

**THE NEWARK PUBLIC SCHOOLS**

**Group 3 Buildings**

**RIDGE STREET SCHOOL**

735 Ridge St., Newark, NJ 07104

**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
<b>Ridge Street School</b>	735 Ridge Street, Newark, NJ 07104	42,582	1911

The annual energy and cost savings for the recommended energy conservation measures (ECM) identified in the survey are shown below:

Building Name	Electric Savings (kWh)	NG Savings (therms)	Fuel Oil #2 Savings (gals)	Total Savings (\$)	Payback (years)
<b>Ridge Street School</b>	38,624	(11,851)	17,504	52,170	3.2

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 Door Seals	1,613	373	4.3	0	4.3	Y
2	Install Additional Attic Insulation	19,500	2,264	8.6	0	8.6	Y
3	Heating Fuel Conversion	47,884	34,582	1.4	0	1.4	Y
4	Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers	2,312,874	2,865	807.2	6,000	805.1	N
5	Install Window A/C Controller	400	324	1.2	0	1.2	Y
6A	Install Basic Controls	21,309	8,837	2.4	0	2.4	Y
6B**	Install Full DDC Controls	215,714	9,632	22.4	0	22.4	N
7	Replace Gas-Fired DHW Heater w/ Condensing Gas-Fired DHW Heater	16,535	527	31.4	300	30.8	N
8	Low Flow Plumbing Fixtures	127,967	1,423	89.9	0	89.9	N
L1**	Lighting Replacements / Upgrades	72,324	5,097	14.2	2,000	13.8	N
L2**	Lighting Controls	4,232	1,295	3.3	660	2.8	N
L3	Lighting Replacements w/ Controls	76,556	5,790	13.2	2,660	12.8	Y
<b>Total**</b>		<b>2,624,638</b>	<b>56,985</b>	<b>46.1</b>	<b>8,960</b>	<b>45.9</b>	
<b>Total (Recommended)</b>		<b>167,262</b>	<b>52,170</b>	<b>3.2</b>	<b>2,660</b>	<b>3.2</b>	

\* Incentive shown is per the New Jersey SmartStart Program.

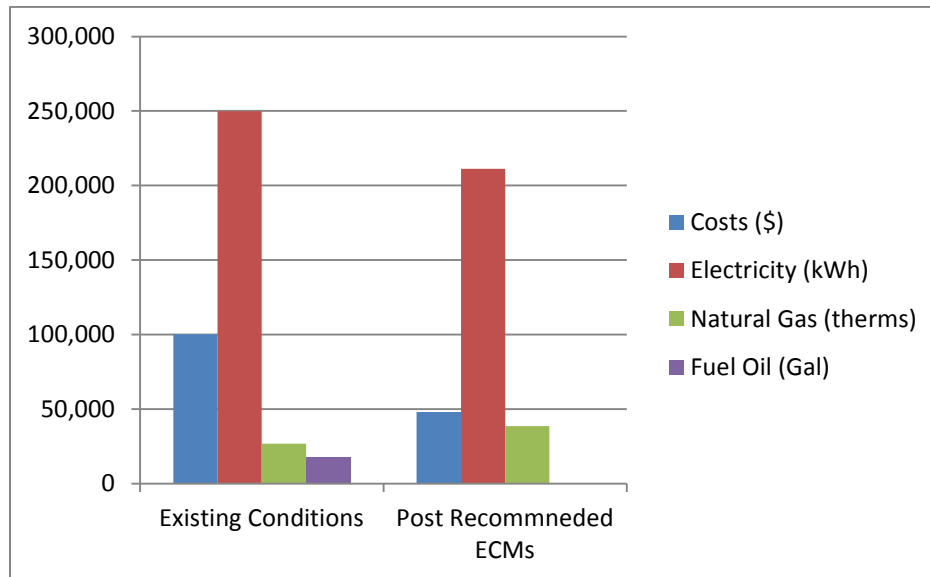
\*\* These ECMs are not included in the Total, as they are alternate measures not recommended.

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 (\$)	100,215	48,045	52%
Electricity (kWh)	249,835	211,211	15%
Natural Gas (therms)	26,748	38,599	-44%
Fuel Oil (Gal)	17,504	0	100%
Site EUI (kbtu/SF/Yr)	119.0	91.2	





## 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:** Ridge Street School

**Address:** 735 Ridge St., Newark NJ 07104

**Gross Floor Area:** 42,582 sq.ft.

**Number of Floors:** 3

**Year Built:** 1911

**Additions:** none



**Description of Spaces:** Classrooms, offices, cafeteria, auditorium, stage, gymnasium, library, storage rooms, toilet rooms and mechanical rooms.

**Description of Occupancy:** The school serves 600 students from second to 8<sup>th</sup> grade. There are 50 school faculty and staff members.

**Number of Computers:** The school has approximately 36 desktop and laptop computers.

**Building Usage:** Hours of operation are 7:00 AM to 3:05 PM Monday through Friday, with various after-school activities. Custodial staff is on site in two shifts, from 6:30 AM to 3:00 PM, and 3:00 PM to 11:00 PM, 80 hours per week, 10 months per year.

**Construction Materials:** Structural steel framing with concrete masonry unit exterior walls, insulation unknown but assumed minimal. Interior walls are brick, and plaster and lathe. Interior and exterior walls are in fair to good condition. The temporary classrooms are constructed of standard 'stick built' lumber construction, insulated 2x4 walls, and interior drywall finish.

**Façade:** Concrete masonry units and brick for the main building; composite batten & board siding on the temporary classrooms

**Roof:** Approximately 60% pitched with slate tiles; and 40% flat utilizing what appears to be an adhered rubber membrane. An adhered membrane covers the flat roof of the temporary classrooms. Insulation in the main building is assumed to be minimal; insulation in the temporary building is assumed to be R-13 in the walls and R-19 in the roof. An ECM was evaluated to install blown in insulation in the attic floor to decrease energy consumption due to infiltration/exfiltration and heat gain/loss.

**Windows:** Double hung double pane windows with aluminum frames. Windows are in good condition and no ECMs associated with window replacement were evaluated.

**Exterior Doors:** Most exterior doors are steel jacketed without windows. Main entrance doors are steel framed storefront style. Sweeps and seals are in poor condition. An ECM was evaluated to change the door sweeps and seals.

### **Heating Ventilation & Air Conditioning (HVAC) Systems**

**Heating:** Two (2) natural gas fired H.B. Smith cast iron sectional steam boilers, approximately eight (8) years old, provide heat for the school. These boilers each provide 2,776 MBH at an efficiency of 82.9%. Both boilers are fired up every morning to provide rapid warm-up; once this is accomplished one boiler is shut down and the building is heated by the other boiler for the rest of the day. As the utility data which was received reflects the older oil fired boilers which were replaced in the summer of 2013; a calculation has been performed to show the savings of a fuel switch from No. 2 oil to natural gas. A two-pipe steam heating system delivers steam to individual cast iron radiators located in perimeter rooms around the building; with the condensate pumped back to the boilers via a condensate return system. Building personnel indicated that steam traps are functionally in good condition- a steam trap in the auditorium was recently replaced. The building is prone to uneven heating, with some spaces being over-heated while others are under-heated. Both steam and electric unit heaters are installed in miscellaneous mechanical areas. We have included an ECM that evaluates the energy savings associated with replacing the entire steam system with a modern high- efficiency hot water heating system. Converting steam system to hot water system was evaluated.

Adjacent to the building is a smaller single story structure that houses eight (8) temporary classrooms. Each of these classrooms is heated by a York gas fired rooftop unit. These RTUs are approximately 10 (ten) years old.

**Cooling:** A computer classroom and a couple offices are cooled by fractional tonnage air conditioning units installed in windows. These are left in place year-round and are not covered in the winter-time. An ECM is included that evaluates the implementation of window A/C controllers. The building does not have a centralized mechanical cooling system. The temporary classrooms are fully air conditioned by the York rooftop units (previously mentioned), which have approximately 5 tons capacity each.

**Ventilation:** At one time the building was ventilated with a large air handling unit installed in a basement mechanical room. This unit is no longer operational. During the site visit several windows were observed open and were providing ventilation.

**Exhaust:** Exhaust fans are used to ventilate toilet rooms and the kitchen. A 4'x6' kitchen range hood and associated ductwork that connects to an exterior sidewall exhaust fan removes smoke and cooking vapors from the range. A propeller type through-wall fan provides general kitchen exhaust. Centrifugal exhaust fans, installed on the roof, provide exhaust for some toilet rooms; others are not exhausted at all.

## **Controls Systems**

During occupied hours, the building is completely manually controlled. The heating system has one (1) temperature sensor for the entire building to control the boilers. Maintenance personnel modulate the steam valves on individual cast iron radiators per request, with limited success. During unoccupied hours, the boilers are switched into automatic mode. The temperature setpoint is 72°F with +/- 2 degree swing, and this temperature is maintained during unoccupied times such as weekends and nighttime. But due to the fact that only one thermostat controls the entire building, the building experiences large swings in temperature while in automatic mode. Both installing a basic boiler control system and installing a full DDC system are evaluated.

Each of the temporary classrooms has a wall mounted temperature sensor that controls the supply air temperature of the RTU installed on the roof above.

## **Domestic Hot Water Systems**

One (1) gas fired A.O. Smith boiler, manufactured in 2007, generates the domestic hot water for the building; and two (2) 115 gallon Ruud storage tanks help to store it. One of the storage tanks was manufactured in 1993, the other in 1997. The domestic hot water is pumped around the school to restrooms and sinks by a B&G circulator pump. An ECM was evaluated to replace the gas fired tank type water heater with an equivalent capacity gas-fired condensing water heater.

## **Kitchen Equipment**

The kitchen contains one 4'x6' (approximate size) range exhaust hood that is ducted and exhausted via an exhaust fan located on the roof. There are four (4) double-door reach-in coolers, two manufactured by Victory and two by Traulsen. For the most part the cooking equipment (such as the bread ovens) is manufactured by both Market Forge and Blodgett, and is natural gas fired. There is also a Wittco heated holding cabinet. A dishwasher is Dishes are washed by hand in a conventional stainless steel triple sink. The equipment is in good condition and no ECMs were evaluated.

## **Plumbing Systems**

In general this building contains older style high flow water closets and high flow urinals, but lavatory faucets are low flow (0.5 GPM). Water usage is primarily toilet rooms, the kitchen, and lavatories; but the building also uses a greater quantity of city water due to the fact that it is heated by an aging steam system, notorious for high water usage. Most fixtures appear to be in good condition. An ECM is included to evaluate the water savings potential of installing low-flow plumbing fixtures.

## **Plug Load**

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

## **Lighting Systems**

The lighting within this school is primarily 4' T8 linear fluorescent fixtures with electronic ballasts, with the number of lamps typically varying per fixture from one to two. Some 2' T8 fixtures were noted in the Faculty Lounge and Art Rm. Exterior lighting consists of 100W metal halide lamps, several of which are left on during the day. It appears that nearly all areas and classrooms are operated by manual switches. We have provided three alternatives for lighting that include adding occupancy sensors to the existing lights, replacing the lights with LED lights and a third ECM that evaluates adding occupancy sensors to the proposed LED lights.

### 3.0 UTILITIES

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

	Electric	Natural Gas
Deliverer	PSEG	PSEG
Supplier	Nextera Energy Services	PSEG

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

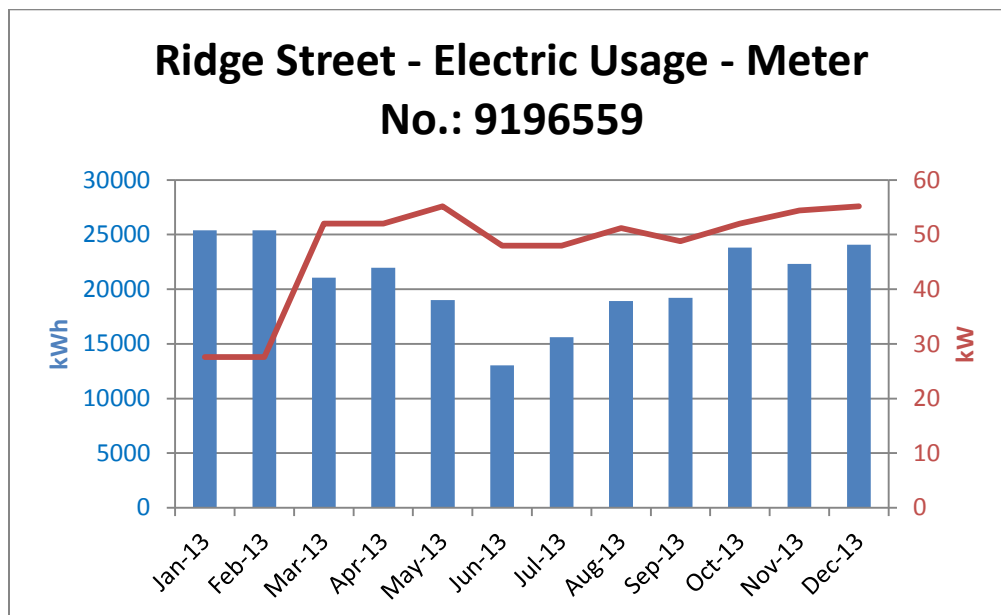
Electric		
Annual Consumption	249,835	kWh
Annual Cost	\$37,730	\$
Blended Unit Rate	\$0.15	\$/kWh
Supply Rate	\$0.14	\$/kWh
Demand Rate	\$5.64	\$/kW
Peak Demand	42.4	kW
Natural Gas		
Annual Consumption	26,748*	Therms
Annual Cost	\$27,818*	\$
Unit Rate	\$1.04	\$/therm
Fuel Oil		
Annual Consumption	17,504	Gal
Annual Cost	58,418	\$
Unit Rate	3.34	\$/gal

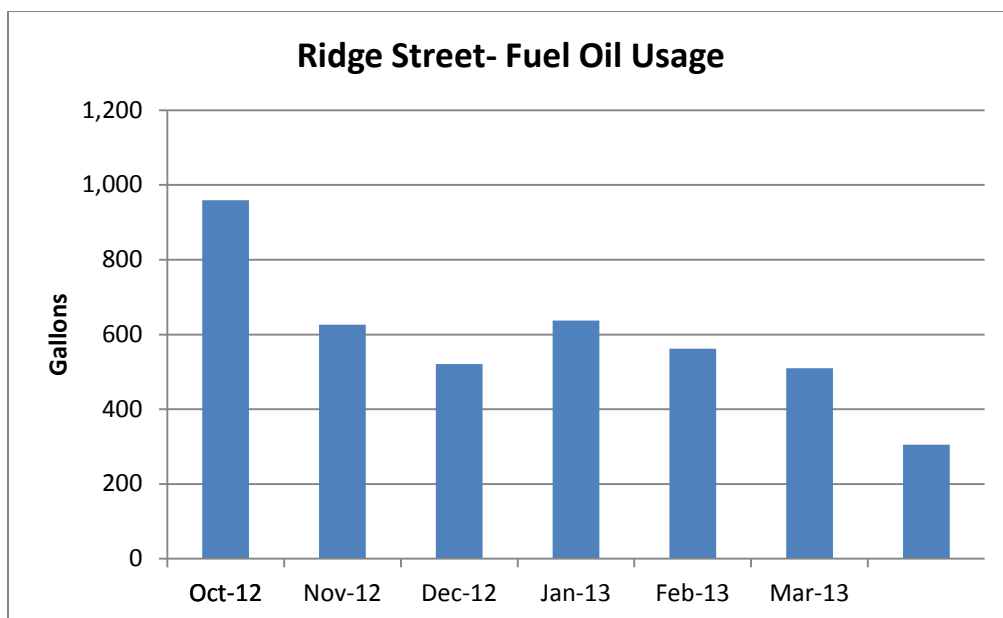
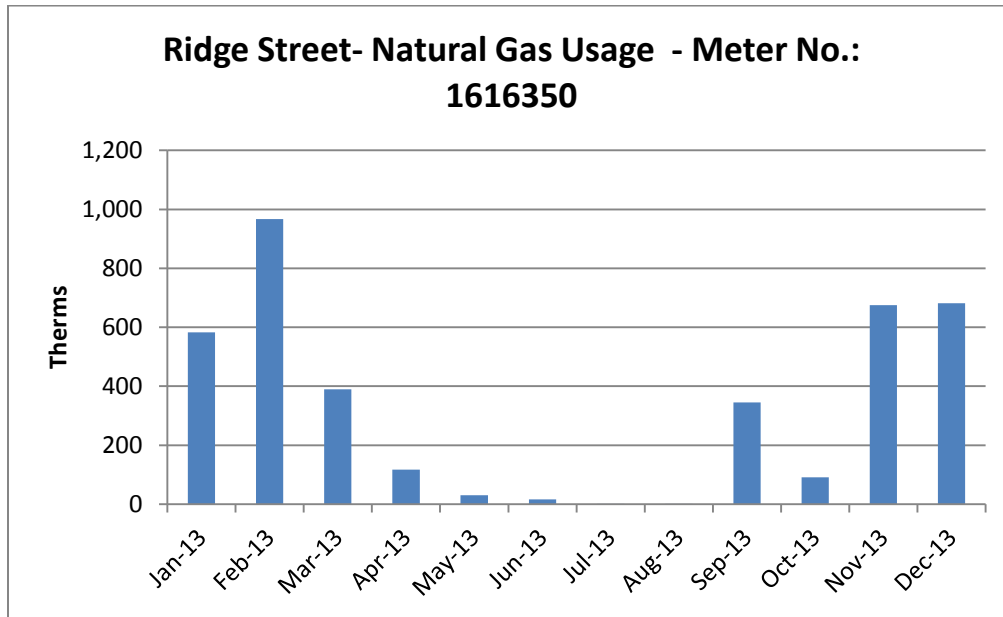
\*estimated due to less than 12-month utility bills. Full switch happened in 2013.

