

THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

LINCOLN SCHOOL

87 Richelieu Terrace, Newark, NJ 07106

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

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CHA PROJECT NO. 27999

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REPORT DISCLAIMER

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

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

List of Common Energy Audit Abbreviations

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

1.0 EXECUTIVE SUMMARY

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

Building Name	Address	Square Feet	Construction Date
Lincoln School	87 Richelieu Terrace, Newark, NJ 07106	57,539	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)	Total Savings (\$)	Payback (years)
Lincoln School	108,044	8,190	22,834	9.3

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

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

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs (\$)	Est. Savings (\$/year)	Payback w/o Incentive	Potential Incentive (\$)*	Payback w/ Incentive	Recommended
1	Install Attic Insulation	37,401	4,782	7.8	0	7.8	Y
2	Install Door Seals/Sweeps	1,383	496	2.8	0	2.8	Y
3	Convert Steam Heating System to Hydronic Heating	2,452,240	3,785	647.9	3,000	647.1	N
4	Install Window A/C Controllers	2,300	1,343	1.7	0	1.7	Y
5A	Basic HVAC Control	21,309	2,179	9.8	0	9.8	Y
5B**	Full DDC Control	227,395	4,904	46.4	0	46.4	N
6	Domestic Hot Water System Improvements	17,158	405	42.3	50	42.2	Y
7	Install Low Flow Plumbing Fixtures	167,755	953	176.1	0	176.1	N
L1**	Lighting Replacements / Upgrades	121,701	12,394	9.8	2,000	9.7	N
L2**	Install Lighting Controls (Add Occupancy Sensors)	11,880	2,542	4.7	1,540	4.1	N
L3	Lighting Replacements with Controls (Occupancy Sensors)	133,581	13,629	9.8	3,540	9.5	Y
Total**		2,833,126	27,572	102.8	6,500	102.5	
Total (Recommended)		213,132	22,834	9.3	6,590	9.2	

* Incentive shown is per the New Jersey SmartStart Program.

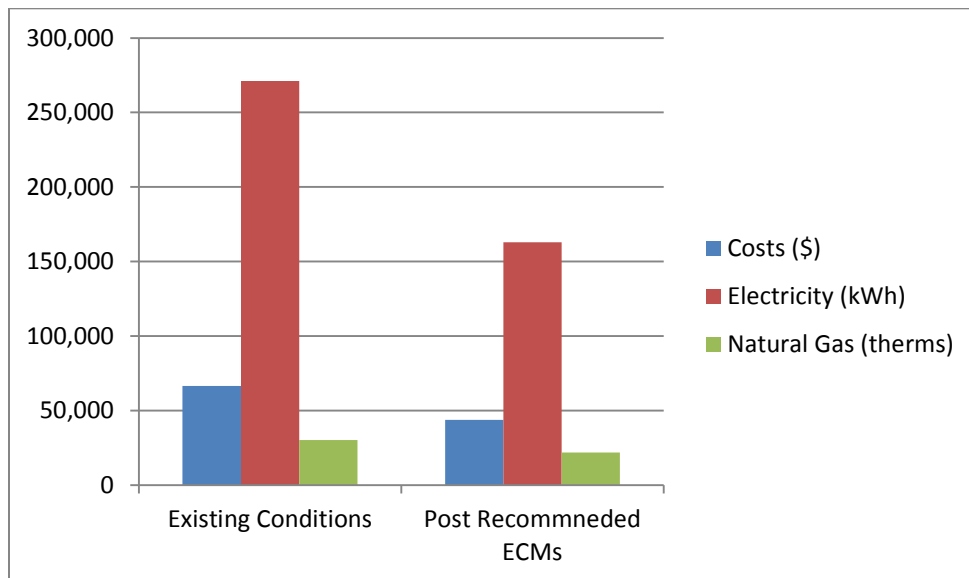
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 10 kW System

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

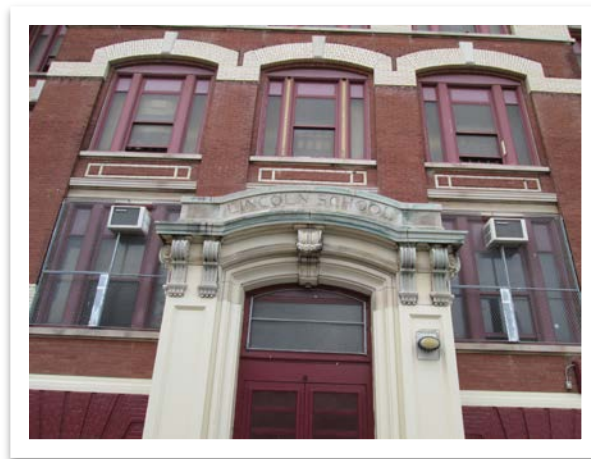
	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	66,461	43,627	34%
Electricity (kWh)	271,016	162,972	40%
Natural Gas (therms)	30,088	21,898	27%
Site EUI (kbtu/SF/Yr)	68.4	47.7	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

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

Building Name: Lincoln School (Index No. 44)
Address: 87 Richelieu Terrace, Newark, NJ 07106
Gross Floor Area: 57,539 Square Feet
Number of Floors: 4
Year Built: 1908
Additions: 1926



Description of Spaces: Classrooms, offices, multipurpose room (cafeteria and auditorium), auditorium, gymnasium, computer lab, media center (library), temporary classroom unit (TCU), storage rooms, toilet rooms and mechanical rooms.

Description of Occupancy: The school serves 416 students from Pre-K to 8th grade. There are 30 school faculty and staff members.

Number of Computers: The school has approximately 100 desktop and laptop computers.

Building Usage: School hours are 8:20 AM – 3:30 PM Monday through Friday, with various after-school activities. Typical occupied hours are 50 hours per week, 10 months per year.

Construction Materials: The typical construction is wood framing with no insulation in the exterior walls. The interior walls are plaster covered terracotta speed tile and brick.

Façade: Brick and limestone

Roof: The 1908 construction has a pitched roof framed with wood and has asphalt shingles. The 1926 roof is flat with asphalt sheet roofing framed out of wood. There was no attic access at the time of the field visit, however facility personnel indicated that there was no insulation. An ECM has been included which evaluates the installation of insulation within the attic of the pitched roof portion.

Windows: The windows throughout the building are single pane double hung windows with aluminum frames. The windows are in good condition; there are no ECMs associated with the windows.

Exterior Doors: The exterior doors are wood or metal with no insulation. The seals and sweeps around doors appear to have deteriorated with time and can be replaced. An ECM is included which evaluates replacing the door seals and sweeps.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The heating system consists of two (2) natural gas fired CB700-125 Cleaver Brooks steam boilers installed in 1995. There are also two small hot water (HW) heat exchangers which generate heating hot water (HHW) for use in some basement classrooms. Steam pressure is typically maintained at 1-2 psi unless it is extremely cold out at which point it can reach up to 5psi. Steam is distributed throughout the building to steam radiators although a few classrooms have unit ventilators (UV) with steam coils. Condensate is collected by steam traps and piped to a condensate return tank where it is mixed with make-up water before being pumped back to the boilers. Steam traps appear to have been replaced possibly when the boiler was installed in 1995.

Although the boilers are relatively new the steam distribution system is original to the building, well beyond its useful life. An ECM which addresses the complete replacement of the steam system with a high efficiency hot water heating system has been included.

A TCU located in the playground area on the grounds has a Bard packaged HVAC unit with a 15 kW electric heater. These temporary classroom units are not used during the winter and may be removed in the near future.

Cooling: About 5% of the building is cooled with window air conditioning units. There are about ten (12) window A/Cs which vary in size and age. The average capacity appeared to be 24,000 btu/h. The Bard unit supplies 2 tons of direct expansion (DX) cooling for the TCU.

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: The majority of the building does not have any mechanical ventilation. There are a few classrooms with UVs which bring in a small amount of outdoor air (OA) if the fans are working properly. The remainder of the ventilation is achieved by teachers opening windows.

Exhaust: There are no mechanical exhaust systems in this school. Any exhaust is achieved through opening windows.

Controls Systems

The boilers are operated manually by the custodian on staff. Typically this results in the building being over-heated. There is no control of individual terminal units (radiators). The TCU packaged unit is controlled by an electronic thermostat located in the room. The TCU thermostat is set at 65F for heating, but is not used as a classroom during the winter.

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

Domestic Hot Water Systems

Domestic hot water (DHW) is generated by two (2) 65 gallon Ruud natural gas fired commercial DHW heater with an input capacity of 360,000 btu/h which was installed in 2000. DHW is used in the building for faucets located in toilet rooms and the teachers' lounge.

ECM is included to evaluate the replacement of these two water heaters with a smaller capacity condensing gas domestic water heater.

Kitchen Equipment

There is a small kitchen in this school but it does not appear to be functional. All food is prepared elsewhere and delivered to this school.

Plumbing Systems

Plumbing fixtures include water closets, urinals, lavatories and mop 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 portable electric heaters (personal) which contribute to the plug load in the building.

There are no ECMs to reduce the plug load proposed for this building

Lighting Systems

The majority of the lighting is 32W T8 fluorescent lamps in a variety of different linear fixture types including pendant mounted box and wraparound fixtures and ceiling mounted wraparound fixtures. There are also a handful of incandescent lamps in closets and some restrooms. The gymnasium has 400W metal halide (MH) fixtures. Interior lighting is mainly controlled by wall mounted switches although lighting in the corridors is controlled by breaker.

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

3.0 UTILITIES

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

	Electric	Natural Gas
Deliverer	PSEG	PSEG
Supplier	Nextera Energy Services	PSEG

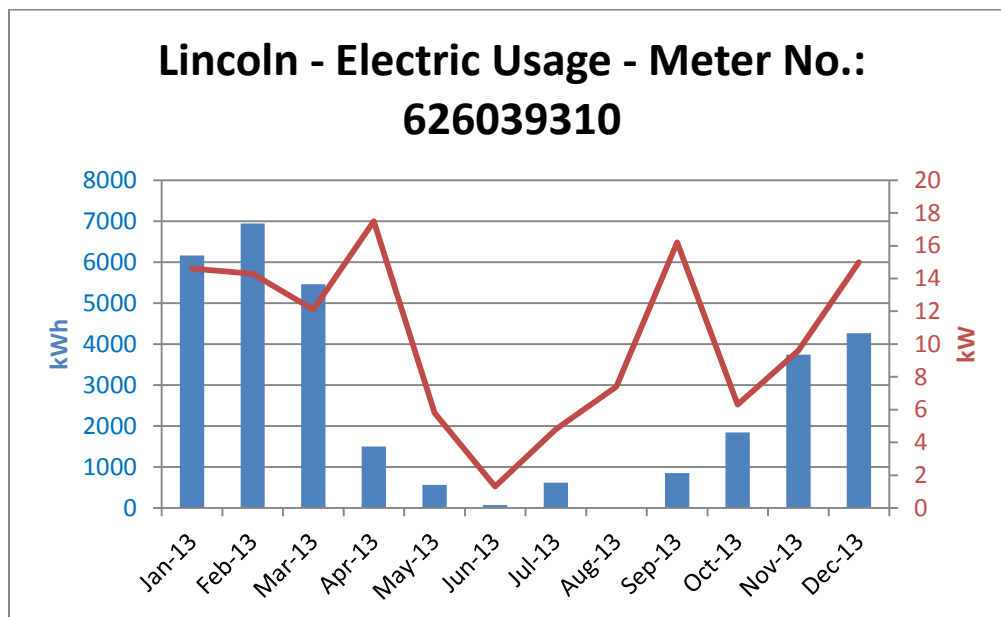
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	271,016	kWh
Annual Cost	37,612	\$
Blended Unit Rate	0.14	\$/kWh
Supply Rate	0.12	\$/kWh
Demand Rate	4.39	\$/kW
Peak Demand	100.8	kW
Natural Gas		
Annual Consumption	30,088	Therms
Annual Cost	28,849	\$
Unit Rate	0.96	\$/therm

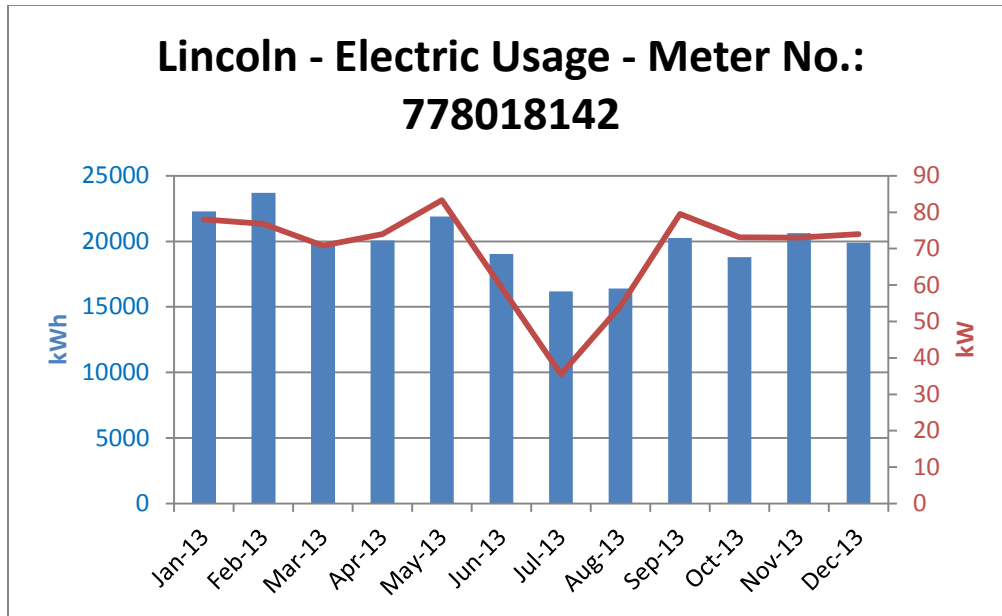
Blended Rate: Average rate charged determined by the annual cost / annual usage

