SW	3,000	180	180	0.1	$ 27.74	$ 290.40	$0	10.5	10.5
5LED	Faculty Lounge	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	3000	360	2	2RTLED	2RTLED	25	0.1	SW	3,000	150	210	0.1	$ 32.37	$ -	$0	0.0	0.0
18LED	Faculty Lounge	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3000	3,024	9	T 74 R LED	RTLED50	50	0.5	SW	3,000	1,350	1,674	0.6	$ 258.00	$ -	$0	0.0	0.0
5LED	Faculty Mens Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	4300	258	1	2T XX R LED	2RTLED	25	0.0	SW	4,300	108	151	0.0	$ 22.42	$ -	$0	0.0	0.0
5LED	Faculty Womens Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	4300	258	1	2T XX R LED	2RTLED	25	0.0	SW	4,300	108	151	0.0	$ 22.42	$ -	$0	0.0	0.0
50LED	207	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	209	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	208	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	214	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	210	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	212	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	215	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
18LED	Vice Principal	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	3000	1,008	3	T 74 R LED	RTLED50	50	0.2	SW	3,000	450	558	0.2	$ 86.00	$ -	$0	0.0	0.0
50LED	213	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	Boys Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516	2	4 ft LED Tube	200732x2	30	0.1	SW	4,300	258	258	0.1	$ 38.43	$ 290.40	$0	7.6	7.6
50LED	Girls Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516	2	4 ft LED Tube	200732x2	30	0.1	SW	4,300	258	258	0.1	$ 38.43	$ 290.40	$0	7.6	7.6
50LED	211	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	SW	4,300	129	129	0.0	$ 19.21	$ 145.20	$0	7.6	7.6
105LED	Exit	1	W 32 F 1	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	SW	6,240	94	106	0.0	$ 15.41	$ 72.60	$0	4.7	4.7
105LED	Cafeteria	42	W 32 F 1	F41LL	32	1.3	SW	2000	2,688	42	4 ft LED Tube	200732x1	15	0.6	SW	2,000	1,260	1,428	0.7	$ 232.31	$ 3,049.20	$0	13.1	13.1
105LED	Kitchen Storage	3	W 32 F 1	F41LL	32	0.1	SW	2000	192	3	4 ft LED Tube	200732x1	15	0.0	SW	2,000	90	102	0.1	$ 16.59	$ 217.80	$0	13.1	13.1
50LED	110	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
18LED	Hallway	15	T 32 R F 4 (ELE)	F44ILL	112	1.7	SW	6240	10,483	15	T 74 R LED	RTLED50	50	0.8	SW	6,240	4,680	5,803	0.9	$ 842.80	$ -	$0	0.0	0.0
50LED	108	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	112	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	2400	1,728	12	4 ft LED Tube	200732x2	30	0.4	SW	2,400	864	864	0.4	$ 136.86	$ 1,742.40	$0	12.7	12.7
18LED	Social Worker	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	SW	3000	2,352	7	T 74 R LED	RTLED50	50	0.4	SW	3,000	1,050	1,302	0.4	$ 200.66	$ -	$0	0.0	0.0
50LED	111	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	SW	4,300	194	219	0.1	$ 32.66	$ 217.80	$0	6.7	6.7
