

THE NEWARK PUBLIC SCHOOLS

Group 3 Buildings

DR. E. ALMA FLAGG SCHOOL

150 3rd St., Newark, NJ 07104

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

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REPORT DISCLAIMER

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

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

List of Common Energy Audit Abbreviations

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

1.0 EXECUTIVE SUMMARY

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

Building Name	Address	Square Feet	Construction Date
Dr. E. Alma Flagg	150 3rd St. Newark, NJ 07104	75,405	1984

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

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings (\$)	Payback (years)
Dr. E. Alma Flagg	1,114,406	(17,512)	135,613	4.7

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 5.0.

Each measure recommended by CHA typically has a simple payback period of 15 years or less to be consistent with the requirements of the Energy Savings Improvement Plan (ESIP) which has a maximum payback period of 15 years. 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	6,453	1,856	3.5	0	3.5	Yes
2	Replace Electric Heating System with Natural Gas Heating System	104,499	43,489	2.4	2,625	2.3	Yes
3	Replace Existing Chillers with High Efficiency Chillers	209,800	8,124	25.8	1,200	25.7	No
4	Install Premium Efficiency Motors and VFDs	13,530	515	26.2	360	25.5	No
5	Install Full DDC Controls	364,921	67,788	5.4	0	5.4	Yes
6	Replace Electrical DHW Heater with Natural Gas Unit	29,108	6,416	4.5	600	4.4	Yes
7	Low Flow Plumbing Fixtures	138,400	1,092	126.7	0	126.7	No
L1**	Lighting Replacements	122,112	13,346	9.1	800	9.1	No
L2**	Lighting Controls	7,850	5,029	1.6	1,210	1.3	No
L3	Lighting Replacements w/ Controls	129,962	16,065	8.1	2,010	8.0	Yes
Total		996,673	145,345	6.9	6,795	6.8	
Total (Recommended)		634,943	135,613	4.7	5,235	4.6	

* Incentive shown is per the New Jersey SmartStart Program.

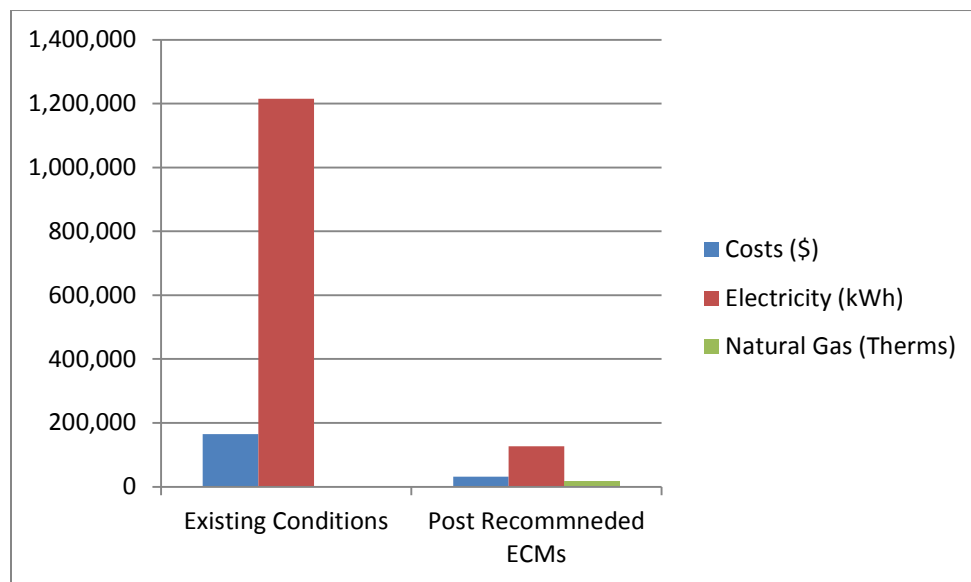
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 200 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	165,163	29,549	82%
Electricity (kWh)	1,215,200	100,794	92%
Natural Gas (Therms)	0	(17,512)	
Site EUI (kbtu/SF/Yr)	55.0	27.8	



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.

Building Name: Dr. E. Alma Flagg

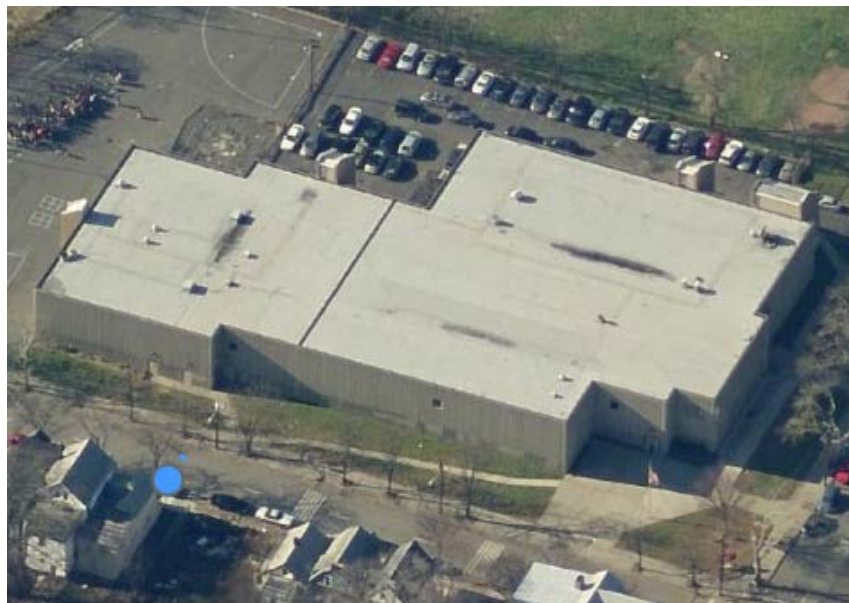
Address: 150 3rd St., Newark NJ

Gross Floor Area: 75,405 sq.ft.

Number of Floors: 2

Year Built: 1984

Additions: None



Description of Spaces: Classrooms, offices, cafeteria, auditorium, stage, gymnasium, media center (library), storage rooms, toilet rooms and mechanical rooms.

Description of Occupancy: The school serves 511 students from Kindergarten to 8th grade. There are approximately 53 school faculty and staff members.

Number of Computers: The school has approximately 83 desktop and laptop computers.

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

Construction Materials: Structural steel framing with prefabricated concrete panels. There may be insulation sandwiched within the concrete walls, however this is unconfirmed. We have included an ECM that adds rigid insulation to the exterior walls.

Façade: Pre-fabricated Concrete panels.

Roof: Flat, adhered light gray rubber membrane, over insulated steel decking. Roof appears to be in good condition and therefore no ECMs are evaluated for the roof.

Windows: The building has a total of four (4) exterior windows, consisting of double pane non-opening in aluminum frames. Windows are in good condition and no ECMs associated with window replacement were evaluated.

Exterior Doors: steel framed & jacketed with small upper security windows. Sweeps on some exterior doors were in poor condition and can be replaced. An ECM is provided that addresses this issue

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The building is heated by two (2) electric heating boilers. Boiler #1 is located in the 1st floor mechanical room and Boiler #2 is located in a 2nd floor book storage room. Boiler #1 is a Brasch Electroduct, manufactured in 1983, with a heating capacity of 240 kW. Boiler #2 is an A.O. Smith Automatic Electric Water Heater with a capacity of 360 kW. These boilers produce 130°F water that is pumped around the building by three (3) B&G base mounted pumps, nameplate HP and motor efficiency not legible. These pumps perform dual-duty, pumping hot water in the winter and chilled water in the summer via a two-pipe system. The hot water is delivered to the coils of five (5) air handling units (AC-1 thru 5), a heat recovery make-up air unit, and numerous ceiling mounted fan coils throughout the building. The air handling units, located in a 2nd floor mechanical room, are as follows:

Unit Tag	Area(s) Served
AC-1	Outer Classrooms
AC-2	Center Classrooms
AC-3	Library & Art rooms
AC-4	Cafeteria
AC-5	Gymnasium

At the time of the site visit, a packaged Aeon Energy Recovery outdoor unit was being installed as a replacement for the previous unit. This packaged unit supplies heated outside air for each of the five (5) air handling units, which in turn deliver this outside air to the spaces indicated. Individual fan coil units, located above the ceiling in each classroom, perform the bulk of the heating by providing hot recirculated air for each space. The gymnasium is equipped with two (2) ceiling hung air handling units, as well as electric wall mounted cabinet heaters installed above each set of exterior doors. Miscellaneous heating equipment includes both electric and hydronic unit heaters, as well as electric duct heaters. We have included an ECM that evaluates converting this building from electric heat to a natural gas hydronic system as well as an ECM to replace fan motors and add VFDs.

Cooling: Dr. E. Alma Flagg school is 100% centrally air conditioned. The building is equipped with two (2) Trane centrifugal 100 ton chillers and two (2) associated Baltimore Aircoil Co. cooling towers; however chiller #1 has been down a year for repairs. The chillers appear to be approximately 30 years old and are nearing the end of their useful lives. Chilled water is pumped around the building to coils in the AC air handling units, the packaged energy recovery unit, and ceiling mounted fan coils via the dual-duty base mounted pumps described above. An ECM is included to address the replacement of these chillers.

Ventilation: Most of the outside air for the building enters through a packaged energy recovery unit. Thermal energy is transferred between the outside airstream and the exhausted airstream within the unit. The pre-treated outside air is provided to each of the AC units, where a supply fan in each unit delivers this air via ductwork into the building. The system is designed to

provide a minimum amount of outside air for each occupied area; economizer cooling and DCV are not options for this type of system.

Exhaust: General building pressure relief is provided primarily by the packaged energy recovery unit. Return air fans in the ductwork pull air out of the building, which is then exhausted through the heat exchanger within the packaged energy recovery unit. Toilet rooms are exhausted by roof mounted centrifugal exhaust fans. The kitchen contains one 12'x4' (approximate size) range exhaust hood that is ducted and exhausted via an up-blast centrifugal exhaust fan located on the roof.

Controls Systems

Nearly all of the existing HVAC equipment is DDC compatible, but the existing JCI BMS system is not set up to control and coordinate functions. As a result air handling units run without control and classroom units do not have occupied/unoccupied control. At the time of the site visit, the facility was in the process of upgrading temperature sensors; however maintenance staff also indicated that the JCI BMS system is not accessible to them. The temperature setpoint is 80°F with +/- 2 degree swing, and this setpoint is maintained during unoccupied times such as weekends and nighttime. The school would benefit from a reduction in energy consumption associated with heating the building for reduced hours. An ECM that evaluates the energy savings associated with installing a full DDC control system has been included.

Domestic Hot Water Systems

Domestic hot water generation is accomplished by two (2) electric hot water heaters, a 1993 Ruudglas with 45 KW capacity and 119 gallons of storage, and a 2008 A.O. Smith also with 45 KW capacity and 119 gallons of storage. A third 115 gallon Ruudglas storage tank is also utilized. Domestic hot water is pumped around the building to restrooms and sinks via a fractional horsepower Taco circulator pump. An ECM is included that evaluates the savings associated with converting the electric DHW heaters to natural gas.