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)





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	\$0.137	\$0.12	Y
Natural Gas	\$/Therm	\$1.04	\$0.95	Y

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

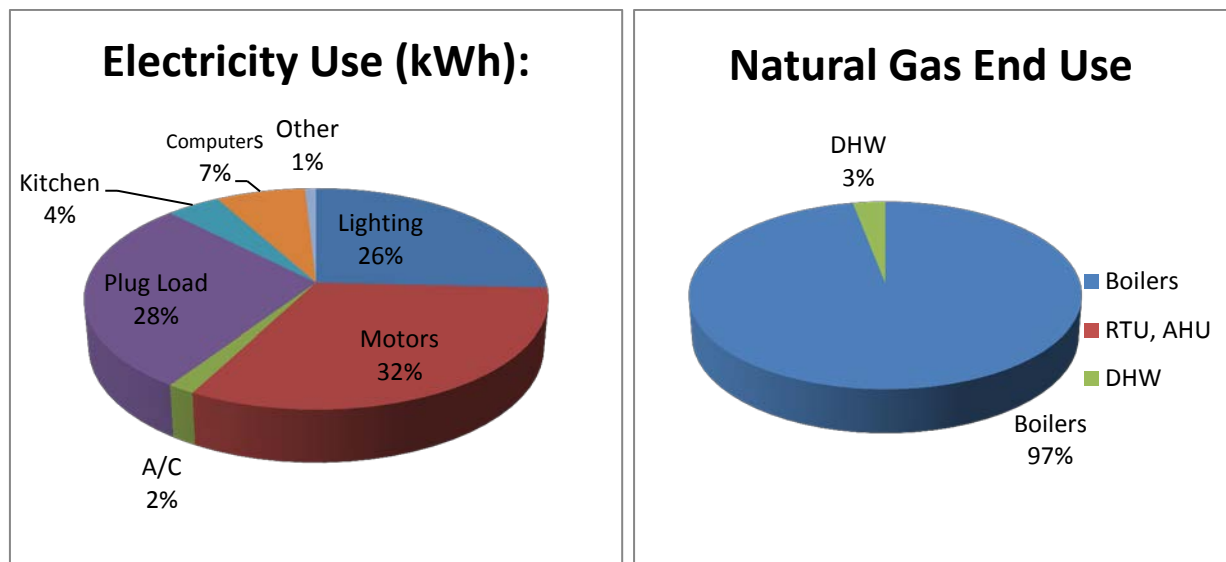
Additional information on selecting a third party energy supplier is available here:

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

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

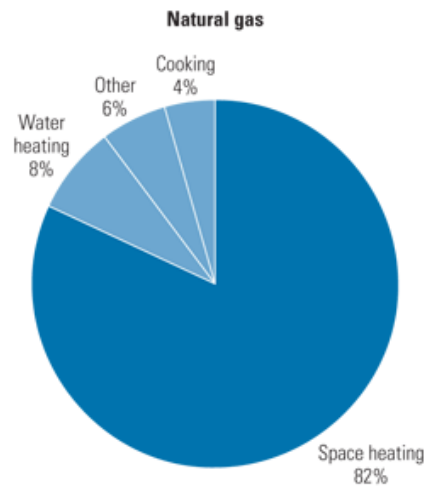
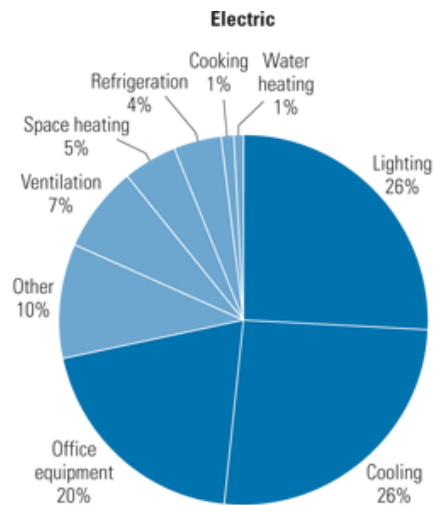
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

### Site End-Use Utility Profile



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

### Typical End-Use Utility Profile for Educational Facilities



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



#### 4.0 BENCHMARKING

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

The EPA Portfolio Manager benchmarking tool provides a site and source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft<sup>2</sup>/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 <sup>2</sup> /yr	Energy Star Rating (1-100)
70.2*	31**

\* Calculated by CHA using Utility Data provided by NPS

\*\* Provided by TRC

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

## 5.0 ENERGY CONSERVATION MEASURES

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

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

Energy savings were quantified in the form of:

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

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

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

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

## 5.1 ECM-1 Replace Door Sweeps and Seals

It was noted during the site visit that the seals and sweeps were showing wear on nearly all of the exterior doors, and daylight was visible between the door and frame.

The seals around exterior doors fail over time. This leads to infiltration of unconditioned outside air or exfiltration of conditioned air resulting in increased heating energy usage. This measure calls for the replacement of all exterior door seals. Replacement of these seals will result in a reduction of the buildings heating and cooling loads, therefore providing natural gas and electricity savings. The linear footage of gap and wind speed is used to estimate the infiltration rate, which is then multiplied by the BIN weather data and the equipment efficiencies to determine the annual energy savings.

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

### ECM-1 Replace Window and Door Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
1,613	0.0	0	357	373	1.8	0	4.3	4.3

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

This measure is recommended.

## 5.2 ECM-2 Install Insulation into Attic

Insulation in the main building is assumed to be minimal; It is estimated that the existing insulation is R-13.

To calculate the savings, the heat losses through the roof assembly of the facility were found using the existing roof's R-value of 13 and bin weather data. The values were totaled to determine the existing annual energy losses. Heating and cooling energy loss values were then determined with a thermal resistance which included the additional R-17.0 loose-fill insulation. The total proposed roof R-value with insulation is R-30. Implementation of this ECM will entail Installing 9" fiberglass blown-in loose-fill insulation in attic cavity to reduce heat transfer.

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

### ECM-2 Install Insulation into Attic

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
19,500	0	0	2,170	2,264	0.7	0	8.6	8.6

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

This measure is recommended.

### 5.3 ECM-3 Heating Fuel Conversion (Fuel Switch)

The existing boilers are steam and have high-low-high No. 2 fuel oil burners with estimated combustion efficiencies in the 78-80% range. Modulating natural gas burners are available that should increase the combustion efficiency to as high as 85%. For the purpose of this calculation, 85% efficiency is used. Although No. 2 fuel oil has a higher BTU content it is also significantly more expensive than natural gas on a per-btu basis. This ECM assesses the replacement of the existing No. 2 oil burners with new modulating natural gas fired burners.

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

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

#### ECM-3 Heating Fuel Conversion (Fuel Switch)

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Fuel Oil	Total				
\$	kW	kWh	Therms	Gal	\$		\$	Years	Years
48,557	0	0	(22,850)	17,504	34,582	(13.4)	0	1.4	1.4

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

This measure is recommended, however has already been implemented by the client as of the summer of 2013. As the utility bills which were received do not reflect the new installation of natural gas fired burners, the savings is still claimed as part of this report under the justification that the coming savings can still benefit the building if further ECMs are to be implemented.

### 5.4 ECM-4 Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers

The heating system consists of two (2) natural gas fired steam boilers that were installed in 2006. The boilers have a 2,278 MBH input with a thermal efficiency of 82%.

The existing steam boilers and distributions system are approaching their service life as defined by ASHRAE. 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-4 Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers**

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
2,312,874	0	0	2,747	2,865	(1.0)	6,000	807.2	805.1

\* 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 cost and long payback. As long as the boilers are maintained properly they should continue to operate beyond their service life. This ECM should only be pursued if a major portion of the steam system, such as the distribution piping fails in the future.

#### **5.5 ECM-5 Install Window A/C Controller**

There are approximately two (2) window air conditioners located throughout the school; one in the teachers' lounge, one in the main office, one in the computer room, and the rest in miscellaneous offices.

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

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

#### **ECM-6 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
400	0	2,146	0	324	11.2	0	1.2	1.2

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

This measure is recommended.

### 5.6.1 ECM-6A Install Basic Controls

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

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

#### ECM-6A 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	8,471	8,837	5.2	0	2.4	2.4

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

This measure is recommended.

### 5.6.2 ECM-6B Install DDC Controls

A Full Direct Digital Control (DDC) building automation system consists of automatic control of individual space heating and ventilation equipment, and provides monitoring, trending and alarms which notify an operator when a piece of equipment fails or operates outside a given set-point. This system allows for the implementation of energy efficient strategies, such as: time of day (TOD) optimization, set point optimization, staggered start, night setback, economizer (free cooling), demand control ventilation, exhaust fan TOD optimization, and holiday TOD optimization. It also allows for remote access and control of the building's systems.

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

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

### ECM-6B Install DDC Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
215,714	0	0	9,233	9,632	(0.3)	0	22.4	22.4

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

This measure is not recommended due to the high cost and long payback. If full DDC controls are to be pursued than ECM-6B may also be considered as there are a larger amount of controls which can be implemented with a hydronic heating system.

### 5.7 ECM-7 Replace DHW Heater with Condensing DHW Heater

One (1) gas fired A.O. Smith boiler, manufactured in 2007, generates the domestic hot water for the building; and two (2) 115 gallon Ruud gals storage tanks help to store it. New condensing DHW heaters operate at efficiencies as high as 95%. Replacing the existing when it fails with a new condensing DHW heater will result in a significant annual fuel energy savings.

Implementation of this ECM involves disconnection from domestic hot water piping and removal of the existing DHW heater, and re-connecting the new condensing DHW heater to the existing piping. Installation of the new unit may require special routing of combustion air intake and exhaust vents—it is important to follow manufacturer's guidelines.

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

### ECM-7 Replace DHW Boiler with Condensing DHW Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
16,535	0	0	505	527	(0.5)	300	31.4	30.8

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

This measure is not recommended due to long pay back and the heaters being installed in 2007. There are still a number of years of useful life associated with the domestic hot water system.

### 5.8 ECM-8 Install Low Flow Plumbing Fixtures

In general this building contains older style high flow water closets and high flow urinals, but lavatory faucets are low flow (0.5 GPM).

The water savings associated from replacing existing high flow fixtures with low-flow fixtures was calculated by taking the difference of the annual water usage for the

proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures. Replacing the existing fixtures in the restrooms with 1.28 Gals/flush toilets, 1.0 gal/flush urinals, and 0.5 gpm faucets will conserve water which will result in lower annual water and sewer charges. Faucets with low-flow push valves were not considered for replacement.

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

#### ECM-8 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water				
\$	kW	kWh	kGals	\$	%	\$	Years
127,967	0.0	0	731	1,423	(0.7)	0	89.9

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

This measure is not recommended due to the extremely long payback period.

#### 5.9.1 ECM-L1 Lighting Replacement / Upgrades

Most of the lighting within this school is primarily 4' T8 linear fluorescent fixtures with electronic ballasts, and in most cases the number of lamps per fixture is one or two. The auditorium is a notable exception with twenty-four (24) 300 watt incandescent lamps. Exterior lighting consists of 150W metal halide wallpack lamps.

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				
\$	kW	kWh	Therms	\$	%	\$	Years
72,324	12.0	31,401	0	5,097	(0.2)	2,000	14.2

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

This measure is not recommended in lieu of ECM L3.



### 5.9.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Lights in all of the areas are operated by manual switches.

Review of the comprehensive lighting survey determined that lighting in these areas could benefit from installation of occupancy sensors to turn off lights when the areas are unoccupied.

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in Section 5.9.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

#### ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
4,232	0.0	9,484	0	1,295	2.4	660	3.3	2.8

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

This measure is not recommended in lieu of ECM L3.

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

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

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

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
76,556	12.0	36,477	0	5,790	(0.2)	2,660	13.2	12.8

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

This measure is recommended.

## 5.10 Additional O&M Opportunities

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

- Install Covers on Window Air Conditioners
- Clean Window AC filters before each season
- Perform a steam trap assessment yearly to ensure steam traps are functioning properly.
- 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
- Insulate domestic hot water piping.

## **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 <sup>2</sup> )	Potential PV Array Size (kW)
2,037	10.0

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of \$155/SREC for 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	4,996	0	857	774	53.1	26.1	N

**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 not recommended due to long payback/

#### 7.1.2 Solar Thermal Hot Water Generation

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

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

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

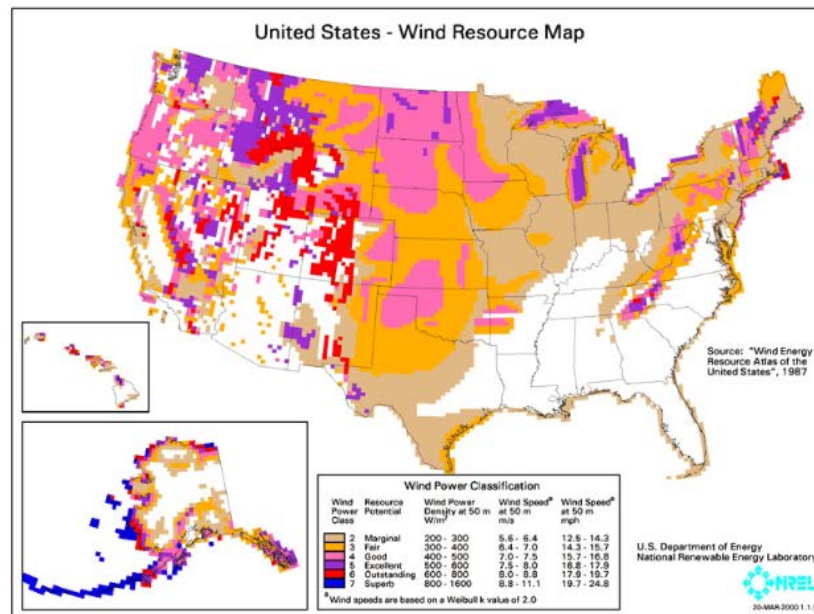
This measure is not recommended due to the relatively low domestic hot water usage.

#### 7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are mounted onto a tower. Newer wind turbines also use advanced technology to generate electricity at a variety of frequencies depending on the wind speed, convert it to DC and



then back to AC before sending it to the grid. Wind turbines range from 50 – 750 kW for utility scale turbines down to below 50 kW for residential use. On a scale of 1 (the lowest) to 7 (the highest), Class 3 and above (wind speeds of 13 mph or greater) are generally considered “good wind resource” according to the Wind Energy Development Programmatic EIS Information Center hosted by the Bureau of Land Management. According to the map below, published by NREL, Newark, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



This measure is not recommended.

### 7.3 Combined Heat and Power Plant

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

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter; however thermal usage during the summer months does not exist. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution

system in the building. CHP is not recommended due to the building's limited summer thermal demand.

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

#### **7.4 Demand Response Curtailment**

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

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

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

**Building Electric Load Profile**

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
55.2	27.6	47.7	N	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 \$52,170/yr with an overall payback of 3.2 years, if the recommended ECMs are implemented.

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

<b>Electric Savings (kWh)</b>	<b>Natural Gas Savings (therms)</b>	<b>Fuel Oil #2 Savings (gals)</b>	<b>Total Savings (\$)</b>	<b>Payback (years)</b>
<b>38,624</b>	(11,851)	17,504	52,170	3.2

The following projects should be considered for implementation:

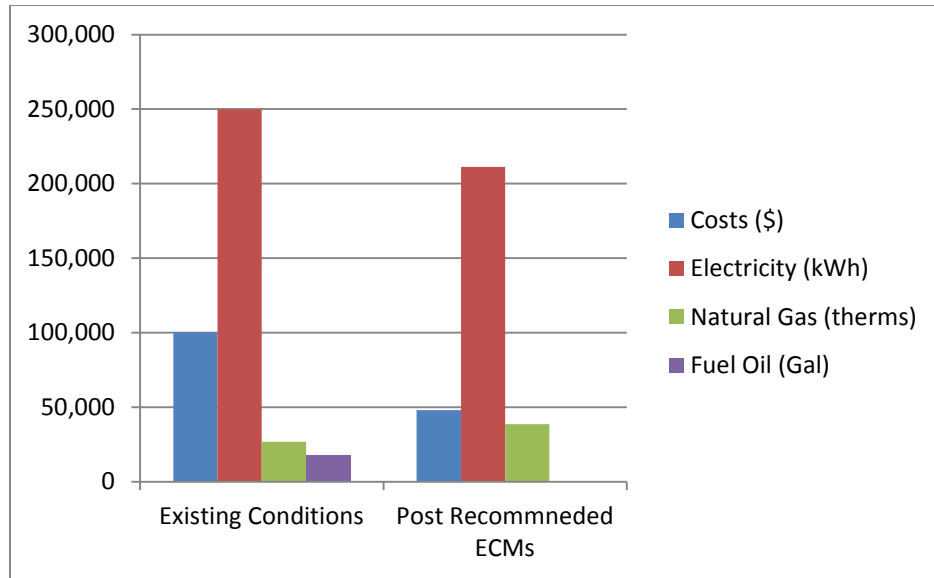
- Install Door Seals
- Install Additional Attic Insulation
- Heating Fuel Conversion (Fuel Switch)
- Install Window A/C Controller
- Install Basic DDC Controls
- Lighting Replacements with Controls (Occupancy Sensors)

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:

	<b>Existing Conditions</b>	<b>Post Recommended ECMs</b>	<b>Percent Savings</b>
Costs (\$)	100,215	48,045	52%
Electricity (kWh)	249,835	211,211	15%
Natural Gas (therms)	26,748	38,599	-44%
Fuel Oil (Gal)	17,504	0	100%
Site EUI (kbtu/SF/Yr)	119.0	91.2	