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	SW	4,300	194	219	0.1	$ 32.66	$ 217.80	$0	6.7	6.7
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	SW	4,300	129	129	0.0	$ 19.21	$ 145.20	$0	7.6	7.6
50LED	107	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	SW	2,400	1,512	1,512	0.6	$ 239.50	$ 3,049.20	$0	12.7	12.7
18LED	Exit	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	6240	699	1	T 74 R LED	RTLED50	50	0.1	SW	6,240	312	387	0.1	$ 56.19	$ -	$0	0.0	0.0
105LED	AHU Room	8	W 32 F 1	F41LL	32	0.3	SW	1640	420	8	4 ft LED Tube	200732x1	15	0.1	SW	1,640	197	223	0.1	$ 37.54	$ 580.80	$0	15.5	15.5
50LED	AHU Room	3	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	1640	295	3	4 ft LED Tube	200732x2	30	0.1	SW	1,640	148	148	0.1	$ 24.84	$ 435.60	$0	17.5	17.5
105LED	Custodial	2	W 32 F 1	F41LL	32	0.1	SW	2125	136	2	4 ft LED Tube	200732x1	15	0.0	SW	2,125	64	72	0.0	$ 11.64	$ 145.20	$0	12.5	12.5
105LED	Boiler Room	7	W 32 F 1	F41LL	32	0.2	SW	1200	269	7	4 ft LED Tube	200732x1	15	0.1	SW	1,200	126	143	0.1	$ 25.68	$ 508.20	$0	19.8	19.8
227	Boiler Room	1	70 W MH Wall Pack	MH70/1	95	0.1	SW	1200	114	1	70 W MH Wall Pack	MH70/1	95	0.1	SW	1,200	114	-	0.0	$ -	$ -	$0		#DIV/0!
50LED	109	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,296	1,296	0.5	$ 205.29	$ 2,613.60	$0	12.7	12.7
50LED	103	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	4 ft LED Tube	200732x2	30	0.1	SW	2,400	288	288	0.1	$ 45.62	$ 580.80	$0	12.7	12.7
50LED	Nurses Office	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	3000	720	4	4 ft LED Tube	200732x2	30	0.1	SW	3,000	360	360	0.1	$ 55.48	$ 580.80	$0	10.5	10.5
50LED	104	8	W 32 P F 2 (ELE)	F42LL	60	0.5	SW	2400	1,152	8	4 ft LED Tube	200732x2	30	0.2	SW	2,400	576	576	0.2	$ 91.24	$ 1,161.60	$0	12.7	12.7
50LED	102	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	4 ft LED Tube	200732x2	30	0.1	SW	2,400	144	144	0.1	$ 22.81	$ 290.40	$0	12.7	12.7
50LED	101-B	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	4 ft LED Tube	200732x2	30	0.1	SW	2,400	144	144	0.1	$ 22.81	$ 290.40	$0	12.7	12.7
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688	14	4 ft LED Tube	200732x2	30	0.4	SW	3,200	1,344	1,344	0.4	$ 205.70	$ 2,032.80	$0	9.9	9.9
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	SW	4,300	129	129	0.0	$ 19.21	$ 145.20	$0	7.6	7.6
50LED	Back Storage	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3200	384	2	4 ft LED Tube	200732x2	30	0.1	SW	3,200	192	192	0.1	$ 29.39	$ 290.40	$0	9.9	9.9
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688	14	4 ft LED Tube	200732x2	30	0.4	SW	3,200	1,344	1,344	0.4	$ 205.70	$ 2,032.80	$0	9.9	9.9
	Total	**1,046**				**64.2**			**177,318**	**1,046**			**2,855**	**32.4**				**87,503**	**89,815**	**31.8**	**$13,937**	**$131,696**	**$0**		
																		Demand Savings			**31.8**	**$1,633**			
																		kWh Savings			**89,815**	**$12,305**			
																		Total savings				**$13,937**		**9.4**	**9.4**