Kitchen Equipment

The kitchen contains one 12'x4' (approximate size) range exhaust hood that is ducted and exhausted via an exhaust fan located on the roof. For the most part kitchen cooking equipment (such as the bread ovens) are manufactured by Market Forge Industries, and are natural gas fired. There is also a Metro HM2000 heated holding cabinet. Dishes are washed automatically by a Hobart dishwasher; a booster heater is in place but nameplate data was not accessible. Two (2) large Hobart walk-ins keeps food cold for storage—one was a freezer with a temperature of 3°F, and a second one was a refrigerator with a temperature of 38°F. The kitchen is used in a warming capacity only, so ECMs related to kitchen equipment were not considered.

Plumbing Systems

This building contains older style high flow water closets (3.5 GPF) and high flow faucets (2.2 GPM). There are no showers in the building. Urinals are 1980's vintage and have higher flow. Water use is primarily toilets, the kitchen, and lavatories. An ECM is included that estimates the water savings potential of installing low flow plumbing fixtures and faucets.

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 varying per fixture from one, two and four. A few T12 fluorescent fixtures were noted in storage rooms. Exterior lighting consisted of 150W metal halide lamps. The building does not contain occupancy sensors—all lights are operated by manual switches. We have included three lighting ECM alternatives that include adding occupancy sensors to the existing lights, replacing the lights with LED lighting and a third ECM that calculates the savings associated with installing occupancy sensors and new LED lighting.

3.0 UTILITIES

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

	Electric	Natural Gas
Deliverer	PSEG	PSEG
Supplier	Nextera Energy Services	PSEG

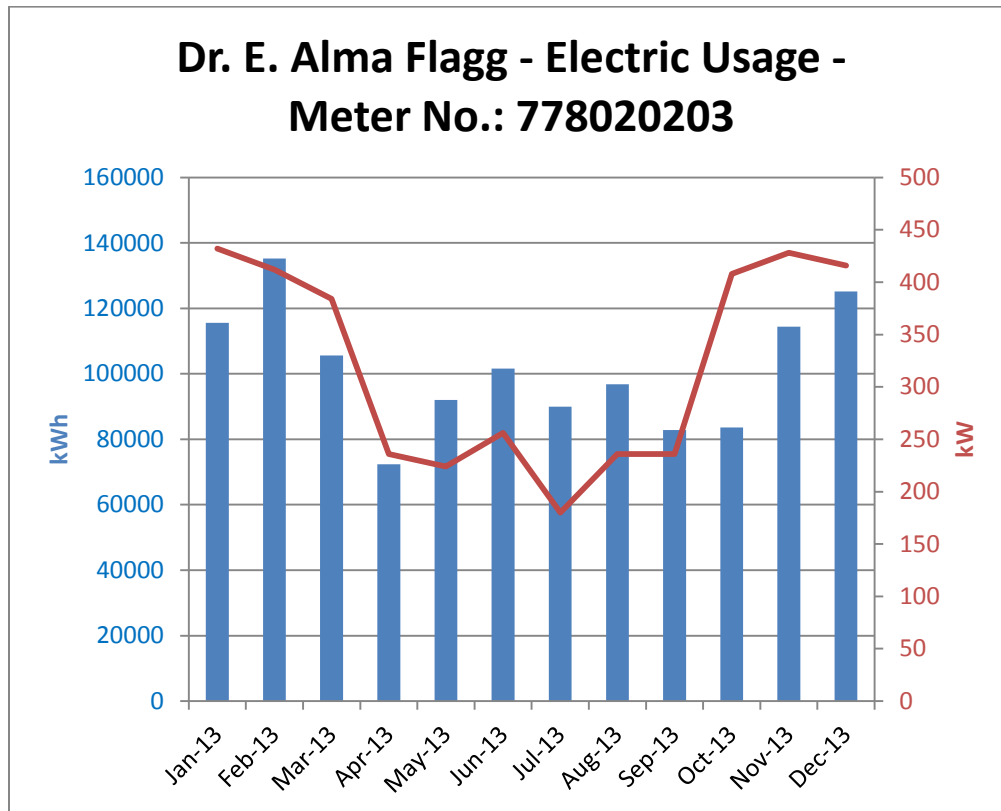
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	1,215,200	kWh
Annual Cost	\$165,163	\$
Blended Unit Rate	\$0.14	\$/kWh
Supply Rate	\$0.12	\$/kWh
Demand Rate	\$3.54	\$/kW
Peak Demand	432	kW

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.

This building has a fairly typical electrical consumption profile, with a slight decrease in usage during the summer when classes are not in session. Electric demand is significantly higher than other buildings because the building does not have a natural gas connection.

See Appendix A for a detailed utility analysis.

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

Comparison of Utility Rates to NJ State Average Rates*			
Utility	Units	School Average Rate	NJ Average Rate
Electricity	\$/kWh	\$0.14	\$0.12

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

This school on average has a higher rate for their electricity than the average commercial building in New Jersey. It is recommended that this school shop for a third party utility supplier for both electricity.

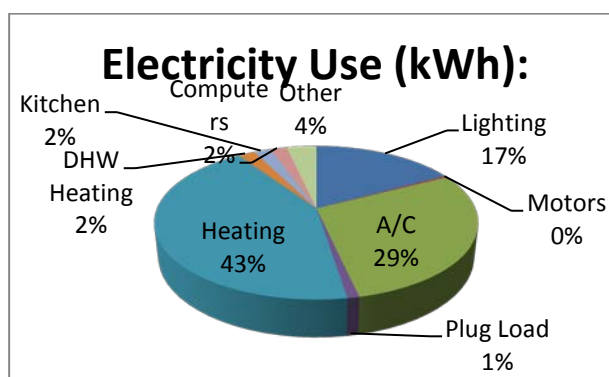
Additional information on selecting a third party energy supplier is available here:

<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.

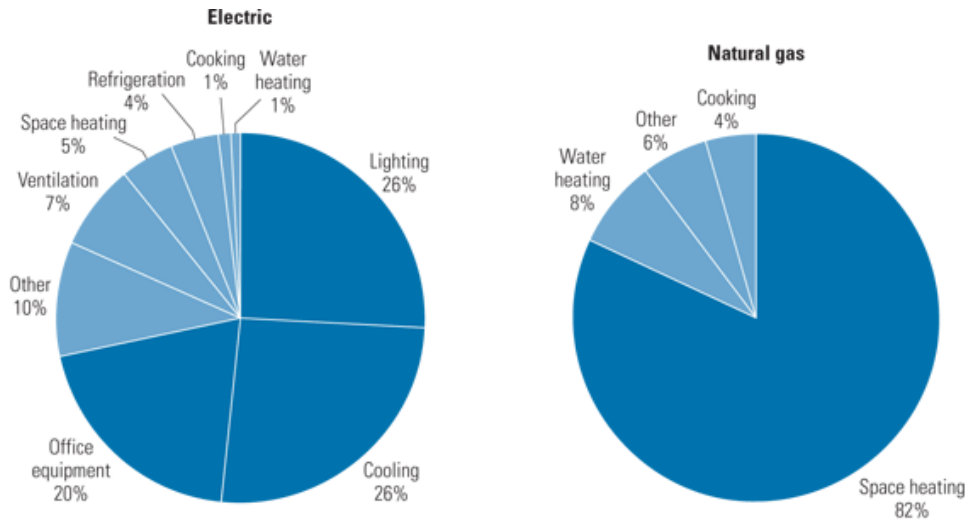
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

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. In the case of Dr. E. Alma Flagg, roughly 25% of electricity used is for space heating, and 20% is used for cooling. 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 EPA Portfolio Manager report are included in Appendix G.

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

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

Site EUI kBtu/ft ² /yr	Energy Star Rating (1-100)
55.0*	27**

* Calculated by CHA using Utility Data provided by NPS

** Provided by TRC

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 some 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 Door Sweeps and Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
6,453	0	13,655	0	1,856	1.9	0	3.5	3.5

* 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 Replace Electric Heating System with Natural Gas Heating System

The building is heated by two (2) electric heating boilers. Boiler #1 is located in the 1st floor mechanical room and Boiler #2 is located in a 2nd floor book storage room. Boiler #1 is a Brasch Electroduct, manufactured in 1983, with a heating capacity of 240 kW.

. Replacing the electric boilers with natural gas condensing boilers will reduce the peak demand charges associated with the 240 kW electric boilers and provide the same water temperatures. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%. It appears that the physical location of the mechanical room lends itself to dedicated boiler venting that would need to be installed either through the roof or sidewall—but this needs to be verified.

It should be noted that this is mainly a cost saving measure and switching to natural gas will not save energy since there will be a tradeoff in electric savings for added gas usage. Cost savings will be attributed to reduced electric demand.

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

ECM-2 Replace Electric Heating System with Natural Gas Heating System

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
104,499	0	440,393	(16,367)	43,489	9.0	2,625	2.4	2.3

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

This measure is recommended.

5.3 ECM-3 Replace Existing Chillers with High Efficiency Chillers

The existing 100 ton centrifugal chillers are nearing the end of their expected useful life, and one of these chillers has not been operational for the past year. Replacing these chillers with newer, more efficient units will reduce the peak electrical demand for the building, and reduced consumption is possible from more efficient units. Typically, newer centrifugal chillers operate with an integrated part load efficiency of nearly 0.55 kw/ton. This represents an improvement from the baseline integrated part load efficiency of 0.67.

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

ECM-3 Replace Existing Chillers with High Efficiency Chillers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
209,800	25.5	51,789	0	8,124	(0.1)	1,200	25.8	25.7

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

This measure is not recommended at this time due to the long payback. However, this measure should be considered during future building renovations.

5.4 ECM-4 Install VFDs & Premium Motors

The existing York supply and return air fans on AHU-3 serving the Library are not controlled by variable frequency drives (VFDs). Typically fans within air handling units are precisely selected to match the ventilation needs of a space functioning at maximum capacity. Often enough there are times during the day when the space is at less than full occupancy. VFDs allow fans to run at slower RPMs to better meet the needs of the system and in the process, energy is saved.

Ideally fans or pump motors are perfectly selected to match the needs of a system operating at maximum capacity. Typically units are over-sized somewhat for safety and the system is operating at less than full heating capacity. VFDs allow motors to run at slower RPMs to better meet the needs of the system and in the process, energy is saved.

To implement this ECM, the existing motors be removed and new inverter duty motors and VFDs installed in their place. Piping and wiring modifications may also be needed.

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

ECM-4 Install VFDs & Premium Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
13,530	8	1,376	0	515	(0.4)	360	26.2	25.5

* 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 long payback.

5.5 ECM-5 Install Full DDC Controls

Nearly all of the existing HVAC equipment is DDC compatible, but the existing JCI BMS system is not set up to control and coordinate functions. As a result air handling units run without control and classroom units do not have occupied/unoccupied control. The electric hot water boilers that are controlled manually by the building operators. Night-time temperature set-back is not implemented. This highly inefficient method of operation consumes excessive fuel (natural gas).

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 both 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-5 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
364,921	0	498,755	0	67,788	1.8	0	5.4	5.4

* 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 ECM-6 Replace Electric DHW Heaters with Condensing Natural Gas Water Heaters

Domestic hot water generation is accomplished by two (2) electric hot water heaters, a 1993 Ruudglas with 45 KW capacity and 119 gallons of storage, and a 2008 A.O. Smith also with 45 KW capacity and 119 gallons of storage.

While the water heaters are relatively efficient in operation, the spikes in electricity demand are costly. Replacing these electric water heaters with natural gas condensing water heaters will reduce the peak demand charges associated with the 45 kW electric heater and provide the same water temperatures. New modulating condensing gas heaters are available that can operate as high as 96%. It appears that the physical location of the mechanical room lends itself to dedicated boiler venting that would need to be installed either through the roof or sidewall—but this needs to be verified.