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

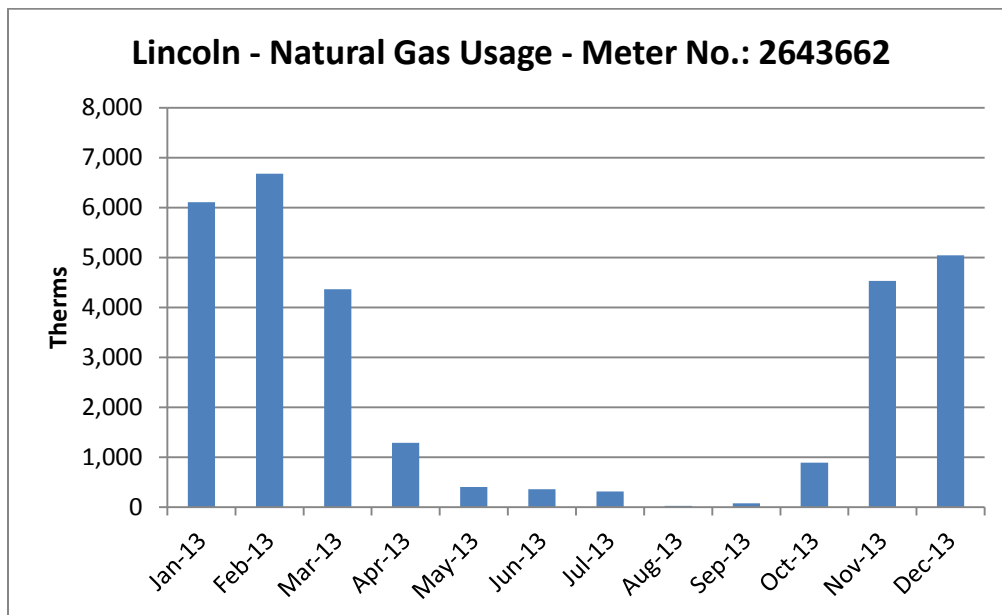
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)



This electric meter is likely for the TCU as it displays less usage than the next chart for electricity. This chart displays peak usage during the winter months and less during the summer months. As the TCU has electric heat and is not used during the majority of the summer as school is not in session, this profile is expected.



This meter is the main electricity meter for the school and shows electricity usage which is expected for this type of building. The usage is fairly constant each month with less usage in the summer when the school is not in session.



The majority of natural gas is used in the winter for space heating which can be seen in the chart above, as peak usage occurs during the winter months. The usage during the summer is for domestic hot water production with some kitchen equipment usage.

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

See Appendix A for a 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	\$0.12	\$0.12	N
Natural Gas	\$/Therm	\$0.96	\$0.95	Y

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

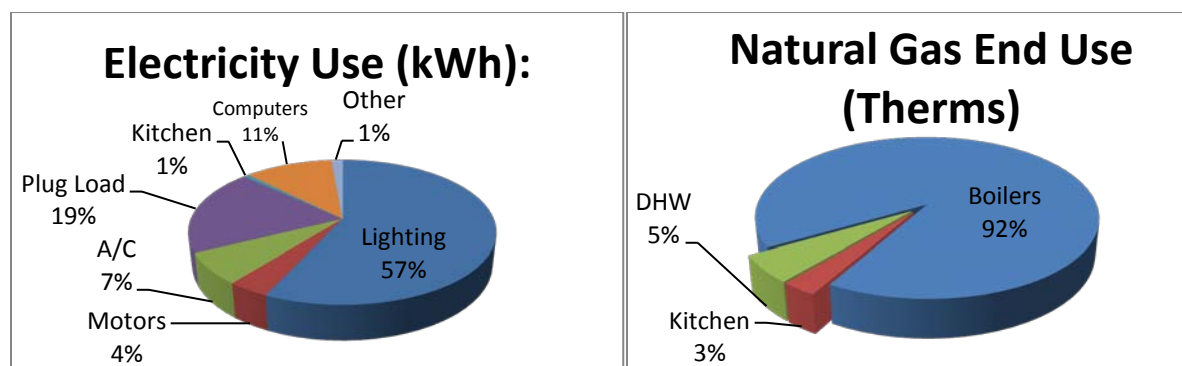
Additional information on selecting a third party energy supplier is available here:

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

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

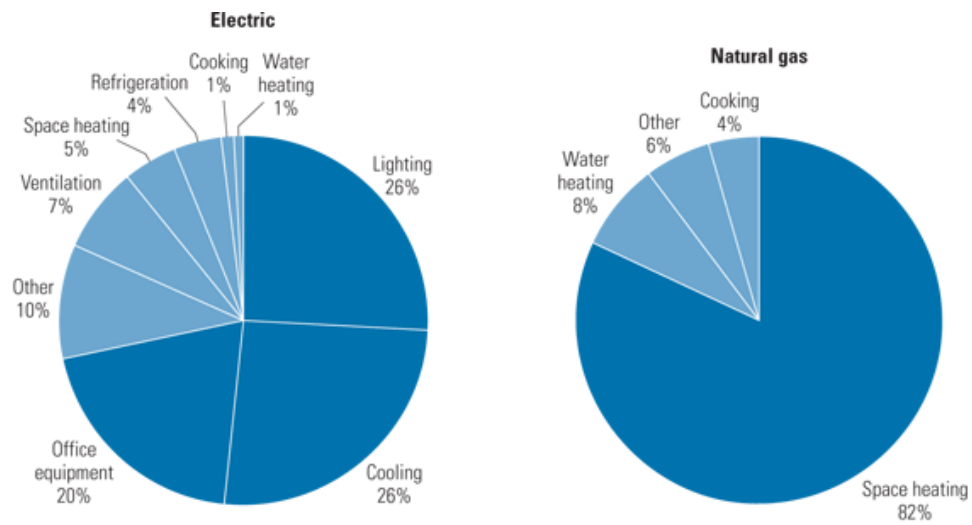
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



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

Typical End-Use Utility Profile for Educational Facilities



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

4.0 BENCHMARKING

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

The EPA Portfolio Manager benchmarking tool provides a site and source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft²/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive an Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase.

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

Site EUI kBtu/ft ² /yr	Energy Star Rating (1-100)
68.4*	51**

* Calculated by CHA using Utility Data provided by NPS

** Provided by TRC

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

5.0 ENERGY CONSERVATION MEASURES

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

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

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Install Blown-In Insulation in Attic Space

Presently there is no insulation within attic of the pitched roof section which allows heat loss through the roof. The addition of insulation on the attic floor will reduce heating costs by allowing building to maintain the internal temperature for longer.

The savings for this ECM is calculated by estimating the internal heat load of the building using 12-months of utility data and establishing a typical R-value of an existing attic; this is compared to a new R-value for the proposed scenario. The difference in R-values results in a difference of energy lost through the walls and ceiling. The difference multiplied by the annual hours is the energy savings.

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

ECM-1 Install Blown-In Insulation in Attic Space

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
37,401	0	0	4,981	4,782	0.9	-	7.8	7.8

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

This measure is recommended.

5.2 ECM-2 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-2 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	516	496	2.6	-	2.8	2.8

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

This measure is recommended.

5.3 ECM-3 Convert Steam System to Hot Water

This ECM evaluates the conversion of the existing natural gas 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 and ultimately pipe failure. Steam heating systems use boilers that only operate up to 84% combustion efficiency and have even lower thermal efficiency. Multiple condensate pumps and boiler feed water pumps consume electricity that would not be needed in other modern heating systems.

In lieu of replacing the boilers in kind, this ECM evaluates replacing the steam system in its entirety with a more efficient hot water system. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. To implement this ECM, the old steam boilers, distribution piping, venting and terminal units would be removed and the new hot water boilers, distribution piping and primary pumps put in their place. Significant piping and wiring modifications would be needed. New dedicated boiler venting would also need to be installed either through the roof or sidewall. Asbestos abatement may need to be performed prior to any work and the cost for this is not included in the payback analysis.

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

ECM-3 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
2,452,240	0	0	3,943	3,785	(1.0)	3,000	647.9	647.1

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

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

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
2,300	0	9,658	0	1,343	7.8	-	1.7	1.7

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

This measure is recommended.

5.5.1 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	2,270	2,179	0.5	-	9.8	9.8

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

This measure is recommended.

5.5.2 ECM-5B Install Full DDC Controls

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

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

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

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

ECM-5B Install Full DDC Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
227,395	0	0	5,109	4,904	(0.7)	-	46.4	46.4

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

This measure is not recommended in lieu of ECM-5A, due to the high cost of implementation and because the current steam system will not benefit as much from DDC controls as a hydronic system would.

5.6 ECM-6 Domestic Hot Water System Improvements

The existing domestic hot water heating system consists of two (2) natural gas fired DHW heaters with combined capacity of 130 gallons. The DHW heaters have a thermal efficiency of 80%. The amount of stored water is oversized for this type of school which only uses hot water at hand sinks.

Implementation of this ECM will entail replacing the existing DHW heater with a high efficiency condensing water heaters. The tank size of the existing system will be reduced to which will result in a combined savings from reducing the storage losses as well as reducing the overall fuel consumption. The proposed DHW heaters include one (1) high efficiency condensing heater with 50 gallon capacity.

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
17,158	0	0	422	405	(0.6)	50	42.3	42.2

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

This measure is recommended.

5.7 ECM-7 Install Low Flow Plumbing Fixtures

The plumbing fixtures in this building are older high flow fixtures. The water savings associated from replacing existing high flow fixtures with low-flow fixtures was calculated by taking the difference of the annual water usage for the proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures. Replacing the existing fixtures in the restrooms with 1.28 Gals/flush toilets, 1.0 gal/flush urinals, and 0.5 gpm faucets will conserve water which will result in lower annual water and sewer charges. Facets with low-flow push valves were not considered for replacement.

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

ECM-7 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
\$	kW	kWh	Therms	kGal	\$		\$	Years	Years
167,755	0	0	0	126	953	(0.8)	-	176.1	176.1

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

These measures are not recommended due to the long payback period.

5.8.1 ECM-L1 Lighting Replacement / Upgrades

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

Overall energy consumption can be reduced by replacing inefficient bulbs and linear fluorescent bulbs with more efficient LED technology. To compute the annual savings for this ECM, the energy consumption of the current lighting fixtures was established and compared to the proposed fixture power requirement with the same annual hours of

operation. The difference between the existing and proposed annual energy consumption was the energy savings. These calculations are based on 1 to 1 replacements of the fixtures, and do not take into account lumen output requirements for a given space. A more comprehensive engineering study should be performed to determine correct lighting levels.

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

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
121,701	29	88,345	0	12,394	0.1	2,000	9.8	9.7

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

This measure is not recommended in lieu of ECM L3.

5.8.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

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

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

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
11,880	0	20,663	0	2,542	1.4	1,540	4.7	4.1

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

This measure is not recommended in lieu of ECM L3.

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

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

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
133,581	29	98,386	0	13,629	0.1	3,540	9.8	9.5

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

This measure is recommended.

5.9 Additional O&M Opportunities

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

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

- During the winter, Custodians should ensure all windows are closed as part of cleaning routine

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

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

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

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

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

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

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

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

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

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

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

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

Electric

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

Gas

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

Incentive cap: 25% of total project cost

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

Electric

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

Gas

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

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

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

6.1.4 Energy Savings Improvement Plan

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

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

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

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft ²)	Potential PV Array Size (kW)
2,244	10

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 – 10 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	
40,000	10.0	12,490	0	1,749	1,936	22.9	10.9	FS

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

7.1.2 Solar Thermal Hot Water Generation

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

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

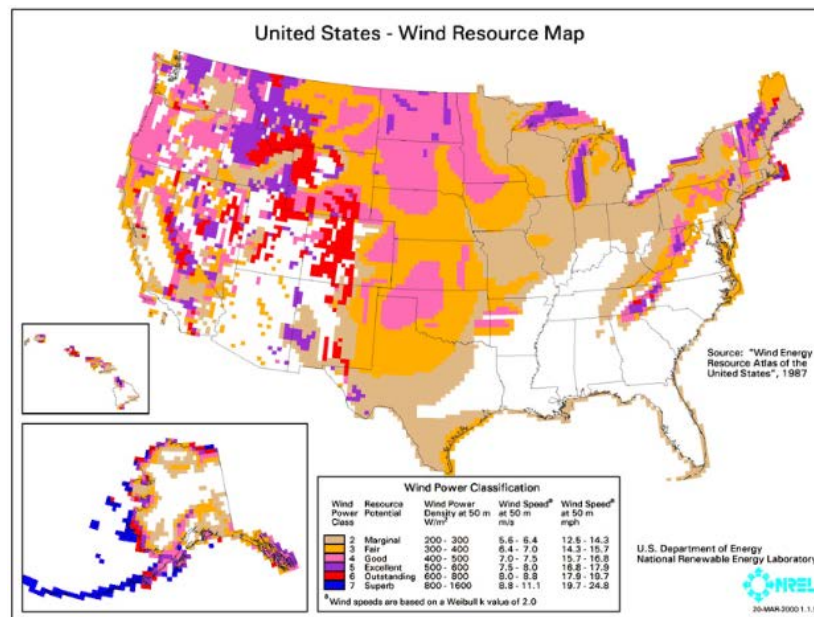
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping).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

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

7.2 Wind Powered Turbines

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

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



This measure is not recommended due to the location of the building.