Energy Audit of Newark Public Schools - Lafayette Street Elementary School
CHA Project No.27999
ECM-L2 Install Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code Lighting Fixture Code	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual $ Saved (kW Saved) * ($/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered
50LED	401	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	World Language	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	Grade 7 Math	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	403	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	8th Grade Writing	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	Reading Room	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	407	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	409	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
105LED	Gymnasium	3	W 32 F 1	F41LL	32	0.1	SW	1600	153.6	3	W 32 F 1	F41LL	32	0.1	NONE	1600	153.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Gymnasium	12	W 32 F 1	F41LL	32	0.4	SW	1600	614.4	12	W 32 F 1	F41LL	32	0.4	NONE	1600	614.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Gym Back Room	2	W 32 F 1	F41LL	32	0.1	SW	3200	204.8	2	W 32 F 1	F41LL	32	0.1	NONE	3200	204.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Gym Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	3000	360.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Gym Office Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	137.6	1	W 32 F 1	F41LL	32	0.0	NONE	4300	137.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	413	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	411	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
105LED	Boys Room	2	W 32 F 1	F41LL	32	0.1	SW	4300	275.2	2	W 32 F 1	F41LL	32	0.1	NONE	4300	275.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	137.6	1	W 32 F 1	F41LL	32	0.0	NONE	4300	137.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
18LED	Hallway	13	T 32 R F 4 (ELE)	F44ILL	112	1.5	SW	6240	9,085.4	13	T 32 R F 4 (ELE)	F44ILL	112	1.5	NONE	6240	9,085.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Stairwell	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!
105LED	Stairwell	3	W 32 F 1	F41LL	32	0.1	SW	6240	599.0	3	W 32 F 1	F41LL	32	0.1	NONE	6240	599.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
18LED	Guidance	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	3000	672.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	NONE	3000	672.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	312	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	314	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	310 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	310 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	313	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	311	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	412.8	3	W 32 F 1	F41LL	32	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	412.8	3	W 32 F 1	F41LL	32	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	137.6	1	W 32 F 1	F41LL	32	0.0	NONE	4300	137.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
18LED	Hallway	16	T 32 R F 4 (ELE)	F44ILL	112	1.8	SW	6240	11,182.1	16	T 32 R F 4 (ELE)	F44ILL	112	1.8	NONE	6240	11,182.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	309	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	307	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	305	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	303	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	306	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	304	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	Custodial	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	127.5	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	2125	127.5	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	302	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	301	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
267	Auditorium	9	CFL Chandelier	CF26/6-L	162	1.5	SW	1200	1,749.6	9	CFL Chandelier	CF26/6-L	162	1.5	NONE	1200	1,749.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Backstage	4	W 32 F 1	F41LL	32	0.1	SW	1200	153.6	4	W 32 F 1	F41LL	32	0.1	NONE	1200	153.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Back Left	1	W 32 F 1	F41LL	32	0.0	SW	1200	38.4	1	W 32 F 1	F41LL	32	0.0	NONE	1200	38.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Back Right	1	W 32 F 1	F41LL	32	0.0	SW	1200	38.4	1	W 32 F 1	F41LL	32	0.0	NONE	1200	38.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	201	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	203	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	Main Office	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	3000	2,160.0	12	W 32 P F 2 (ELE)	F42LL	60	0.7	NONE	3000	2,160.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Principals Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	3000	360.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
5LED	Faculty Lounge	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	3000	360.0	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	NONE	3000	360.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
18LED	Faculty Lounge	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3000	3,024.0	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	NONE	3000	3,024.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