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**

## Ridge Street - 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	3690	13.5	690.2	549.2	83.81	57.19	633.01	\$ 0.19	\$ 0.17	\$ 4.24
2/3/2012	3/7/2012	5355	13.5	897.05	702.66	137.19	57.2	839.85	\$ 0.17	\$ 0.16	\$ 4.24
3/8/2012	8/2/2012	29115	38.3	5,595.86	3,459.60	1,495.28	640.98	4954.88	\$ 0.19	\$ 0.17	\$ 16.74
8/3/2012	8/30/2012	5445	19.8	1,043.36	638.01	321.47	83.88	959.48	\$ 0.19	\$ 0.18	\$ 4.24
8/30/2012	12/3/2012	16920	30.6	2,604.98	1,932.58	382.62	289.78	2315.2	\$ 0.15	\$ 0.14	\$ 9.47
12/4/2012	1/3/2013	4905	19.4	811.1	588.84	139.99	82.27	728.83	\$ 0.17	\$ 0.15	\$ 4.24
1/4/2013	2/1/2013	5040	8.6	800.43	600.77	162.85	36.81	763.62	\$ 0.16	\$ 0.15	\$ 4.28
2/2/2013	3/5/2013	5265	18.9	875.21	648.67	145.64	80.9	794.31	\$ 0.17	\$ 0.15	\$ 4.28
3/6/2013	4/4/2013	4770	19.4	827.46	615.36	129.06	83.04	744.42	\$ 0.17	\$ 0.16	\$ 4.28
4/5/2013	5/3/2013	4680	25.2	842.87	617.17	117.83	107.87	735	\$ 0.18	\$ 0.16	\$ 4.28
5/4/2013	6/5/2013	7155	34.2	1,459.92	808.81	504.72	146.39	1313.53	\$ 0.20	\$ 0.18	\$ 4.28
6/6/2013	7/3/2013	4365	33.8	1,151.74	605.94	401.12	144.68	1007.06	\$ 0.26	\$ 0.23	\$ 4.28
7/3/2013	8/2/2013	7560	34.2	1,508.52	828.85	261.6	418.07	1090.45	\$ 0.20	\$ 0.14	\$ 12.22
8/2/2013	9/3/2013	7920	34.2	1,409.45	715.18	276.2	418.07	991.38	\$ 0.18	\$ 0.13	\$ 12.22
9/2/2013	10/2/2013	5985	32.9	841.9	540.44	160.62	140.83	701.07	\$ 0.14	\$ 0.12	\$ 4.28
10/2/2013	10/31/2013	5535	18.9	746.7	499.81	165.99	80.9	665.8	\$ 0.13	\$ 0.12	\$ 4.28
11/1/2013	12/3/2013	3375	21.6	485.6	304.76	88.38	92.46	393.14	\$ 0.14	\$ 0.12	\$ 4.28
12/3/2013	1/3/2014	5355	19.4	724.8	483.56	158.19	83.05	641.75	\$ 0.14	\$ 0.12	\$ 4.28
1/3/2014	2/5/2014	5715	8.6	729.79	516.06	176.92	36.81	692.98	\$ 0.13	\$ 0.12	\$ 4.28

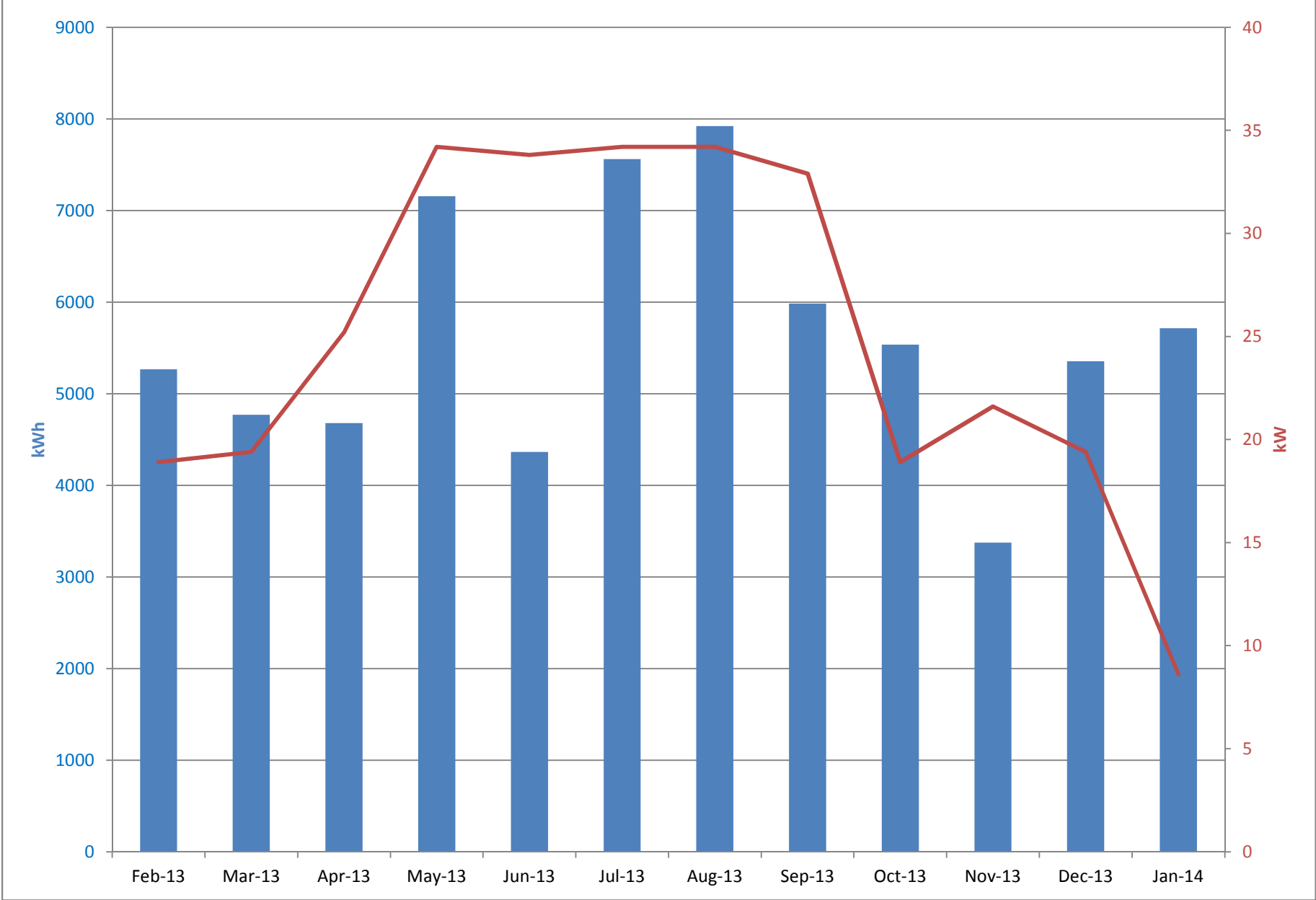
Ridge Street	Start Date	End Date	Months
735 Ridge St. , 07104	1/5/2012	2/5/2014	25
Account Number 2147483647			
Meter Number 278004268			

### ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:

2/5/2014

Total Usage	67,680	kwh
Total Charges	\$11,604	
Blended Rate	\$0.17	\$/kWh
Consumption Rate	\$0.14	\$/kWh
Demand Rate	\$6.08	\$/kW
Max Demand	34.2	kW
Min Demand	8.6	kW
Avg Demand	25.1	kW

Ridge Street - Electric Usage - Meter No.: 278004268



## Ridge Street - 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)
6/4/2011	6/4/2012	261848	96.8	44,245.00	0	13,682.65	2,446.49	41,798.51	\$ 0.17	\$ 0.16	\$ 25.27
6/5/2012	7/3/2012	19582	55.2	3,221.64	1,461.41	1,526.38	233.85	2987.79	\$ 0.16	\$ 0.15	\$ 4.24
7/4/2012	8/2/2012	14326	22.4	2,267.21	1,113.59	1,058.72	94.9	2,172.31	\$ 0.16	\$ 0.15	\$ 4.24
8/3/2012	8/30/2012	13858	24	2,191.17	1,037.37	1,052.12	101.68	2089.49	\$ 0.16	\$ 0.15	\$ 4.24
8/31/2012	12/3/2012	64119	55.2	8,442.35	4,631.15	3,153.70	657.5	7784.85	\$ 0.13	\$ 0.12	\$ 11.91
12/4/2012	1/3/2013	23830	54.4	3,078.13	1,712.21	1,135.23	230.69	2847.44	\$ 0.13	\$ 0.12	\$ 4.24
1/4/2013	2/1/2013	24656	55.2	3,277.38	1,838.43	1,202.66	236.29	3041.09	\$ 0.13	\$ 0.12	\$ 4.28
2/2/2013	3/4/2013	25400	27.6	3,351.32	1,938.17	1,176.88	236.28	3115.04	\$ 0.13	\$ 0.12	\$ 8.56
3/5/2013	4/4/2013	25400	27.6	3,351.32	1,938.17	1,176.88	236.28	3115.04	\$ 0.13	\$ 0.12	\$ 8.56
4/5/2013	5/3/2013	21054	52	2,938.53	1,686.13	1,029.81	222.59	2715.94	\$ 0.14	\$ 0.13	\$ 4.28
5/4/2013	6/5/2013	21955	52	3,618.92	1,802.72	1,180.53	635.67	2983.25	\$ 0.16	\$ 0.14	\$ 12.22
6/6/2013	7/3/2013	19022	55.2	3,454.49	1,680.50	1,537.71	236.28	3218.21	\$ 0.18	\$ 0.17	\$ 4.28
7/4/2013	8/2/2013	13046	48	2,809.85	1,217.90	1,181.03	410.92	2398.93	\$ 0.22	\$ 0.18	\$ 8.56
8/3/2013	9/3/2013	15619	48	2,958.53	1,410.40	1,342.67	205.46	2753.07	\$ 0.19	\$ 0.18	\$ 4.28
9/4/2013	10/2/2013	18934	51.2	2,932.01	1,709.74	1,003.11	219.16	2712.85	\$ 0.15	\$ 0.14	\$ 4.28
10/3/2013	10/31/2013	19214	48.8	2,961.85	1,735.02	1,017.94	208.89	2752.96	\$ 0.15	\$ 0.14	\$ 4.28
11/1/2013	12/3/2013	23810	52	3,556.21	2,150.04	1,183.58	222.59	3333.62	\$ 0.15	\$ 0.14	\$ 4.28
12/4/2013	1/3/2014	22310	54.4	2,798.34	1,437.58	1,127.91	232.85	2565.49	\$ 0.13	\$ 0.11	\$ 4.28
1/4/2014	2/5/2014	24071	55.2	2,998.83	1,610.95	1,151.60	236.28	2762.55	\$ 0.12	\$ 0.11	\$ 4.28

Ridge Street	Start Date	End Date	Months
735 Ridge St. , 07104	6/4/2011	2/5/2014	32
Account Number 2147483647			
Meter Number 9196559			

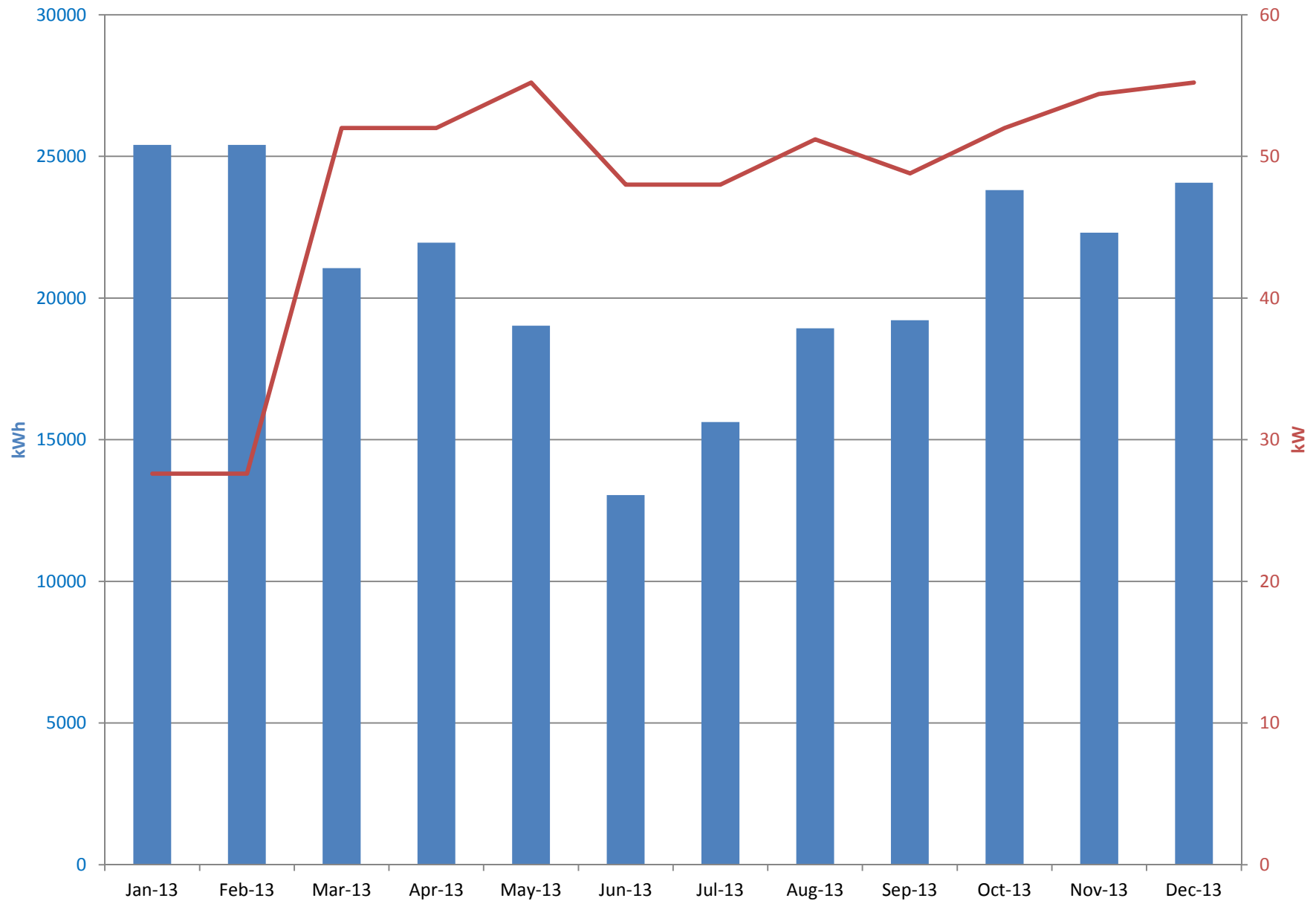
### ELECTRIC USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING:

2/5/2014

Total Usage	249,835	kwh
Total Charges	\$37,730	
Blended Rate	\$0.15	\$/kWh
Consumption Rate	\$0.14	\$/kWh
Demand Rate	\$5.64	\$/kW
Max Demand	55.2	kW
Min Demand	27.6	kW
Avg Demand	47.7	kW



## Ridge Street - Electric Usage - Meter No.: 9196559



## Ridge Street - Natural Gas Usage (1)

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	\$/therm
63	Ridge Street	6710589609	1616350	1/5/2012	2/2/2012	618.4	625.58	1.01
63	Ridge Street	6710589609	1616350	2/3/2012	3/7/2012	789.83	746.85	0.95
63	Ridge Street	6710589609	1616350	3/8/2012	8/2/2012	356	341.88	0.96
63	Ridge Street	6710589609	1616350	8/3/2012	8/30/2012	1.05	11.69	11.13
63	Ridge Street	6710589609	1616350	8/31/2012	12/3/2012	780.2	857.57	1.10
63	Ridge Street	6710589609	1616350	12/4/2012	1/3/2013	544.11	593.04	1.09
63	Ridge Street	6710589609	1616350	1/4/2013	2/1/2013	583.14	613.17	1.05
63	Ridge Street	6710589609	1616350	2/2/2013	3/5/2013	966.85	1,017.50	1.05
63	Ridge Street	6710589609	1616350	3/6/2013	4/4/2013	389.42	373.48	0.96
63	Ridge Street	6710589609	1616350	4/5/2013	5/3/2013	117.65	125.24	1.06
63	Ridge Street	6710589609	1616350	5/4/2013	6/5/2013	30.55	41.42	1.36
63	Ridge Street	6710589609	1616350	6/6/2013	7/3/2013	15.81	26.83	1.70
63	Ridge Street	6710589609	1616350	7/4/2013	8/2/2013	1.06	12.23	11.54
63	Ridge Street	6710589609	1616350	8/3/2013	9/3/2013	1.07	12.25	11.45
63	Ridge Street	6710589609	1616350	9/4/2013	10/1/2013	345.27	326.42	0.95
63	Ridge Street	6710589609	1616350	10/2/2013	10/31/2013	90.6	102.33	1.13
63	Ridge Street	6710589609	1616350	11/1/2013	12/3/2013	675.36	691.09	1.02
63	Ridge Street	6710589609	1616350	12/4/2013	1/3/2014	681.71	724.77	1.06

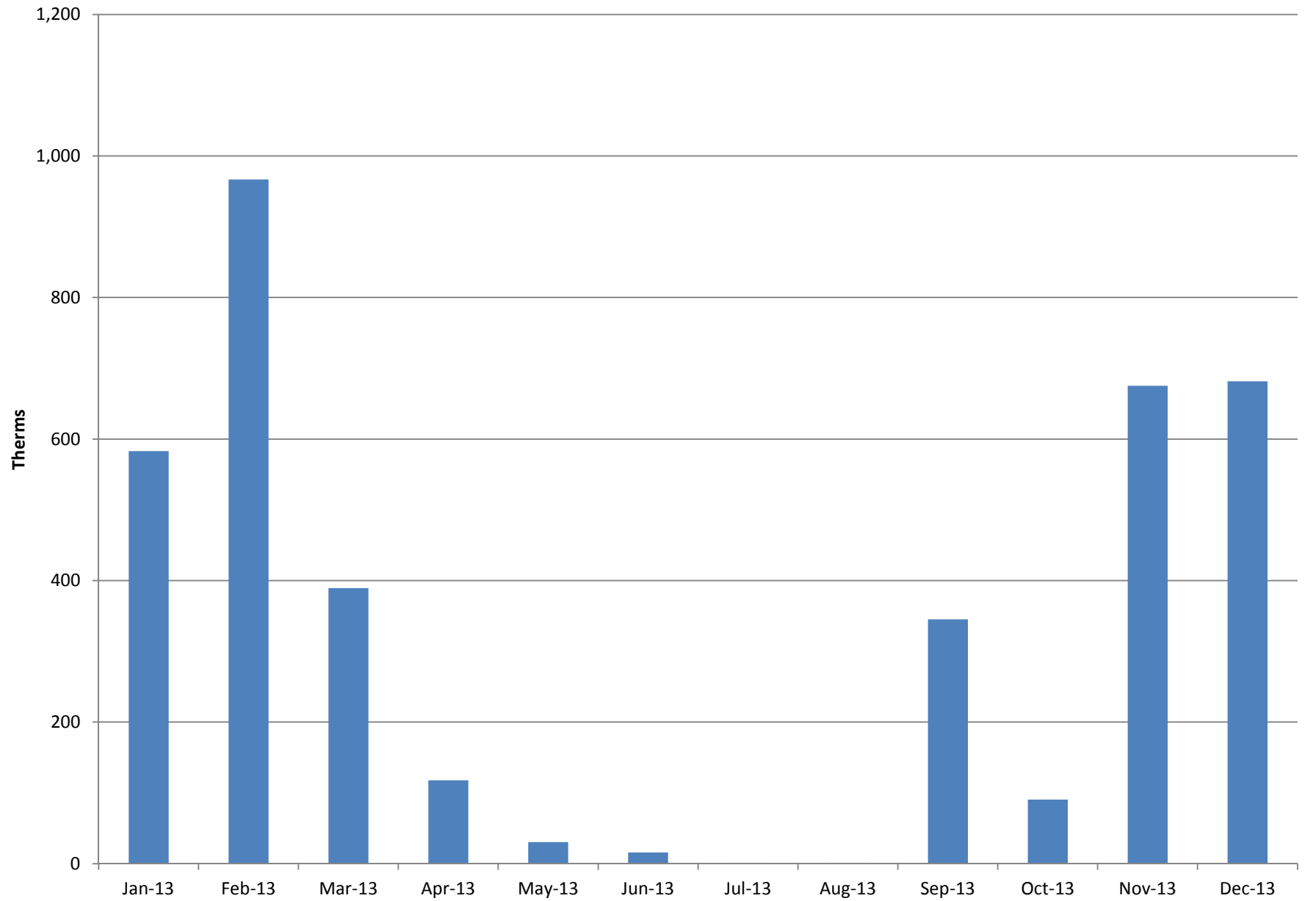
Ridge Street		Start Date	End Date	# Months
Account Number	6710589609	1/5/2012	1/3/2014	23
Meter Number	1616350			