7.3 Combined Heat and Power Plant

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

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

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

This measure is not recommended due to the 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
100.8	36.8	79.7	Y	N

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 \$22,834/yr with an overall payback of 9.3 years, if the recommended ECMs are implemented.

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
108,044	8,190	22,834	9.3

The following projects should be considered for implementation:

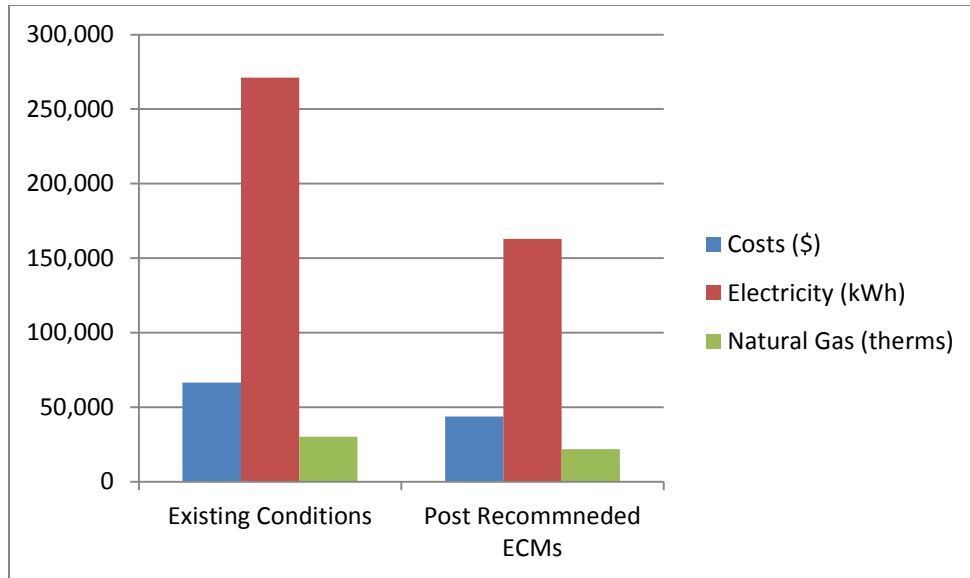
- Install Attic Insulation
- Install Door Sweeps and Seals
- Install Window A/C Controllers
- Install Basic Controls
- Domestic Hot Water System Improvements
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 10 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	66,461	43,627	34%
Electricity (kWh)	271,016	162,972	40%
Natural Gas (therms)	30,088	21,898	27%
Site EUI (kbtu/SF/Yr)	68.4	47.7	



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

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

Lincoln - Electric Usage (1)

Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption (\$)	Blended Rate (\$/kWh)	Consumption Rate (\$/kWh)	Demand Rate (\$/kW)
1/5/2012	2/2/2012	3470	12.5	533.56	364.97	115.63	52.96	480.60	\$ 0.15	\$ 0.14	\$ 4.24
2/3/2012	3/5/2012	3142	12.6	503.25	344.76	105.11	53.38	449.87	\$ 0.16	\$ 0.14	\$ 4.24
3/6/2012	4/3/2012	1474	16.3	312.18	191.49	51.64	69.05	243.13	\$ 0.21	\$ 0.16	\$ 4.24
4/4/2012	5/3/2012	1106	12.6	256.11	162.89	39.84	53.38	202.73	\$ 0.23	\$ 0.18	\$ 4.24
5/4/2012	6/4/2012	561	12.5	294.58	117.34	124.28	52.96	241.62	\$ 0.53	\$ 0.43	\$ 4.24
6/5/2012	7/3/2012	671	11	274.96	110.69	117.67	46.6	228.36	\$ 0.41	\$ 0.34	\$ 4.24
7/4/2012	8/1/2012	613	4.8	195.25	108.23	66.68	20.34	174.91	\$ 0.32	\$ 0.29	\$ 4.24
8/2/2012	8/30/2012	29	8	166.32	63.98	68.45	33.89	132.43	\$ 5.74	\$ 4.57	\$ 4.24
8/31/2012	12/3/2012	4483	16.1	807.22	505.69	162.57	138.96	668.26	\$ 0.18	\$ 0.15	\$ 8.63
12/4/2012	1/3/2013	5883	12.2	730.15	477.9	200.52	51.73	678.42	\$ 0.12	\$ 0.12	\$ 4.24
1/4/2013	2/1/2013	6165	14.6	773.2	497.28	213.42	62.5	710.7	\$ 0.13	\$ 0.12	\$ 4.28
2/2/2013	3/5/2013	6946	14.3	846.91	559.01	226.69	61.21	785.7	\$ 0.12	\$ 0.11	\$ 4.28
3/6/2013	4/4/2013	5459	12.1	686.57	455.7	179.08	51.79	634.78	\$ 0.13	\$ 0.12	\$ 4.28
4/5/2013	5/3/2013	1497	17.5	303.74	176.63	52.2	74.91	228.83	\$ 0.20	\$ 0.15	\$ 4.28
5/4/2013	6/5/2013	561	5.8	205.72	108.76	72.13	24.83	180.89	\$ 0.37	\$ 0.32	\$ 4.28
6/6/2013	7/3/2013	73	1.3	93.23	70.11	17.56	5.56	87.67	\$ 1.28	\$ 1.20	\$ 4.28
7/4/2013	8/2/2013	614	4.8	196.6	108.75	67.3	20.55	176.05	\$ 0.32	\$ 0.29	\$ 4.28
8/3/2013	9/3/2013	10	7.4	96.04	0.9	63.46	31.68	64.36	\$ 9.60	\$ 6.44	\$ 4.28
9/4/2013	10/2/2013	848	16.2	179.04	76.57	33.13	69.34	109.7	\$ 0.21	\$ 0.13	\$ 4.28
10/3/2013	11/1/2013	1842	6.3	260.44	166.33	67.14	26.97	233.47	\$ 0.14	\$ 0.13	\$ 4.28
11/2/2013	12/3/2013	3741	9.6	510.87	337.81	131.97	41.09	469.78	\$ 0.14	\$ 0.13	\$ 4.28
12/4/2013	1/3/2014	4264	15	598.44	385.04	149.2	64.2	534.24	\$ 0.14	\$ 0.13	\$ 4.28

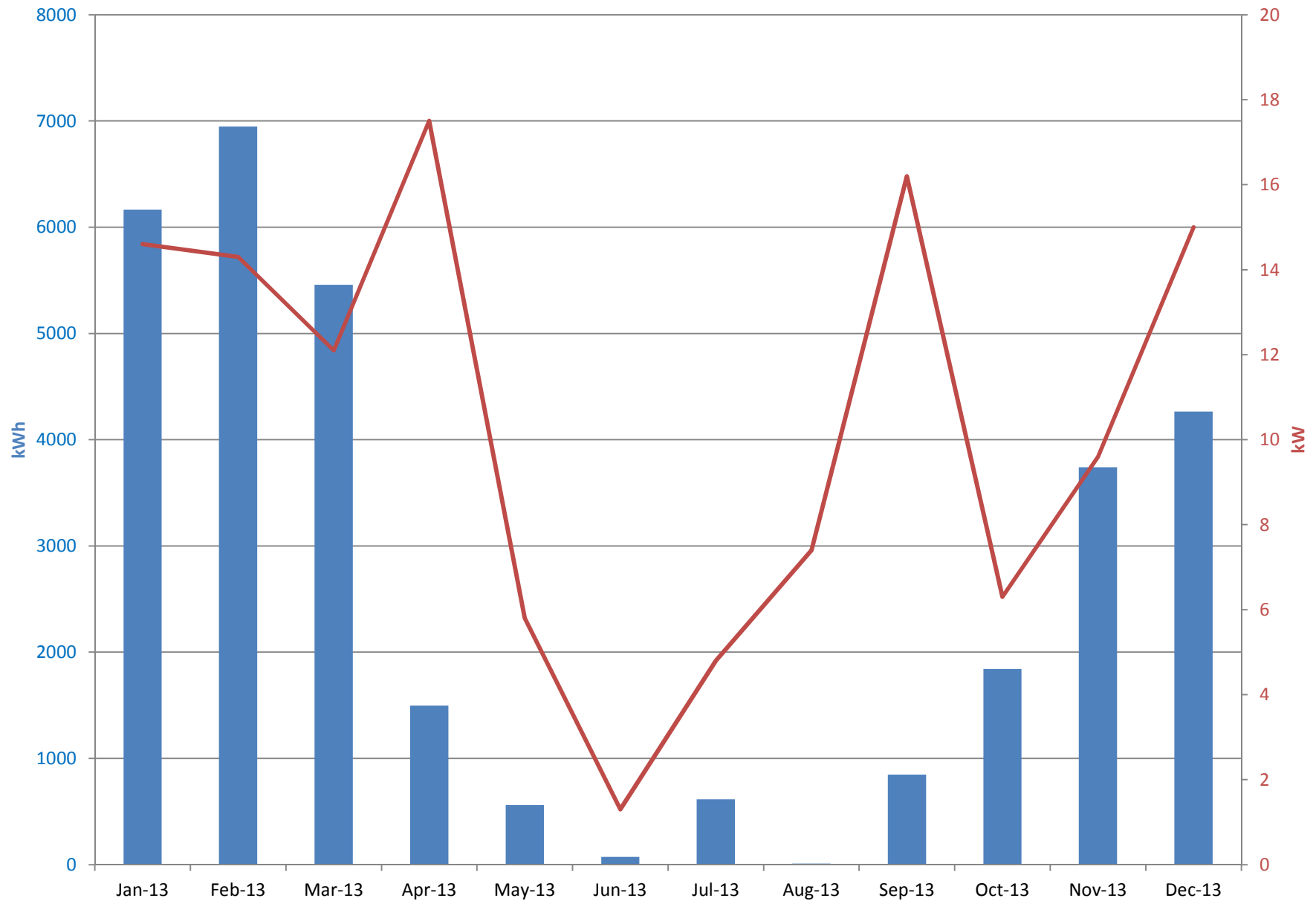
Lincoln	Start Date	End Date	Months
87 Richelieu Terr., 07106	1/5/2012	1/3/2014	23
Account Number 2147483647			
Meter Number 626039310			

ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:

1/3/2014

Total Usage	32,020	kwh
Total Charges	\$4,751	
Blended Rate	\$0.15	\$/kWh
Consumption Rate	\$0.13	\$/kWh
Demand Rate	\$4.28	\$/kW
Max Demand	17.5	kW
Min Demand	1.3	kW
Avg Demand	10.4	kW

Lincoln - Electric Usage - Meter No.: 626039310



Lincoln - Electric Usage (2)