5LED	Faculty Womens Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	4300	258.0	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	207	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	209	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	208	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	214	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	210	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	212	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	215	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
18LED	Vice Principal	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	3000	1,008.0	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	NONE	3000	1,008.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	213	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	Boys Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	4300	516.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Girls Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	4300	516.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	211	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Exit	1	W 32 F 1	F41LL	32	0.0	SW	6240	199.7	1	W 32 F 1	F41LL	32	0.0	NONE	6240	199.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Cafeteria	42	W 32 F 1	F41LL	32	1.3	SW	2000	2,688.0	42	W 32 F 1	F41LL	32	1.3	NONE	2000	2,688.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Kitchen Storage	3	W 32 F 1	F41LL	32	0.1	SW	2000	192.0	3	W 32 F 1	F41LL	32	0.1	NONE	2000	192.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	110	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
18LED	Hallway	15	T 32 R F 4 (ELE)	F44ILL	112	1.7	SW	6240	10,483.2	15	T 32 R F 4 (ELE)	F44ILL	112	1.7	NONE	6240	10,483.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	108	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	113	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	2400	1,728.0	12	W 32 P F 2 (ELE)	F42LL	60	0.7	C-OCC	1680	1,209.6	518.4	0.0	$71.02	$270.00	$35.00	3.8	3.3
18LED	Social Worker	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	SW	3000	2,352.0	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	NONE	3000	2,352.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	111	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	412.8	3	W 32 F 1	F41LL	32	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	412.8	3	W 32 F 1	F41LL	32	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	107	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024.0	21	W 32 P F 2 (ELE)	F42LL	60	1.3	C-OCC	1680	2,116.8	907.2	0.0	$124.29	$270.00	$35.00	2.2	1.9
18LED	Exit	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	6240	698.9	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	NONE	6240	698.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	AHU Room	8	W 32 F 1	F41LL	32	0.3	SW	1640	419.8	8	W 32 F 1	F41LL	32	0.3	NONE	1640	419.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	AHU Room	3	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	1640	295.2	3	W 32 P F 2 (ELE)	F42LL	60	0.2	NONE	1640	295.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Custodial	2	W 32 F 1	F41LL	32	0.1	SW	2125	136.0	2	W 32 F 1	F41LL	32	0.1	NONE	2125	136.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
105LED	Boiler Room	7	W 32 F 1	F41LL	32	0.2	SW	1200	268.8	7	W 32 F 1	F41LL	32	0.2	NONE	1200	268.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
227	Boiler Room	1	70 W MH Wall Pack	MH70/1	95	0.1	SW	1200	114.0	1	70 W MH Wall Pack	MH70/1	95	0.1	NONE	1200	114.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	109	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592.0	18	W 32 P F 2 (ELE)	F42LL	60	1.1	C-OCC	1680	1,814.4	777.6	0.0	$106.53	$270.00	$35.00	2.5	2.2
50LED	103	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2400	576.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	C-OCC	1680	403.2	172.8	0.0	$23.67	$270.00	$35.00	11.4	9.9
50LED	Nurses Office	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	3000	720.0	4	W 32 P F 2 (ELE)	F42LL	60	0.2	NONE	3000	720.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	104	8	W 32 P F 2 (ELE)	F42LL	60	0.5	SW	2400	1,152.0	8	W 32 P F 2 (ELE)	F42LL	60	0.5	C-OCC	1680	806.4	345.6	0.0	$47.35	$270.00	$35.00	5.7	5.0
50LED	102	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	C-OCC	1680	201.6	86.4	0.0	$11.84	$270.00	$35.00	22.8	19.9
50LED	101-B	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	C-OCC	1680	201.6	86.4	0.0	$11.84	$270.00	$35.00	22.8	19.9
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688.0	14	W 32 P F 2 (ELE)	F42LL	60	0.8	NONE	3200	2,688.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258.0	1	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	4300	258.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Back Storage	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3200	384.0	2	W 32 P F 2 (ELE)	F42LL	60	0.1	NONE	3200	384.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688.0	14	W 32 P F 2 (ELE)	F42LL	60	0.8	NONE	3200	2,688.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
	Total	**1,046**				**64.2**			**177318.1**	**1046.0**				**64.2**				**143060.5**	**34257.6**	**0.0**	**4693.3**	**12150.0**	**1575.0**		
																		Demand Savings			**0.0**	**$0**			
																		kWh Savings			**34,258**	**$4,693**			
																		Total Savings				**$4,693**		**2.6**	**2.3**