It should be noted that this is mainly a cost saving measure and switching to natural gas will not save energy since there will be a tradeoff in electric savings for added gas usage. Cost savings will be attributed to reduced electric demand.

ECM-6 Replace Electric DHW Heaters with Condensing Natural Gas Water Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
29,108	45	41,549	(1,145)	6,416	3.0	600	4.5	4.4

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

This measure is recommended.

5.7 ECM-7 Install Low Flow Plumbing Fixtures

The building contains primarily older high flow plumbing fixtures, which includes lavatory faucets, toilets, and urinals.

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

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

ECM-7 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water				
\$	kW	kWh	Kgal	\$	%	\$	Years
138,400	0	0	145	1,092	(0.8)	0	126.7

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

This measure is not recommended due to the long payback.

5.8 ECM-L1 Lighting Replacements / Upgrades

The lighting within this school is primarily 4' T8 linear fluorescent fixtures with electronic ballasts, with the number of lamps varying per fixture from one, two and four. A few T12 fluorescent fixtures were noted in storage rooms.

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 Replacements / Upgrades

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	%	\$	Years
122,112	25.7	98,249	0	13,346	0.2	800	9.1

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

This measure is not recommended in lieu of ECM L3.

5.9 ECM-L2 Install Lighting Controls (Occupancy Sensors)

The building does not contain occupancy sensors—all lights 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 5.7.1, 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
7,850	0	40,332	0	5,029	6.0	1,210	1.6	1.3

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

This measure is not recommended in lieu of ECM L3.

5.10 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
129,962	25.7	120,054	0	16,065	0.3	2,010	8.1	8.0

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

This measure is recommended.

5.11 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:

- 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
- Install pipe insulation on domestic hot water system piping
- Look for the ENERGY STAR® label when purchasing Window AC units or Kitchen Appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train custodians to turn off lights and set HVAC temperatures to minimum levels when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance
- Educate students and staff about how their behavior affects energy use. Create student energy patrols to monitor and inform administration when energy is being wasted.
- During the winter, Custodians should ensure all windows are closed as part of cleaning routine

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

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

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

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

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

The building does not qualify for this program because its electrical demand is greater 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)

The Dr. E. Alma Flagg school 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 is shown in Appendix C, along with more detailed program information, provided 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. This can be done over a maximum term of 15 years. ESOs are not considered “new general obligation debt” of a local unit and do not count against debt limits or require voter approval. They may be issued as

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

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 | ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft ²)	Potential PV Array Size (kW)
39,499	200

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 \$170/SREC for 2014 and this number was utilized in the cash flow for this report.

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

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

Photovoltaic (PV) Rooftop Solar Power Generation – 200 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without incentive)	Payback (with incentives)	Recommended
	Electricity		Natural Gas					
\$	kW	kWh	Therms	\$	\$	Years	Years	Y/N
800,000	200	249,793	0	33,950	42,465	23.6	10.5	FS

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

7.1.2 Solar Thermal Hot Water Generation

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

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

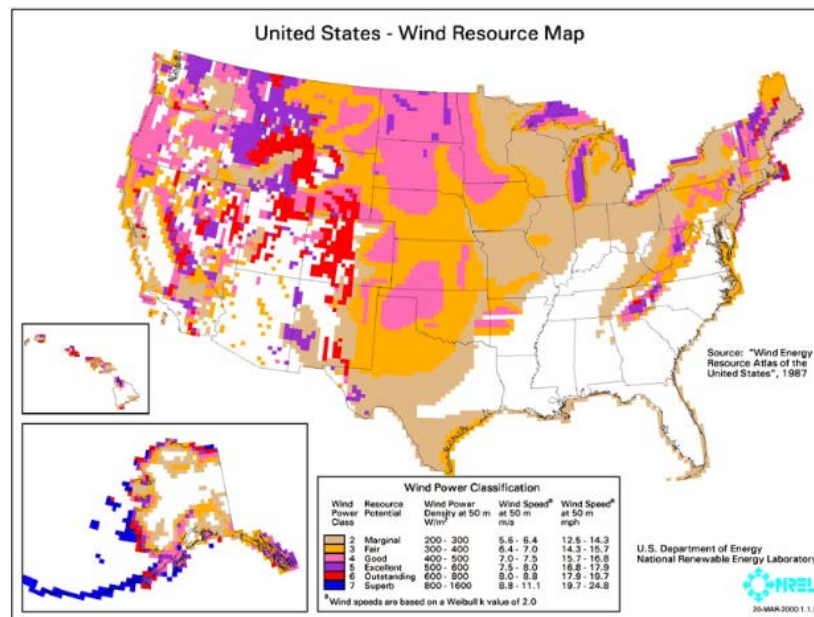
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping).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

This measure is not recommended due to low hot water demand.

7.2 Wind Powered Turbines

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

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



This measure is not recommended because Newark, NJ is a Class 1 area.

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 build's limited thermal demand.

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
432	180	321	N	N

This measure is not recommended because the building does not currently have onsite generation available.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of \$135,613/yr with an overall payback of 4.7 years, if the recommended ECMs are implemented.

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
1,114,406	(17,512)	135,613	4.7

The following projects should be considered for implementation:

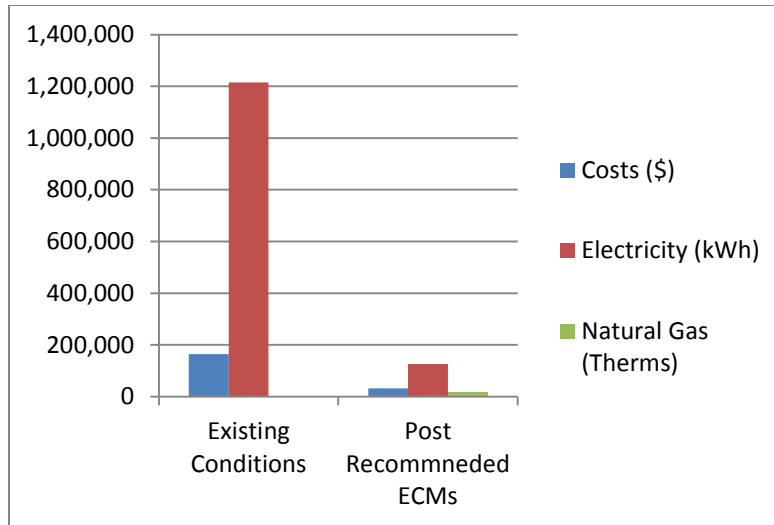
- Replace Door Sweeps and Seals
- Fuel Conversion and Boiler Replacement
- Install Piping Insulation
- Install Full DDC Controls
- Replace Electrical DHW Heater with Natural Gas Unit
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 200 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	165,163	29,549	82%
Electricity (kWh)	1,215,200	100,794	92%
Natural Gas (therms)	0	(17,512)	
Site EUI (kbtu/SF/Yr)	55.0	27.8	



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

Dr. E. Alma Flagg - Electric Usage

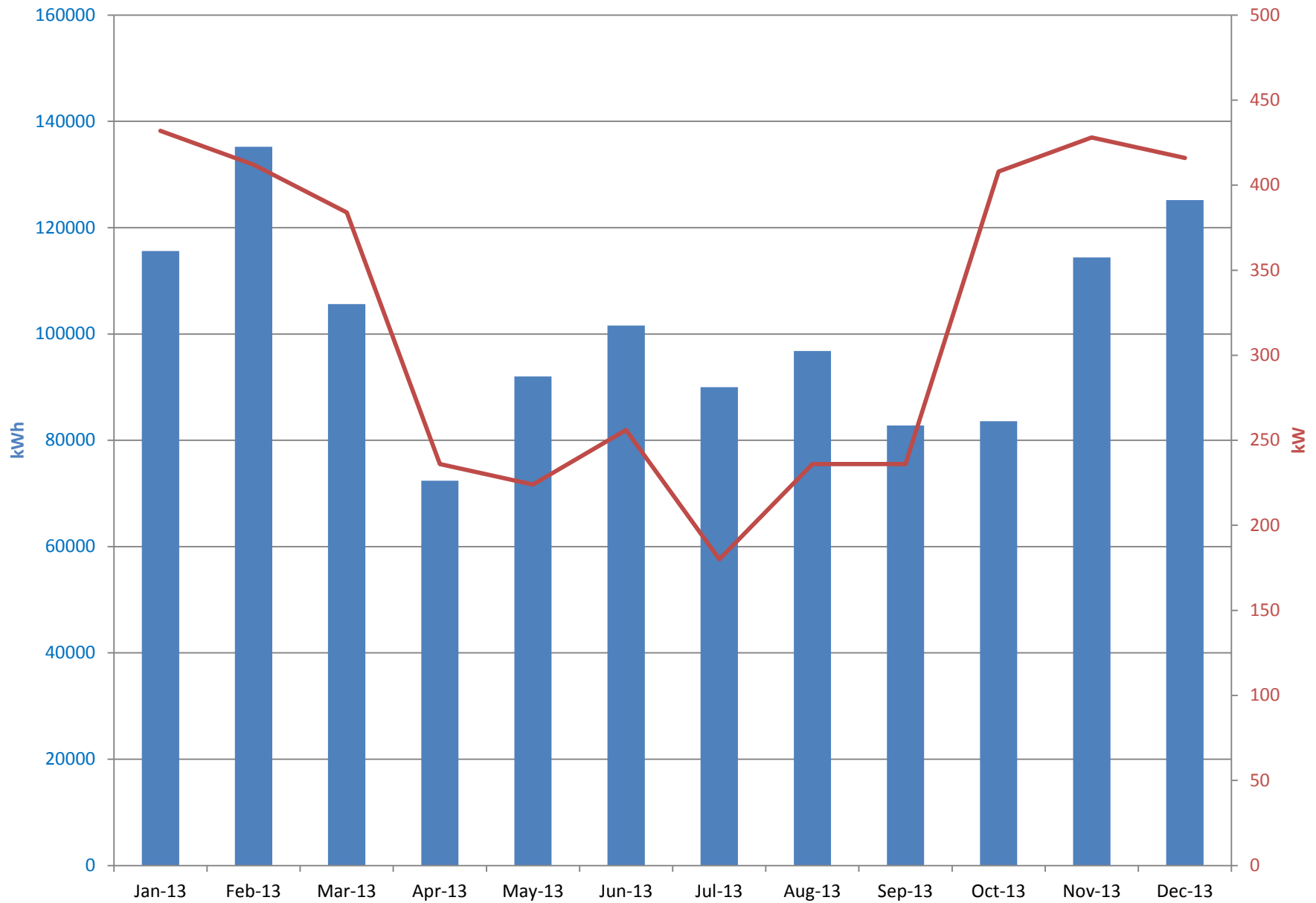
Start Date	End Date	kWh	Demand Usage (KW)	Total Charge	Supply Charge	Delivery Charge	Demand Charge	Consumption (\$)	Blended Rate (\$/kWh)	Consumption Rate (\$/kWh)	Demand Rate (\$/kW)
1/5/2012	2/2/2012	107600	420	16,680.00		0	2,196.01	1,464.37	15215.63	\$ 0.16	\$ 0.14 \$ 3.49
2/3/2012	3/5/2012	103200	412	15,995.00		0	2,095.50	1,436.48	14558.52	\$ 0.15	\$ 0.14 \$ 3.49
3/6/2012	4/3/2012	67200	448	10,415.00		0	981.08	1,562.00	8853	\$ 0.15	\$ 0.13 \$ 3.49
4/4/2012	5/3/2012	70400	284	10,915.00		0	1,543.24	990.19	9924.81	\$ 0.16	\$ 0.14 \$ 3.49
5/4/2012	6/4/2012	104000	284	16,120.00		0	4,842.34	990.19	15129.81	\$ 0.16	\$ 0.15 \$ 3.49
6/5/2012	7/3/2012	98400	232	14,345.40	8,990.87		4,545.64	808.89	13536.51	\$ 0.15	\$ 0.14 \$ 3.49
7/4/2012	8/2/2012	101600	216	14,812.79	9,496.24		4,563.44	753.11	14059.68	\$ 0.15	\$ 0.14 \$ 3.49
8/3/2012	8/31/2012	94000	184	13,455.07	8,643.05		4,170.49	641.53	12813.54	\$ 0.14	\$ 0.14 \$ 3.49
9/1/2012	12/3/2012	289600	448	36,778.92	26,532.72		7,024.57	3,221.63	33557.29	\$ 0.13	\$ 0.12 \$ 7.19
12/4/2012	1/3/2013	113200	400	13,838.91	9,885.83		2,556.21	1,396.87	12442.04	\$ 0.12	\$ 0.11 \$ 3.49
1/4/2013	2/1/2013	115600	432	14,134.96	9,998.75		2,605.03	1,531.18	12603.78	\$ 0.12	\$ 0.11 \$ 3.54
2/2/2013	3/5/2013	135200	412	15,875.20	11,419.61		2,995.30	1,460.29	14414.91	\$ 0.12	\$ 0.11 \$ 3.54
3/6/2013	4/4/2013	105600	384	13,210.50	9,607.08		2,242.37	1,361.05	11849.45	\$ 0.13	\$ 0.11 \$ 3.54
4/5/2013	5/3/2013	72400	236	10,281.94	7,711.79		1,733.67	836.48	9445.46	\$ 0.14	\$ 0.13 \$ 3.54
5/4/2013	6/4/2013	92000	224	14,547.10	9,197.49		4,555.67	793.94	13753.16	\$ 0.16	\$ 0.15 \$ 3.54
6/5/2013	7/3/2013	101600	256	15,754.61	9,617.19		5,230.05	907.37	14847.24	\$ 0.16	\$ 0.15 \$ 3.54
7/4/2013	8/2/2013	90000	180	13,582.15	8,595.52		4,348.64	637.99	12944.16	\$ 0.15	\$ 0.14 \$ 3.54
8/3/2013	9/3/2013	96800	236	14,219.33	8,741.04		4,641.81	836.48	13382.85	\$ 0.15	\$ 0.14 \$ 3.54
9/4/2013	10/2/2013	82800	236	10,846.95	7,476.84		2,533.63	836.48	10010.47	\$ 0.13	\$ 0.12 \$ 3.54
10/3/2013	10/31/2013	83600	408	11,313.25	7,549.08		2,318.05	1,446.12	9867.13	\$ 0.14	\$ 0.12 \$ 3.54
11/1/2013	12/3/2013	114400	428	15,069.06	10,330.32		3,221.74	1,517.00	13552.06	\$ 0.13	\$ 0.12 \$ 3.54
12/4/2013	1/3/2014	125200	416	16,327.68	11,305.56		3,547.65	1,474.47	14853.21	\$ 0.13	\$ 0.12 \$ 3.54