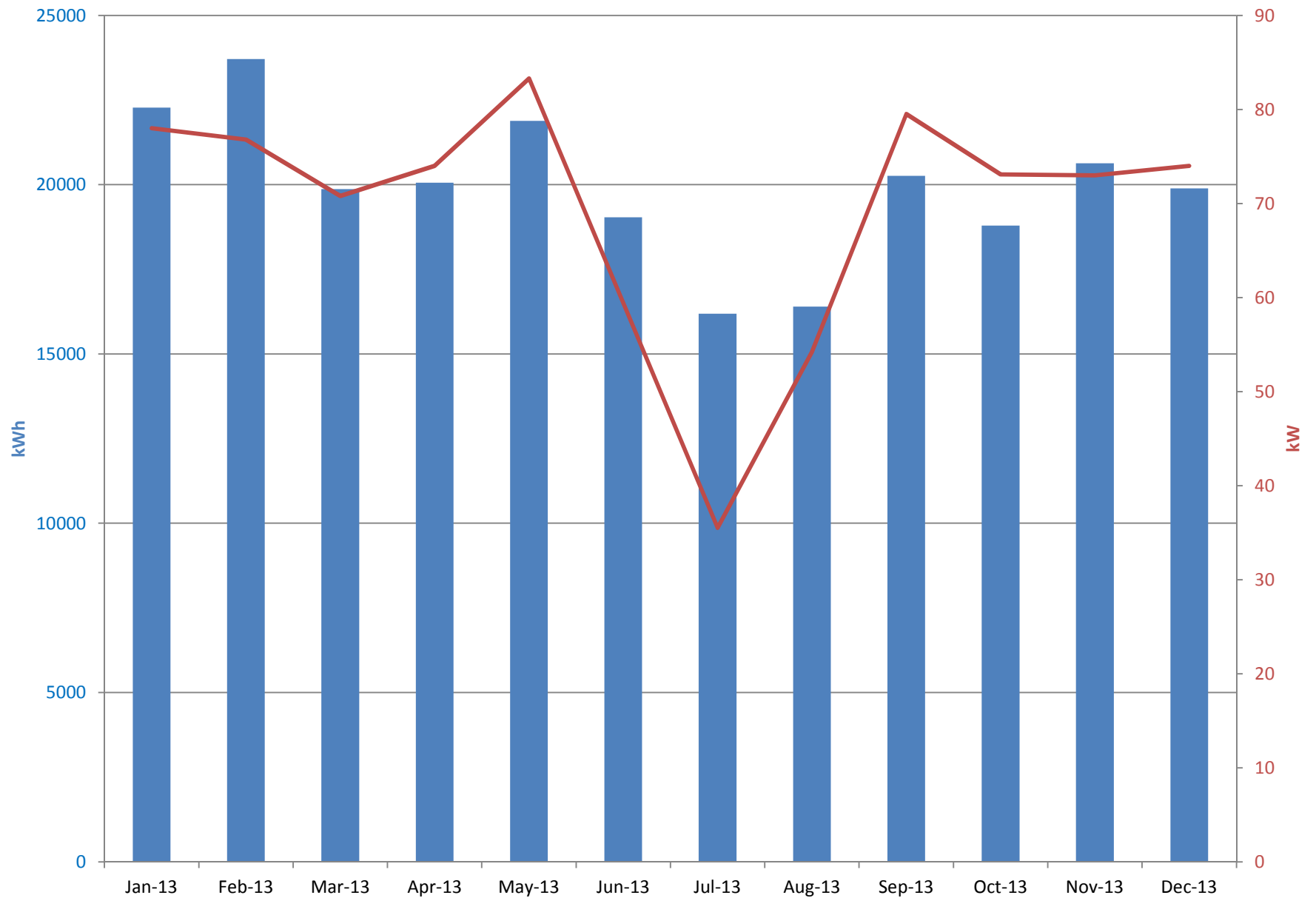
Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption (\$)	Blended Rate (\$/kWh)	Consumption Rate (\$/kWh)	Demand Rate (\$/kW)
1/5/2012	2/2/2012	21360	80.4	3,610.00		0	573.46	340.61	3,269.39	\$ 0.17	\$ 4.24
2/3/2012	3/5/2012	22320	79.2	3,770.00		0	605.95	335.53	3434.47	\$ 0.17	\$ 4.24
3/6/2012	4/3/2012	20760	81.6	3,510.00		0	552.49	345.7	3164.3	\$ 0.17	\$ 4.24
4/4/2012	5/3/2012	20160	76.8	3,405.00		0	540.16	325.36	3079.64	\$ 0.17	\$ 4.24
5/4/2012	6/4/2012	21840	73.2	3,690.00		0	1,315.68	310.11	3379.89	\$ 0.17	\$ 4.24
6/5/2012	8/2/2012	32520	79.2	5,411.60	2,413.14			671.06	4,740.54	\$ 0.17	\$ 8.47
8/3/2012	8/30/2012	15840	36	2,179.04	1,155.51			152.51	2026.53	\$ 0.14	\$ 4.24
8/31/2012	10/2/2012	23280	82.8	2,699.19	1,679.90			668.51	350.78	\$ 0.12	\$ 4.24
10/3/2012	12/3/2012	39418	72	4,541.95	2,817.96	1,117.32		606.67	3935.28	\$ 0.12	\$ 8.43
12/4/2012	1/3/2013	20136	70.3	2,296.50	1,423.72	574.66		298.12	1998.38	\$ 0.11	\$ 4.24
1/4/2013	2/1/2013	22274	78	2,672.82	1,579.22	759.72		333.88	2338.94	\$ 0.12	\$ 4.28
2/2/2013	3/5/2013	23711	76.8	2,769.96	1,677.70	763.52		328.74	2441.22	\$ 0.12	\$ 4.28
3/6/2013	4/4/2013	19867	70.8	2,357.32	1,413.82	640.44		303.06	2054.26	\$ 0.12	\$ 4.28
4/5/2013	5/3/2013	20061	74	2,425.48	1,462.08	646.64		316.76	2108.72	\$ 0.12	\$ 4.28
5/4/2013	6/4/2013	21884	83.3	3,496.33	1,624.81	1,514.96		356.56	3139.77	\$ 0.16	\$ 4.28
6/5/2013	7/3/2013	19035	59.4	2,874.86	1,391.78	1,228.82		254.26	2620.6	\$ 0.15	\$ 4.28
7/4/2013	8/2/2013	16186	35.5	2,253.39	1,158.75	942.68		151.96	2101.43	\$ 0.14	\$ 4.28
8/3/2013	9/3/2013	16399	54.2	2,812.68	1,480.83	1,099.85		232	2580.68	\$ 0.17	\$ 4.28
9/4/2013	10/2/2013	20260	79.5	2,863.74	1,829.48	588.99		445.27	2418.47	\$ 0.14	\$ 5.60
10/3/2013	10/31/2013	18793	73.1	2,655.69	1,697.01	645.78		312.9	2342.79	\$ 0.14	\$ 4.28
11/1/2013	12/3/2013	20634	73	2,884.34	1,863.23	708.63		312.48	2571.86	\$ 0.14	\$ 4.28
12/4/2013	1/3/2014	19892	74	2,794.33	1,796.24	241.49		318.04	2476.29	\$ 0.14	\$ 4.30

Lincoln	Start Date	End Date	Months
87 Richelieu Terr., 07106	1/5/2012	1/3/2014	23
Account Number 2147483647			
Meter Number 778018142			

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

Total Usage	238,996	kwh
Total Charges	\$32,861	
Blended Rate	\$0.137	\$/kWh
Consumption Rate	\$0.122	\$/kWh
Demand Rate	\$4.41	\$/kW
Max Demand	83.3	kW
Min Demand	35.5	kW
Avg Demand	69.3	kW

Lincoln - Electric Usage - Meter No.: 778018142



Lincoln - Natural Gas Usage

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	\$/therm
44	Lincoln	6606130905	2643662	1/5/2012	2/2/2012	5,432.55	4,999.27	0.92
44	Lincoln	6606130905	2643662	2/3/2012	3/5/2012	4,519.79	3,912.75	0.87
44	Lincoln	6606130905	2643662	3/6/2012	4/3/2012	2,019.81	1,337.95	0.66
44	Lincoln	6606130905	2643662	4/4/2012	5/3/2012	950.25	680.87	0.72
44	Lincoln	6606130905	2643662	5/4/2012	6/4/2012	215.17	228.87	1.06
44	Lincoln	6606130905	2643662	6/5/2012	8/30/2012	128.34	385.3	3.00
44	Lincoln	6606130905	2643662	8/31/2012	10/2/2012	73.11	148.22	2.03
44	Lincoln	6606130905	2643662	10/3/2012	11/2/2012	285.22	908.08	3.18
44	Lincoln	6606130905	2643662	11/3/2012	12/3/2012	5,197.35	5,059.75	0.97
44	Lincoln	6606130905	2643662	12/4/2012	1/3/2013	5,035.13	4,987.12	0.99
44	Lincoln	6606130905	2643662	1/4/2013	2/1/2013	6,108.50	5,711.65	0.94
44	Lincoln	6606130905	2643662	2/2/2013	3/5/2013	6,679.23	6,335.24	0.95
44	Lincoln	6606130905	2643662	3/6/2013	4/4/2013	4,367.06	3,187.14	0.73
44	Lincoln	6606130905	2643662	4/5/2013	5/3/2013	1,287.31	1,086.40	0.84
44	Lincoln	6606130905	2643662	5/4/2013	6/5/2013	403.66	422.52	1.05
44	Lincoln	6606130905	2643662	6/6/2013	7/3/2013	358.86	379.45	1.06
44	Lincoln	6606130905	2643662	7/4/2013	8/2/2013	314.05	336.37	1.07
44	Lincoln	6606130905	2643662	8/3/2013	9/3/2013	26.97	123.25	4.57
44	Lincoln	6606130905	2643662	9/4/2013	10/2/2013	74.17	157.22	2.12
44	Lincoln	6606130905	2643662	10/3/2013	11/1/2013	889.6	1,619.06	1.82
44	Lincoln	6606130905	2643662	11/2/2013	12/3/2013	4,534.15	4,445.26	0.98
44	Lincoln	6606130905	2643662	12/4/2013	1/3/2014	5,044.78	5,045.67	1.00

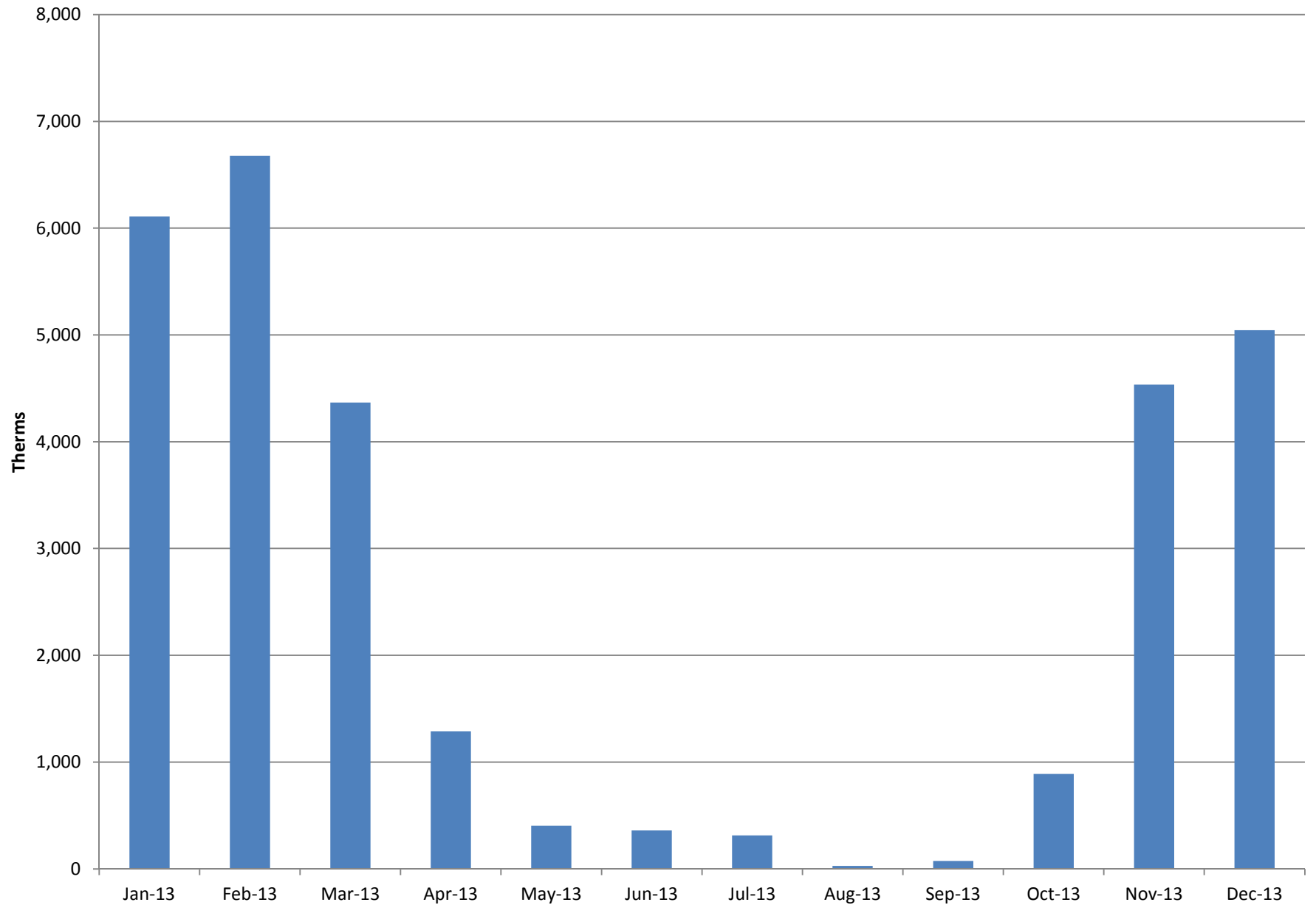
Lincoln		Start Date	End Date	# Months
Account Number	6606130905	1/5/2012	1/3/2014	23
Meter Number	2643662			

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

1/3/2014

Annual Usage	30,088	Therms
Annual Cost	\$28,849	
Rate	\$0.96	\$/Therm

Lincoln - Natural Gas Usage - Meter No.: 2643662



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[Back to main supplier information page](#)

APPENDIX B

Equipment Inventory

Newark Schools
CHA Project# 27999
Lincoln School

[illegible]

Cost of Electricity:

\$0.123	\$/kWh
\$4.39	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
	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
18LED	3rd Floor Hallway	Hallways	6	B 32 R F 4 (ELE)	F44ILL	112	0.67	SW	6240	4,193	NONE	
105LED	Room 312	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	Room 311	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	Room 309	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	Room 310	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	Boys Room	Restroom	2	W 32 W F 1	F41LL	32	0.06	SW	4300	275	NONE	
105LED	Girls Room	Restroom	2	W 32 W F 1	F41LL	32	0.06	SW	4300	275	NONE	
105LED	Room 307	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	Room 308	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
50LED	Room 305	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 306	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 304	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 303	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 302	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 301	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
18LED	3rd Floor Hallway	Hallways	8	B 32 R F 4 (ELE)	F44ILL	112	0.90	SW	6240	5,591	NONE	
18LED	Main Stairwell	Hallways	5	B 32 R F 4 (ELE)	F44ILL	112	0.56	SW	6240	3,494	NONE	
18LED	2nd Floor Hallway	Hallways	3	B 32 R F 4 (ELE)	F44ILL	112	0.34	SW	6240	2,097	NONE	
50LED	Room 210	Classrooms	12	W 32 W F 2 (ELE)	F42LL	60	0.72	SW	2400	1,728	C-OCC	
50LED	Room 209	Classrooms	12	W 32 W F 2 (ELE)	F42LL	60	0.72	SW	2400	1,728	C-OCC	
50LED	Room 208	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 207	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 205	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 206	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 203	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 204	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 201	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 202	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	UN-64	Classrooms	2	W 32 W F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
50LED	UN-63	Classrooms	2	W 32 W F 2 (ELE)	F42LL	60	0.12	SW	2400	288	C-OCC	
50LED	Boys Room	Restroom	2	W 32 W F 2 (ELE)	F42LL	60	0.12	SW	4300	516	NONE	
50LED	Girls Room	Restroom	2	W 32 W F 2 (ELE)	F42LL	60	0.12	SW	4300	516	NONE	
18LED	1st Floor Hallway	Hallways	12	B 32 R F 4 (ELE)	F44ILL	112	1.34	SW	6240	8,387	NONE	
71	Custodian Closet	Storage	1	I 60	I60/1	60	0.06	SW	1200	72	NONE	
50LED	Cafeteria/Auditorium	Cafeteria	16	W 32 W F 2 (ELE)	F42LL	60	0.96	SW	2400	2,304	NONE	
18LED	Stage Left	Cafeteria	1	B 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2400	269	NONE	
18LED	Stage Right	Cafeteria	1	B 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2400	269	NONE	
50LED	Stage Back	Cafeteria	3	W 32 W F 2 (ELE)	F42LL	60	0.18	SW	2400	432	NONE	
50LED	Room 106	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 105	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 103	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 104	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
18LED	Main Office	Offices	8	B 32 R F 4 (ELE)	F44ILL	112	0.90	SW	2400	2,150	C-OCC	
18LED	Teachers Lounge	Offices	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2400	538	C-OCC	
65	Teachers Lounge Restroom	Restroom	1	I 100	I100/1	100	0.10	SW	4300	430	NONE	
18LED	Principals Office	Offices	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2400	538	C-OCC	
18LED	Nurse Office	Offices	3	B 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2400	806	C-OCC	
50LED	Room 102	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
50LED	Room 101	Classrooms	14	W 32 W F 2 (ELE)	F42LL	60	0.84	SW	2400	2,016	C-OCC	
18LED	Stairwell	Hallways	7	B 32 R F 4 (ELE)	F44ILL	112	0.78	SW	6240	4,892	NONE	
18LED	Stairwell	Hallways	7	B 32 R F 4 (ELE)	F44ILL	112	0.78	SW	6240	4,892	NONE	
50LED	3 - Storage	Storage	21	W 32 W F 2 (ELE)	F42LL	60	1.26	SW	1200	1,512	NONE	
50LED	4 - Storage	Storage	21	W 32 W F 2 (ELE)	F42LL	60	1.26	SW	1200	1,512	NONE	
18LED	Basement Corridor	Hallways	11	B 32 R F 4 (ELE)	F44ILL	112	1.23	SW	6240	7,688	NONE	
18LED	Boys Room	Restroom	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4300	963	NONE	
18LED	Girls Room	Restroom	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4300	963	NONE	
14	Mens Room	Restroom	1	CIRC 32 C F 2	FC32/1	40	0.04	SW	4300	172	NONE	
14	Womens Room	Restroom	1	CIRC 32 C F 2	FC32/1	40	0.04	SW	4300	172	NONE	
146LED	Gymnasium	Gymnasium	12	High Bay MH 400	MH400/1	458	5.50	SW	1600	8,794	NONE	
146LED	Library	Library	8	High Bay MH 400	MH400/1	458	3.66	SW	4368	16,004	NONE	
105LED	Basement Corridor	Hallways	8	W 32 W F 1	F41LL	32	0.26	SW	6240	1,597	NONE	
105LED	Custodian Office	Offices	4	W 32 W F 1	F41LL	32	0.13	SW	2400	307	C-OCC	
71	Custodian Storage	Storage	1	I 60	I60/1	60	0.06	SW	1200	72	NONE	
18LED	Basement Corridor	Hallways	14	B 32 R F 4 (ELE)	F44ILL	112	1.57	SW	6240	9,784	NONE	
18LED	Child Study Room	Classrooms	3	B 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2400	806	C-OCC	
105LED	Basement Storage	Storage	20	W 32 W F 1	F41LL	32	0.64	SW	1200	768	NONE	
18LED	Counselor	Offices	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2400	538	C-OCC	
105LED	Counselor	Offices	2	W 32 W F 1	F41LL	32	0.06	SW	2400	154	C-OCC	
218LED	UN-16 Boiler Room	Boiler Room	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.72	SW	1200	864	NONE	
105LED	UN-17 Storage	Storage	2	W 32 W F 1	F41LL	32	0.06	SW	1200	77	NONE	
18LED	B2 Resource Room	Classrooms	3	B 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2400	806	C-OCC	

Cost of Electricity:

\$0.123	\$/kWh
\$4.39	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
	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
18LED	B4 Social Worker	Offices	2	B 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2400	538	C-OCC	
40LED	UN-7 Office	Offices	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	2400	144	C-OCC	
270LED	UN-7 Office	Offices	2	2T 40 R CF 2	CFQ40/2	90	0.18	SW	2400	432	C-OCC	
105LED	Art Room	Classrooms	21	W 32 W F 1	F41LL	32	0.67	SW	2400	1,613	C-OCC	
105LED	B1 Classroom	Classrooms	18	W 32 W F 1	F41LL	32	0.58	SW	2400	1,382	C-OCC	
	Total		718				51.01			154,628		

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
CHA Project Number: 27998

Utility Costs	Yearly Usage	Newark/ren Carbon Double Equivalent	Building Area	Annual Utility Cost		
\$ 0.139 \$/kWh blended		0.000420205	57,538	Electric	Natural Gas	Fuel Oil
\$ 0.123 \$/kWh supply	271,016	0.000420205		\$ 37,612	\$ 28,849	\$ -
\$ 4.39 \$/kW	100.8	0				
\$ 0.96 \$/Therm	30,088	0.00533471				
\$ 7.55 \$/gals	1,000	0				
\$ - \$/Gal	-	0.008				

Rate of Discount (used for NPV) 3.9%

Recommend?		Item	Savings						Cost	Simple Payback	Life Expectancy	Equivalent CO ₂ (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR		
Y or N			kW	kWh	therms	No. 2 Oil gal	Water kgal	\$								kW	kWh	therms	kgal/yr	\$					
Y		ECM-1	Install Attic Insulation	0.0	0	4,981	0	0	4,782	\$ 37,401	7.8	15	26.6	\$ -	N	7.8	0.0	0	74,722	0	\$ 71,733	0.9	\$19,689	9.5%	
Y		ECM-2	Install Door Seals/Sweeps	0.0	0	516	0	0	496	\$ 1,383	2.8	10	2.8	\$ -	N	2.8	0.0	0	5,165	0	\$ 4,958	2.6	\$2,846	33.9%	
N		ECM-3	Convert Steam Heating System to Hydronic Heating	0.0	0	3,943	0	0	3,785	\$ 2,452,240	647.9	30	21.0	\$ 3,000	N	647.1	0.0	0	118,283	0	\$113,552	(1.0)	(\$2,375,051)	-14.0%	
Y		ECM-4	Install Window A/C Controllers	0.0	9,658	0	0	0	1,343	\$ 2,300	1.7	15	4.1	\$ -	N	1.7	0.0	144,875	0	\$ 20,138	7.8	\$13,727	58.3%		
Y		ECM-5a	Basic HVAC Control	0.0	0	2,270	0	0	2,179	\$ 21,309	9.8	15	12.1	\$ -	N	9.8	0.0	0	34,046	0	\$ 32,684	0.5	\$4,702	5.9%	
N		ECM-5b	Full DDC Control	0.0	0	5,109	0	0	4,904	\$ 227,395	46.4	15	27.3	\$ -	N	46.4	0.0	0	76,628	0	\$ 73,563	(0.7)	(\$168,849)	-11.6%	
Y		ECM-6	Domestic Hot Water System Improvements	0.0	0	422	0	0	405	\$ 17,158	42.3	15	2.3	\$ 50	N	42.2	0.0	0	6,333	0	\$ 6,079	(0.6)	(\$12,270)	-10.8%	
N		ECM-7	Install Low Flow Plumbing Fixtures	0.0	0	0	0	126	953	\$ 167,755	176.1	30	0.0	\$ -	N	176.1	0.0	0	3,785	\$ 28,580	(0.8)	(\$149,082)	-9.0%		
N		ECM-L1	Lighting Replacements / Upgrades	29.0	88,345	0	0	0	12,394	\$ 121,701	9.8	10	37.1	\$ 2,000	N	9.7	290.0	883,450	0	0	\$138,077	0.1	(\$13,976)	0.6%	
N		ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	20,663	0	0	0	2,542	\$ 11,880	4.7	10	8.7	\$ 1,540	N	4.1	0.0	206,630	0	0	\$ 28,722	1.4	\$11,340	20.9%	
Y		ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	29.0	98,386	0	0	0	13,629	\$ 133,581	9.8	10	41.3	\$ 3,540	N	9.5	290.0	983,860	0	0	\$152,034	0.1	(\$13,781)	0.9%	
Total (Does Not Include Alternate ECMs)				29.0	108,044	12,133	0	126	\$ 27,572	\$ 2,833,126	102.8	17.5	110	\$ 6,590		102.5	290	1,128,735	238,548	3,785	\$429,758	(0.8)	-\$246,3524.601	-15.2%	
Recommended Measures (highlighted green above)				29.0	108,044	8,190	0	0	\$ 22,834	\$ 213,132	9.3	13.3	89	\$ 3,590		0	9.2	290	1,128,735	120,265	-	\$287,626	0.3	\$3296.07078	5.4%
% of Existing				29%	40%	27%	N/A	0%																	

City:		Newark, NJ				
Occupied Hours/Week		70	70	70	70	50
		Building	Auditorium	Gymnasium	Library	Classrooms
Temp	Enthalpy h (Btu/lb)	Bin Hours	Operating Hours	Occupied Hours	Occupied Hours	Occupied Hours
102.5						
97.5	35.4	6	3	3	3	2
92.5	37.4	31	13	13	13	9
87.5	35.0	131	55	55	55	39
82.5	33.0	500	208	208	208	149
77.5	31.5	620	258	258	258	185
72.5	29.9	664	277	277	277	198
67.5	27.2	654	356	356	356	254
62.5	24.0	927	386	386	386	276
57.5	20.3	600	250	250	250	179
52.5	18.2	730	304	304	304	217
47.5	16.0	491	205	205	205	146
42.5	14.5	656	273	273	273	195
37.5	12.5	1,023	426	426	426	304
32.5	10.5	734	306	306	306	218
27.5	8.7	334	139	139	139	99
22.5	7.0	252	105	105	105	75
17.5	5.4	125	52	52	52	37
12.5	3.7	47	20	20	20	14
7.5	2.1	34	14	14	14	10
2.5	1.3	1	9	9	9	0
-2.5						
-7.5						

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

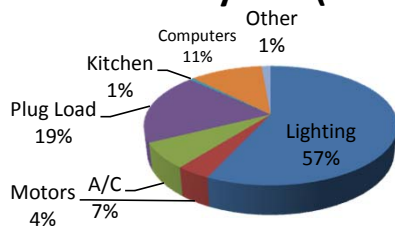
Heating	
Hours	4,427 Hrs
Weighted Avg	40 F
Avg	28 F
Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	78 F

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
271,016	Total	Based on utility analysis
154,268	Lighting	From Lighting Calculations
10,150	Motors	Estimated
18,764	A/C	See Window AC Calculation
52,360	Plug Load	Estimated
1,750	Kitchen	Estimated
30,000	Computers	Estimated
3,723	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
30,088	Total	Based on utility analysis
28,388	Boilers	Therms/SF x Square Feet Served
903	Kitchen	Based on utility analysis
1,700	DHW	Based on utility analysis

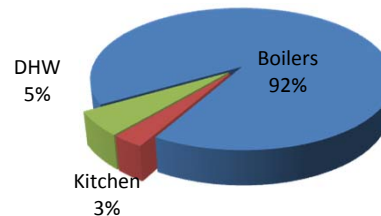
57%
4%
7%
19%
1%
11%
1%

94%
3%
6%

Electricity Use (kWh):



Natural Gas End Use



Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

ECM-1 Install Additional Ceiling Insulation

Existing: Attic can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 9" fiberglass blown-in loose-fill insulation in attic cavity to reduce heat transfer.