Energy Audit of Newark Public Schools - Lafayette Street Elementary School
CHA Project No.27999
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kWspace) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kWspace) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
50LED	401	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	World Language	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	Grade 7 Math	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	403	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	8th Grade Writing	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	Reading Room	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	407	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	409	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
105LED	Gymnasium	3	W 32 F 1	F41LL	32	0.1	SW	1600	154	3	4 ft LED Tube	200732x1	15	0.0	NONE	1,600	72	82	0.1	$ 13.80	$ 217.80	$ -	15.8	15.8
105LED	Gymnasium	12	W 32 F 1	F41LL	32	0.4	SW	1600	614	12	4 ft LED Tube	200732x1	15	0.2	NONE	1,600	288	326	0.2	$ 55.19	$ 871.20	$ -	15.8	15.8
105LED	Gym Back Room	2	W 32 F 1	F41LL	32	0.1	SW	3200	205	2	4 ft LED Tube	200732x1	15	0.0	NONE	3,200	96	109	0.0	$ 16.65	$ 145.20	$ -	8.7	8.7
50LED	Gym Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360	2	4 ft LED Tube	200732x2	30	0.1	NONE	3,000	180	180	0.1	$ 27.74	$ 290.40	$ -	10.5	10.5
105LED	Gym Office Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	65	73	0.0	$ 10.89	$ 72.60	$ -	6.7	6.7
50LED	413	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	411	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
105LED	Boys Room	2	W 32 F 1	F41LL	32	0.1	SW	4300	275	2	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	129	146	0.0	$ 21.78	$ 145.20	$ -	6.7	6.7
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	65	73	0.0	$ 10.89	$ 72.60	$ -	6.7	6.7
18LED	Hallway	13	T 32 R F 4 (ELE)	F44ILL	112	1.5	SW	6240	9,085	13	T 74 R LED	RTLED50	50	0.7	NONE	6,240	4,056	5,029	0.8	$ 730.43	$ -	$ -	0.0	0.0
40LED	Stairwell	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	6240	2,246	6	T 59 R LED	RTLED38	38	0.2	NONE	6,240	1,423	824	0.1	$ 119.62	$ -	$ -	0.0	0.0
105LED	Stairwell	3	W 32 F 1	F41LL	32	0.1	SW	6240	599	3	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	281	318	0.1	$ 46.22	$ 217.80	$ -	4.7	4.7
18LED	Guidance	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	3000	672	2	T 74 R LED	RTLED50	50	0.1	NONE	3,000	300	372	0.1	$ 57.33	$ -	$ -	0.0	0.0
50LED	312	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	314	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	310 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	318 Computer	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	313	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	311	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	194	219	0.1	$ 32.66	$ 217.80	$ -	6.7	6.7
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	194	219	0.1	$ 32.66	$ 217.80	$ -	6.7	6.7
105LED	Restroom	1	W 32 F 1	F41LL	32	0.0	SW	4300	138	1	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	65	73	0.0	$ 10.89	$ 72.60	$ -	6.7	6.7
18LED	Hallway	16	T 32 R F 4 (ELE)	F44ILL	112	1.8	SW	6240	11,182	16	T 74 R LED	RTLED50	50	0.8	NONE	6,240	4,992	6,190	1.0	$ 898.99	$ -	$ -	0.0	0.0
50LED	309	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	307	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	305	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	303	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	306	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	304	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	Custodial	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	128	1	4 ft LED Tube	200732x2	30	0.0	NONE	2,125	64	64	0.0	$ 10.27	$ 145.20	$ -	14.1	14.1