Dr. E. Alma Flagg	Start Date	End Date	Months
150 3rd St., 07104	1/5/2012	1/3/2014	23
Account Number 2147483647			
Meter Number 778020203			

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

Total Usage	1,215,200	kwh
Total Charges	\$165,163	
Blended Rate	\$0.14	\$/kWh
Consumption Rate	\$0.12	\$/kWh
Demand Rate	\$3.54	\$/kW
Max Demand	432	kW
Min Demand	180	kW
Avg Demand	321	kW

Dr. E. Alma Flagg - Electric Usage - Meter No.: 778020203



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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APPENDIX B

Equipment Inventory

**Newark Schools
CHA Project# 27999
Dr. E. Alma Flagg**

[illegible]

Cost of Electricity:

\$0.125	\$/kWh
\$3.54	\$/kW

			EXISTING CONDITIONS								Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
105LED	1st Floor Hallway	Hallways	40	W 32 F 1	F41LL	32	1.28	Breaker	6240	7,987	None	
18LED	Room CR124-Break Room	Staff Lounge	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	None	
20LED	Mechanical Room	Mechanical Room	18	S 32 C F 1 (ELE)	F41LL	32	0.58	SW	1000	576	None	
50LED	Men's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Women's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
18LED	Room 124	Classrooms	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	3600	2,419	OCC	
18LED	Room 125A	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Room 125B	Classrooms	7	T 32 R F 4 (ELE)	F44ILL	112	0.78	SW	3600	2,822	OCC	
18LED	Room 131	Classrooms	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	3600	2,419	OCC	
50LED	Men's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Women's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
18LED	Classroom 143	Classrooms	12	T 32 R F 4 (ELE)	F44ILL	112	1.34	SW	3600	4,838	OCC	
18LED	Classroom 145	Classrooms	12	T 32 R F 4 (ELE)	F44ILL	112	1.34	SW	3600	4,838	OCC	
18LED	Classroom 144	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 147	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 150	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 148	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 151	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 152	Classrooms	9	T 32 R F 4 (ELE)	F44ILL	112	1.01	SW	3600	3,629	OCC	
18LED	Classroom 149	Classrooms	11	T 32 R F 4 (ELE)	F44ILL	112	1.23	SW	3600	4,435	OCC	
18LED	Main Office	Offices	18	T 32 R F 4 (ELE)	F44ILL	112	2.02	SW	4160	8,387	OCC	
50LED	Lobby	Hallways	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	6240	749	None	
105LED	Hallway	Hallways	28	W 32 F 1	F41LL	32	0.90	Breaker	6240	5,591	None	
105LED	Stairs	Hallways	3	W 32 F 1	F41LL	32	0.10	Breaker	6240	599	None	
105LED	Classroom 227	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 226	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 225	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 224	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 223	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 243	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 242	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 240	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 239	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 238	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 237	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 236	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 235	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Classroom 234	Classrooms	9	W 32 F 1	F41LL	32	0.29	SW	3600	1,037	OCC	
105LED	Second Floor Mechanical Room	Mechanical Room	20	W 32 F 1	F41LL	32	0.64	SW	1000	640	None	
105LED	Room 227-Media Center	Classrooms	42	W 32 F 1	F41LL	32	1.34	SW	3600	4,838	OCC	
50LED	Men's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Women's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Men's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Women's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
18LED	Room 214-Teachers Lounge	Staff Lounge	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3600	1,613	OCC	
50LED	Room 214-Teachers Lounge	Staff Lounge	1	W 32 W P 2 (ELE)	F42LL	60	0.06	SW	3600	216	OCC	
18LED	Classroom 213	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3600	1,613	OCC	
18LED	Classroom 214	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3600	1,613	OCC	
18LED	Guidance	Offices	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4160	932	OCC	
198LED	Social Work Hallway	Hallways	5	2T 17 R F 2 (ELE) REFLECTOR	F22LL	31	0.16	SW	6240	967	None	
18LED	Social Work Hallway	Hallways	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	6240	1,398	None	
18LED	Social Work Office	Private Office	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4160	932	OCC	
18LED	Social Work Office	Private Office	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4160	932	OCC	
18LED	Social Work Office	Private Office	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4160	932	OCC	
18LED	Social Work Office	Private Office	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	4160	932	OCC	
18LED	Room 233	Offices	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	4160	2,796	OCC	
7LED	Room 234	Offices	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.06	SW	4160	250	OCC	
18LED	Staff Bathroom	Restrooms	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2600	291	OCC	
18LED	Staff Bathroom	Restrooms	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2600	291	OCC	
18LED	Staff Bathroom	Restrooms	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2600	291	OCC	
18LED	Room 241	Classrooms	21	T 32 R F 4 (ELE)	F44ILL	112	2.35	SW	3600	8,467	OCC	
20LED	2nd Floor Hallways	Hallways	72	S 32 C F 1 (ELE)	F41LL	32	2.30	SW	6240	14,377	None	
40LED	Art Studio Lobby	Hallways	8	T 32 R F 2 (ELE)	F42LL	60	0.48	SW	6240	2,995	None	
50LED	Men's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
50LED	Women's Bathroom	Restrooms	2	W 32 W P 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
18LED	Art Studio	Classrooms	13	T 32 R F 4 (ELE)	F44ILL	112	1.46	SW	3600	5,242	OCC	
18LED	Computer Room (locked)	Classrooms	13	T 32 R F 4 (ELE)	F44ILL	112	1.46	SW	3600	5,242	OCC	
40LED	Room 233A	Storage Areas	1	T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1300	78	None	
40LED	Book Storage	Storage Areas	4	T 32 R F 2 (ELE)	F42LL	60	0.24	SW	1300	312	None	
185LED	Book Storage	Storage Areas	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	1300	447	None	
105LED	Stairs	Hallways	4	W 32 F 1	F41LL	32	0.13	Breaker	6240	799	None	

Cost of Electricity:

\$0.125	\$/kWh
\$3.54	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	Usage Describe Usage Type using Operating Hours	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code Lighting Fixture Code	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Retrofit control device	Notes
105LED	Stairs	Hallways	4	W 32 F 1	F41LL	32	0.13	Breaker	6240	799	None	
18LED	Cafeteria	Cafeteria	42	T 32 R F 4 (ELE)	F44ILL	112	4.70	SW	3400	15,994	C-OCC	
29	Stage	Cafeteria	15	CR 22 C F 1 (MAG)	FC8/1	26	0.39	SW	3400	1,326	None	
18LED	AV Stage Room	Cafeteria	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	3400	381	None	
18LED	Kitchen	Cafeteria	16	T 32 R F 4 (ELE)	F44ILL	112	1.79	SW	3400	6,093	None	
40LED	Back of House	Cafeteria	2	T 32 R F 2 (ELE)	F42LL	60	0.12	SW	3400	408	None	
252	Gym	Gymnasium	25	T 54 W F 6 (ELE) (T-5)	F46GHL	351	8.78	SW	3000	26,325	C-OCC	
18LED	Gym Office	Offices	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	4160	1,398	OCC	
226LED	Exterior	Outdoor Lighting	8	70 High Pressure Sodium	HPS70/1	95	0.76	Breaker	4368	3,320	None	
Total			737				56.22			207,804		

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
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Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$	0.136	\$/kWh blended	0.000420205	75,405	Electric	Natural Gas	Fuel Oil
\$	0.125	\$/kWh supply	1,215,200	0.000420205	\$ 165,163	\$ -	
\$	3.54	\$/kW	432.0				
\$	1.00	\$/Therm	-	0.00533471			
\$	7.55	\$/kgals	449	0			

(estimate)

Recommended?