Area of attic	28,770 SF	Cooling System Efficiency	0 kW/ton	Heating System Efficiency	80%
Existing Infiltration Factor	0.05 cfm/SF	Ex Occupied Cng Temp.	85 °F	Heating On Point	55 °F
Proposed Infiltration Factor	0.02 cfm/SF	Ex Unoccupied Cng Temp.	85 °F	Ex Occupied Htg Temp.	80 °F
Existing U Value	0.076 Btuh/SF°F	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	80 °F
Proposed U Value	0.033 Btuh/SF°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Cooling Electricity	\$ 0.139 \$/kWh
				Heating Oil Cost	\$ 0.96 \$/therm

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	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy gallons
A		B	C	D	E	F	G	H	I	J	K	L
97.5	35.4	6	3	4	-78,517	-78,517	-32,462	-32,462	0	0	0	0
92.5	37.4	31	13	18	-80,497	-80,497	-32,832	-32,832	0	0	0	0
87.5	35.0	131	55	76	-53,917	-53,917	-21,778	-21,778	0	0	0	0
82.5	33.0	500	208	292	0	0	0	0	0	0	0	0
77.5	31.5	620	258	362	0	0	0	0	0	0	0	0
72.5	29.9	664	277	387	0	0	0	0	0	0	0	0
67.5	27.2	854	356	498	0	0	0	0	0	0	0	0
62.5	24.0	927	386	541	0	0	0	0	0	0	0	0
57.5	20.3	600	250	350	0	0	0	0	0	0	0	0
52.5	18.2	730	304	426	102,853	102,853	43,462	43,462	0	0	939	397
47.5	16.0	491	205	286	121,553	121,553	51,364	51,364	0	0	746	315
42.5	14.5	656	273	383	140,254	140,254	59,266	59,266	0	0	1,150	486
37.5	12.5	1,023	426	597	158,954	158,954	67,168	67,168	0	0	2,033	859
32.5	10.5	734	306	428	177,655	177,655	75,071	75,071	0	0	1,630	689
27.5	8.7	334	139	195	196,355	196,355	82,973	82,973	0	0	820	346
22.5	7.0	252	105	147	215,056	215,056	90,875	90,875	0	0	677	286
17.5	5.4	125	52	73	233,756	233,756	98,777	98,777	0	0	365	154
12.5	3.7	47	20	27	252,457	252,457	106,679	106,679	0	0	148	63
7.5	2.1	34	14	20	271,157	271,157	114,581	114,581	0	0	115	49
2.5	1.3	1	0	1	289,858	289,858	122,483	122,483	0	0	4	2
TOTALS		8,760	3,650	5,110					0	0	8,627	3,645

Existing Ceiling Infiltration	1,439 cfm
Existing Ceiling Heat Transfer	2,187 Btuh/°F
Proposed Ceiling Infiltration	575 cfm
Proposed Ceiling Heat Transfer	959 Btuh/°F

Savings	4,981 therms	\$ 4,782
	0 kWh	\$ -
		\$ 4,782

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1 Install Additional Ceiling Insulation - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Blown-In Ceiling Insulation (9" thick)	28,770	SF	\$ 0.470	\$ 0.330	\$ 0.130	\$ 13,887	\$ 11,830	\$ 4,204	\$ 29,921	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 29,921	Subtotal
\$ 7,480	25% Contingency
\$ 37,401	Total

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ECM-2: Install Door Seals

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

Heating System Efficiency	80%	Ex Occupied Cing Temp.	°F	Ex Occupied Htg Temp.	80 °F
Cooling System Efficiency	0.00 kW/ton	Ex Unoccupied Cing Temp.	°F	Ex Unoccupied Htg Temp.	80 °F
Linear Feet of Door Edge	120 LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.14 \$/kWh
Existing Infiltration Factor*	1.5 cfm/LF	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Natural Gas	\$ 0.96 \$/therm
Proposed Infiltration Factor*	0.45 cfm/LF				

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

						EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
						Occupied	Unoccupied	Occupied	Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
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	I	J	K	L
A		B	C	D		E	F	G	H				
102.5	0.0	0	0	0		22,275	22,275	6,683	6,683	0	0	0	0
97.5	35.4	6	3	4		-6,405	-6,405	-1,921	-1,921	0	0	0	0
92.5	37.4	31	13	18		-8,021	-8,021	-2,406	-2,406	0	0	0	0
87.5	35.0	131	55	76		-6,063	-6,063	-1,819	-1,819	0	0	0	0
82.5	33.0	500	208	292		-4,493	-4,493	-1,348	-1,348	0	0	0	0
77.5	31.5	620	258	362		-3,279	-3,279	-984	-984	0	0	0	0
72.5	29.9	664	277	387		-1,949	-1,949	-585	-585	0	0	0	0
67.5	27.2	864	356	498		255	255	77	77	0	0	3	1
62.5	24.0	927	386	541		2,840	2,840	852	852	0	0	44	13
57.5	20.3	600	250	350		5,872	5,872	1,762	1,762	0	0	69	21
52.5	18.2	730	304	426		7,525	7,525	2,258	2,258	0	0	57	17
47.5	16.0	491	205	286		9,322	9,322	2,797	2,797	0	0	86	26
42.5	14.5	656	273	383		10,524	10,524	3,157	3,157	0	0	155	47
37.5	12.5	1,023	426	597		12,142	12,142	3,642	3,642	0	0	126	38
32.5	10.5	734	306	428		13,771	13,771	4,131	4,131	0	0	64	19
27.5	8.7	334	139	195		15,256	15,256	4,577	4,577	0	0	52	16
22.5	7.0	252	105	147		16,630	16,630	4,989	4,989	0	0	28	8
17.5	5.4	125	52	73		17,869	17,869	5,361	5,361	0	0	11	3
12.5	3.7	47	20	27		19,256	19,256	5,777	5,777	0	0	9	3
7.5	2.1	34	14	20		20,586	20,586	6,176	6,176	0	0	0	0
2.5	1.3	1	0	1		21,213	21,213	6,364	6,364	0	0	0	0
-2.5	0.0	0	0	0		16,038	16,038	4,811	4,811	0	0	0	0
-7.5	0.0	0	0	0		17,010	17,010	5,103	5,103	0	0	0	0
TOTALS		8,760	3,650	5,110						0	0	738	221

Existing Door Infiltration	180 cfm	Savings	516 therms	\$ 496
Existing Unoccupied Door Infiltration	180 cfm		0 kWh	\$ -
Proposed Door Infiltration	54 cfm			\$ 496
Proposed Unoccupied Door Infiltration	54 cfm			

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap (in)	gap location	LF of gap	% door w/ gap	Average gap for door (in)
1	3	7	20	0.25	all sides	13	65%	0.1625
2	3	7	20	0.25	all sides	13	65%	0.1625
3	3	7	20	0.25	all sides	13	65%	0.1625
4	3	7	20	0.25	all sides	13	65%	0.1625
5	3	7	20	0.25	all sides	13	65%	0.1625
6	3	7	20	0.25	all sides	13	65%	0.1625
Total	18	42	120	0.250		78	65%	0.163

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

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-2: 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
						\$ -	\$ -	\$ -	\$ -	

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

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

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ECM-3b: Convert Steam Heating System to Hydronic Heating

Description: This ECM evaluates the replacement of an existing steam boiler system with high efficiency condensing gas boiler and hydronic heating system. The existing boiler efficiency is 80% (per NJBPU protocols) and the proposed boiler efficiency is 90% (average seasonal efficiency).

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 0.96	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	743,787	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	14	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	743,787	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	3,943	therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 3,785		

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

Algorithms

Gas Savings (Therms)

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

Definition of Variables

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

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

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

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

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

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

EFF_B = Efficiency of baseline heaters (AFUE %)

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

Furnaces and Boilers

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

Sources:

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

Adjusted Heating Degree Days by Building Type

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

Heating Degree Days and Outdoor Design Temperature by Zone

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

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-3b: Convert Steam Heating System to Hydronic Heating - Co5

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Hydronic Heating System (piping, radi	57,539	SF	\$ 15	\$ 15		\$ 886,388	\$ 1,075,404	\$ -	\$ 1,961,792	2012 RS Means Square Foot Construction Costs
						\$ -	\$ -	\$ -	\$ -	

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

\$ 1,961,792	Subtotal
\$ 490,448	25% Contingency
\$ 2,452,240	Total

EQUIPMENT		AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)
Window AC	18,000 12x	Computer Rm, Office	216,000

Total btu/h of all window A/C Units: 216,000 btu/h

ECM-4: Window A/C Controller

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

ASSUMPTIONS		Comments
Electric Cost	\$0.139 / kWh	
Average run hours per Week	80 Hours	
Space Balance Point	55 F	
Space Temperature Setpoint	72 deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	216,000 Btu / Hr	Total BTU/hr of window A/C units .
Average EER	10.7	
Existing Annual Electric Usage	18,764 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	9,106	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	9,658 kWh
Annual Cost Savings	\$1,343
Total Project Cost	\$2,300
Simple Payback	1.7 years

OAT - DB Bin Temp F	Annual Hours	Existing Hours of Operation	Proposed % of time of operation	Proposed hrs of Operation
102.5	0	0	100%	0
97.5	6	3	89%	3
92.5	31	15	79%	12
87.5	131	62	68%	43
82.5	500	238	58%	138
77.5	620	295	47%	140
72.5	664	316	37%	116
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	930	49%	451

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ECM-4: 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	12	EA	\$ 150	\$ -	\$ -	1848.6	\$ -	\$ -	\$ 1,849	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 1,849	Subtotal
\$ 462	25% Contingency
\$ 2,300	Total

ECM-5a: Basic Controls

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

Day Setback				Nighttime Setback			
EXISTING CONDITIONS				EXISTING CONDITIONS			
Heating				Heating			
Heating Season Facility Temp	80	F	Th	Heating Season Facility Temp	80	F	
Weekly Occupied Hours	70	hrs	H	Weekly Occupied Hours	70	hrs	
Heating Season Setback Temp	72	F	Sh	Heating Season Setback Temp	65	F	
Heating Season % Savings per	3%		Ph	Heating Season % Savings per	3%		
Annual Boiler Capacity		Mbtu/yr		Annual Boiler Capacity		Mbtu/yr	
Connected Heating Load	743,787	Btu/hr	Caph	Connected Heating Load Capacity	743,787	Btu/hr	
Equivalent Full Load Heating	900	hrs	EFLHh	Equivalent Full Load Heating Hours	500	hrs	
Heating Equipment Efficiency	80%		AFUEh	Heating Equipment Efficiency	80%		
Cooling				Cooling			
Cooling Season Facility Temp	74	F	Tc	Cooling Season Facility Temp	74	F	
Weekly Occupied Hours	70	hrs	H	Weekly Occupied Hours	70	hrs	
Cooling Season Setback Temp	79	F	Sc	Cooling Season Setback Temp	80	F	
Cooling Season % Savings per	6%		Pc	Cooling Season % Savings per	6%		
Connected Cooling Load	-	Tons	Capc	Connected Cooling Load Capacity	-	Tons	
Equivalent Full Load Cooling	381	hrs	EFLHc	Equivalent Full Load Cooling Hours	381	hrs	
Cooling Equipment EER	14.0		AFUEc	Cooling Equipment EER	14.0		
SAVINGS				SAVINGS			
Natural Gas Savings	1,112	Therms ³		Natural Gas Savings	1,158	Therms ³	
Cooling Electricity Savings	0	kWh		Cooling Electricity Savings	0	kWh	

\$0.14 \$/kWh Blended \$0.96 \$/Therm	COMBINED SAVINGS		
	Natural Gas Savings	2,270	Therms
	Cooling Electricity Savings	0	kWh
	Total Cost Savings	\$ 2,179	
	Estimated Total Project Cost	\$ 21,309	
	Simple Payback	9.8	Yrs

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

Algorithms

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

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

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

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

Sources:

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

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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.		
						\$ -	\$ -	\$ -	\$ -	
Boiler Controller	1	ea	\$ 7,500	\$ 7,500		\$ 7,703	\$ 9,345	\$ -	\$ 17,048	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

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

ECM-5B: Install Full DDC Controls

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

Building Information:

57,539	Sq Footage	\$0.14	\$/kWh Blended
N	Cooling	\$0.96	\$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	72	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	743,787	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	1,112	Therms
Cooling Electricity Savings	0	kWh

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	271,016	kWh
Existing Facility Total Gas usage	30,088	Therms
Existing Facility Cooling Electric usage	-	kWh ¹
Existing Facility Heating Natural Gas usage	28,388	Therms ²
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	2,839	Therms
SAVINGS		
Electric Savings	0	kWh
Gas Savings	2,839	Therms

Assumptions

- 0% of facility total electricity dedicated to Cooling; based on utility information
- 94% of facility total natural gas dedicated to Heating; based on utility information
- 10% Typical Savings associated with installation of DDC controls

Nighttime Setback

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	70	hrs
Heating Season Setback Temp	65	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	-	Mbtu/yr
Connected Heating Load Capacity	743,787	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 Degree Setback	6%	
Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling Hours	381	hrs
Cooling Equipment EER	14.0	
SAVINGS		
Natural Gas Savings	1,158	Therms ³
Cooling Electricity Savings	0	kWh