50LED	302	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	301	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
267	Auditorium	9	CFL Chandelier	CF26/6-L	162	1.5	SW	1200	1,750	9	CFL Chandelier	CF26/6-L	162	1.5	NONE	1,200	1,750	-	0.0	$ -	$ -	$ -	-	-
105LED	Backstage	4	W 32 F 1	F41LL	32	0.1	SW	1200	154	4	4 ft LED Tube	200732x1	15	0.1	NONE	1,200	72	82	0.1	$ 14.67	$ 290.40	$ -	19.8	19.8
105LED	Back Left	1	W 32 F 1	F41LL	32	0.0	SW	1200	38	1	4 ft LED Tube	200732x1	15	0.0	NONE	1,200	18	20	0.0	$ 3.67	$ 72.60	$ -	19.8	19.8
105LED	Back Right	1	W 32 F 1	F41LL	32	0.0	SW	1200	38	1	4 ft LED Tube	200732x1	15	0.0	NONE	1,200	18	20	0.0	$ 3.67	$ 72.60	$ -	19.8	19.8
50LED	201	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	203	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	Main Office	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	3000	2,160	12	4 ft LED Tube	200732x2	30	0.4	NONE	3,000	1,080	1,080	0.4	$ 166.45	$ 1,742.40	$ -	10.5	10.5
5LED	Principals Office	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3000	360	2	4 ft LED Tube	200732x2	30	0.1	NONE	3,000	180	180	0.1	$ 27.74	$ 290.40	$ -	10.5	10.5
5LED	Faculty Lounge	2	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	3000	360	2	2RTLED	2T XX R LED	25	0.1	NONE	3,000	150	210	0.1	$ 32.37	$ -	$ -	0.0	0.0
18LED	Faculty Lounge	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3000	3,024	9	T 74 R LED	RTLED50	50	0.5	NONE	3,000	1,350	1,674	0.6	$ 258.00	$ -	$ -	0.0	0.0
5LED	Faculty Mens Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	4300	258	1	2T XX R LED	2RTLED	25	0.0	NONE	4,300	108	151	0.0	$ 22.42	$ -	$ -	0.0	0.0
5LED	Faculty Womens Room	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.1	SW	4300	258	1	2T XX R LED	2RTLED	25	0.0	NONE	4,300	108	151	0.0	$ 22.42	$ -	$ -	0.0	0.0
50LED	207	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	209	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	208	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	214	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	210	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	212	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	215	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
18LED	Vice Principal	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	3000	1,008	3	T 74 R LED	RTLED50	50	0.2	NONE	3,000	450	558	0.2	$ 86.00	$ -	$ -	0.0	0.0
50LED	213	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	Boys Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516	2	4 ft LED Tube	200732x2	30	0.1	NONE	4,300	258	258	0.1	$ 38.43	$ 290.40	$ -	7.6	7.6
50LED	Girls Room	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	516	2	4 ft LED Tube	200732x2	30	0.1	NONE	4,300	258	258	0.1	$ 38.43	$ 290.40	$ -	7.6	7.6
50LED	211	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	NONE	4,300	129	129	0.0	$ 19.21	$ 145.20	$ -	7.6	7.6
105LED	Exit	1	W 32 F 1	F41LL	32	0.0	SW	6240	200	1	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	94	106	0.0	$ 15.41	$ 72.60	$ -	4.7	4.7
105LED	Cafeteria	42	W 32 F 1	F41LL	32	1.3	SW	2000	2,688	42	4 ft LED Tube	200732x1	15	0.6	NONE	2,000	1,260	1,428	0.7	$ 232.31	$ 3,049.20	$ -	13.1	13.1
105LED	Kitchen Storage	3	W 32 F 1	F41LL	32	0.1	SW	2000	192	3	4 ft LED Tube	200732x1	15	0.0	NONE	2,000	90	102	0.1	$ 16.59	$ 217.80	$ -	13.1	13.1
50LED	110	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
18LED	Hallway	15	T 32 R F 4 (ELE)	F44ILL	112	1.7	SW	6240	10,483	15	T 74 R LED	RTLED50	50	0.8	NONE	6,240	4,680	5,803	0.9	$ 842.80	$ -	$ -	0.0	0.0