Y or N

Dr. E. Alma Flagg

	Item	Savings					Cost	Simple Payback	Life Expectancy	Equivalent CO ₂ (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR
		kW	kWh	therms	Water kgal	\$								kW	kWh	therms	kgal/yr	\$			
ECM-1	Install Door Seals	0.0	13,655	0	0	1,856	\$ 6,453	3.5	10	5.7		N	3.5	0.0	136,554	0	0	\$ 18,560	1.9	\$9,379	25.9%
ECM-2	Replace Electric Heating System with Natural Gas Heating System	0.0	440,393	(16,367)	0	43,489	\$ 104,499	2.4	24	97.7	\$ 2,625	N	2.3	0.0	10,569,432	(392,800)	0	\$ 1,043,734	9.0	\$634,634	42.7%
ECM-3	Replace Existing Chiller with High Efficiency Chiller	25.5	51,789	0	0	8,124	\$ 209,800	25.8	23	21.8	\$ 1,200	N	25.7	586.8	1,191,142	0	0	\$ 186,852	(0.1)	(\$75,012)	-0.9%
ECM-4	Install Premium Efficiency Motors and VFDs	7.7	1,376	0	0	515	\$ 13,530	26.2	15	0.6	\$ 360	N	25.5	115.9	20,633	0	0	\$ 7,732	(0.4)	(\$7,016)	-6.0%
ECM-5	Install Full DDC Controls	0.0	498,755	0	0	67,788	\$ 364,921	5.4	15	209.6		N	5.4	0.0	7,481,328	0	0	\$ 1,016,817	1.8	\$444,326	16.8%
ECM-6	Replace Electrical DHW Heater with Natural Gas Unit	45.0	41,549	(1,145)	0	6,416	\$ 29,108	4.5	18	11.4	\$ 600	N	4.4	810.0	747,876	(20,612)	0	\$ 115,486	3.0	\$59,733	21.9%
ECM-7	Low Flow Plumbing Fixtures	0.0	0	0	145	1,092	\$ 138,400	126.7	30	0.0		N	126.7	0.0	0	4,340	\$ 32,770	(0.8)	(\$116,990)	-7.6%	
ECM-L1	Lighting Replacements / Upgrades	25.7	98,249	0	0	13,346	\$ 122,112	9.1	10	41.3	\$ 800	N	9.1	257.5	982,492	0	0	\$ 144,485	0.2	(\$7,470)	1.8%
ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	40,332	0	0	5,029	\$ 7,850	1.6	10	16.9	\$ 1,210	N	1.3	0.0	403,318	0	0	\$ 54,817	6.0	\$36,258	75.5%
ECM-L3	Lighting Replacements with Controls (Occupany Sensors)	25.7	120,054	0	0	16,065	\$ 129,962	8.1	10	50.4	\$ 2,010	N	8.0	257.5	1,200,538	0	0	\$ 174,120	0.3	\$9,082	4.4%
Total (Does Not Include ECM-L1 & ECM-L2)		104.0	1,167,570	(17,512)	0	\$ 145,345	\$ 996,673	6.9	18	397	\$ 6,795		6.8	1,770	21,347,503	(413,412)	4,340	\$ 2,596,072	1.6	\$ 1,009,127	13.1%
Total Measures with Payback <15 % of Existing		70.7	1,114,406	(17,512)	0	\$ 135,613	\$ 634,943	4.7	15	375	\$ 5,235		4.6	1,067	20,135,727	(413,412)	0	\$ 2,368,718	2.7	\$ 989,234	20.2%
		16%	92%	-100%	0%																

City:		Newark, NJ				
Occupied Hours/Week		70	70	70	70	50
		Building	Auditorium	Gymnasium	Library	Classrooms
Temp	Enthalpy h (Btu/lb)	Operating Hours	Occupied Hours	Occupied Hours	Occupied Hours	Occupied Hours
102.5						
97.5	35.4	6	3	3	3	2
92.5	37.4	31	13	13	13	9
87.5	35.0	131	55	55	55	39
82.5	33.0	500	208	208	208	149
77.5	31.5	620	258	258	258	185
72.5	29.9	664	277	277	277	198
67.5	27.2	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	334	139	139	139	99
22.5	7.0	252	105	105	105	75
17.5	5.4	125	52	52	52	37
12.5	3.7	47	20	20	20	14
7.5	2.1	34	14	14	14	10
2.5	1.3	1	0	0	0	0
-2.5						
-7.5						

8,760

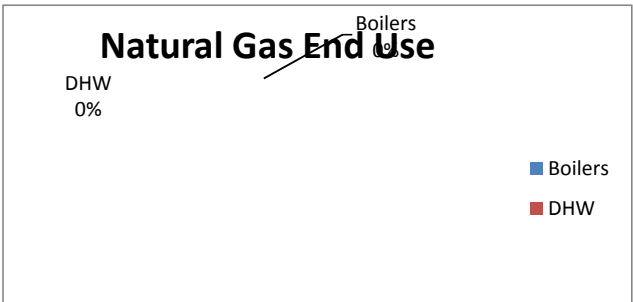
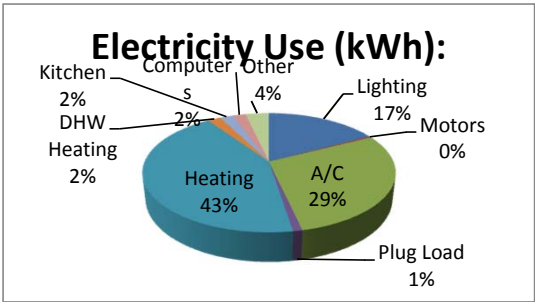
Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

Heating	
Hours	4,427 Hrs
Weighted Avg	40 F
Avg	29 F

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

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
1,215,200	Total	Based on utility analysis
207,804	Lighting	From Lighting Calculations
4,277	Motors	Estimated
352,408	A/C	Based on Chiller Replacement
12,152	Plug Load	Estimated
522,536	Heating	Based on Full DDC Controls Calculation
24,304	DHW Heating	Calculated based on nameplate data
24,304	Kitchen	Estimated
24,304	Computers	Estimated
43,111	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
-	Total	Based on utility analysis
0	Boilers	Therms/SF x Square Feet Served
0	DHW	Based on utility analysis



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ECM-1: Install Door Seals

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

Heating System Efficiency	80%	Ex Occupied Cing Temp.	80 °F	Ex Occupied Htg Temp.	80 °F
Cooling System Efficiency	1.20 kW/ton	Ex Unoccupied Cing Temp.	85 °F	Ex Unoccupied Htg Temp.	68 °F
Linear Feet of Door Edge	182 LF	Cooling Occ Enthalpy Setpoint	31.4 Btu/lb	Electricity	\$ 0.14 \$/kWh
Existing Infiltration Factor*	1.5 cfm/LF	Cooling Unocc Enthalpy Setpoint	34.8 Btu/lb	Natural Gas	\$ 1.00 \$/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				
A		B	C	D	E	F	G	H	I	J	K	L
102.5	0.0	0	0	0	38,575	42,752	11,572	12,826	0	0	0	0
97.5	35.4	6	3	4	-4,923	-746	-1,477	-224	1	0	0	0
92.5	37.4	31	13	18	-7,373	-3,197	-2,212	-959	15	5	0	0
87.5	35.0	131	55	76	-4,404	-227	-1,321	-68	26	8	0	0
82.5	33.0	500	208	292	-2,023	0	-607	0	42	13	0	0
77.5	31.5	620	258	362	737	0	221	0	0	0	2	1
72.5	29.9	664	277	387	2,211	0	663	0	0	0	8	2
67.5	27.2	854	356	498	3,686	147	1,106	44	0	0	17	5
62.5	24.0	927	386	541	5,160	1,622	1,548	486	0	0	36	11
57.5	20.3	600	250	350	6,634	3,096	1,990	929	0	0	34	10
52.5	18.2	730	304	426	8,108	4,570	2,432	1,371	0	0	55	17
47.5	16.0	491	205	286	9,582	6,044	2,875	1,813	0	0	46	14
42.5	14.5	656	273	383	11,057	7,518	3,317	2,256	0	0	74	22
37.5	12.5	1,023	426	597	12,531	8,993	3,759	2,698	0	0	134	40
32.5	10.5	734	306	428	14,005	10,467	4,201	3,140	0	0	110	33
27.5	8.7	334	139	195	15,479	11,941	4,644	3,582	0	0	56	17
22.5	7.0	252	105	147	16,953	13,415	5,086	4,025	0	0	47	14
17.5	5.4	125	52	73	18,428	14,889	5,528	4,467	0	0	26	8
12.5	3.7	47	20	27	19,902	16,364	5,971	4,909	0	0	10	3
7.5	2.1	34	14	20	21,376	17,838	6,413	5,351	0	0	8	2
2.5	1.3	1	0	1	22,850	19,312	6,855	5,794	0	0	0	0
-2.5	0.0	0	0	0	24,324	20,786	7,297	6,236	0	0	0	0
-7.5	0.0	0	0	0	25,799	22,260	7,740	6,678	0	0	0	0
TOTALS		8,760	3,650	5,110					85	25	663	199

Existing Door Infiltration	273 cfm	Savings	13,596 kWh	\$ 1,848	Converted to kWh
Existing Unoccupied Door Infiltration	273 cfm		59 kWh	\$ 8	
Proposed Door Infiltration	82 cfm			\$ 1,856	
Proposed Unoccupied Door Infiltration	82 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	10	50%	0.0625
1b	3	7	20	0.125	bottom/seam	10	50%	0.0625
2a	3	7	20	0.125	bottom/seam	10	50%	0.0625
2b	3	7	20	0.125	bottom/seam	10	50%	0.0625
3a	3	7	20	0.125	bottom/seam	10	50%	0.0625
3b	3	7	20	0.125	bottom/seam	10	50%	0.0625
4a	3	7	20	0.125	bottom/seam	10	50%	0.0625
4b	3	7	20	0.125	bottom/seam	10	50%	0.0625
5a	3	7	20	0.125	bottom/seam	10	50%	0.0625
5b	3	7	20	0.125	bottom/seam	10	50%	0.0625
6a	3	7	20	0.125	bottom/seam	10	50%	0.0625
6b	3	7	20	0.125	bottom/seam	10	50%	0.0625
7a	3	7	20	0.125	bottom/seam	10	50%	0.0625
7b	3	7	20	0.125	bottom/seam	10	50%	0.0625
8	3	7	20	0.125	bottom	3	15%	0.01875
9	3	7	20	0.125	bottom	3	15%	0.01875
10	3	7	20	0.125	bottom	3	15%	0.01875
11	3	7	20	0.125	bottom	3	15%	0.01875
12	3	7	20	0.125	bottom	3	15%	0.01875
13	3	7	20	0.125	bottom	3	15%	0.01875
14	3	7	20	0.125	bottom	3	15%	0.01875
15	3	7	20	0.125	bottom	3	15%	0.01875
16	3	7	20	0.125	bottom	3	15%	0.01875
17	3	7	20	0.125	bottom	3	15%	0.01875
18	3	7	20	0.125	bottom	3	15%	0.01875
19	3	7	20	0.125	bottom	3	15%	0.01875
20	3	7	20	0.125	bottom	3	15%	0.01875
21	3	7	20	0.125	bottom	3	15%	0.01875
Total	84	196	560	0.125		182	33%	0.041

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

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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Install Door Seals - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Door Weatherization Seals & Sweeps	28	EA	\$ 40	\$ 115	\$ -	\$ 1,150	\$ 4,012	\$ -	\$ 5,162	
						\$ -	\$ -	\$ -	\$ -	

\$ 5,162	Subtotal
\$ 1,291	25% Contingency
\$ 6,453	Total

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ECM-2: Replace Electric Heating System with Natural Gas Heating System