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

1/3/2014

Annual Usage	3,898	Therms
Annual Cost	\$4,067	
Rate	\$1.04	\$/Therm

### Ridge Street- Natural Gas Usage - Meter No.: 1616350



## Ridge Street - Natural Gas Usage (2)

Index No	Current Name	Acct	Meter	Start Date	End Date	Therms	Total Charge	\$/therm
63	Ridge Street	6714365004	1619686	6/4/2012	6/4/2012	2,437.52	2,346.98	0.96
63	Ridge Street	6714365004	1619686	6/5/2012	7/3/2012	154.57	139.08	0.90
63	Ridge Street	6714365004	1619686	7/4/2012	8/2/2012	130.26	123.63	0.95
63	Ridge Street	6714365004	1619686	8/3/2012	8/30/2012	129.08	125.74	0.97
63	Ridge Street	6714365004	1619686	8/31/2012	12/3/2012	652.82	639.92	0.98
63	Ridge Street	6714365004	1619686	12/4/2012	1/3/2013	279.98	290.47	1.04
63	Ridge Street	6714365004	1619686	1/4/2013	2/1/2013	273.12	274.5	1.01
63	Ridge Street	6714365004	1619686	2/2/2013	3/4/2013	228.20	225.89	0.99
63	Ridge Street	6714365004	1619686	3/5/2013	4/4/2013	228.20	225.89	0.99
63	Ridge Street	6714365004	1619686	4/5/2013	5/3/2013	200.64	205.61	1.02
63	Ridge Street	6714365004	1619686	5/4/2013	6/5/2013	232.82	240.97	1.04
63	Ridge Street	6714365004	1619686	6/6/2013	7/2/2013	67.82	76.305	1.13
63	Ridge Street	6714365004	1619686	7/3/2013	8/2/2013	67.82	76.305	1.13
63	Ridge Street	6714365004	1619686	8/3/2013	9/3/2013	25.55	543.72	21.28
63	Ridge Street	6714365004	1619686	9/4/2013	10/1/2013	166.24	688	4.14
63	Ridge Street	6714365004	1619686	10/2/2013	10/31/2013	2.11	548.93	260.16
63	Ridge Street	6714365004	1619686	11/1/2013	12/3/2013	227.59	817.92	3.59
63	Ridge Street	6714365004	1619686	12/4/2013	1/3/2014	280.52	876.77	3.13

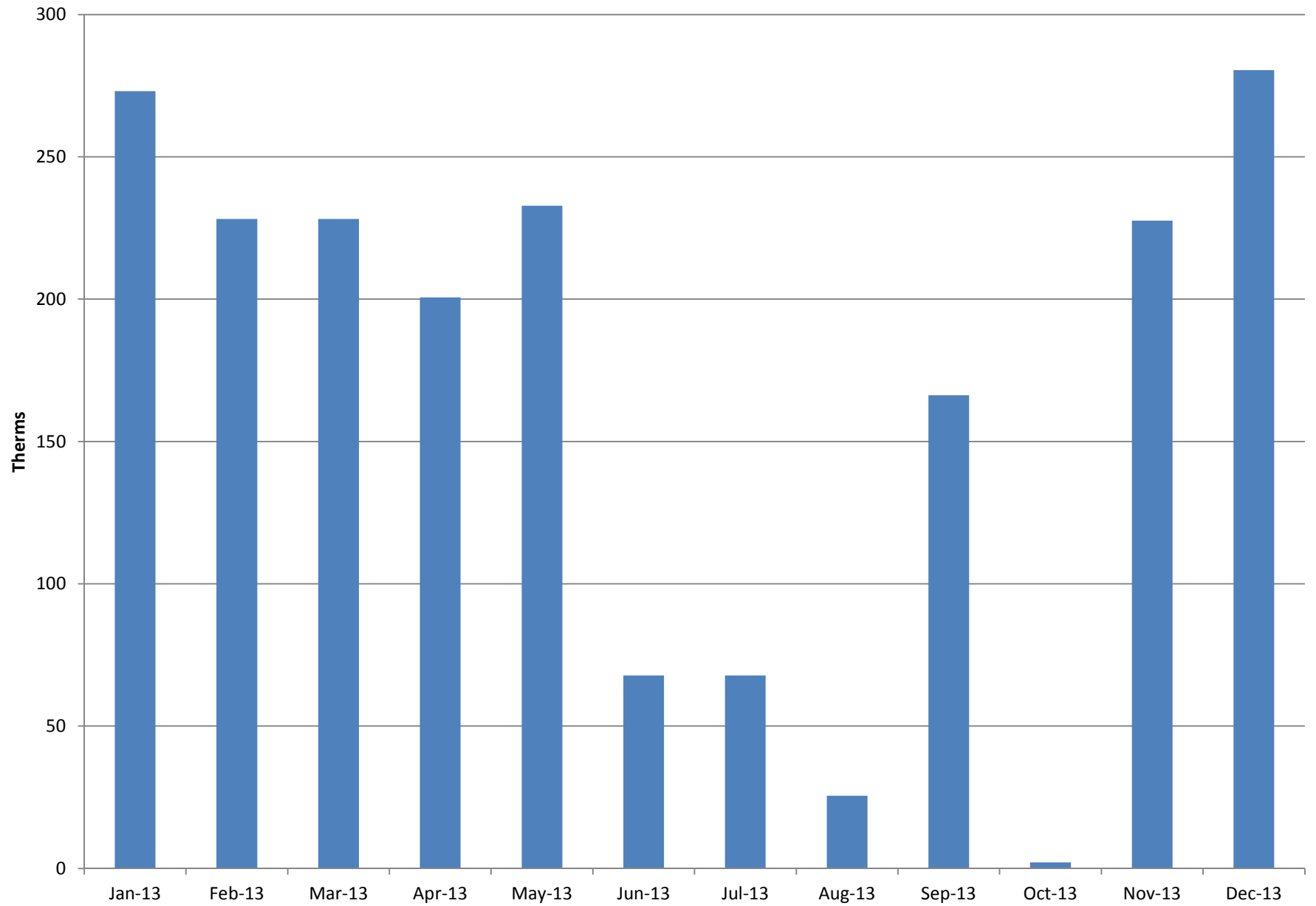
Ridge Street		Start Date	End Date	# Months
Account Number	6714365004	6/4/2012	1/3/2014	18
Meter Number	1619686			

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

1/3/2014

Annual Usage	2,001	Therms
Annual Cost	\$4,801	
Rate	\$2.40	\$/Therm

### Ridge Street- Natural Gas Usage - Meter No.: 1619686



## Ridge Street - Fuel Oil Usage

Index No	Current Name	Address NJIT PSS	Ticket Number	Delivery Date	Gallons	Delivery \$	\$/Gallon
63	Ridge Street	735 Ridge St. , 07104	74762681	11/30/2011	361	1,130.00	3.13
63	Ridge Street	735 Ridge St. , 07104	74762761	12/2/2011	225	692	3.08
63	Ridge Street	735 Ridge St. , 07104	74763178	12/6/2011	96	298	3.10
63	Ridge Street	735 Ridge St. , 07104	74763525	12/9/2011	229	694	3.03
63	Ridge Street	735 Ridge St. , 07104	74764084	12/12/2011	229	692	3.02
63	Ridge Street	735 Ridge St. , 07104	74764083	12/14/2011	224	678	3.03
63	Ridge Street	735 Ridge St. , 07104	74764679	12/16/2011	138	403	2.92
63	Ridge Street	735 Ridge St. , 07104	74764679	12/19/2011	347	1,013.00	2.92
63	Ridge Street	735 Ridge St. , 07104	74764777	12/21/2011	173	515	2.98
63	Ridge Street	735 Ridge St. , 07104	74765663	12/23/2011	57	170	2.98
63	Ridge Street	735 Ridge St. , 07104	74765664	12/28/2011	44	131	2.98
63	Ridge Street	735 Ridge St. , 07104	74766407	1/3/2012	570	1,749.00	3.07
63	Ridge Street	735 Ridge St. , 07104	74766636	1/5/2012	500	1,623.00	3.25
63	Ridge Street	735 Ridge St. , 07104	74767206	1/6/2012	232	745	3.21
63	Ridge Street	735 Ridge St. , 07104	74767205	1/9/2012	134	434	3.24
63	Ridge Street	735 Ridge St. , 07104	74767287	1/11/2012	164	536	3.27
63	Ridge Street	735 Ridge St. , 07104	74767493	1/13/2012	264	846	3.20
63	Ridge Street	735 Ridge St. , 07104	74768838	1/17/2012	412	1,318.00	3.20
63	Ridge Street	735 Ridge St. , 07104	74768967	1/25/2012	226	718	3.18
63	Ridge Street	735 Ridge St. , 07104	74769608	2/1/2012	223	715	3.21
63	Ridge Street	735 Ridge St. , 07104	74769950	2/3/2012	160	514	3.21
63	Ridge Street	735 Ridge St. , 07104	74769131	2/6/2012	111	360	3.24
63	Ridge Street	735 Ridge St. , 07104	74769132	2/6/2012	177	572	3.23
63	Ridge Street	735 Ridge St. , 07104	74769610	2/6/2012	487	1,574.00	3.23
63	Ridge Street	735 Ridge St. , 07104	74769609	2/6/2012	362	1,168.00	3.23
63	Ridge Street	735 Ridge St. , 07104	74770892	2/6/2012	280	904	3.23
63	Ridge Street	735 Ridge St. , 07104	74771378	2/9/2012	302	1,010.00	3.34
63	Ridge Street	735 Ridge St. , 07104	74771268	2/13/2012	353	1,183.00	3.35
63	Ridge Street	735 Ridge St. , 07104	74771280	2/15/2012	236	784	3.32
63	Ridge Street	735 Ridge St. , 07104	74771689	2/17/2012	127	426	3.35
63	Ridge Street	735 Ridge St. , 07104	74772120	2/21/2012	137	458	3.34
63	Ridge Street	735 Ridge St. , 07104	74772483	2/24/2012	272	932	3.43
63	Ridge Street	735 Ridge St. , 07104	74772482	2/27/2012	302	1,043.00	3.45
63	Ridge Street	735 Ridge St. , 07104	74772803	2/29/2012	164	552	3.37
63	Ridge Street	735 Ridge St. , 07104	74773114	3/2/2012	256	885	3.46
63	Ridge Street	735 Ridge St. , 07104	74773389	3/5/2012	313	1,048.00	3.35
63	Ridge Street	735 Ridge St. , 07104	74773587	3/7/2012	187	620	3.32
63	Ridge Street	735 Ridge St. , 07104	74773665	3/9/2012	123	417	3.39
63	Ridge Street	735 Ridge St. , 07104	74774174	3/19/2012	60	206	3.43
63	Ridge Street	735 Ridge St. , 07104	74775164	3/30/2012	322	1,052.00	3.27
63	Ridge Street	735 Ridge St. , 07104	74775651	4/9/2012	255	841	3.30
63	Ridge Street	735 Ridge St. , 07104	74777165	4/24/2012	204	663	3.25
63	Ridge Street	735 Ridge St. , 07104	74787525	10/19/2012	959	3,223.00	3.36
63	Ridge Street	735 Ridge St. , 07104	74788559	10/26/2012	41	135	3.29
63	Ridge Street	735 Ridge St. , 07104	74789892	11/6/2012	292	967	3.31
63	Ridge Street	735 Ridge St. , 07104	74790388	11/9/2012	417	1,404.00	3.37
63	Ridge Street	735 Ridge St. , 07104	74791138	11/20/2012	626	2,179.00	3.48

## Ridge Street - Fuel Oil Usage

63 Ridge Street	735 Ridge St. , 07104	74791564	11/23/2012	159	547	3.44
63 Ridge Street	735 Ridge St. , 07104	74791118	11/27/2012	552	1,909.00	3.46
63 Ridge Street	735 Ridge St. , 07104	74791849	12/1/2012	521	1,691.00	3.25
63 Ridge Street	735 Ridge St. , 07104	74791850	12/3/2012	100	329	3.29
63 Ridge Street	735 Ridge St. , 07104	74792455	12/5/2012	61	196	3.21
63 Ridge Street	735 Ridge St. , 07104	74792456	12/10/2012	301	952	3.16
63 Ridge Street	735 Ridge St. , 07104	74792892	12/13/2012	250	803	3.21
63 Ridge Street	735 Ridge St. , 07104	74793553	12/17/2012	236	756	3.20
63 Ridge Street	735 Ridge St. , 07104	74793859	12/19/2012	160	515	3.22
63 Ridge Street	735 Ridge St. , 07104	74794050	12/21/2012	144	473	3.28
63 Ridge Street	735 Ridge St. , 07104	74795161	12/29/2012	247	809	3.28
63 Ridge Street	735 Ridge St. , 07104	74795528	1/2/2013	263	832	3.16
63 Ridge Street	735 Ridge St. , 07104	74795620	1/4/2013	595	1,880.00	3.16
63 Ridge Street	735 Ridge St. , 07104	74796087	1/7/2013	116	367	3.16
63 Ridge Street	735 Ridge St. , 07104	74795668	1/9/2013	199	632	3.18
63 Ridge Street	735 Ridge St. , 07104	74796921	1/11/2013	226	760	3.36
63 Ridge Street	735 Ridge St. , 07104	74796922	1/14/2013	64	211	3.30
63 Ridge Street	735 Ridge St. , 07104	74797059	1/16/2013	274	908	3.31
63 Ridge Street	735 Ridge St. , 07104	74798470	1/18/2013	284	941	3.31
63 Ridge Street	735 Ridge St. , 07104	74798614	1/22/2013	453	1,519.00	3.35
63 Ridge Street	735 Ridge St. , 07104	74798469	1/24/2013	634	2,147.00	3.39
63 Ridge Street	735 Ridge St. , 07104	74798471	1/25/2013	229	777	3.39
63 Ridge Street	735 Ridge St. , 07104	74799045	1/28/2013	637	2,144.00	3.37
63 Ridge Street	735 Ridge St. , 07104	74799015	1/30/2013	77	262	3.40
63 Ridge Street	735 Ridge St. , 07104	74799532	2/1/2013	235	814	3.46
63 Ridge Street	735 Ridge St. , 07104	74799687	2/4/2013	430	1,499.00	3.49
63 Ridge Street	735 Ridge St. , 07104	74800136	2/6/2013	401	1,411.00	3.52
63 Ridge Street	735 Ridge St. , 07104	74800504	2/8/2013	328	1,147.00	3.50
63 Ridge Street	735 Ridge St. , 07104	74800602	2/11/2013	538	1,908.00	3.55
63 Ridge Street	735 Ridge St. , 07104	74801067	2/13/2013	162	573	3.54
63 Ridge Street	735 Ridge St. , 07104	74801906	2/15/2013	249	877	3.52
63 Ridge Street	735 Ridge St. , 07104	74802016	2/19/2013	401	1,406.00	3.51
63 Ridge Street	735 Ridge St. , 07104	74802017	2/20/2013	165	575	3.48
63 Ridge Street	735 Ridge St. , 07104	74802158	2/22/2013	562	1,926.00	3.43
63 Ridge Street	735 Ridge St. , 07104	74802258	2/25/2013	100	345	3.45
63 Ridge Street	735 Ridge St. , 07104	74803183	3/1/2013	128	419	3.27
63 Ridge Street	735 Ridge St. , 07104	74803184	3/4/2013	111	382	3.44
63 Ridge Street	735 Ridge St. , 07104	74803185	3/4/2013	510	1,752.00	3.44
63 Ridge Street	735 Ridge St. , 07104	74803625	3/6/2013	426	1,391.00	3.27
63 Ridge Street	735 Ridge St. , 07104	74803849	3/8/2013	442	1,516.00	3.43
63 Ridge Street	735 Ridge St. , 07104	74803626	3/11/2013	352	1,172.00	3.33
63 Ridge Street	735 Ridge St. , 07104	74803950	3/11/2013	120	399	3.33
63 Ridge Street	735 Ridge St. , 07104	74804381	3/14/2013	253	821	3.25
63 Ridge Street	735 Ridge St. , 07104	74804800	3/18/2013	446	1,446.00	3.24
63 Ridge Street	735 Ridge St. , 07104	74805259	3/20/2013	347	1,095.00	3.16
63 Ridge Street	735 Ridge St. , 07104	74805547	3/22/2013	178	562	3.16
63 Ridge Street	735 Ridge St. , 07104	74805546	3/25/2013	202	640	3.17
63 Ridge Street	735 Ridge St. , 07104	74806238	3/28/2013	319	1,021.00	3.20