50LED	108	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	113	12	W 32 P F 2 (ELE)	F42LL	60	0.7	SW	2400	1,728	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	605	1,123	0.4	$ 172.37	$ 2,012.40	$ 35	11.7	11.5
18LED	Social Worker	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	SW	3000	2,352	7	T 74 R LED	RTLED50	50	0.4	NONE	3,000	1,050	1,302	0.4	$ 200.66	$ -	$ -	0.0	0.0
50LED	111	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
105LED	Boys Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	194	219	0.1	$ 32.66	$ 217.80	$ -	6.7	6.7
105LED	Girls Room	3	W 32 F 1	F41LL	32	0.1	SW	4300	413	3	4 ft LED Tube	200732x1	15	0.0	NONE	4,300	194	219	0.1	$ 32.66	$ 217.80	$ -	6.7	6.7
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	NONE	4,300	129	129	0.0	$ 19.21	$ 145.20	$ -	7.6	7.6
50LED	107	21	W 32 P F 2 (ELE)	F42LL	60	1.3	SW	2400	3,024	21	4 ft LED Tube	200732x2	30	0.6	C-OCC	1,680	1,058	1,966	0.6	$ 301.64	$ 3,319.20	$ 35	11.0	10.9
18LED	Exit	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	6240	699	1	T 74 R LED	RTLED50	50	0.1	NONE	6,240	312	387	0.1	$ 56.19	$ -	$ -	0.0	0.0
105LED	AHU Room	8	W 32 F 1	F41LL	32	0.3	SW	1640	420	8	4 ft LED Tube	200732x1	15	0.1	NONE	1,640	197	223	0.1	$ 37.54	$ 580.80	$ -	15.5	15.5
50LED	AHU Room	3	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	1640	295	3	4 ft LED Tube	200732x2	30	0.1	NONE	1,640	148	148	0.1	$ 24.84	$ 435.60	$ -	17.5	17.5
105LED	Custodial	2	W 32 F 1	F41LL	32	0.1	SW	2125	136	2	4 ft LED Tube	200732x1	15	0.0	NONE	2,125	64	72	0.0	$ 11.64	$ 145.20	$ -	12.5	12.5
105LED	Boiler Room	7	W 32 F 1	F41LL	32	0.2	SW	1200	269	7	4 ft LED Tube	200732x1	15	0.1	NONE	1,200	126	143	0.1	$ 25.68	$ 508.20	$ -	19.8	19.8
227	Boiler Room	1	70 W MH Wall Pack	MH70/1	95	0.1	SW	1200	114	1	70 W MH Wall Pack	MH70/1	95	0.1	NONE	1,200	114	-	0.0	$ -	$ -	$ -	-	-
50LED	109	18	W 32 P F 2 (ELE)	F42LL	60	1.1	SW	2400	2,592	18	4 ft LED Tube	200732x2	30	0.5	C-OCC	1,680	907	1,685	0.5	$ 258.55	$ 2,883.60	$ 35	11.2	11.0
50LED	103	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	2400	576	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,680	202	374	0.1	$ 57.46	$ 850.80	$ 35	14.8	14.2
50LED	Nurses Office	4	W 32 P F 2 (ELE)	F42LL	60	0.2	SW	3000	720	4	4 ft LED Tube	200732x2	30	0.1	NONE	3,000	360	360	0.1	$ 55.48	$ 580.80	$ -	10.5	10.5
50LED	104	8	W 32 P F 2 (ELE)	F42LL	60	0.5	SW	2400	1,152	8	4 ft LED Tube	200732x2	30	0.2	C-OCC	1,680	403	749	0.2	$ 114.91	$ 1,431.60	$ 35	12.5	12.2
50LED	102	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,680	101	187	0.1	$ 28.73	$ 560.40	$ 35	19.5	18.3
50LED	101-B	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	2400	288	2	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,680	101	187	0.1	$ 28.73	$ 560.40	$ 35	19.5	18.3
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688	14	4 ft LED Tube	200732x2	30	0.4	NONE	3,200	1,344	1,344	0.4	$ 205.70	$ 2,032.80	$ -	9.9	9.9
50LED	Restroom	1	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	4300	258	1	4 ft LED Tube	200732x2	30	0.0	NONE	4,300	129	129	0.0	$ 19.21	$ 145.20	$ -	7.6	7.6
50LED	Back Storage	2	W 32 P F 2 (ELE)	F42LL	60	0.1	SW	3200	384	2	4 ft LED Tube	200732x2	30	0.1	NONE	3,200	192	192	0.1	$ 29.39	$ 290.40	$ -	9.9	9.9
50LED	Storage	14	W 32 P F 2 (ELE)	F42LL	60	0.8	SW	3200	2,688	14	4 ft LED Tube	200732x2	30	0.4	NONE	3,200	1,344	1,344	0.4	$ 205.70	$ 2,032.80	$ -	9.9	9.9
S	**Total**	**1,046**				**64.2**			**177,318**	**1,046**				**32.4**				**70,374**	**31.8**	**16,284**	**143,846**	**$1,575**		
S																		**Demand Savings**		**31.8**	**$1,633**			
S																		**kWh Savings**		**106,944**	**$14,651**			
S																		**Total Savings**			**$16,284**		**8.8**	**8.7**