Electrical Savings and proposed gas use from boiler replacement

Existing Fuel

Electric ▼

Proposed Fuel

Nat.Gas ▼

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 0.14	/ kWh	
Proposed Fuel Cost	\$ 0.99	/ Therm	Estimated \$/therm based on buildings of similar size
Baseline Fuel Use	440,393	kWh	Estimated based on square footage
Existing Boiler Plant Efficiency	98%		Estimated or Measured
Baseline Boiler Load	1,473,000	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 3.413 Mbtu/kWh
Baseline Fuel Cost	\$ 59,856		
Proposed Boiler Plant Efficiency	90%		New Boiler Efficiency
Proposed Fuel Use	16,367	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	\$ 16,203		
Estimated Annual Savings	440,393	kWh	

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

Newark Board of Education - NJBPU

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Dr. E. Alma Flagg

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-2: Replace Electric Heating System with Natural Gas Heating Equipment:

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Aerco BMK1.5 w/ condensate neutraliz	2	EA	\$ 27,500	\$ 5,300		\$ 56,485	\$ 13,208	\$ -	\$ 69,693	
Flue Installation	25	LF	\$ 75.0	\$ 15.00		\$ 1,926	\$ 467	\$ -	\$ 2,393	
Reprogram DDC system	2	EA	\$ 100.0	\$ 350.00		\$ 205	\$ 872	\$ -	\$ 1,078	
Miscellaneous Electrical	2	LS	\$ 500	\$ 250		\$ 1,027	\$ 623	\$ -	\$ 1,650	
Miscellaneous HW Piping	2	LS	\$ 2,000	\$ 1,000		\$ 4,108	\$ 2,492	\$ -	\$ 6,600	
Gas Piping	50	LF	\$ 32.50	\$ 6.50	\$ 2.00	\$ 1,669	\$ 405	\$ 112	\$ 2,186	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 83,599	Subtotal
\$ 20,900	25% Contingency
\$ 104,499	Total

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

ECM-3: Replace Existing Chiller with High Efficiency Chiller

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 3.54	/ kW	
	\$ 0.12	/ kWh	
FORMULA CONSTANTS			
Peak Duty Cycle	67%		NJ Protocols
Equivalent full Load Hours	1,360	hrs	NJ Protocols
Capacity of Chillers	200	tons	
PART-LOAD OPERATION			
Baseline IPLV	0.67	kW/ton	
Proposed IPLV	0.55	kW/ton	
Demand Savings	16.2	kW	
Energy Savings	32,912	kWh	
FULL LOAD OPERATION			
Baseline FLV	0.70	kW/ton	
Proposed FLV	0.63	kW/ton	
Demand Savings	9.3	kW	
Energy Savings	18,877	kWh	
ENERGY SAVINGS			
Demand Savings	26	kW	
Energy Savings	51,789	kWh	
Cost Savings	\$ 6,548		

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-3: Replace Existing Chiller with High Efficiency Chiller - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Existing (2) demolition	3	EA	\$ 500	\$ 1,500		\$ 1,541	\$ 5,607	\$ -	\$ 7,148	
(1) Chillers, Centrifugal water chillers	1	EA	\$129,500	\$ 15,000		\$132,997	\$ 18,690	\$ -	\$ 151,687	
- Reprogram DDC system for (1) chiller	2	EA	\$ 500	\$ 300		\$ 1,027	\$ 748	\$ -	\$ 1,775	
Electrical - misc.	1	LS	\$ 1,000	\$ 5,000		\$ 1,027	\$ 6,230	\$ -	\$ 7,257	
						\$ -	\$ -	\$ -	\$ -	

\$ 167,866	Subtotal
\$ 41,966	25% Contingency
\$ 209,800	Total

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

ECM-4: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

Variable Inputs

Electric Rate	\$0.14	\$/kWh
Demand Rate	\$3.54	\$/kW

MOTOR SCHEDULE										Savings Factor		Existing Motor Energy		Proposed Motor Energy		Energy Savings		
Motor ID	Motor Type	Qty	HP	Total HP	Upgrade Motor	Load Factor	Existing Motor Eff.	New Motor Eff.	Annual Hours	Demand Savings Factor	Energy Savings Factor	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)	
HWP-1	AF/BI	2	3.0	6.0	Y	0.75	81.0%	92.0%	4,380	0.448	0.475	-	-	2.2	10.121	2.2	10.121	
Total:															2.2	10.121		
															\$	8	\$	1,376

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
VFD	2	EA	\$ 1,575	\$ 431		\$ 3,235	\$ 1,073	\$ -	\$ 4,308	
Motor	2	EA	\$ 326	\$ 79		\$ 669	\$ 196	\$ -	\$ 865	
Electrical - misc.	2	LS	\$ 1,000	\$ 500		\$ 2,054	\$ 1,246	\$ -	\$ 3,300	
VAV boxes	2	EA	\$ 405	\$ 84		\$ 832	\$ 208	\$ -	\$ 1,040	
T-stat installation	2	EA	\$ 119	\$ 99		\$ 244	\$ 245	\$ -	\$ 490	
Sheetmetal modification (per box)	2	EA	\$ 400			\$ 822	\$ -	\$ -	\$ 822	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 10,824	Subtotal
\$ 2,706	25% Contingency
\$ 13,530	Total

ECM-5: Install Full DDC Controls

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

Building Information:

75,405	Sq Footage	\$0.14	\$/kWh Blended
Y	Cooling	\$1.00	\$/Therm
Y	Heating		

FULL DDC - TEMPERATURE SETBACK SAVINGS CALCULATION

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	85	hrs
Heating Season Setback Temp	75	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity	1,878,827	Mbtu/yr
Connected Heating Load Capacity	218,855	Btu/hr
Equivalent Full Load Heating Hours	900	hrs
Heating System Efficiency	98%	
Cooling		
Cooling Season Facility Temp	74	F
Weekly Occupied Hours	85	hrs
Cooling Season Setback Temp	79	F
Cooling Season % Savings per Degree Setback	6%	
Connected Cooling Load Capacity	100	Tons
Equivalent Full Load Cooling Hours	381	hrs
Cooling Equipment EER	10.0	
SAVINGS		
Heating Electricity Savings	4,098	kWh
Cooling Electricity Savings	211,128	kWh

FULL DDC - ADDITIONAL CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	1,215,200	kWh
Existing Facility Total Gas usage	-	kWh
Existing Facility Cooling Electric usage	315,952	kWh ¹
Existing Facility Heating Electric usage	401,016	kWh ²
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	15,798	kWh
Proposed Facility Heating Electric Savings	20,051	kWh
SAVINGS		
Electric Savings from DDC System	35,848	kWh

Assumptions

- 26% of facility total electricity dedicated to Cooling; based on utility information
- 33% of facility total natural gas dedicated to Heating; based on utility information
- 5% Typical Savings associated with installation of DDC controls

Nighttime Setback

EXISTING CONDITIONS		
Heating		
Heating Season Facility Temp	80	F
Weekly Occupied Hours	83	hrs
Heating Season Setback Temp	65	F
Heating Season % Savings per Degree Setback	3%	
Annual Boiler Capacity		Mbtu/yr
Connected Heating Load Capacity	218,855	Btu/hr
Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	98%	
Cooling		
Cooling Season Facility Temp	74	F
Weekly Occupied Hours	83	hrs
Cooling Season Setback Temp	80	F
Cooling Season % Savings per Degree Setback	6%	
Connected Cooling Load Capacity	100	Tons
Equivalent Full Load Cooling Hours	381	hrs
Cooling Equipment EER	10.0	
SAVINGS		
Heating Electricity Savings	7,006	kWh ³
Cooling Electricity Savings	204,826	kWh

COMBINED SAVINGS

Electric Savings from DDC System	35,848	kWh
Heating Electricity Savings	31,155	kWh
Cooling Electricity Savings	431,752	kWh
Total Electricity Savings	498,755	kWh
Total Cost Savings	\$ 67,788	
Estimated Total Project Cost	\$364,921	
Simple Payback	5.4	Yrs

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-5: Install Full DDC 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	
Wireless DDC	1	ea	\$207,000	\$ 50,000		\$ 212,589	\$ 62,300	\$ -	\$ 274,889	
						\$ -	\$ -	\$ -	\$ -	

\$ 291,937	Subtotal
\$ 72,984	25% Contingency
\$ 364,921	Total

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

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

Summary

* Replace Electric DHW Heater w/ Condensing, Gas-Fired DHW Heater

Item	Value	Units	Formula/Comments
Occupied days per week	5	days/wk	
Occupied weeks per year	52	week/yr	
Water supply Temperature	55	°F	Temperature of water coming into building
Hot Water Temperature	140	°F	
Hot Water Usage per day	516	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	95,038	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	354	Gallons	Per manufacturer nameplate
Hot Water Temperature	140	°F	Per building personnel
Average 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)	5.0	MBH	
Annual Standby Hot Water Load	43,931	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	138,969	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	98%		Per Manufacturer
Total Annual Energy Required	141,806	Mbtu/yr	
Total Annual Electric Required	41,549	kWh/yr	Electrical Savings
Average Annual Electric Demand	4.74	kW	
Peak Electric Demand	45.00	kW	Per Manufacturer's Nameplate (Demand Savings)
New Tank Size	120	Gallons	tankless
Hot Water Temperature	140	°F	
Average 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)	1.7	MBH	
Annual Standby Hot Water Load	14,892	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	109,930	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on A.O. Smith Cyclone, condensing DHW Heater
Proposed Total Annual Energy Required	114,510	MBTU/yr	
Proposed Fuel Use	1,145	Therms/yr	Standby Losses and inefficient DHW heater eliminatec
Elec Utility Demand Unit Cost	\$3.54	\$/kW	
Elec Utility Supply Unit Cos	\$0.12	\$/kWh	
NG Utility Unit Cost	\$1.00	\$/Therm	
Existing Operating Cost of DHW	\$7,095	\$/yr	
Proposed Operating Cost of DHW	\$1,145	\$/yr	
Annual Utility Cost Savings	\$5,950	\$/yr	

Daily Hot Water Demand

FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	#USES PER DAY		FULL TIME OCCUPANTS**		TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY
			MALE	FEMALE	MALE	FEMALE			
LAVATORY (Low-Flow Lavs use 0.5 GPM)	2.5	0.25	3	3	251	251	941	50%	471
SHOWER	2.5	5	1	1	1	1	25	75%	19
KITCHEN SINK	2.5	0.5	1	1	5	5	13	75%	9
MOP SINK	2.5	2	1	1	1	1	10	75%	8
Dishwasher (gal per use)	10	1	1	0	1	1	10	100%	10
						TOTAL	989		516

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.