Ridge Street - Fuel Oil Usage

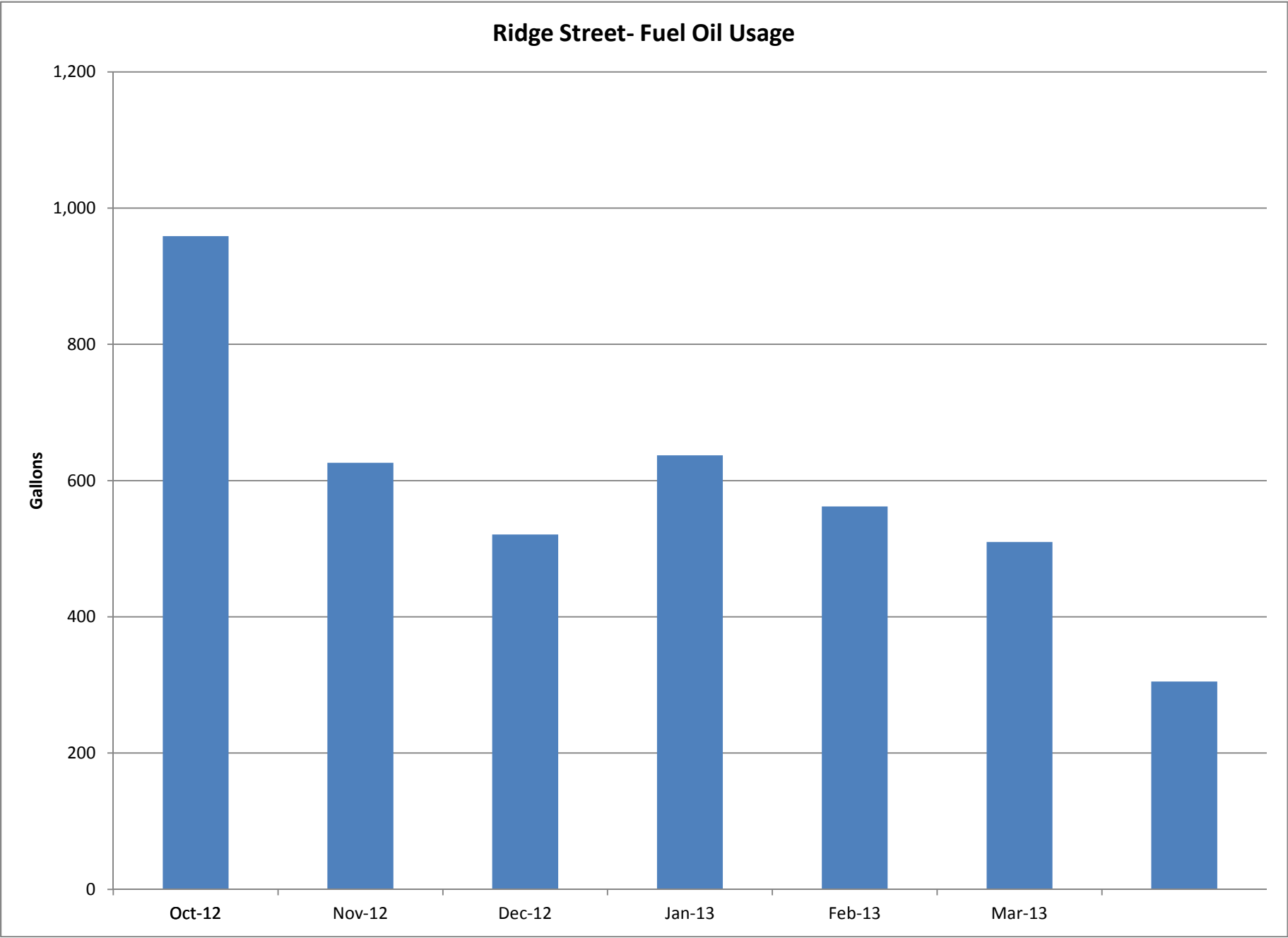
63 Ridge Street	735 Ridge St. , 07104	74806632	4/3/2013	305	992	3.25
63 Ridge Street	735 Ridge St. , 07104	74806838	4/5/2013	201	633	3.15
63 Ridge Street	735 Ridge St. , 07104	74806858	4/9/2013	27	86	3.19
63 Ridge Street	735 Ridge St. , 07104	74807456	4/17/2013	215	629	2.93
63 Ridge Street	735 Ridge St. , 07104	74807980	4/25/2013	234	713	3.05

Ridge Street	Start Date	End Date	# Months
Address 735 Ridge St. , 07104	11/30/2011	4/25/2013	16

FUEL OIL USAGE - MOST RECENT 12 MONTHS, PERIOD ENDING: 4/25/2013

Annual Usage	17,504	Gallons
Annual Cost	\$58,418	
Rate	\$3.34	\$/Gallon





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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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## **APPENDIX B**

### **Equipment Inventory**

Newark Schools  
CHA Project# 27999  
Ridge Street School

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)
B-1	1	Smith Cast Iron Boiler	28HE-11	28HE-11-132177	Gas fired Steam Boiler	2276 MBH / 82.9%	Boiler Room	School	2006	6
B-2	1	Smith Cast Iron Boiler	28HE-11	28HE-11-132178	Gas fired Steam Boiler	2276 MBH / 82.9%	Boiler Room	School	2006	6
CSR-1	1	Shipco	180LPD-X	61054	Condensate Return Pump	1.5 HP / 115/1/60	Boiler Room	School	2005	11
DHW Boiler	1	A.O. Smith	C19065	L 07 19865	Domestic Hot Water Boiler	526 lbs/hr	Boiler Room	School	2007	13
DHW-1	1	Ruud	RST-120-4	RL 0394G00438	Hot Water Heater	115 gallons	Boiler Room	School	1994	-1
DHW-2	1	Ruud	ST120A	R 0597G03846	Hot Water Heater	115 gallons	Boiler Room	School	2003	-1
DHW pump	2	B&G	HV BNFI	102213	Hot Water Pump	0.10 HP	Boiler Room	School	2005	11
RTU	8	Trane	----	----	Packaged RTU with gas heat and DX cooling	5.0 ton	Roof of temporary classrooms	School	2003	9
Exhaust fans	4	Loren Cook	----	----	Roof mounted centrifugal exhaust fan	Fractional HP	Roof	School	Varies	N/A
Window A/C	2	----	NA	NA	Air Conditioner	8-24000	Various classrooms	School	Varies	N/A

## **APPENDIX C**

### **ECM Calculations**



Newark Board of Education - NJBPU  
CHA Project Number: 27999

Rate of Discount (used for NPV) 3.8%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost						
\$	0.151	\$/kWh blended	0.000420205	50,231	Electric	\$	37,730	\$	4,067	\$	58,418
\$	0.137	\$/kWh supply	249,835								
\$	5.64	\$/kW	55.2								
\$	1.04	\$/Therm	26,748								
\$	7.55	\$/kgals	1,571								
\$	3.34	\$/Gal	17,504	0.01016882							

Ridge Street

Recommend? Y or N		Item	Savings					Cost	Simple Payback	Life Expectancy	Equivalent CO <sub>2</sub> (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR						
			kW	kWh	therms	No. 2 Oil gal	Water kgal								\$	kW	kWh	therms	kgal/yr				\$					
Y	ECM-1	Install Door Sweeps and Seals	0.0	0	357	0	0	373	\$	1,613	4.3	12	1.9	\$	-	N	4.3	0.0	0	4,286	0	\$	4,471	1.8	\$2,096	20.7%		
Y	ECM-2	Install Additional Attic Insulation	0.0	0	2,170	0	0	2,264	\$	19,500	8.6	15	11.6	\$	-	N	8.6	0.0	0	32,556	0	\$	33,961	0.7	\$7,529	7.9%		
Y	ECM-3	Heating Fuel Conversion (Fuel Switch)	0.0	0	(22,850)	17,504	0	34,582	\$	47,884	1.4	25	56	\$	-	N	1.4	0.0	0	(571,248)	0	\$	(595,901)	(13.4)	\$554,297	72.2%		
N	ECM-4	Convert Steam System to Hot Water & Install High Efficiency	0.0	0	2,747	0	0	2,865	\$	2,312,874	807.2	30	14.7	\$	6,000	N	805.1	0.0	0	82,406	0	\$	85,963	(1.0)	(\$2,250,711)	-14.7%		
Y	ECM-5	Install Window A/C Controller	0.0	2,146	0	0	0	324	\$	400	1.2	15	0.9	\$	-	N	1.2	0.0	32,195	0	0	\$	4,862	11.2	\$3,470	81.0%		
Y	ECM-6A	Install Basic Controls	0.0	0	8,471	0	0	8,837	\$	21,309	2.4	15	45.2	\$	-	N	2.4	0.0	0	127,067	0	\$	132,551	5.2	\$84,183	41.2%		
N	ECM-6B	Install Full DDC Controls	0.0	0	9,233	0	0	9,632	\$	215,714	22.4	15	49.3	\$	-	N	22.4	0.0	0	138,502	0	\$	144,479	(0.3)	(\$100,728)	-4.6%		
N	ECM-7	Replace Gas-Fired DHW Heater w/ Condensing Gas-Fired DHW	0.0	0	505	0	0	527	\$	16,535	31.4	15	2.7	\$	300	N	30.8	0.0	0	7,575	0	\$	7,902	(0.5)	(\$9,946)	-7.9%		
N	ECM-8	Low Flow Plumbing Fixtures	0.0	0	731	0	88	1,423	\$	127,967	89.9	25	3.9	\$	-	N	89.9	0.0	0	18,274	2,188	\$	35,585	(0.7)	(\$103,181)	-8.1%		
N	ECM-L1	Lighting Replacements / Upgrades	12.0	31,401	0	0	0	5,097	\$	72,324	14.2	10	13.2	\$	2,000	N	13.8	119.7	314,012	0	0	\$	55,531	(0.2)	(\$26,844)	-5.5%		
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	9,484	0	0	0	1,295	\$	4,232	3.3	10	4.0	\$	660	N	2.8	0.0	94,842	0	0	\$	14,323	2.4	\$7,471	34.3%		
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	12.0	36,477	0	0	0	5,790	\$	76,556	13.2	10	15.3	\$	2,660	N	12.8	119.7	364,774	0	0	\$	63,197	(0.2)	(\$24,506)	-4.2%		
Total (Does Not Include ECM-5B, ECM-L1 & ECM-L2)			12.0	38,624	(7,668)	17,504	88	\$	56,985	\$	2,624,438	46.1	18.0	152	\$	8,960		45.9	120	396,968	(299,083)	2,188	\$	(227,408)	(1.1)	(\$1,831,931)	-8.4%	
Recommended Measures (highlighted green above)			12.0	38,624	(11,851)	17,504	0	\$	52,170	\$	167,262	3.2	15.3	131	\$	2,660		0	3.2	120	396,968	(407,339)	-	\$	(356,858)	(3.1)	\$458,194	31.2%
% of Existing			22%	15%	-44%	100%	0%																					

City:		Newark, NJ				
Occupied Hours/Week		70	70	70	70	50
Temp	Enthalpy h (Btu/lb)	Building		Gymnasium		Classrooms
		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	39.0	131	55	55	55	39
82.5	33.0	500	208	208	208	149
77.5	31.5	620	258	258	258	185
72.5	29.9	664	277	277	277	198
67.5	27.2	854	356	356	356	254
62.5	24.0	927	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	324	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	0	0	0	0
-2.5						
-7.5						

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

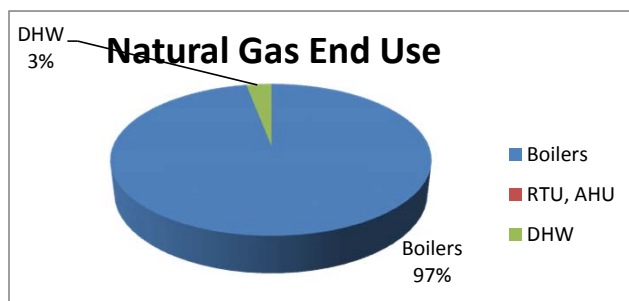
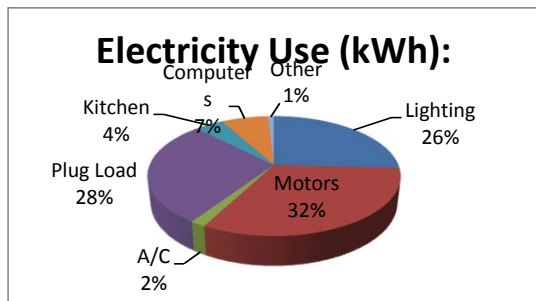
Heating	
Hours	4,427 Hrs
Weighted Avg	40 F
Avg	28 F
Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	78 F

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Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
249,835	Total	Based on utility analysis
64,319	Lighting	From Lighting Calculations
80,000	Motors	Estimated
4,170	A/C	See Window AC Calculation
70,323	Plug Load	Estimated
10,800	Kitchen	Estimated
18,000	Computers	Estimated
2,223	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
26,748	Total	Based on utility analysis
25,944	Boilers	Therms/SF x Square Feet Served
	RTU, AHU	Based on utility analysis
804	DHW	Based on utility analysis

0.257445914  
0.320211339  
0.016690321  
0.281479376  
0.043228531  
0.072047551  
0.008896966

0.969941678  
0  
0.030058322



Newark Board of Education - NJBPU  
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Ridge Street

ECM-1: • Install Door Sweeps and Seals

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

Heating System Efficiency	80%	Ex Occupied Clng Temp.	80 °F	Ex Occupied Htg Temp.	80 °F
Cooling System Efficiency	1.20 kW/ton	Ex Unoccupied Clng Temp.	85 °F	Ex Unoccupied Htg Temp.	68 °F
Linear Feet of Door Edge	140 LF	Cooling Occ Enthalpy Setpoint	31.4 Btu/lb	Electricity	\$ 0.15 \$/kWh
Existing Infiltration Factor*	1.5 cfm/LF	Cooling Unocc Enthalpy Setpoint	34.8 Btu/lb	Natural Gas	\$ 1.04 \$/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
102.5	0.0	0	0	0	29,673	32,886	8,902	9,866	0	0	0	0
97.5	35.4	6	3	4	-3,787	-574	-1,136	-172	1	0	0	0
92.5	37.4	31	13	18	-5,672	-2,459	-1,702	-738	12	4	0	0
87.5	35.0	131	55	76	-3,388	-175	-1,016	-52	20	6	0	0
82.5	33.0	500	208	292	-1,556	0	-467	0	32	10	0	0
77.5	31.5	620	258	362	567	0	170	0	0	0	2	1
72.5	29.9	664	277	387	1,701	0	510	0	0	0	6	2
67.5	27.2	864	356	498	2,835	113	851	34	0	0	13	4
62.5	24.0	927	386	541	3,969	1,247	1,191	374	0	0	28	8
57.5	20.3	600	250	350	5,103	2,381	1,531	714	0	0	26	8
52.5	18.2	730	304	426	6,237	3,515	1,871	1,055	0	0	42	13
47.5	16.0	491	205	286	7,371	4,649	2,211	1,395	0	0	35	11
42.5	14.5	656	273	383	8,505	5,783	2,552	1,735	0	0	57	17
37.5	12.5	1,023	426	597	9,639	6,917	2,892	2,075	0	0	103	31
32.5	10.5	734	306	428	10,773	8,051	3,232	2,415	0	0	84	25
27.5	8.7	334	139	195	11,907	9,185	3,572	2,756	0	0	43	13
22.5	7.0	252	105	147	13,041	10,319	3,912	3,096	0	0	36	11
17.5	5.4	125	52	73	14,175	11,453	4,253	3,436	0	0	20	6
12.5	3.7	47	20	27	15,309	12,587	4,593	3,776	0	0	8	2
7.5	2.1	34	14	20	16,443	13,721	4,933	4,116	0	0	6	2
2.5	1.3	1	0	1	17,577	14,855	5,273	4,457	0	0	0	0
-2.5	0.0	0	0	0	18,711	15,989	5,613	4,797	0	0	0	0
-7.5	0.0	0	0	0	19,845	17,123	5,954	5,137	0	0	0	0
TOTALS		8,760	3,650	5,110					65	20	510	153

Existing Door Infiltration	210 cfm	Savings	357 therms	\$ 373
Existing Unoccupied Door Infiltration	210 cfm		0 kWh	\$ -
Proposed Door Infiltration	63 cfm			\$ 373
Proposed Unoccupied Door Infiltration	63 cfm			

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap (in)	gap location	LF of gap	% door w/ gap	Average gap for door (in)
1a	3	7	20	0.125	bottom/seam	20	100%	0.125
1b	3	7	20	0.125	bottom/seam	20	100%	0.125
2	3	7	20	0.125	bottom	20	100%	0.125
3	3	7	20	0.125	bottom	20	100%	0.125
4	3	7	20	0.125	bottom	20	100%	0.125
5	3	7	20	0.125	bottom	20	100%	0.125
6	3	7	20	0.125	bottom	20	100%	0.125
Total	21	49	140	0.125		140	100%	0.125

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

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

**ECM-1: • Install Door Sweeps and Seals - Cost**

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Door Weatherization Seals & Sweeps	7	EA	\$ 40	\$ 115	\$ -	\$ 288	\$ 1,003	\$ -	\$ 1,291	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

\$ 1,291	Subtotal
\$ 323	25% Contingency
<b>\$ 1,613</b>	<b>Total</b>

Newark Board of Education - NJBPU

CHA Project Number: 27999

Ridge Street

ECM-2 Install Additional Attic 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	15,000 SF	Cooling System Efficiency	0 kW/ton	Heating System Efficiency	80%
Existing Infiltration Factor	0.05 cfm/SF	Ex Occupied Cng Temp.	72 °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	31.4 Btu/lb	Ex Unoccupied Htg Temp.	68 °F
Proposed U Value	0.033 Btuh/SF°F	Cooling Unocc Enthalpy Setpoint	34.8 Btu/lb	Cooling Electricity	\$ 0.151 \$/kWh
				Natural Gas Cost	\$ 1.04 \$/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 therms
A		B	C	D	E	F	G	H	I	J	K	L
97.5	35.4	6	3	4	-42,594	-16,299	-18,160	-7,070	0	0	0	0
92.5	37.4	31	13	18	-43,627	-17,332	-18,353	-7,263	0	0	0	0
87.5	35.0	131	55	76	-29,768	-3,473	-12,589	-1,499	0	0	0	0
82.5	33.0	500	208	292	-17,529	0	-7,474	0	0	0	0	0
77.5	31.5	620	258	362	-6,769	0	-2,950	0	0	0	0	0
72.5	29.9	664	277	387	4,472	0	1,767	0	0	0	15	6
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	53,625	30,225	22,660	12,772	0	0	365	154
47.5	16.0	491	205	286	63,375	39,975	26,780	16,892	0	0	305	129
42.5	14.5	656	273	383	73,125	49,725	30,900	21,012	0	0	488	206
37.5	12.5	1,023	426	597	82,875	59,475	35,020	25,132	0	0	885	374
32.5	10.5	734	306	428	92,625	69,225	39,140	29,252	0	0	725	306
27.5	8.7	334	139	195	102,375	78,975	43,260	33,372	0	0	370	157
22.5	7.0	252	105	147	112,125	88,725	47,380	37,492	0	0	310	131
17.5	5.4	125	52	73	121,875	98,475	51,500	41,612	0	0	169	71
12.5	3.7	47	20	27	131,625	108,225	55,620	45,732	0	0	69	29
7.5	2.1	34	14	20	141,375	117,975	59,740	49,852	0	0	54	23
2.5	1.3	1	0	1	151,125	127,725	63,860	53,972	0	0	2	1
TOTALS		8,760	3,650	5,110					0	0	3,758	1,588