COMBINED SAVINGS

Natural Gas Savings	5,109	Gallons
Cooling Electricity Savings	0	kWh
Total Cost Savings	\$ 4,904	
Estimated Total Project Cost	\$ 227,395	
Simple Payback	46.4	Yrs

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

Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-5B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Radiator Control (Group of 4)	12	ea		\$ 4,500		\$ -	\$ 67,284	\$ -	\$ 67,284	Vendor Quote
Unit Ventilator Control	15	ea		\$ 4,000		\$ -	\$ 74,760	\$ -	\$ 74,760	Vendor Quote
Head End Controller & Programming	1	ls		\$ 32,000		\$ -	\$ 39,872	\$ -	\$ 39,872	Vendor Quote
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 181,916	Subtotal
\$ 45,479	25% Contingency
\$ 227,395	Total

Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

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

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

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	142	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	170,000	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	78%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	132,600	MBTU/yr	
Existing Tank Size	130	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)	1.9	MBH	
Annual Standby Hot Water Load	16,754	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	122,672	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on AO Smith Cyclone condensing DHW Heater
Proposed Fuel Use	1,278	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$0.96	\$/Therm	
Existing Operating Cost of DHW	\$1,632	\$/yr	
Proposed Operating Cost of DHW	\$1,227	\$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	422	\$405

Newark Board of Education - NJBPU

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Lincoln School

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	\$ 4,000		\$ 5,649	\$ 4,984	\$ -	\$ 10,633	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 300	\$ 500		\$ 308	\$ 623	\$ -	\$ 931	RS Means 2012
Venting Kit	1	EA	\$ 450	\$ 650		\$ 462	\$ 810	\$ -	\$ 1,272	RS Means 2012
Miscellaneous Piping and Valves	1	LS	\$ 200	\$ 500		\$ 205	\$ 623	\$ -	\$ 828	RS Means 2012

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

\$ 13,726	Subtotal
\$ 3,432	25% Contingency
\$ 17,158	Total

Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

ECM-XX: 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	13	
Average Flushes / Urinal (per Day)	3	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	13	
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	35.59	kGal / year
Proposed Urinal Water Use	1.78	kGal / year
Water Savings	33.81	kGal / year
Cost Savings	\$255	/ year

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

Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

ECM-XX: 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	38	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	38	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	145.64	kGal / year
Proposed Toilet Water Use	53.26	kGal / year
Water Savings	92.37	kGal / year
Cost Savings	\$697	/ year

Newark Board of Education - NJBPU

CHA Project Number: 27998

Lincoln School

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Low-Flow Urinal	13	EA	\$ 1,200	\$ 1,000	\$ -	\$ 16,021	\$ 16,198	\$ -	\$ 32,219	Vendor Estimate
Low-Flow Toilet	38	EA	\$ 1,400	\$ 1,000	\$ -	\$ 54,636	\$ 47,348	\$ -	\$ 101,984	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 134,204	Subtotal
\$ 33,551	25% Contingency
\$ 167,755	Total

Newark Board of Education - NJBPU
CHA Project Number: 27998
Lincoln School

New Jersey Pay For Performance Incentive Program

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

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

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

Total Building Area (Square Feet)	37,612
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$37,612	\$28,849
Existing Usage (from utility)	271,016	30,088
Proposed Savings	108,044	8,190
Existing Total MMBtus	3,934	
Proposed Savings MMBtus	1,188	
% Energy Reduction	30.2%	
Proposed Annual Savings	\$22,834	

	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
Incentive #1	\$0	\$0	\$1,881
Incentive #2	\$11,885	\$10,237	\$22,122
Incentive #3	\$11,885	\$10,237	\$22,122
Total All Incentives	\$23,770	\$20,475	\$46,125

Total Project Cost	\$213,132
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	Allowable Incentive	
% Incentives #1 of Utility Cost*	2.8%	\$1,881
% Incentives #2 of Project Cost**	10.4%	\$22,122
% Incentives #3 of Project Cost**	10.4%	\$22,122
Total Eligible Incentives***	\$46,125	
Project Cost w/ Incentives	\$167,007	

Project Payback (years)	
w/o Incentives	w/ Incentives
9.3	7.3

* 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						
	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 Incentive	Simple Payback					
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kWh/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
18LED	3rd Floor Hallway	6	B 32 R F 4 (ELE)	F44ILL	112	0.7	SW	6240	4,193	6	T 74 R LED	RTLED50	50	0.3	SW	6,240	1,872	2,321	0.4	\$ 305.11	\$ 1,417.50	\$0	4.6	4.6				
105LED	Room 312	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
105LED	Room 311	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
105LED	Room 309	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
105LED	Room 310	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
105LED	Boys Room	2	W 32 W 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	\$ 19.77	\$ 163.35	\$0	8.3	8.3				
105LED	Girls Room	2	W 32 W 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	\$ 19.77	\$ 163.35	\$0	8.3	8.3				
105LED	Room 307	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
105LED	Room 308	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	SW	2,400	756	857	0.4	\$ 124.19	\$ 1,715.18	\$0	13.8	13.8				
50LED	Room 305	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 306	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 304	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 303	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 302	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 301	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
18LED	3rd Floor Hallway	8	B 32 R F 4 (ELE)	F44ILL	112	0.9	SW	6240	5,591	8	T 74 R LED	RTLED50	50	0.4	SW	6,240	2,496	3,095	0.5	\$ 406.82	\$ 1,890.00	\$0	4.6	4.6				
18LED	Main Stairwell	5	B 32 R F 4 (ELE)	F44ILL	112	0.6	SW	6240	3,494	5	T 74 R LED	RTLED50	50	0.3	SW	6,240	1,560	1,934	0.3	\$ 254.26	\$ 1,181.25	\$0	4.6	4.6				
18LED	2nd Floor Hallway	3	B 32 R F 4 (ELE)	F44ILL	112	0.3	SW	6240	2,097	3	T 74 R LED	RTLED50	50	0.2	SW	6,240	936	1,161	0.2	\$ 152.56	\$ 708.75	\$0	4.6	4.6				
50LED	Room 210	12	W 32 W 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	\$ 125.24	\$ 1,960.20	\$0	15.7	15.7				
50LED	Room 209	12	W 32 W 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	\$ 125.24	\$ 1,960.20	\$0	15.7	15.7				
50LED	Room 208	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 207	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 205	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 206	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 203	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 204	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 201	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 202	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	UN-64	2	W 32 W 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	\$ 20.87	\$ 326.70	\$0	15.7	15.7				
50LED	UN-63	2	W 32 W 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	\$ 20.87	\$ 326.70	\$0	15.7	15.7				
50LED	Boys Room	2	W 32 W 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	\$ 34.89	\$ 326.70	\$0	9.4	9.4				
50LED	Girls Room	2	W 32 W 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	\$ 34.89	\$ 326.70	\$0	9.4	9.4				
18LED	1st Floor Hallway	12	B 32 R F 4 (ELE)	F44ILL	112	1.3	SW	6240	8,387	12	T 74 R LED	RTLED50	50	0.6	SW	6,240	3,744	4,643	0.7	\$ 610.23	\$ 2,835.00	\$0	4.6	4.6				
71	Custodian Closet	1	I 60	I60I	60	0.1	SW	1200	72	1	CF 26	CFQ261-L	27	0.0	SW	1,200	32	40	0.0	\$ 6.61	\$ 6.75	\$0	1.0	1.0				
50LED	Cafeteria/Auditorium	16	W 32 W F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	4 ft LED Tube	200732x2	30	0.5	SW	2,400	1,152	1,152	0.5	\$ 166.98	\$ 2,613.60	\$0	15.7	15.7				
18LED	Stage Left	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	269	1	T 74 R LED	RTLED50	50	0.1	SW	2,400	120	149	0.1	\$ 21.57	\$ 236.25	\$0	11.0	11.0				
18LED	Stage Right	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	269	1	T 74 R LED	RTLED50	50	0.1	SW	2,400	120	149	0.1	\$ 21.57	\$ 236.25	\$0	11.0	11.0				
50LED	Stage Back	3	W 32 W F 2 (ELE)	F42LL	60	0.2	SW	2400	432	3	4 ft LED Tube	200732x2	30	0.1	SW	2,400	216	216	0.1	\$ 31.31	\$ 490.05	\$0	15.7	15.7				
50LED	Room 106	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	SW	2,400	1,008	1,008	0.4	\$ 146.11	\$ 2,286.90	\$0	15.7	15.7				
50LED	Room 105	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	20073																

			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 device	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback					
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-Inst. control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * (\$/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
18LED	3rd Floor Hallway	6	B 32 R F 4 (ELE)	F44ILL	112	0.7	SW	6240	4,193.3	6	B 32 R F 4 (ELE)	F44ILL	112	0.7	NONE	6240	4,193.3	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
105LED	Room 312	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
105LED	Room 311	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
105LED	Room 309	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
105LED	Room 310	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
105LED	Boys Room	2	W 32 W F 1	F41LL	32	0.1	SW	4300	275.2	2	W 32 W F 1	F41LL	32	0.1	NONE	4300	275.2	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
105LED	Girls Room	2	W 32 W F 1	F41LL	32	0.1	SW	4300	275.2	2	W 32 W F 1	F41LL	32	0.1	NONE	4300	275.2	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
105LED	Room 307	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
105LED	Room 308	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,612.8	21	W 32 W F 1	F41LL	32	0.7	C-0CC	1680	1,129.0	483.8	0.0	\$59.51	\$270.00	\$35.00	4.5	3.9				
50LED	Room 305	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 306	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 304	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 303	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 302	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 301	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
18LED	3rd Floor Hallway	8	B 32 R F 4 (ELE)	F44ILL	112	0.9	SW	6240	5,591.0	8	B 32 R F 4 (ELE)	F44ILL	112	0.9	NONE	6240	5,591.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
18LED	Main Stairwell	5	B 32 R F 4 (ELE)	F44ILL	112	0.6	SW	6240	3,494.4	5	B 32 R F 4 (ELE)	F44ILL	112	0.6	NONE	6240	3,494.4	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
18LED	2nd Floor Hallway	3	B 32 R F 4 (ELE)	F44ILL	112	0.3	SW	6240	2,096.6	3	B 32 R F 4 (ELE)	F44ILL	112	0.3	NONE	6240	2,096.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
50LED	Room 210	12	W 32 W F 2 (ELE)	F42LL	60	0.7	SW	2400	1,728.0	12	W 32 W F 2 (ELE)	F42LL	60	0.7	C-0CC	1680	1,209.6	518.4	0.0	\$63.76	\$270.00	\$35.00	4.2	3.7				
50LED	Room 209	12	W 32 W F 2 (ELE)	F42LL	60	0.7	SW	2400	1,728.0	12	W 32 W F 2 (ELE)	F42LL	60	0.7	C-0CC	1680	1,209.6	518.4	0.0	\$63.76	\$270.00	\$35.00	4.2	3.7				
50LED	Room 208	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 207	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 205	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 206	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 203	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 204	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 201	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 202	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	UN-64	2	W 32 W F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	W 32 W F 2 (ELE)	F42LL	60	0.1	C-0CC	1680	201.6	86.4	0.0	\$10.63	\$270.00	\$35.00	25.4	22.1				
50LED	UN-63	2	W 32 W F 2 (ELE)	F42LL	60	0.1	SW	2400	288.0	2	W 32 W F 2 (ELE)	F42LL	60	0.1	C-0CC	1680	201.6	86.4	0.0	\$10.63	\$270.00	\$35.00	25.4	22.1				
50LED	Boys Room	2	W 32 W F 2 (ELE)	F42LL	60	0.1	SW	4300	516.0	2	W 32 W 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 W F 2 (ELE)	F42LL	60	0.1	SW	4300	516.0	2	W 32 W F 2 (ELE)	F42LL	60	0.1	NONE	4300	516.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
18LED	1st Floor Hallway	12	B 32 R F 4 (ELE)	F44ILL	112	1.3	SW	6240	8,386.6	12	B 32 R F 4 (ELE)	F44ILL	112	1.3	NONE	6240	8,386.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
71	Custodian Closet	1	I 60	I60I	60	0.1	SW	1200	72.0	1	I 60	I60I	60	0.1	NONE	1200	72.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
50LED	Cafeteria/Auditorium	16	W 32 W F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304.0	16	W 32 W F 2 (ELE)	F42LL	60	1.0	NONE	2400	2,304.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
18LED	Stage Left	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	268.8	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	NONE	2400	268.8	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
18LED	Stage Right	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	268.8	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	NONE	2400	268.8	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
50LED	Stage Back	3	W 32 W F 2 (ELE)	F42LL	60	0.2	SW	2400	432.0	3	W 32 W F 2 (ELE)	F42LL	60	0.2	NONE	2400	432.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!				
50LED	Room 106	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50LED	Room 105	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016.0	14	W 32 W F 2 (ELE)	F42LL	60	0.8	C-0CC	1680	1,411.2	604.8	0.0	\$74.39	\$270.00	\$35.00	3.6	3.2				
50																												