**These are the occupant that use the fixtures. If fixture does not exist change to (0).

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-6: Replace Electric DHW Heater w/ Tankless 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	
High Efficiency Gas-Fired DHW Heater	3	EA	\$ 4,000	\$ 280		\$ 12,324	\$ 1,047	\$ -	\$ 13,371	
Miscellaneous Electrical	3	LS	\$ 300			\$ 924	\$ -	\$ -	\$ 924	
Venting Kit	3	EA	\$ 450	\$ 650		\$ 1,386	\$ 2,430	\$ -	\$ 3,816	
Miscellaneous Piping and Valves	3	LS	\$ 200			\$ 616	\$ -	\$ -	\$ 616	
Gas Piping	100	LF	\$ 33	\$ 7	\$ 2	\$ 3,338	\$ 810	\$ 225	\$ 4,372	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 23,287	Subtotal
\$ 5,822	25% Contingency
\$ 29,108	Total

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Urinals in Building to be replaced	16	
Average Flushes / Urinal (per Day)	5	
Average Gallons / Flush	1.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	16	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	\$1,200	
Proposed Installation Cost of new urinal & valve	\$1,000	
Total cost of new urinals & valves	\$35,200	

SAVINGS		
Current Urinal Water Use	43.80	kGal / year
Proposed Urinal Water Use	3.65	kGal / year
Water Savings	40.15	kGal / year
Cost Savings	\$303	/ year
Simple Payback	116.121	years

Newark Board of Education - NJBPU
CHA Project #27999
Dr. E. Alma Flagg

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$7.55	\$ / kGal
Toilets in Building	43	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	43	
Proposed Gallons / Flush	1.28	Gal
Proposed Material Cost of new toilet & valve	\$1,400	
Proposed Installation cost of new toilet & valve	\$1,000	
Total cost of new toilets & valves	\$103,200	

SAVINGS		
Current Toilet Water Use	164.80	kGal / year
Proposed Toilet Water Use	60.27	kGal / year
Water Savings	104.53	kGal / year
Cost Savings	\$789	/ year
Simple Payback	130.7667	years

Newark Board of Education - NJBPU
CHA Project #27999
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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)

Incentive #1		
Total Building Area (Square Feet)	75,405	
Is this audit funded by NJ BPU (Y/N)	Yes	

Board of Public Utilities (BPU)

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$165,163	\$0
Existing Usage (from utility)	1,215,200	0
Proposed Savings	1,114,406	-17,512
Existing Total MMBtus	4,147	
Proposed Savings MMBtus	2,052	
% Energy Reduction	49.5%	
Proposed Annual Savings	\$135,613	

	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	\$3,770
Incentive #2	\$122,585	-\$21,890	\$100,695
Incentive #3	\$122,585	-\$21,890	\$100,695
Total All Incentives	\$245,169	-\$43,779	\$205,160

Total Project Cost	\$634,943
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	Allowable Incentive	
% Incentives #1 of Utility Cost*	2.3%	\$3,770
% Incentives #2 of Project Cost**	15.9%	\$100,695
% Incentives #3 of Project Cost**	15.9%	\$100,695
Total Eligible Incentives***	\$205,160	
Project Cost w/ Incentives	\$429,783	

Project Payback (years)	
w/o Incentives	w/ Incentives
4.7	3.2

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

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

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

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

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

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback						
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kWh/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kWh/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered				
105LED	1st Floor Hallway	40	W 32 F 1	F41LL	32	1.3	Breaker	6240	7,987	40	4 f LED Tube	200732x1	15	0.6	Breaker	6,240	3,744	4,243	0.7	\$	558.01	\$	4,688.00	\$0	8.4			
18LED	Room CR124-Break Room	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
20LED	Mechanical Room	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	1000	576	18	4 f LED Tube	200732x1	15	0.3	SW	1,000	270	306	0.3	\$	51.17	\$	2,109.60	\$0	41.2			
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 f LED Tube	200732x2	30	0.1	SW	2,600	156	156	0.1	\$	22.00	\$	355.40	\$0	16.2			
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 f LED Tube	200732x2	30	0.1	SW	2,600	156	156	0.1	\$	22.00	\$	355.40	\$0	16.2			
18LED	Room 124	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	3600	2,419	6	T 74 R LED	RTL5D50	50	0.3	SW	3,600	1,080	1,339	0.4	\$	182.81	\$	1,417.50	\$0	7.8			
18LED	Room 125A	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Room 125B	7	T 32 R F 4 (ELE)	F44LL	112	0.8	SW	3600	2,822	7	T 74 R LED	RTL5D50	50	0.4	SW	3,600	1,260	1,562	0.4	\$	213.28	\$	1,653.75	\$0	7.8			
18LED	Room 131	6	T 32 R F 4 (ELE)	F44LL	112	0.7	SW	3600	2,419	6	T 74 R LED	RTL5D50	50	0.3	SW	3,600	1,080	1,339	0.4	\$	182.81	\$	1,417.50	\$0	7.8			
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 f LED Tube	200732x2	30	0.1	SW	2,600	156	156	0.1	\$	22.00	\$	355.40	\$0	16.2			
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	4 f LED Tube	200732x2	30	0.1	SW	2,600	156	156	0.1	\$	22.00	\$	355.40	\$0	16.2			
18LED	Classroom 143	12	T 32 R F 4 (ELE)	F44LL	112	1.3	SW	3600	4,838	12	T 74 R LED	RTL5D50	50	0.6	SW	3,600	2,160	2,678	0.7	\$	365.62	\$	2,835.00	\$0	7.8			
18LED	Classroom 145	12	T 32 R F 4 (ELE)	F44LL	112	1.3	SW	3600	4,838	12	T 74 R LED	RTL5D50	50	0.6	SW	3,600	2,160	2,678	0.7	\$	365.62	\$	2,835.00	\$0	7.8			
18LED	Classroom 144	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 147	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 150	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 148	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 151	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 152	9	T 32 R F 4 (ELE)	F44LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTL5D50	50	0.5	SW	3,600	1,620	2,009	0.6	\$	274.21	\$	2,126.25	\$0	7.8			
18LED	Classroom 149	11	T 32 R F 4 (ELE)	F44LL	112	1.2	SW	3600	4,435	11	T 74 R LED	RTL5D50	50	0.6	SW	3,600	1,980	2,455	0.7	\$	335.15	\$	2,588.75	\$0	7.8			
18LED	Main Office	18	T 32 R F 4 (ELE)	F44LL	112	2.0	SW	4160	8,387	18	T 74 R LED	RTL5D50	50	0.9	SW	4,160	3,744	4,643	1.1	\$	626.35	\$	4,252.50	\$0	6.8			
50LED	Lobby	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	6240	749	2	4 f LED Tube	200732x2	30	0.1	SW	6,240	374	49	0.1	\$	49.24	\$	355.40	\$0	7.2			
105LED	Hallway	28	W 32 F 1	F41LL	32	0.9	Breaker	6240	5,591	28	4 f LED Tube	200732x1	15	0.4	Breaker	6,240	2,621	2,970	0.5	\$	390.61	\$	3,281.60	\$0	8.4			
105LED	Stairs	3	W 32 F 1	F41LL	32	0.1	Breaker	6240	599	3	4 f LED Tube	200732x1	15	0.0	Breaker	6,240	281	318	0.1	\$	41.85	\$	351.60	\$0	8.4			
105LED	Classroom 227	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 226	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 225	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 224	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 223	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 243	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 242	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 240	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 239	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 238	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 237	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 236	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 235	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Classroom 234	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,037	9	4 f LED Tube	200732x1	15	0.1	SW	3,600	486	551	0.2	\$	75.19	\$	1,054.80	\$0	14.0			
105LED	Second Floor Mechanical Room	20	W 32 F 1	F41LL	32	0.6	SW	1000	640	20	4 f LED Tube	200732x1	15															

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS					
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per	kW/Space	Exist Control	Annual Hours	Annual kWh		Standard Fixture Code	Fixture Code	Watts per	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh	Annual kWh	Annual kWh	Annual kWh	NJ Smart Start	Simple Payback				
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	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	(kWh/Space) * (Annual Hours)	Number of fixtures after the retrofit	"Lighting Fixture Code" Example 21 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kWh/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kWh) - (Retrofit Annual kWh)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Lighting Incentive	Length of time for renovations cost to be recovered	Simple Payback			
105LED	1st Floor Hallway	40	W 32 F 1	F41LL	32	1.3	Breaker	6240	7,987.2	40	W 32 F 1	F41LL	32	1.3	None	6240	7,987.2	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
18LED	Room CR124-Break Room	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	None	3600	3,628.8	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
20LED	Mechanical Room	18	S 32 C F 1 (ELE)	F41LL	32	0.6	SW	1000	576.0	18	S 32 C F 1 (ELE)	F41LL	32	0.6	None	1000	576.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	W 32 W P 2 (ELE)	F42LL	60	0.1	CCC	2210	265.2	46.8	0.0	\$5.84	\$128.25	\$20.00	22.0	18.6			
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	W 32 W P 2 (ELE)	F42LL	60	0.1	CCC	2210	265.2	46.8	0.0	\$5.84	\$128.25	\$20.00	22.0	18.6			
18LED	Room 124	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	3600	2,419.2	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	2520	1,693.4	725.8	0.0	\$90.50	\$128.25	\$20.00	1.4	1.2			
18LED	Room 125A	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Room 125B	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	SW	3600	2,822.4	7	T 32 R F 4 (ELE)	F44ILL	112	0.8	CCC	2520	1,975.7	846.7	0.0	\$105.58	\$128.25	\$20.00	1.2	1.0			
18LED	Room 131	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	3600	2,419.2	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	2520	1,693.4	725.8	0.0	\$90.50	\$128.25	\$20.00	1.4	1.2			
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	W 32 W P 2 (ELE)	F42LL	60	0.1	CCC	2210	265.2	46.8	0.0	\$5.84	\$128.25	\$20.00	22.0	18.6			
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	2600	312.0	2	W 32 W P 2 (ELE)	F42LL	60	0.1	CCC	2210	265.2	46.8	0.0	\$5.84	\$128.25	\$20.00	22.0	18.6			
18LED	Classroom 143	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	3600	4,838.4	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	CCC	2520	3,386.9	1,451.5	0.0	\$180.99	\$128.25	\$20.00	0.7	0.6			
18LED	Classroom 145	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	3600	4,838.4	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	CCC	2520	3,386.9	1,451.5	0.0	\$180.99	\$128.25	\$20.00	0.7	0.6			
18LED	Classroom 144	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 147	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 150	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 148	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 151	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 152	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	3600	3,628.8	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	CCC	2520	2,540.2	1,088.6	0.0	\$135.74	\$128.25	\$20.00	0.9	0.8			
18LED	Classroom 149	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	3600	4,435.2	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	CCC	2520	3,104.6	1,330.6	0.0	\$165.91	\$128.25	\$20.00	0.8	0.7			
18LED	Main Office	18	T 32 R F 4 (ELE)	F44ILL	112	2.0	SW	4160	8,386.6	18	T 32 R F 4 (ELE)	F44ILL	112	2.0	CCC	3328	6,709.2	1,677.3	0.0	\$209.14	\$128.25	\$20.00	0.6	0.5			
50LED	Lobby	2	W 32 W P 2 (ELE)	F42LL	60	0.1	SW	6240	748.8	2	W 32 W P 2 (ELE)	F42LL	60	0.1	None	6240	748.8	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
105LED	Hallway	28	W 32 F 1	F41LL	32	0.9	Breaker	6240	5,591.0	28	W 32 F 1	F41LL	32	0.9	None	6240	5,591.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
105LED	Stairs	3	W 32 F 1	F41LL	32	0.1	Breaker	6240	599.0	3	W 32 F 1	F41LL	32	0.1	None	6240	599.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
105LED	Classroom 227	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 226	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 225	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 224	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 223	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 243	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 242	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 240	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 239	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 238	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 237	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 236	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 235	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Classroom 234	9	W 32 F 1	F41LL	32	0.3	SW	3600	1,036.8	9	W 32 F 1	F41LL	32	0.3	CCC	2520	725.8	311.0	0.0	\$38.78	\$128.25	\$20.00	3.3	2.8			
105LED	Second Floor Mechanical Room	20	W 32 F 1	F41LL	32	0.6	SW	1000	640.0	20	W 32 F 1	F41LL	32	0.6	None	1000	640.0	0.0	0.0	\$0.00	\$0.00	\$0.00		#DIV/0!			
105LED	Room 227-Media Center	42	W 32 F 1	F41LL	32	1.3	SW	3600	4,838.4	42	W 32 F 1	F41LL	32	1.3	CCC	2520	3,386.9	1,451.5	0.0	\$180.99	\$128.25						

			EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Incentive	Simple Payback						
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(kW/Space) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Simple Payback					
105LED	1st Floor Hallway	40	W 32 F 1	F411L	32	1.3	Breaker	6240	7,987	40	4 fL LED Tube	200732x1	15	0.6	None	6,240	3,744	4,243	0.7	\$ 558.01	\$ 4,688.00	\$ -	8.4	8.4					
18LED	Room CR124-Break Room	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	None	3,600	1,620	2,009	0.6	\$ 274.21	\$ 2,126.25	\$ -	7.8	7.8					
20LED	Mechanical Room	18	S 32 C F 1 (ELE)	F411L	32	0.6	SW	1000	576	18	4 fL LED Tube	200732x1	15	0.3	None	1,000	270	306	0.3	\$ 51.17	\$ 2,109.60	\$ -	41.2	41.2					
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F421L	60	0.1	SW	2600	312	2	4 fL LED Tube	200732x2	30	0.1	OCC	2,210	133	179	0.1	\$ 24.92	\$ 483.65	\$ 20	19.4	18.6					
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F421L	60	0.1	SW	2600	312	2	4 fL LED Tube	200732x2	30	0.1	OCC	2,210	133	179	0.1	\$ 24.92	\$ 483.65	\$ 20	19.4	18.6					
18LED	Room 124	6	T 32 R F 4 (ELE)	F441LL	112	0.7	SW	3600	2,419	6	T 74 R LED	RTLED50	50	0.3	OCC	2,520	756	1,663	0.4	\$ 223.21	\$ 1,545.75	\$ 20	6.9	6.8					
18LED	Room 125A	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Room 125B	7	T 32 R F 4 (ELE)	F441LL	112	0.8	SW	3600	2,822	7	T 74 R LED	RTLED50	50	0.4	OCC	2,520	882	1,940	0.4	\$ 260.41	\$ 1,782.00	\$ 20	6.8	6.8					
18LED	Room 131	6	T 32 R F 4 (ELE)	F441LL	112	0.7	SW	3600	2,419	6	T 74 R LED	RTLED50	50	0.3	OCC	2,520	756	1,663	0.4	\$ 223.21	\$ 1,545.75	\$ 20	6.9	6.8					
50LED	Men's Bathroom	2	W 32 W P 2 (ELE)	F421L	60	0.1	SW	2600	312	2	4 fL LED Tube	200732x2	30	0.1	OCC	2,210	133	179	0.1	\$ 24.92	\$ 483.65	\$ 20	19.4	18.6					
50LED	Women's Bathroom	2	W 32 W P 2 (ELE)	F421L	60	0.1	SW	2600	312	2	4 fL LED Tube	200732x2	30	0.1	OCC	2,210	133	179	0.1	\$ 24.92	\$ 483.65	\$ 20	19.4	18.6					
18LED	Classroom 143	12	T 32 R F 4 (ELE)	F441LL	112	1.3	SW	3600	4,838	12	T 74 R LED	RTLED50	50	0.6	OCC	2,520	1,512	3,326	0.7	\$ 446.41	\$ 2,963.25	\$ 20	6.6	6.6					
18LED	Classroom 145	12	T 32 R F 4 (ELE)	F441LL	112	1.3	SW	3600	4,838	12	T 74 R LED	RTLED50	50	0.6	OCC	2,520	1,512	3,326	0.7	\$ 446.41	\$ 2,963.25	\$ 20	6.6	6.6					
18LED	Classroom 144	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 147	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 150	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 148	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 151	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 152	9	T 32 R F 4 (ELE)	F441LL	112	1.0	SW	3600	3,629	9	T 74 R LED	RTLED50	50	0.5	OCC	2,520	1,134	2,495	0.6	\$ 334.81	\$ 2,254.50	\$ 20	6.7	6.7					
18LED	Classroom 149	11	T 32 R F 4 (ELE)	F441LL	112	1.2	SW	3600	4,435	11	T 74 R LED	RTLED50	50	0.6	OCC	2,520	1,386	3,049	0.7	\$ 409.21	\$ 2,727.00	\$ 20	6.7	6.6					
18LED	Main Office	18	T 32 R F 4 (ELE)	F441LL	112	2.0	SW	4160	8,387	18	T 74 R LED	RTLED50	50	0.9	OCC	3,328	2,995	5,391	1.1	\$ 719.72	\$ 4,380.75	\$ 20	6.1	6.1					
50LED	Lobby	2	W 32 W P 2 (ELE)	F421L	60	0.1	SW	2600	749	2	4 fL LED Tube	200732x2	30	0.1	None	6,240	374	49.24	\$ 355.40	\$ -	7.2	7.2	7.2						
105LED	Hallway	28	W 32 F 1	F411L	32	0.9	Breaker	6240	5,591	28	4 fL LED Tube	200732x1	15	0.4	None	6,240	2,621	2,970	0.5	\$ 390.61	\$ 3,281.60	\$ -	8.4	8.4					
105LED	Stairs	3	W 32 F 1	F411L	32	0.1	Breaker	6240	599	3	4 fL LED Tube	200732x1	15	0.0	None	6,240	281	318	0.1	\$ 41.85	\$ 351.60	\$ -	8.4	8.4					
105LED	Classroom 227	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 226	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 225	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 224	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 223	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 243	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 242	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 240	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 239	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 238	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 237	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 236	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 235	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Classroom 234	9	W 32 F 1	F411L	32	0.3	SW	3600	1,037	9	4 fL LED Tube	200732x1	15	0.1	OCC	2,520	340	697	0.2	\$ 93.37	\$ 1,183.05	\$ 20	12.7	12.5					
105LED	Second Floor Mechanical Room	20	W 32 F 1	F411L	32	0.6	SW	1000	640	2																			

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

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SBC CREDIT PROGRAM



With New Jersey SmartStart Buildings ...

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

Special Notice

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

Visit the Sandy web page for details and important links.

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

[Project Categories](#)

[Custom Measures](#)

[Incentives for Qualifying Equipment and Projects](#)

[Program Terms and Conditions](#)

[Find a Trade Ally](#)

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

Getting Started

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

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

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

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

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

Find out more about equipment incentives

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

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Equipment Incentives

Special Notice

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

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

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

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

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

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



Electric Chillers

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

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

Gas Cooling

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

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

PAST PROGRAMS**TOOLS AND RESOURCES****PROGRAM UPDATES****CONTACT US****Desiccant Systems** (\$1.00 per cfm - gas or electric)**Electric Unitary HVAC**

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

Ground Source Heat Pumps

Closed Loop (\$450-750 per ton)

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

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

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

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

Prescriptive Lighting

New Linear Fluorescent

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

New Induction (\$70 per replaced HID fixture)

New LED

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

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

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

Display case (\$30 per case)

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

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

Parking garage luminaires (\$100 per fixture)

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

Stairwell and Passageway luminaires (\$40 per fixture)

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

Bollard (\$50 per fixture)

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

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

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

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

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

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

Lighting Controls

Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

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

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

HID or Fluorescent Hi-Bay Controls

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

Daylight dimming (\$45 per fixture controlled)

Refrigeration

Covers and Doors

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

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

Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

Food Service Equipment

Cooking

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

Holding

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

Cooling

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

Cleaning

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

Other Equipment Incentives*

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

Custom electric and gas equipment incentives (not prescriptive)

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

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II. DIRECT INSTALL



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NEW JERSEY'S CLEAN ENERGY PROGRAM

DIRECT Install

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

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

ELIGIBILITY



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

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

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



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

III. PAY FOR PERFORMANCE (P4P)



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Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

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



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

Eligibility

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

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

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

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

Visit our website: NJCleanEnergy.com/P4P

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

*Incentives/Requirements subject to change.



002-FY14-04/14

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

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

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

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

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

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

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

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

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

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

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

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

Program Manager – TRC Energy Services.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)



Your Power to Save

At Home, for Business, and for the Future

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

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLSLOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

Energy Savings Improvement Program

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

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

Local Government
School Districts (K-12)

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

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

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

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

FIRST STEP – ENERGY AUDIT

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

ENERGY REDUCTION PLANS

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

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

ESIP PROGRAM

Final version 42413

BPU RULES

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

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

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

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

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

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

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

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

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

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

27999 - Newark Public Schools
Dr. E. Alma Flagg

Cost of Electricity	\$0.136	/kWh
Electricity Usage	1,215,200	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
\$800,000	200.0	249,793	0	\$33,950	0	\$33,950	\$0	\$42,465	23.6	10.5

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= \$170 /1000kwh

Area Output*
3,670 m2
39,499 ft2

Perimeter Output*
289 m
947 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
25,525 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes
8 watt/ft2
204,199 DC watts
200 kW Enter into PV Watts

PV Watts Inputs***
Array Tilt Angle 20 Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth 180 Enter into PV Watts (default)
Zip Code 07107 Enter into PV Watts
DC/AC Derate Factor 0.83 Enter info PV Watts

PV Watts Output
249,793 annual kWh calculated in PV Watts program

% Offset Calc
Usage 1,215,200 (from utilities)
PV Generation 249,793 (generated using PV Watts)
% offset 21%

* <http://www.freemaptools.com/area-calculator.htm>
** <http://www.flettexchange.com>
*** 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:	200.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	166.0 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	13.6 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.78	14609	1986.82
2	3.54	16832	2289.15
3	4.35	22284	3030.62
4	4.95	23621	3212.46
5	5.69	27425	3729.80
6	5.86	26527	3607.67
7	5.73	26485	3601.96
8	5.47	25020	3402.72
9	4.91	22415	3048.44
10	3.99	19442	2644.11
11	2.68	13050	1774.80
12	2.35	12084	1643.42
Year	4.36	249793	33971.85

Output Hourly Performance Data

Output Results as Text

*

[About the Hourly Performance Data](#)

[Saving Text from a Browser](#)

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

Please send questions and comments regarding PVW A T T S to [Webmaster](#)

[Disclaimer and copyright notice](#)



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

APPENDIX F

Photos



1: Electroduct electric boiler should be replaced



4: Existing chiller in mechanical room



2: Un-insulated DHW piping



5: New ERU being installed on outdoor concrete pad



3: A.O. Smith 45000 watt electric DHW heater



6: Two BAC cooling towers

APPENDIX G

EPA Portfolio Manager



ENERGY STAR® Statement of Energy Performance

27

ENERGY STAR®
Score¹

Dr. E. Alma Flagg Elementary School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 75,406
Built: 1984

For Year Ending: May 31, 2013
Date Generated: May 05, 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

Dr. E. Alma Flagg Elementary School
150 3rd 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: 3877121

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

55.1 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu) 4,154,451 (100%)

National Median Comparison

National Median Site EUI (kBtu/ft²) 45.1
National Median Source EUI (kBtu/ft²) 141.5
% Diff from National Median Source EUI 22%

Source EUI

173 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year) 526

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

,
() -



Professional Engineer Stamp
(if applicable)