Existing Ceiling Infiltration	750 cfm
Existing Ceiling Heat Transfer	1,140 Btuh/°F
Proposed Ceiling Infiltration	300 cfm
Proposed Ceiling Heat Transfer	500 Btuh/°F

Savings	2,170 therms	\$ 2,264
	0 kWh	\$ -
		\$ 2,264

Newark Board of Education - NJBPU  
CHA Project #27999  
Wilson Avenue

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

**ECM-2 Install Additional Attic Insulation - Cost**

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Blown-In Attic Insulation (9" thick)	15,000	SF	\$ 0.470	\$ 0.330	\$ 0.130	\$ 7,240	\$ 6,168	\$ 2,192	\$ 15,600	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 15,600	Subtotal
\$ 3,900	25% Contingency
\$ 19,500	Total

**Newark Board of Education - NJBPU**  
**CHA Project #27999**  
**Ridge Street**

**ECM-3: Heating Fuel Conversion (Fuel Switch)**

Description : This building was converted from No 2 fuel oil to natural gas in 2013 . This calculation converts the cost savings and 5% increase in burner efficiency

**Existing Fuel**

#2 Oil ▼

**Proposed Fuel**

Nat.Gas ▼

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 3.34	/ Gal #2	Based on Utility Analysis
Proposed Fuel Cost	\$ 1.04	/ Therm	Based on Utility Analysis
Baseline Fuel Use	17,504	Gals #2	Based on historical utility data
Existing Boiler Plant Efficiency	80%		Estimated or Measured
Baseline Boiler Load	1,942,244	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 138.7 Mbtu/Gals #2
Baseline Fuel Cost	\$ 58,418		
Proposed Boiler Plant Efficiency	85%		New Burner Efficiency
Proposed Fuel Use	22,850	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	\$ 23,836		
Calculated Gas Penalty	(22,850)	Therms	Baseline Case Usage
Estimated Annual Savings	17,504	Gals #2	

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

Newark Board of Education - NJBPU

CHA Project Number: 27999

Ridge Street

**ECM-3: Heating Fuel Conversion (Fuel Switch) - Cost**

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
8,000 MBH Replacement NG Burner	2	EA	\$ 10,000	\$ 1,400		\$ 20,540	\$ 3,489	\$ -	\$ 24,029	RS Means 2012
Boiler Controllers	1	EA	\$ 5,500	\$ 1,000		\$ 5,649	\$ 1,246	\$ -	\$ 6,895	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 500	\$ 250		\$ 514	\$ 312	\$ -	\$ 825	RS Means 2012
Natural Gas Piping	150	LF	\$ 32.5	\$ 6.5	\$ 2.0	\$ 5,007	\$ 1,215	\$ 337	\$ 6,559	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

\$ 38,307	Subtotal
\$ 9,577	25% Contingency
<b>\$ 47,884</b>	<b>Total</b>



**Newark Board of Education - NJBPU**  
**CHA Project Number: 27999**  
**Ridge Street**

**ECM-4: Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers**

Description: This ECM evaluates the replacement of an existing steam boiler with high efficiency condensing gas boiler. The existing boiler efficiency is 80% (per NJBPU protocols) and the proposed boiler efficiency is 90% (average seasonal efficiency). Electrical power consumption due to pumps is considered to be the same for both the proposed system and the baseline system. The natural gas usage on the property does not correspond to boiler operation, and a previous year's fuel oil usage was considered to develop a baseline case.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 1.04	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	2,776,000	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	75	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	2,776,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	2,747	Therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 2,865		

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<sub>Bi</sub> = Total input capacity of the baseline furnace, boiler or heater in Btu/hour

CAPY<sub>Qi</sub> = Total input capacity of the qualifying furnace, boiler or heater in Btu/hour

HDD<sub>mod</sub> = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

HC<sub>fuel</sub> = 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<sub>Q</sub> = Efficiency of qualifying heater(s) (AFUE %)

EFF<sub>B</sub> = Efficiency of baseline heaters (AFUE %)

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

### 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
$\Delta T$	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](http://www.spaceray.com/1_space-ray_faqs.php)

### Adjusted Heating Degree Days by Building Type

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

### Heating Degree Days and Outdoor Design Temperature by Zone

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

Newark Board of Education - NJBPU

CHA Project Number: 27999

Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4: Convert Steam System to Hot Water & Install High Efficiency Condensing Boilers - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Aerco BMK3000 w/ condensate neutralizer	2	EA	\$ 47,500	\$ 9,125		\$ 97,565	\$ 22,740	\$ -	\$ 120,305	Vendor Estimate
Flue Installation	25	LF	\$ 75.0	\$ 15.00		\$ 1,926	\$ 467	\$ -	\$ 2,393	Vendor Estimate
Reprogram DDC system	2	EA	\$ 100.0	\$ 350.00		\$ 205	\$ 872	\$ -	\$ 1,078	RS Means 2012
Miscellaneous Electrical	2	LS	\$ 500	\$ 250		\$ 1,027	\$ 623	\$ -	\$ 1,650	RS Means 2012
Miscellaneous HW Piping	2	LS	\$ 2,000	\$ 1,000		\$ 4,108	\$ 2,492	\$ -	\$ 6,600	RS Means 2012
ACS Boiler Controller (if more than one boiler)	1	EA	\$ 3,000	\$ -	\$ -	\$ 3,081	\$ -	\$ -	\$ 3,081	Vendor Quote (labor included)
Boiler Valve Controller (if more than one boiler)	1	EA	\$ 2,500	\$ -	\$ -	\$ 2,568	\$ -	\$ -	\$ 2,568	Vendor Quote (labor included)
Hydronic Heating System (piping, radiator & UVs)	50,231	SF	\$ 15	\$ 15		\$ 773,809	\$ 938,817	\$ -	\$ 1,712,626	RS Means 2012 Square Foot
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 1,850,299	Subtotal
\$ 462,575	25% Contingency
<b>\$ 2,312,874</b>	<b>Total</b>

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

EQUIPMENT	AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)
Window ACs	Main Office	24,000
Window ACs	Main Office	24,000

Total btu/h of all window A/C Units: 48,000 btu/h

**ECM-5: Install 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	\$0.151 / 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	48,000 Btu / Hr	Total BTU/hr of DX cooling equipment to be replaced.
Average EER	10.7	
Existing Annual Electric Usage	4,170 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	2,024	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	2,146 kWh
Annual Cost Savings	\$324
Total Project Cost	\$400
Simple Payback	1 years

OAT - DB Bin Temp F	Annual Hours	Existing Hours of Operation	Proposed % of time of operation	Proposed hrs of Operation
102.5	0	0	100%	0
97.5	6	3	89%	3
92.5	31	15	79%	12
87.5	131	62	68%	43
82.5	500	238	58%	138
77.5	620	295	47%	140
72.5	664	316	37%	116
67.5	854	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

<b>Total</b>	8,760	930	49%	451
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Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-5: Install Window A/C Controller - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	\$ -	\$ -	\$ -	
Window AC Controller	2	EA	\$ 150	\$ -	\$ -	308.1	\$ -	\$ -	\$ 308	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 308	Subtotal
\$ 77	25% Contingency
\$ 400	Total

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

ECM-6A: Install 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	2,776,000	Btu/hr	Caph	Connected Heating Load Capacity	2,776,000	Btu/hr	
Equivalent Full Load Heating	900	hrs	EFLHh	Equivalent Full Load Heating Hours	500	hrs	
Heating Equipment Efficiency	80%		AFUEh	Heating Equipment Efficiency	80%		
Cooling				Cooling			
Cooling Season Facility Temp	-	F	Tc	Cooling Season Facility Temp	-	F	
Weekly Occupied Hours	-	hrs	H	Weekly Occupied Hours	-	hrs	
Cooling Season Setback Temp	-	F	Sc	Cooling Season Setback Temp	-	F	
Cooling Season % Savings per	-		Pc	Cooling Season % Savings per	-		
Connected Cooling Load	-	Tons	Capc	Connected Cooling Load Capacity	-	Tons	
Equivalent Full Load Cooling	-	hrs	EFLHc	Equivalent Full Load Cooling Hours	-	hrs	
Cooling Equipment EER	-		AFUEc	Cooling Equipment EER	-		
No Significant Cooling in Bldg				No Significant Cooling in Bldg			
SAVINGS				SAVINGS			
Natural Gas Savings	4,149	Therms <sup>3</sup>		Natural Gas Savings	4,322	Therms <sup>3</sup>	
Cooling Electricity Savings	0	kWh		Cooling Electricity Savings	0	kWh	

\$0.15 \$/kWh Blended \$1.04 \$/Therm	COMBINED SAVINGS		
	Natural Gas Savings	8,471	Therms
	Cooling Electricity Savings	0	kWh
	Total Cost Savings	\$ 8,837	
	Estimated Total Project Cost	\$ 21,309	
	Simple Payback	2.4	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



Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-6A: Install Basic Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Boiler Controller	1	ea	\$ 7,500	\$ 7,500		\$ 7,703	\$ 9,345	\$ -	\$ 17,048	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

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

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

**ECM-6B: 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:**

50,231	Sq Footage	\$0.15 \$/kWh Blended
N	Cooling	\$1.04 \$/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	2,776,000	Btu/hr
Equivalent Full Load Heating Hours	900	hrs
Heating System Efficiency	80%	
Cooling		
Cooling Season Facility Temp		F
Weekly Occupied Hours		hrs
Cooling Season Setback Temp		F
Cooling Season % Savings per Degree Setback		
Connected Cooling Load Capacity		Tons
Equivalent Full Load Cooling Hours		hrs
Cooling Equipment EER		
No Significant Cooling		
SAVINGS		
Natural Gas Savings	4,149	Therms
Cooling Electricity Savings	0	kWh

**FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION**

EXISTING CONDITIONS		
Existing Facility Total Electric usage	249,835	kWh
Existing Facility Total Gas usage	26,748	Therms
Existing Facility Cooling Electric usage	-	kWh <sup>1</sup>
Existing Facility Heating Natural Gas usage	25,411	Therms <sup>2</sup>
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	0	kWh
Proposed Facility Natural Gas Savings	762	Therms
SAVINGS		
Electric Savings	0	kWh
Natural Gas Savings	762	Therms

Assumptions

- 0% of facility total electricity dedicated to Cooling; based on utility information
- 95% of facility total natural gas dedicated to Heating; based on utility information
- 3% 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	2,776,000	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	80%	
Cooling		
Cooling Season Facility Temp	-	F
Weekly Occupied Hours	-	hrs
Cooling Season Setback Temp	-	F
Cooling Season % Savings per Degree Setback		
Connected Cooling Load Capacity	-	Tons
Equivalent Full Load Cooling Hours	-	hrs
Cooling Equipment EER	-	
No Significant Cooling in Bldg		
SAVINGS		
Natural Gas Savings	4,322	Therms <sup>3</sup>
Cooling Electricity Savings	0	kWh

COMBINED SAVINGS

Natural Gas Savings	9,233	Therms
Cooling Electricity Savings	0	kWh
Total Cost Savings	\$ 9,632	
Estimated Total Project Cost	\$ 215,714	
Simple Payback	22.4	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: 27999  
Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-6B: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Unit Ventilator Controls	0	ea		\$ 4,000		\$ -	\$ -	\$ -	\$ -	Vendor Quote
Radiator Control (Group of 4)	20	ea		\$ 4,500		\$ -	\$ 112,140	\$ -	\$ 112,140	Vendor Quote
Exhaust Fan Control (Group of 4)	5	ea		\$ 3,300		\$ -	\$ 20,559	\$ -	\$ 20,559	Vendor Quote
Head End Controller & Programming	1	ls		\$ 32,000		\$ -	\$ 39,872	\$ -	\$ 39,872	Vendor Quote
New Unit Ventilator	0	ea	\$ 5,000	\$ 4,000		\$ -	\$ -	\$ -	\$ -	Engineering Estimate
New Exhaust Fan	0	ea	\$ 1,525	\$ 239		\$ -	\$ -	\$ -	\$ -	RS Means 2012
New Radiator	0	lf	\$ 43	\$ 21		\$ -	\$ -	\$ -	\$ -	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 172,571	Subtotal
\$ 43,143	25% Contingency
\$ 215,714	Total

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

**ECM-7: Replace Gas-Fired DHW Heater w/ 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 condensing water heater.

<u>Item</u>	<u>Value</u>	<u>Units</u>	<u>Formula/Comments</u>
Avg. Monthly Utility Demand by Water Heater	167	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	200,400	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	78%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	156,312	MBTU/yr	
Existing Tank Size	230	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)	3.3	MBH	
Annual Standby Hot Water Load	29,164	MBTU/yr	
New Tank Size	130	Gallons	Based on A.O. 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)	1.9	MBH	
Annual Standby Hot Water Load	16,754	MBTU/yr	
Total Annual Hot Water Demand	143,902	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on A.O. Smith Cyclone condensing DHW Heater
Proposed Fuel Use	1,499	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$1.04	\$/Therm	
Existing Operating Cost of DHW	\$2,090	\$/yr	
Proposed Operating Cost of DHW	\$1,564	\$/yr	

**Savings Summary:**

Utility	Energy Savings	Cost Savings
Therms/yr	505	\$527

Newark Board of Education - NJBPU

CHA Project Number: 27999

Ridge Street

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

**ECM-7: Replace Gas-Fired DHW Heater w/ Condensing Gas-Fired DHW Heater - Cost**

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Gas-Fired DHW Heater Removal	3	LS		\$ 50		\$ -	\$ 187	\$ -	\$ 187	RS Means 2012
High Efficiency Gas-Fired DHW Heater	1	EA	\$ 5,500	\$ 4,500		\$ 5,649	\$ 5,607	\$ -	\$ 11,256	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 300			\$ 308	\$ -	\$ -	\$ 308	RS Means 2012
Venting Kit	1	EA	\$ 450	\$ 650		\$ 462	\$ 810	\$ -	\$ 1,272	RS Means 2012
Miscellaneous Piping and Valves	1	LS	\$ 200			\$ 205	\$ -	\$ -	\$ 205	RS Means 2012

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

\$ 13,228	Subtotal
\$ 3,307	25% Contingency
<b>\$ 16,535</b>	<b>Total</b>

Newark Board of Education - NJBPU  
 CHA Project Number: 27999  
 Ridge Street

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Urinals in Building to be replaced	15	
Average Flushes / Urinal (per Day)	3	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	15	
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	41.06	kGal / year
Proposed Urinal Water Use	2.05	kGal / year
Water Savings	39.01	kGal / year
Cost Savings	\$295	/ year

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

Newark Board of Education - NJBPU  
CHA Project Number: 27999  
Ridge Street

**ECM-8: Replace toilets and flush valves with low flow**

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Toilets in Building	19	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	19	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	72.82	kGal / year
Proposed Toilet Water Use	26.63	kGal / year
Water Savings	46.19	kGal / year
Cost Savings	\$349	/ year

**Newark Board of Education - NJBPU**  
**CHA Project Number: 27999**  
**Ridge Street**

**ECM-8: Replace faucets with low flow**

Description; This ECM evaluates the water savings resulting from replacing/ upgrading faucets to 0.5 gallon per minute flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Faucets in Building	13	
Average Uses / Faucet (per day)	3	# Uses
Average Time of Use	10.0	seconds
Average Flowrate	2.5	gpm

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	13	
Proposed Flowrate	0.5	gpm

HEATING SAVINGS		
Fuel Cost	\$ 1.04	/Therm
Number of Faucets	13	
Hours per Day of Usage	0.5	hrs
Days per Year of Facility Usage	180	days
Average Flowrate	2.5	gpm
Proposed Flowrate	0.5	gpm
Heat Content of Water	8.33	Btu/gal/F
Temperature Difference (Intake and Output)	50	F
Water Heating Equipment Efficiency	80%	
Conversion Factor	100,000	Btu/Therm
SAVINGS		
Current Faucet Water Use	2.93	kGal / year
Proposed Faucet Water Use	0.59	kGal / year
Water Savings	2.34	kGal / year
Heating Savings	731	Therms
Cost Savings	\$780	/ year

Savings calculation formulas are taken from NJ Protocols document for Faucet

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



**Newark Board of Education - NJBPU**

**CHA Project Number: 27999**

**Ridge Street**

**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	15	EA	\$ 1,200	\$ 1,000	\$ -	\$ 18,486	\$ 18,690	\$ -	\$ 37,176	Vendor Estimate
Low-Flow Toilet	19	EA	\$ 1,400	\$ 1,000	\$ -	\$ 27,318	\$ 23,674	\$ -	\$ 50,992	Vendor Estimate
Low-Flow Faucet	13	EA	\$ 700	\$ 300	\$ -	\$ 9,346	\$ 4,859	\$ -	\$ 14,205	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 102,373	Subtotal
\$ 25,593	25% Contingency
<b>\$ 127,967</b>	<b>Total</b>

**Newark Board of Education - NJBPU**  
**CHA Project Number: 27999**  
**Ridge Street**

**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)	50,231
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)	\$37,730	\$4,067
Existing Usage (from utility)	249,835	26,748
Proposed Savings	38,624	10,999
Existing Total MMBtus	3,527	
Proposed Savings MMBtus	1,232	
% Energy Reduction	34.9%	
Proposed Annual Savings	\$17,588	

Fuel conversion not included

Fuel conversion not included

	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	\$2,512
Incentive #2	\$4,249	\$13,748	\$17,997
Incentive #3	\$4,249	\$13,748	\$17,997
Total All Incentives	\$8,497	\$27,497	\$38,506

Total Project Cost	\$119,379
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Fuel conversion not included

	Allowable Incentive	
% Incentives #1 of Utility Cost*	6.0%	\$2,512
% Incentives #2 of Project Cost**	15.1%	\$17,997
% Incentives #3 of Project Cost**	15.1%	\$17,997
Total Eligible Incentives***	\$38,506	
Project Cost w/ Incentives	\$80,873	

Project Payback (years)	
w/o Incentives	w/ Incentives
6.8	4.6

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

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

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

\*\*\* Maximum allowable amount of Incentive #1 is \$50,000 if not funded by NJ BPU, and \$25,000 if it is.