		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 kWh Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start 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	(kW/Space) * (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	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kWh) - (Retrofit Annual kWh)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered			
18LED	3rd Floor Hallway	6	B 32 R F 4 (ELE)	F44ILL	112	0.7	SW	6240	4,193	6	T 74 R LED	RTLED50	50	0.3	NONE	6,240	1,872	2,321	0.4	\$ 305.11	\$ 1,417.50	\$ -	4.6	4.6			
105LED	Room 312	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
105LED	Room 311	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
105LED	Room 309	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
105LED	Room 310	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
105LED	Boys Room	2	W 32 W 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	\$ 19.77	\$ 163.35	\$ -	8.3	8.3			
105LED	Girls Room	2	W 32 W 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	\$ 19.77	\$ 163.35	\$ -	8.3	8.3			
105LED	Room 307	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
105LED	Room 308	21	W 32 W F 1	F41LL	32	0.7	SW	2400	1,613	21	4 ft LED Tube	200732x1	15	0.3	C-OCC	1,680	529	1,084	0.4	\$ 152.09	\$ 1,985.18	\$ 35	13.1	12.8			
50LED	Room 305	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 306	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 304	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 303	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 302	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 301	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
18LED	3rd Floor Hallway	8	B 32 R F 4 (ELE)	F44ILL	112	0.9	SW	6240	5,591	8	T 74 R LED	RTLED50	50	0.4	NONE	6,240	2,496	3,095	0.5	\$ 406.82	\$ 1,890.00	\$ -	4.6	4.6			
18LED	Main Stairwell	5	B 32 R F 4 (ELE)	F44ILL	112	0.6	SW	6240	3,494	5	T 74 R LED	RTLED50	50	0.3	NONE	6,240	1,560	1,934	0.3	\$ 254.26	\$ 1,181.25	\$ -	4.6	4.6			
18LED	2nd Floor Hallway	3	B 32 R F 4 (ELE)	F44ILL	112	0.3	SW	6240	2,097	3	T 74 R LED	RTLED50	50	0.2	NONE	6,240	936	1,161	0.2	\$ 152.56	\$ 708.75	\$ -	4.6	4.6			
50LED	Room 210	12	W 32 W 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	\$ 157.12	\$ 2,230.20	\$ 35	14.2	14.0			
50LED	Room 209	12	W 32 W 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	\$ 157.12	\$ 2,230.20	\$ 35	14.2	14.0			
50LED	Room 208	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 207	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 205	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 206	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 203	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 204	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 201	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	Room 202	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	1,680	706	1,310	0.4	\$ 183.30	\$ 2,556.90	\$ 35	13.9	13.8			
50LED	UN-64	2	W 32 W 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	\$ 26.19	\$ 596.70	\$ 35	22.8	21.5			
50LED	UN-63	2	W 32 W 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	\$ 26.19	\$ 596.70	\$ 35	22.8	21.5			
50LED	Boys Room	2	W 32 W 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	\$ 34.89	\$ 326.70	\$ -	9.4	9.4			
50LED	Girls Room	2	W 32 W 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	\$ 34.89	\$ 326.70	\$ -	9.4	9.4			
18LED	1st Floor Hallway	12	B 32 R F 4 (ELE)	F44ILL	112	1.3	SW	6240	8,387	12	T 74 R LED	RTLED50	50	0.6	NONE	6,240	3,744	4,643	0.7	\$ 610.23	\$ 2,835.00	\$ -	4.6	4.6			
71	Custodian Closet	1	I 60	I601	60	0.1	SW	1200	72	1	CF 26	CFQ261-L	27	0.0	NONE	1,200	32	40	0.0	\$ 6.61	\$ 6.75	\$ -	1.0	1.0			
50LED	Cafeteria/Auditorium	16	W 32 W F 2 (ELE)	F42LL	60	1.0	SW	2400	2,304	16	4 ft LED Tube	200732x2	30	0.5	NONE	2,400	1,152	1,152	0.5	\$ 166.98	\$ 2,613.60	\$ -	15.7	15.7			
18LED	Stage Left	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	269	1	T 74 R LED	RTLED50	50	0.1	NONE	2,400	120	149	0.1	\$ 21.57	\$ 236.25	\$ -	11.0	11.0			
18LED	Stage Right	1	B 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2400	269	1	T 74 R LED	RTLED50	50	0.1	NONE	2,400	120	149	0.1	\$ 21.57	\$ 236.25	\$ -	11.0	11.0			
50LED	Stage Back	3	W 32 W F 2 (ELE)	F42LL	60	0.2	SW	2400	432	3	4 ft LED Tube	200732x2	30	0.1	NONE	2,400	216	216	0.1	\$ 31.31	\$ 490.05	\$ -	15.7	15.7			
50LED	Room 106	14	W 32 W F 2 (ELE)	F42LL	60	0.8	SW	2400	2,016	14	4 ft LED Tube	200732															

APPENDIX D

New Jersey Board of Public Utilities Incentives

- i. Smart Start**
 - ii. Direct Install**
 - iii. Pay for Performance (P4P)**
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-

I. SMART START



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NJ SmartStart Buildings

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With New Jersey SmartStart Buildings ...

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

Special Notice

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

Visit the Sandy web page for details and important links.

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

[Project Categories](#)

[Custom Measures](#)

[Incentives for Qualifying Equipment and Projects](#)

[Program Terms and Conditions](#)

[Find a Trade Ally](#)

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

Getting Started

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

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

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

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

Find out more about equipment incentives

For specific details on equipment requirements and financial incentives, including incentives for equipment not listed here, contact a program representative. Fiscal year financial incentives will be limited to a maximum of \$500,000 per customer utility account and are available as long as permits are obtained.

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Equipment Incentives

Special Notice

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

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

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

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

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

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



Electric Chillers

Water-cooled chillers (\$12 - \$170 per ton)

Air-cooled chillers (\$8 - \$52 per ton)

Gas Cooling

Gas absorption chillers (\$185-\$450 per ton)

Gas Engine-Driven Chillers (Calculated through Custom Measure F)

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Desiccant Systems (\$1.00 per cfm - gas or electric)**Electric Unitary HVAC**

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

Ground Source Heat Pumps

Closed Loop (\$450-750 per ton)

Gas Heating

Gas-fired boilers < 300 MBH (\$300 per unit)
 Gas-fired boilers ≥ 300 MBH - 1500 MBH (\$1.75 per MBH)
 Gas-fired boilers ≥ 1500 MBH - ≤ 4000 MBH (\$1.00 per MBH)
 Gas-fired boilers > 4000 MBH (Calculated through Custom Measure)
 Gas furnaces (\$300-\$400 per unit)
 Gas infrared heaters - indoor only (\$300 - \$500 per unit)
 Boiler economizing controls (\$1,200 - \$2,700 per unit)

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

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

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

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

Prescriptive Lighting

New Linear Fluorescent

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

New Induction (\$70 per replaced HID fixture)

New LED

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

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

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

Display case (\$30 per case)

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

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

Parking garage luminaires (\$100 per fixture)

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

Stairwell and Passageway luminaires (\$40 per fixture)

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

Bollard (\$50 per fixture)

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

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

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

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

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

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

Lighting Controls

Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

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

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

HID or Fluorescent Hi-Bay Controls

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

Daylight dimming (\$45 per fixture controlled)

Refrigeration

Covers and Doors

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

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

Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

Food Service Equipment

Cooking

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

Holding

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

Cooling

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

Cleaning

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

Other Equipment Incentives*

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

Custom electric and gas equipment incentives (not prescriptive)

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

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II. DIRECT INSTALL



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NEW JERSEY'S CLEAN ENERGY PROGRAM

DIRECT Install

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

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

ELIGIBILITY



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

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

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



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

III. PAY FOR PERFORMANCE (P4P)



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Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

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



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

Eligibility

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

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

ENERGY STAR Portfolio Manager

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



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

Incentives

**OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS**

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

EDA PROGRAMS

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

SBC CREDIT PROGRAM

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

PAST PROGRAMS

TOOLS AND RESOURCES

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

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

CONTACT US



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

Steps to Participation

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

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PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2013 - June 30, 2014

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

Instructions

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

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

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

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

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

Partner Information

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

Project Information

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

Funding

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

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

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

Additional Project information

Additional Utility Account(s)

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

Additional Comments:

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

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

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

Visit our website: NJCleanEnergy.com/P4P

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*Incentives/Requirements subject to change.



002-FY14-04/14

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

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

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

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

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

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

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

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

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

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

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

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

Program Manager – TRC Energy Services.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)



Your Power to Save

At Home, for Business, and for the Future

[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

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

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

Local Government
School Districts (K-12)

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

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs. Local units considering an ESIP should carefully review the Local Finance Notice, the law, and consult with qualified professionals to determine how they should approach the task.

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

FIRST STEP – ENERGY AUDIT

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

ENERGY REDUCTION PLANS

If you have an ESIP plan that needs to be submitted to the Board of Public Utilities, please email it to ESIP@bpu.state.nj.us. Please limit the file size to 3MB (or break it into smaller files).

Frankford Township School District
Northern Hunterdon-Voorhees Regional High School
Manalapan Township (**180 MB** - Right Click, Save As)

ESIP PROGRAM

Final version 42413

BPU RULES

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

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

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

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

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

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

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

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

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

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

NEWARK PUBLIC SCHOOL DISTRICT LINCOLN SCHOOL

Cost of Electricity	\$0.14	/kWh
Electricity Usage	271,016	kWh/yr
System Unit Cost	\$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary	Annual Utility Savings				Estimated	Total		New Jersey	Payback	Payback
Cost					Maintenance	Savings	Federal Tax	Renewable	(without	(with
					Savings		Credit	** SREC	SREC	SREC
\$	kW	kWh	therms	\$	\$	\$	\$	\$	Years	Years
\$40,000	10.0	12,490	0	\$1,749	0	\$1,749	\$0	\$1,936	22.9	10.9

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

Area Output*

555 m²
5,978 ft²

Perimeter Output*

102 m
334 ft

Available Roof Space for PV:

(Area Output - 10 ft x Perimeter) x 85%
2,244 ft²

Approximate System Size:

Is the roof flat? (Yes/No) Yes

8 watt/ft²
17,954 DC watts
10 kW Enter into PV Watts

PV Watts Inputs***

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

PV Watts Output

12,490 annual kWh calculated in PV Watts program

% Offset Calc

Usage 271,016 (from utilities)
PV Generation 12,490 (generated using PV Watts)
% offset 5%

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

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

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





* * *

**AC Energy
&
Cost Savings**



Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	10.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	8.3 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.78	730	102.20
2	3.54	842	117.88
3	4.35	1114	155.96
4	4.95	1181	165.34
5	5.69	1371	191.94
6	5.86	1326	185.64
7	5.73	1324	185.36
8	5.47	1251	175.14
9	4.91	1121	156.94
10	3.99	972	136.08
11	2.68	652	91.28
12	2.35	604	84.56
Year	4.36	12490	1748.60

*

[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

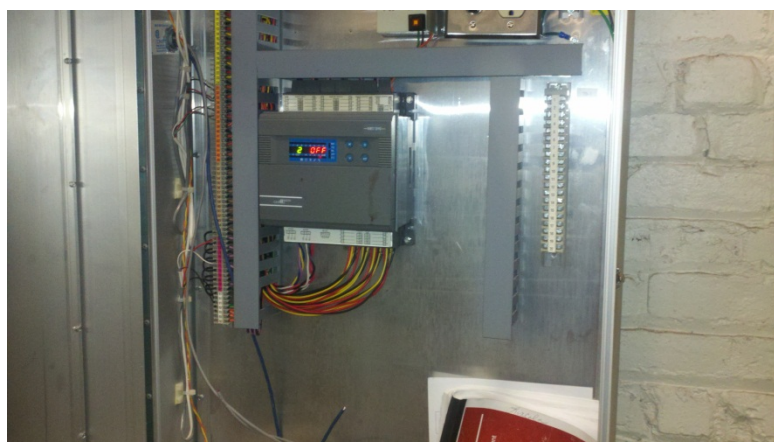
Photos



1: Deteriorated door sweeps allow excessive infiltration



2: Typical window a/c unit



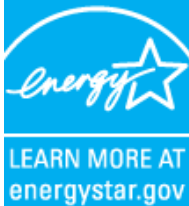
3: Johnson Metasys controls system



4: Typical exterior lighting fixture

APPENDIX G

EPA Benchmarking Report



ENERGY STAR[®] Statement of Energy Performance

51

ENERGY STAR[®]
Score¹

Lincoln Street Elementary

Primary Property Function: K-12 School
Gross Floor Area (ft²): 65,400
Built: 1908

For Year Ending: September 30, 2010
Date Generated: May 23, 2014

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

Property & Contact Information

Property Address
Lincoln Street Elementary
87 Richelieu Terrace
Newark, New Jersey 07106

Property Owner

,
(____)____-____

Primary Contact

LGEA LGEA
900 ROUTE 9 NORTH
SUITE 404
WOODBIDGE, NJ 07095
732-855-2864
amiller@trcsolutions.com

Property ID: 3570028

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
56.9 kBtu/ft ²	Natural Gas (kBtu) 2,697,542 (72%)	National Median Site EUI (kBtu/ft ²)	57.8
	Electric - Grid (kBtu) 1,025,030 (28%)	National Median Source EUI (kBtu/ft ²)	93.9
		% Diff from National Median Source EUI	-1%
Source EUI	Annual Emissions		
92.5 kBtu/ft ²	Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	273	

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)