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

PROGRAM UPDATES

CONTACT US

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

Electric Unitary HVAC

Unitary AC and split systems ($73 - $92 per ton)
Air-to-air heat pumps ($73 - $92 per ton)
Water-source heat pumps ($81 per ton)
Packaged terminal AC & HP ($65 per ton)
Central DX AC Systems ($40 - $72 per ton)
Dual Enthalpy Economizer Controls ($250)
Occupancy Controlled Thermostats ($75 each)
A/C Economizing Controls ($85 - $170 each)

Ground Source Heat Pumps

Closed Loop ($450-750 per ton)

Gas Heating

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

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

EXISTING BUILDINGS

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FAQS

BECOME A PARTNER

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

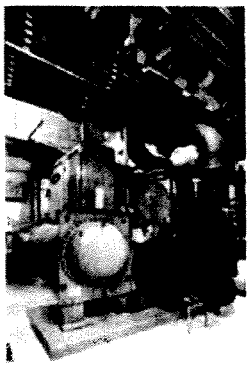
ENERGY BENCHMARKING

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

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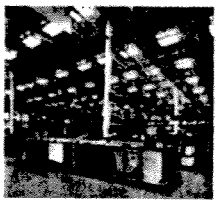
CONTACT US

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.

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

BPU New Jersey Board of Public Utilities

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

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 SCHOOL DISTRICT
LAFAYETTE STREET SCHOOL

Cost of Electricity	$0.15	/kWh
Electricity Usage	309,600	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without SREC	Payback (with SREC
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$80,000	**20.0**	**24,979**	**0**	**$3,747**	**0**	**$3,747**	**$0**	**$3,872**	**21.4**	**10.5**

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

Area Output*

701 m2
7,542 ft2

Perimeter Output*

192 m
631 ft

Available Roof Space for PV:
(Area Output - 5 ft x Perimeter) x 85%
3,728 ft2

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

8 watt/ft2
29,822 DC watts
20 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	07105	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output

24,979 annual kWh calculated in PV Watts program

% Offset Calc

Usage	309,600	(from utilities)
PV Generation	24,979	(generated using PV Watts)
% offset	8%	

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

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

Lafayette Street School

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	20.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	16.6 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	2.78	1461	219.15
2	3.54	1683	252.45
3	4.35	2228	334.20
4	4.95	2362	354.30
5	5.69	2742	411.30
6	5.86	2653	397.95
7	5.73	2648	397.20
8	5.47	2502	375.30
9	4.91	2241	336.15
10	3.99	1944	291.60
11	2.68	1305	195.75
12	2.35	1208	181.20
Year	4.36	24979	3746.85

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

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

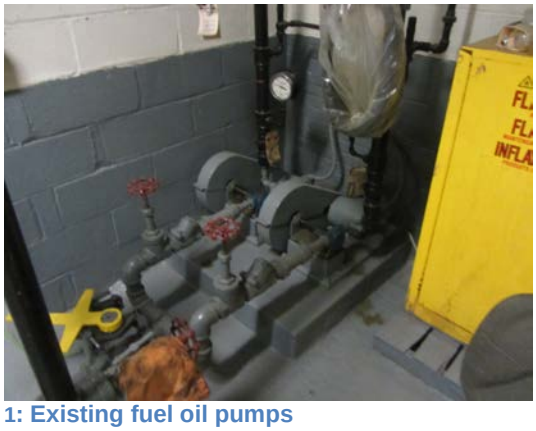
APPENDIX F

Photos

5.1 ECM-1 Replace Door Sweeps and Seals

No picture included

5.2.1 ECM-2A Heating Fuel Conversion (Fuel Switch)



1: Existing fuel oil pumps

5.2.2 ECM-2B Convert Steam System to Hot Water

2: One of two oil fired steam boilers in boiler room

5.3 ECM-3 Install Insulation on Piping

3: Picture depicting uninsulated DHW piping

5.4 ECM-4 Install Window A/C Controller

No picture included

5.5.1 ECM-5A Install Basic Controls

4: Existing control system which is not used under 28F

5.5.2 ECM-5B Install DDC Controls

No picture included

5.6 ECM-6 Domestic Hot Water System Improvements

5: School DHW heater

5.7 ECM-7 Install Vending Misers

No picture included

5.8 ECM-8 Install Low Flow Plumbing Fixtures

6: High flow plumbing fixtures

5.9.1 ECM-L1 Lighting Replacement / Upgrades

7: Example of Lighting in classroom

5.9.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

8: Typical classroom lighting layout

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

No picture included

APPENDIX G

EPA Portfolio Manager

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Lafayette St.

Primary Property Function: K-12 School
Gross Floor Area (ft²): 75,170
Built: 1848

For Year Ending: May 31, 2013
Date Generated: April 14, 2014

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Lafayette St. 205 Lafayette St. Newark, New Jersey 07105	Newark Public Schools 2 Cedar Street Newark, NJ 07102 (____)____-_____	Gregory Coleman 10 Maxwell Drive Suite 200 Clifton Park, NY 12065 000-000-0000 mvadney@trcsolutions.com

Property ID: 3924355

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
72.6 kBtu/ft²

Source EUI
102.9 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	303,259 (6%)
Fuel Oil (No. 2) (kBtu)	4,118,472 (75%)
Electric - Grid (kBtu)	1,038,340 (19%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	65.8
National Median Source EUI (kBtu/ft²)	93.2
% Diff from National Median Source EUI	10%

Annual Emissions	
Greenhouse Gas Emissions (MtCO2e/year)	453

Signature & Stamp of Verifying Professional

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

Signature: _____Date: _____

Licensed Professional

____ _____
,
(____)____-_____
_____

Professional Engineer Stamp (if applicable)