Maximum allowable amount of Incentive #2 & #3 is \$1 million per gas account and \$1 million per electric account; maximum 2 million per project

Cost of Electricity:

\$0.137	\$/kWh
\$5.64	\$/kW

			EXISTING CONDITIONS								Retrofit	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Retrofit	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
40LED	310 - Counselor's Office	Offices	3	T 32 R F 2 (ELE)	F42LL	60	0.18	SW	2000	360	OCC	
40LED	Classroom 301	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 302	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 303	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 304	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 305	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 306	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 307	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 308	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
40LED	Classroom 309	Classrooms	9	T 32 R F 2 (ELE)	F42LL	60	0.54	SW	2400	1,296	OCC	
20LED	3rd Floor Hallway	Hallways	15	S 32 C F 1 (ELE)	F41LL	32	0.48	Breaker	4420	2,122	None	
50LED	Boys' Bathroom	Restrooms	1	W 32 W P 2 (ELE)	F42LL	60	0.06	SW	2250	135	None	
50LED	Girls' Bathroom	Restrooms	1	W 32 W P 2 (ELE)	F42LL	60	0.06	SW	2250	135	None	
20LED	Ground Floor Hallway	Hallways	12	S 32 C F 1 (ELE)	F41LL	32	0.38	Breaker	4420	1,697	None	
20LED	105 - Parent Room	Staff Lounge	10	S 32 C F 1 (ELE)	F41LL	32	0.32	SW	2400	768	OCC	
40LED	Classroom 101	Classrooms	6	T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2400	864	OCC	
20LED	Classroom 102	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 103	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
105LED	Staff Bathroom	Restrooms	1	W 32 F 1	F41LL	32	0.03	SW	2250	72	None	
50LED	Kitchen	Cafeteria	10	W 32 W P 2 (ELE)	F42LL	60	0.60	SW	2000	1,200	None	
50LED	Cafeteria	Cafeteria	24	W 32 W P 2 (ELE)	F42LL	60	1.44	SW	2000	2,880	None	
9LED	Cafeteria	Cafeteria	12	High Bay MH 200 35 Feet High	MH200/1	232	2.78	SW	2000	5,568	None	
20LED	Office	Offices	4	S 32 C F 1 (ELE)	F41LL	32	0.13	SW	2000	256	OCC	
20LED	Custodian's Office	Offices	3	S 32 C F 1 (ELE)	F41LL	32	0.10	SW	2000	192	OCC	
220	Boiler Room	Boiler Room	3	S 17 C F 1(ELE)	F21LL	20	0.06	SW	2800	168	None	
40LED	Boiler Room	Boiler Room	11	T 32 R F 2 (ELE)	F42LL	60	0.66	SW	2800	1,848	None	
20LED	Classroom 108	Classrooms	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2400	1,152	OCC	
20LED	Classroom 109	Classrooms	15	S 32 C F 1 (ELE)	F41LL	32	0.48	SW	2400	1,152	OCC	
20LED	Hallway	Hallways	6	S 32 C F 1 (ELE)	F41LL	32	0.19	Breaker	4420	849	None	
40LED	Hallway	Hallways	3	T 32 R F 2 (ELE)	F42LL	60	0.18	Breaker	4420	796	None	
20LED	Classroom 104	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
105LED	Generator Room	Mechanical Room	1	W 32 F 1	F41LL	32	0.03	SW	1000	32	None	
220	Generator Room	Mechanical Room	3	S 17 C F 1(ELE)	F21LL	20	0.06	SW	1000	60	None	
105LED	Stairs	Hallways	7	W 32 F 1	F41LL	32	0.22	SW	4420	990	None	
105LED	Stairs	Hallways	7	W 32 F 1	F41LL	32	0.22	SW	4420	990	None	
20LED	1st Floor Hallway	Hallways	17	S 32 C F 1 (ELE)	F41LL	32	0.54	Breaker	4420	2,404	None	
50LED	2nd Floor Hallway	Hallways	2	W 32 W P 2 (ELE)	F42LL	60	0.12	Breaker	4420	530	None	
20LED	Classroom 201	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 202	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 203	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 204	Classrooms	9	S 32 C F 1 (ELE)	F41LL	32	0.29	SW	2400	691	OCC	
105LED	Office	Offices	8	W 32 F 1	F41LL	32	0.26	SW	2000	512	OCC	
105LED	Office	Offices	1	W 32 F 1	F41LL	32	0.03	SW	2000	64	OCC	
105LED	206 - Nurse's Office	Offices	4	W 32 F 1	F41LL	32	0.13	SW	2000	256	OCC	
105LED	Staff Lounge	Staff Lounge	3	W 32 F 1	F41LL	32	0.10	SW	2400	230	OCC	
105LED	Room 213	Storage Areas	2	W 32 F 1	F41LL	32	0.06	SW	1300	83	None	
105LED	Stage Office	Offices	2	W 32 F 1	F41LL	32	0.06	SW	2000	128	OCC	
20LED	Classroom 208	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 209	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 210	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Classroom 211	Classrooms	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	2400	1,382	OCC	
20LED	Office 212	Offices	6	S 32 C F 1 (ELE)	F41LL	32	0.19	SW	2000	384	OCC	
40LED	Boys' Bathroom	Restrooms	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2250	270	None	
40LED	Girls' Bathroom	Restrooms	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2250	270	None	
231LED	Exterior	Outdoor Lighting	2	WP400MH1	MH400/1	458	0.92	Breaker	4368	4,001	None	
117	Auditorium	Auditorium	42	CF 23	CFS23/1	23	0.97	SW	2800	2,705	None	
220	Auditorium	Auditorium	6	S 17 C F 1(ELE)	F21LL	20	0.12	SW	2800	336	None	
50LED	Auditorium	Auditorium	10	W 32 W P 2 (ELE)	F42LL	60	0.60	SW	2800	1,680	None	
	Total		552				24.76			64,319		



EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS									
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control (Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/Space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code* Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/Space) (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual \$ Saved (kWh Saved) * (\$/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Measures	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered					
40LED	310 - Counselor's Office	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2000	360	3	T 59 R LED	RTLED38	38	0.1	SW	2,000	228	132	0.1	\$	22.49	\$	708.75	\$0	31.5	31.5			
40LED	Classroom 301	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 302	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 303	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 304	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 305	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 306	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 307	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 308	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
40LED	Classroom 309	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	SW	2,400	821	475	0.2	\$	78.27	\$	2,126.25	\$0	27.2	27.2			
20LED	3rd Floor Hallway	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2000	2,122	15	4 ft LED Tube	200732x1	15	0.2	Breaker	4,420	995	1,127	0.3	\$	171.12	\$	1,225.13	\$0	7.2	7.2			
50LED	Boys' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135	1	4 ft LED Tube	200732x2	30	0.0	SW	2,250	68	68	0.0	\$	11.25	\$	163.35	\$0	14.5	14.5			
50LED	Girls' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135	1	4 ft LED Tube	200732x2	30	0.0	SW	2,250	68	68	0.0	\$	11.25	\$	163.35	\$0	14.5	14.5			
20LED	Ground Floor Hallway	12	S 32 C F 1 (ELE)	F41LL	32	0.4	Breaker	4420	1,697	12	4 ft LED Tube	200732x1	15	0.2	Breaker	4,420	796	902	0.2	\$	136.89	\$	980.10	\$0	7.2	7.2			
20LED	105 - Parent Room	10	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	768	10	4 ft LED Tube	200732x1	15	0.2	SW	2,400	360	408	0.2	\$	67.20	\$	816.75	\$0	12.2	12.2			
40LED	Classroom 101	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2400	864	6	T 59 R LED	RTLED38	38	0.2	SW	2,400	547	317	0.1	\$	52.18	\$	1,417.50	\$0	27.2	27.2			
20LED	Classroom 102	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
20LED	Classroom 103	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
105LED	Staff Bathroom	1	W 32 F 1	F41LL	32	0.0	SW	2250	72	1	4 ft LED Tube	200732x1	15	0.0	SW	2,250	34	38	0.0	\$	6.37	\$	81.68	\$0	12.8	12.8			
50LED	Kitchen	10	W 32 W P 2 (ELE)	F42LL	60	0.6	SW	2000	1,200	10	4 ft LED Tube	200732x2	30	0.3	SW	2,000	600	600	0.3	\$	102.22	\$	1,633.50	\$0	16.0	16.0			
50LED	Cafeteria	24	W 32 W P 2 (ELE)	F42LL	60	1.4	SW	2000	2,880	24	4 ft LED Tube	200732x2	30	0.7	SW	2,000	1,440	1,440	0.7	\$	245.32	\$	3,920.40	\$0	16.0	16.0			
9LED	Cafeteria	12	High Bay MH 200 35 Feet High	MH200V1	232	2.8	SW	2000	5,568	12	FXLED78	FXLED78/1	78	0.9	SW	2,000	1,872	3,696	1.8	\$	629.65	\$	10,130.35	\$1,800	16.1	13.2			
20LED	Office	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	256	4	4 ft LED Tube	200732x1	15	0.1	SW	2,000	120	136	0.1	\$	23.17	\$	326.70	\$0	14.1	14.1			
20LED	Custodian's Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	192	3	4 ft LED Tube	200732x1	15	0.0	SW	2,000	90	102	0.1	\$	17.38	\$	245.03	\$0	14.1	14.1			
220	Boiler Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	2800	168	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	2,800	168	-	0.0	\$	-	\$	-	\$0	#DIV/0!	#DIV/0!			
40LED	Boiler Room	11	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2800	1,848	11	T 59 R LED	RTLED38	38	0.4	SW	2,800	1,170	678	0.2	\$	108.88	\$	2,598.75	\$0	23.9	23.9			
20LED	Classroom 108	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152	15	4 ft LED Tube	200732x1	15	0.2	SW	2,400	540	612	0.3	\$	100.81	\$	1,225.13	\$0	12.2	12.2			
20LED	Classroom 109	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152	15	4 ft LED Tube	200732x1	15	0.2	SW	2,400	540	612	0.3	\$	100.81	\$	1,225.13	\$0	12.2	12.2			
20LED	Hallway	6	S 32 C F 1 (ELE)	F41LL	32	0.2	Breaker	4420	848	6	4 ft LED Tube	200732x1	15	0.1	Breaker	4,420	398	451	0.1	\$	68.45	\$	490.05	\$0	7.2	7.2			
40LED	Hallway	3	T 32 R F 2 (ELE)	F42LL	60	0.2	Breaker	4420	796	3	T 59 R LED	RTLED38	38	0.1	Breaker	4,420	504	292	0.1	\$	44.29	\$	708.75	\$0	16.0	16.0			
20LED	Classroom 104	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
105LED	Generator Room	1	W 32 F 1	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	SW	1,000	15	17	0.0	\$	3.47	\$	81.68	\$0	23.5	23.5			
220	Generator Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	1000	60	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	1,000	60	-	0.0	\$	-	\$	-	\$0	#DIV/0!	#DIV/0!			
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	796	7	4 ft LED Tube	200732x1	15	0.1	SW	4,420	464	526	0.1	\$	79.86	\$	571.73	\$0	7.2	7.2			
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	796	7	4 ft LED Tube	200732x1	15	0.1	SW	4,420	464	526	0.1	\$	79.86	\$	571.73	\$0	7.2	7.2			
20LED	1st Floor Hallway	17	S 32 C F 1 (ELE)	F41LL	32	0.5	Breaker	4420	2,404	17	4 ft LED Tube	200732x1	15	0.3	Breaker	4,420	1,127	1,277	0.3	\$	193.93	\$	1,388.48	\$0	7.2	7.2			
50LED	2nd Floor Hallway	2	W 32 W P 2 (ELE)	F42LL	60	0.1	Breaker	4420	530	2	4 ft LED Tube	200732x2	30	0.1	Breaker	4,420	265	265	0.1	\$	40.26	\$	326.70	\$0	8.1	8.1			
20LED	Classroom 201	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
20LED	Classroom 202	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
20LED	Classroom 203	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	SW	2,400	648	734	0.3	\$	120.97	\$	1,470.15	\$0	12.2	12.2			
20LED	Classroom 204	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691	9	4 ft LED Tube	200732x1	15	0.1	SW	2,400	324	367	0.2	\$	60.48	\$	735.08	\$0	12.2	12.2			
105LED	Office	8	W 32 F 1	F41LL	32	0.3	SW	2000	512	8	4 ft LED Tube	200732x1	15	0.1	SW	2,000	240	272	0.1	\$	46.34	\$	653.40	\$0	14.1	14.1			
105LED	Office	1	W 32 F 1	F41LL	32	0.0	SW	2000	64	1	4 ft LED Tube	200732x1	15	0.0															



		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS							
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-Inst. control device	Annual Hours	Annual kWh (kW/Space) * (Annual Hours)	Number of Fixtures after the retrofit	Standard Fixture Code Example 21 40 R F(U) = 2'x2' Troff 40 recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit Control device	Annual Hours	Annual kWh (kW/Space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual \$ Saved (kW/Wh) * (\$/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive	Simple Payback Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered					
40LED	310 - Counselor's Office	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2000	360.0	3	T 32 R F 2 (ELE)	F42LL	60	0.2	OCC	1600	288.0	72.0	0.0	\$9.83	\$128.25	\$20.00	13.0	11.0					
40LED	Classroom 301	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 302	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 303	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 304	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 305	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 306	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 307	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 308	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
40LED	Classroom 309	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296.0	9	T 32 R F 2 (ELE)	F42LL	60	0.5	OCC	1680	907.2	388.8	0.0	\$53.07	\$128.25	\$20.00	2.4	2.0					
20LED	3rd Floor Hallway	15	S 32 C F 1 (ELE)	F41LL	32	0.5	Breaker	4420	2,121.6	15	S 32 C F 1 (ELE)	F41LL	32	0.5	None	4420	2,121.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
50LED	Boys' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135.0	1	W 32 W P 2 (ELE)	F42LL	60	0.1	None	2250	135.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
50LED	Girls' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135.0	1	W 32 W P 2 (ELE)	F42LL	60	0.1	None	2250	135.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	Ground Floor Hallway	12	S 32 C F 1 (ELE)	F41LL	32	0.4	Breaker	4420	1,697.3	12	S 32 C F 1 (ELE)	F41LL	32	0.4	None	4420	1,697.3	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	105 - Parent Room	10	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	768.0	10	S 32 C F 1 (ELE)	F41LL	32	0.3	OCC	1800	576.0	192.0	0.0	\$26.21	\$128.25	\$20.00	4.9	4.1					
40LED	Classroom 101	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2400	864.0	6	T 32 R F 2 (ELE)	F42LL	60	0.4	OCC	1680	604.8	259.2	0.0	\$36.38	\$128.25	\$20.00	3.6	3.1					
20LED	Classroom 102	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
20LED	Classroom 103	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
105LED	Staff Bathroom	1	W 32 F 1	F41LL	32	0.0	SW	2250	72.0	1	W 32 F 1	F41LL	32	0.0	None	2250	72.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
50LED	Kitchen	10	W 32 W P 2 (ELE)	F42LL	60	0.6	SW	2000	1,200.0	10	W 32 W P 2 (ELE)	F42LL	60	0.6	None	2000	1,200.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
50LED	Cafeteria	24	W 32 W P 2 (ELE)	F42LL	60	1.4	SW	2000	2,880.0	24	W 32 W P 2 (ELE)	F42LL	60	1.4	None	2000	2,880.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
9LED	Cafeteria	12	High Bay MH 200 35 Feet High	MH200/1	232	2.8	SW	2000	5,668.0	12	High Bay MH 200 35 Feet High	MH200/1	232	2.8	None	2000	5,668.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	Office	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	256.0	4	S 32 C F 1 (ELE)	F41LL	32	0.1	OCC	1600	204.8	51.2	0.0	\$6.99	\$128.25	\$20.00	18.4	15.5					
20LED	Custodian's Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	192.0	3	S 32 C F 1 (ELE)	F41LL	32	0.1	OCC	1600	163.6	38.4	0.0	\$5.24	\$128.25	\$20.00	24.5	20.7					
220	Boiler Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	2800	168.0	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	None	2800	168.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
40LED	Boiler Room	11	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2800	1,848.0	11	T 32 R F 2 (ELE)	F42LL	60	0.7	None	2800	1,848.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	Classroom 108	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152.0	15	S 32 C F 1 (ELE)	F41LL	32	0.5	OCC	1680	806.4	345.6	0.0	\$47.17	\$128.25	\$20.00	2.7	2.3					
20LED	Classroom 109	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152.0	15	S 32 C F 1 (ELE)	F41LL	32	0.5	OCC	1680	806.4	345.6	0.0	\$47.17	\$128.25	\$20.00	2.7	2.3					
20LED	Hallway	6	S 32 C F 1 (ELE)	F41LL	32	0.2	Breaker	4420	848.6	6	S 32 C F 1 (ELE)	F41LL	32	0.2	None	4420	848.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
40LED	Hallway	3	T 32 R F 2 (ELE)	F42LL	60	0.2	Breaker	4420	795.6	3	T 32 R F 2 (ELE)	F42LL	60	0.2	None	4420	795.6	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	Classroom 104	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
105LED	Generator Room	1	W 32 F 1	F41LL	32	0.0	SW	1000	32.0	1	W 32 F 1	F41LL	32	0.0	None	1000	32.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
220	Generator Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	1000	60.0	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	None	1000	60.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	790.1	7	W 32 F 1	F41LL	32	0.2	None	4420	790.1	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	790.1	7	W 32 F 1	F41LL	32	0.2	None	4420	790.1	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	1st Floor Hallway	17	S 32 C F 1 (ELE)	F41LL	32	0.5	Breaker	4420	2,404.5	17	S 32 C F 1 (ELE)	F41LL	32	0.5	None	4420	2,404.5	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
50LED	2nd Floor Hallway	2	W 32 W P 2 (ELE)	F42LL	60	0.1	Breaker	4420	530.4	2	W 32 W P 2 (ELE)	F42LL	60	0.1	None	4420	530.4	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!					
20LED	Classroom 201	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
20LED	Classroom 202	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
20LED	Classroom 203	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382.4	18	S 32 C F 1 (ELE)	F41LL	32	0.6	OCC	1680	967.7	414.7	0.0	\$56.61	\$128.25	\$20.00	2.3	1.9					
20LED	Classroom 204	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691.2	9	S 32 C F 1 (ELE)	F41LL	32	0.3	OCC	1680	483.8	207.4	0.0	\$28.30	\$128.25	\$20.00	4.5	3.8					
105LED	Office	8	W 32 F 1	F41LL	32	0.3	SW	2000	512.0	8	W 32 F 1	F41LL	32	0.3	OCC	1600	409.6	102.4	0.0	\$13.98	\$128.25	\$20.00	9.2	7.7					
105LED	Office	1	W 32 F 1	F41LL	32	0.0	SW	2000	64.0	1	W 32 F 1	F41LL	32	0.0	OCC	1600	51.2	12.8	0.0	\$1.75	\$128.25	\$20.00	73.4	62.0					
105LED	206 - Nurse's Office	4	W 32 F 1	F41LL	32	0.1	SW	2000	256.0	4	W 32 F 1	F41LL	32	0.1	OCC	1600	204.8	51.2	0.0	\$6.99	\$128.25	\$20.00	18.4	15.5					
105LED	Staff Lounge	3	W 32 F 1	F41LL	32	0.1	SW																						



		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS					
Field Code	Area description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control	Annual Hours	Annual kWh (kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space * (Number of Fixtures)	Retrofit Control device	Annual Hours	Annual kWh (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual \$ Saved (kWh Saved) * (\$/kWh)	Retrofit Cost for renovations to lighting system	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback			
40LED	310 - Counselor's Office	3	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2000	360	3	T 59 R LED	RTLED38	38	0.1	OCC	1,600	182	178	0.1	\$ 28.71	\$ 837.00	\$ 20	29.2	28.5			
40LED	Classroom 301	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 302	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 303	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 304	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 305	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 306	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 307	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 308	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
40LED	Classroom 309	9	T 32 R F 2 (ELE)	F42LL	60	0.5	SW	2400	1,296	9	T 59 R LED	RTLED38	38	0.3	OCC	1,680	575	721	0.2	\$ 111.89	\$ 2,254.50	\$ 20	20.2	20.0			
20LED	3rd Floor Hallway	15	S 32 C F 1 (ELE)	F41LL	32	0.5	Breaker	4420	2,122	15	4 ft LED Tube	200732x1	15	0.2	None	4,420	995	1,127	0.3	\$ 171.12	\$ 1,225.13	\$ -	7.2	7.2			
50LED	Boys' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135	1	4 ft LED Tube	200732x2	30	0.0	None	2,250	68	68	0.0	\$ 11.25	\$ 163.35	\$ -	14.5	14.5			
50LED	Girls' Bathroom	1	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2250	135	1	4 ft LED Tube	200732x2	30	0.0	None	2,250	68	68	0.0	\$ 11.25	\$ 163.35	\$ -	14.5	14.5			
20LED	Ground Floor Hallway	12	S 32 C F 1 (ELE)	F41LL	32	0.4	Breaker	4420	1,697	12	4 ft LED Tube	200732x1	15	0.2	None	4,420	796	902	0.2	\$ 136.89	\$ 980.10	\$ -	7.2	7.2			
20LED	105 - Parent Room	10	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	768	10	4 ft LED Tube	200732x1	15	0.2	OCC	1,800	270	498	0.2	\$ 79.49	\$ 945.00	\$ 20	11.9	11.6			
40LED	Classroom 101	6	T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2400	864	6	T 59 R LED	RTLED38	38	0.2	OCC	1,680	383	481	0.1	\$ 74.59	\$ 1,545.75	\$ 20	20.7	20.5			
20LED	Classroom 102	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
20LED	Classroom 103	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
105LED	Staff Bathroom	1	W 32 F 1	F41LL	32	0.0	SW	2250	72	1	4 ft LED Tube	200732x1	15	0.0	None	2,250	34	38	0.0	\$ 6.37	\$ 81.68	\$ -	12.8	12.8			
50LED	Kitchen	10	W 32 W P 2 (ELE)	F42LL	60	0.6	SW	2000	1,200	10	4 ft LED Tube	200732x2	30	0.3	None	2,000	600	600	0.3	\$ 102.22	\$ 1,633.50	\$ -	16.0	16.0			
50LED	Cafeteria	24	W 32 W P 2 (ELE)	F42LL	60	1.4	SW	2000	2,880	24	4 ft LED Tube	200732x2	30	0.7	None	2,000	1,440	1,440	0.7	\$ 245.32	\$ 3,920.40	\$ -	16.0	16.0			
9LED	Cafeteria	12	High Bay MH 200 35 Feet High	MH200V1	232	2.8	SW	2000	5,568	12	FXLED78	FXLED78/1	78	0.9	None	2,000	1,872	3,696	1.8	\$ 629.65	\$ 10,130.35	\$ 1,800	16.1	13.2			
20LED	Office	4	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	256	4	4 ft LED Tube	200732x1	15	0.1	OCC	1,600	96	160	0.1	\$ 26.45	\$ 454.95	\$ 20	17.2	16.4			
20LED	Custodian's Office	3	S 32 C F 1 (ELE)	F41LL	32	0.1	SW	2000	192	3	4 ft LED Tube	200732x1	15	0.0	OCC	1,600	72	120	0.1	\$ 19.83	\$ 373.28	\$ 20	18.8	17.8			
220	Boiler Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	2800	168	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	None	2,800	168	-	0.0	\$ -	\$ -	\$ -	-	-			
40LED	Boiler Room	11	T 32 R F 2 (ELE)	F42LL	60	0.7	SW	2800	1,848	11	T 59 R LED	RTLED38	38	0.4	None	2,800	1,170	678	0.2	\$ 108.88	\$ 2,598.75	\$ -	23.9	23.9			
20LED	Classroom 108	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152	15	4 ft LED Tube	200732x1	15	0.2	OCC	1,680	378	774	0.3	\$ 122.92	\$ 1,353.38	\$ 20	11.0	10.8			
20LED	Classroom 109	15	S 32 C F 1 (ELE)	F41LL	32	0.5	SW	2400	1,152	15	4 ft LED Tube	200732x1	15	0.2	OCC	1,680	378	774	0.3	\$ 122.92	\$ 1,353.38	\$ 20	11.0	10.8			
20LED	Hallway	6	S 32 C F 1 (ELE)	F41LL	32	0.2	Breaker	4420	848	6	4 ft LED Tube	200732x1	15	0.1	None	4,420	398	451	0.1	\$ 88.45	\$ 490.05	\$ -	7.2	7.2			
40LED	Hallway	3	T 32 R F 2 (ELE)	F42LL	60	0.2	Breaker	4420	796	3	T 59 R LED	RTLED38	38	0.1	None	4,420	504	292	0.1	\$ 44.29	\$ 708.75	\$ -	16.0	16.0			
20LED	Classroom 104	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
105LED	Generator Room	1	W 32 F 1	F41LL	32	0.0	SW	1000	32	1	4 ft LED Tube	200732x1	15	0.0	None	1,000	15	17	0.0	\$ 3.47	\$ 81.68	\$ -	23.5	23.5			
220	Generator Room	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	SW	1000	60	3	S 17 C F 1 (ELE)	F21ILL	20	0.1	None	1,000	60	-	0.0	\$ -	\$ -	\$ -	-	-			
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	980	7	4 ft LED Tube	200732x1	15	0.1	None	4,420	464	526	0.1	\$ 79.86	\$ 571.73	\$ -	7.2	7.2			
105LED	Stairs	7	W 32 F 1	F41LL	32	0.2	SW	4420	980	7	4 ft LED Tube	200732x1	15	0.1	None	4,420	464	526	0.1	\$ 79.86	\$ 571.73	\$ -	7.2	7.2			
20LED	1st Floor Hallway	17	S 32 C F 1 (ELE)	F41LL	32	0.5	Breaker	4420	2,404	17	4 ft LED Tube	200732x1	15	0.3	None	4,420	1,127	1,277	0.3	\$ 193.93	\$ 1,388.48	\$ -	7.2	7.2			
50LED	2nd Floor Hallway	2	W 32 W P 2 (ELE)	F42LL	60	0.1	Breaker	4420	530	2	4 ft LED Tube	200732x2	30	0.1	None	4,420	265	40.26	\$ 40.26	\$ 326.70	\$ -	8.1	8.1				
20LED	Classroom 201	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
20LED	Classroom 202	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
20LED	Classroom 203	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	2400	1,382	18	4 ft LED Tube	200732x1	15	0.3	OCC	1,680	454	929	0.3	\$ 147.50	\$ 1,598.40	\$ 20	10.8	10.7			
20LED	Classroom 204	9	S 32 C F 1 (ELE)	F41LL	32	0.3	SW	2400	691	9	4 ft LED Tube	200732x1	15	0.1	OCC	1,680	227	464	0.2	\$ 73.75	\$ 863.33	\$ 20	11.7	11.4			
105LED	Office	8	W 32 F 1	F41LL	32	0.3	SW	2000	512	8	4 ft LED Tube	200732x1	15	0.1	OCC	1,600	192	320	0.1	\$ 52.89	\$ 781.65	\$ 20	14.8	14.4			
105LED	Office	1	W 32 F 1	F41LL	32	0.0	SW	2000	64	1	4 ft LED Tube	200732x1	15	0.0	OCC	1,600	24	40	0.0	\$ 6.61	\$ 209.93	\$ 20	31.8	28.7			
105LED	206 - Nurse's Office	4	W 32 F 1	F41LL	32	0.1	SW	2000	256	4	4 ft LED Tube	200732x1	15	0.1	OCC	1,600	96	160	0.1	\$ 26.45	\$ 454.95	\$ 20	17.2	16.4			
105LED	Staff Lounge	3	W 32 F 1	F41LL	32	0.1	SW	2400	230	3	4 ft LED Tube	200732x1	15	0.0	OCC	1,800	81	149	0.1								

## **APPENDIX D**

### **New Jersey Board of Public Utilities Incentives**

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

## I. SMART START





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## NJ SmartStart Buildings

### Program Overview

### COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

#### PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND  
FUEL CELLS

LOCAL GOVERNMENT ENERGY  
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT  
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL  
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM



#### With New Jersey SmartStart Buildings ...

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

#### Special Notice

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

**Visit the Sandy web page for details and important links.**

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

[Project Categories](#)

[Custom Measures](#)

[Incentives for Qualifying Equipment and Projects](#)

[Program Terms and Conditions](#)

[Find a Trade Ally](#)

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

#### Getting Started

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

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

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

HURRICANE SANDY

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## Equipment Incentives

### Special Notice

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

**Visit the Sandy web page for details and important links.**

### More reasons for a smart start on your next project!

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

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

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

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



#### Electric Chillers

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

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

#### Gas Cooling

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

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

## PAST PROGRAMS

## TOOLS AND RESOURCES

## PROGRAM UPDATES

## CONTACT US

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

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

**Ground Source Heat Pumps**

Closed Loop (\$450-750 per ton)

**Gas Heating**

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

**Variable Frequency Drives**

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

**Natural Gas Water Heating**

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

**Premium Motors**

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

**Refrigerator/Freezer Case Premium Efficiency Motors (ECM)**

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

**Prescriptive Lighting**

New Linear Fluorescent

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

New Induction (\$70 per replaced HID fixture)

New LED

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

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

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

Display case (\$30 per case)

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

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

Parking garage luminaires (\$100 per fixture)

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

Stairwell and Passageway luminaires (\$40 per fixture)

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

Bollard (\$50 per fixture)

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

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

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

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

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

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

### Lighting Controls

#### Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

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

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

#### HID or Fluorescent Hi-Bay Controls

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

Daylight dimming (\$45 per fixture controlled)

### Refrigeration

#### Covers and Doors

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

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

#### Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

## Food Service Equipment

### Cooking

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

### Holding

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

### Cooling

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

### Cleaning

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

## Other Equipment Incentives\*

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

Custom electric and gas equipment incentives (not prescriptive)

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

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## II. DIRECT INSTALL



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COMMERCIAL, INDUSTRIAL  
AND LOCAL GOVERNMENT

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### Direct Install

#### 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

PARTICIPATION STEPS

PARTICIPATING  
CONTRACTORS

SUSTAINABLE JERSEY

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL  
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

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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COMMERCIAL, INDUSTRIAL  
AND LOCAL GOVERNMENT

### COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

#### PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

EXISTING BUILDINGS

PARTICIPATION STEPS

APPLICATIONS AND  
FORMS

APPROVED PARTNERS

NEW CONSTRUCTION

FAQS

BECOME A PARTNER

COMBINED HEAT & POWER AND  
FUEL CELLSLOCAL GOVERNMENT ENERGY  
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT  
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

[Home](#) » [Commercial & Industrial](#) » [Programs](#) » [Pay for Performance](#)

## 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 must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more.

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

### ENERGY STAR Portfolio Manager

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



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

#### Incentives

**OIL, PROPANE & MUNICIPAL  
ELECTRIC CUSTOMERS**

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

**EDA PROGRAMS**

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

**SBC CREDIT PROGRAM**

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

**PAST PROGRAMS**

**TOOLS AND RESOURCES**

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

**PROGRAM UPDATES**

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

**CONTACT US**



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

### **Steps to Participation**

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

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# PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2013 - June 30, 2014

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

## Instructions

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

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

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

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

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

## Partner Information

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

## Project Information

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

## Funding

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

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

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

## Additional Project information

Additional Utility Account(s)

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

## Additional Comments:

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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](http://NJCleanEnergy.com/P4P)**

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

\*Incentives/Requirements subject to change.



002-FY14-04/14

# Pay For Performance-Existing Buildings

## Participation Agreement

### Definitions:

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

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

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

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

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

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

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

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

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

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

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

**Program Manager** – TRC Energy Services.

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

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

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

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

Please refer to the program guide on the [NJCleanEnergy.com/ssb](http://NJCleanEnergy.com/ssb) website for the complete Application and Eligibility Process.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)





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## Energy Savings Improvement Program

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

This Local Finance Notice outlines how local governments can develop and implement an ESIP for 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](mailto: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](mailto: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

## 27999 - Newark Public Schools Ridge Street Elementary School

Cost of Electricity	\$0.151	/kWh
Electricity Usage	249,835	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	incentive)	incentive)
\$	kW	kWh	therms	\$	\$	\$	\$	\$	Years	Years
\$40,000	10.0	4,996	0	\$754	0	\$754	\$0	\$774	53.1	26.2

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

### Area Output\*

608 m<sup>2</sup>  
6,543 ft<sup>2</sup>

### Perimeter Output\*

126 m  
415 ft

### Available Roof Space for PV:

(Area Output - 10 ft x Perimeter) x 85%  
2,037 ft<sup>2</sup>

### Approximate System Size:

Is the roof flat? (Yes/No) Yes

8 watt/ft<sup>2</sup>  
16,299 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 07104 Enter into PV Watts  
DC/AC Derate Factor 0.83 Enter into PV Watts

### PV Watts Output

4,996 annual kWh calculated in PV Watts program

### % Offset Calc

Usage 249,835 (from utilities)  
PV Generation 4,996 (generated using PV Watts )  
% offset 2%

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

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

\*\*\* [http://rredc.nrel.gov/solar/calculators/pvwatts/version1/US/New\\_Jersey/Newark.html](http://rredc.nrel.gov/solar/calculators/pvwatts/version1/US/New_Jersey/Newark.html)





**AC Energy  
&  
Cost Savings**



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	4.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	3.3 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.1 ¢/kWh

Results			
Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Energy Value (\$)
1	2.78	292	49.93
2	3.54	337	57.63
3	4.35	446	76.27
4	4.95	472	80.71
5	5.69	548	93.71
6	5.86	531	90.80
7	5.73	530	90.63
8	5.47	500	85.50
9	4.91	448	76.61
10	3.99	389	66.52
11	2.68	261	44.63
12	2.35	242	41.38
Year	4.36	4996	854.32

Output Hourly Performance Data

\*

Output Results as Text

[About the Hourly Performance Data](#)

[Saving Text from a Browser](#)

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

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

[Disclaimer and copyright notice](#)



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

## **APPENDIX F**

### **Photos**







## **APPENDIX G**

### **EPA Benchmarking Report**



# ENERGY STAR<sup>®</sup> Statement of Energy Performance

# 31

ENERGY STAR<sup>®</sup>  
Score<sup>1</sup>

## Ridge Street Elementary School

**Primary Property Function:** K-12 School  
**Gross Floor Area (ft<sup>2</sup>):** 50,231  
**Built:** 1911

**For Year Ending:** July 31, 2013  
**Date Generated:** April 28, 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**

Ridge Street Elementary School  
735 Ridge St.  
Newark, New Jersey 07104

**Property Owner**

Newark Public Schools  
2 Cedar Street  
Newark, NJ 07102  
( ) -

**Primary Contact**

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

**Property ID:** 3877118

### Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
81.2 kBtu/ft <sup>2</sup>	Fuel Oil (No. 2) (kBtu) 2,415,552 (59%)	National Median Site EUI (kBtu/ft <sup>2</sup> )	68.5
	Electric - Grid (kBtu) 1,086,534 (27%)	National Median Source EUI (kBtu/ft <sup>2</sup> )	108.5
	Natural Gas (kBtu) 577,555 (14%)	% Diff from National Median Source EUI	19%
Source EUI		Annual Emissions	
128.6 kBtu/ft <sup>2</sup>		Greenhouse Gas Emissions (Metric Tons CO <sub>2</sub> e/year)	348

### 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

Gregory Coleman  
10 Maxwell Drive  
Suite 200  
Clifton Park, NY 12065  
000-000-0000  
mvadney@trcsolutions.com



Professional Engineer Stamp  
(if applicable)