THE NEWARK PUBLIC SCHOOLS

Group 2 Buildings

NEWARK INNOVATION ACADEMY

190 Mohammad Ali Ave, Newark, NJ 07108

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

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CHA PROJECT NO. 27998

TABLE OF CONTENTS

APPENDICES

REPORT DISCLAIMER

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

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

List of Common Energy Audit Abbreviations

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

1.0 EXECUTIVE SUMMARY

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

Building Name	Address	Square Feet	Construction Date
Newark Innovation Academy	190 Muhammad Ali Ave, Newark, NJ 07108	73,347	1983

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

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings ($)	Payback (years)
Newark Innovation Academy	963,449	(19,698)	115,812	10.0

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

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

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
1	Add Wall and Ceiling Insulation	141,181	10,858	13.0	0	13.0	Y
2	Heating Fuel Conversion	111,106	48,079	2.3	1,400	2.3	Y
3	Heating Hot Water Pump VFDs	7,130	2,746	2.6	1,550	2.0	Y
4	Replace Chillers	227,217	6,446	35.2	6,400	34.3	Y
5	Replace Air Handling Units	175,000	5,568	31.4	0	31.4	Y
6	Full DDC Controls	229,731	10,951	21.0	0	21.0	Y
7	Domestic Hot Water System Improvements	18,092	9,518	1.9	50	1.9	Y
8	Walk-In Cooler/Freezer Controls	41,250	1,243	33.2	0	33.2	Y
9	Vending Machine Controls	840	999	0.8	0	0.8	Y
10	Install Low Flow Plumbing Fixtures	104,528	601	173.8	0	173.8	N
L1**	Lighting Replacements / Upgrades	197,566	19,127	10.3	7,950	9.9	N
L2**	Install Lighting Controls (Occupancy Sensors)	3,240	504	6.4	420	5.6	N
L3	Lighting Replacements with Controls	200,806	19,404	10.3	8,370	9.9	Y
	Total**	**1,256,882**	**116,413**	**10.8**	**17,770**	**10.6**	
	Total (Recommended)	**1,152,354**	**115,812**	**10.0**	**17,770**	**9.8**	

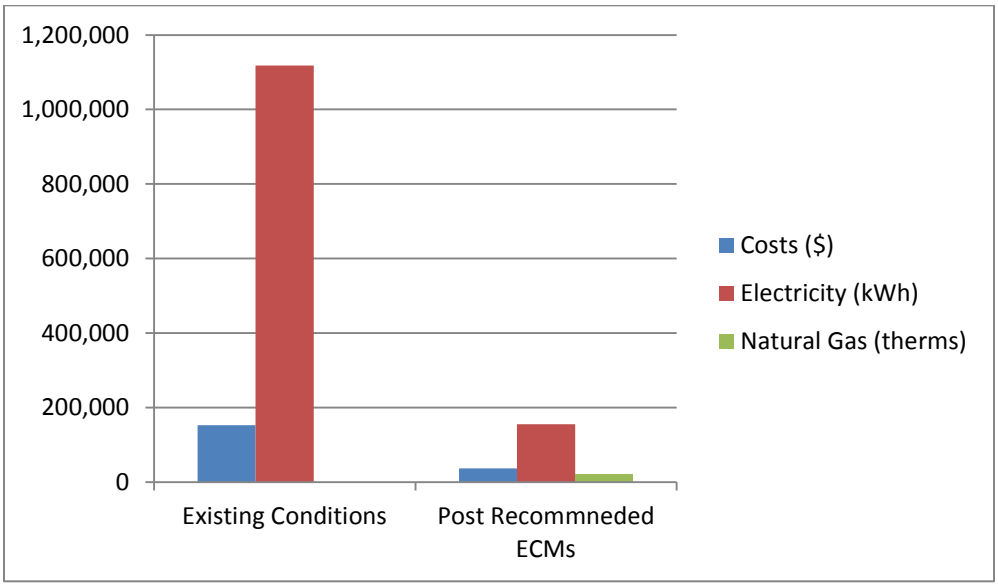
* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

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

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	152,102	36,291	76%
Electricity (kWh)	1,118,400	154,951	86%
Natural Gas (therms)	0	19,698	-100%
Site EUI (kbtu/SF/Yr)	52.0	34.1	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

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

Building Name: Newark Innovation Academy (Index No. 18)
Address: 190 Muhammad Ali Ave, Newark NJ
Gross Floor Area: 73,347 Square Feet
Number of Floors: 2
Year Built: 1983
Additions: None

Description of Spaces: Previously used as an elementary school, now used for administration offices. Classrooms, offices, cafeteria, gymnasium, storage rooms, toilet rooms and mechanical rooms.
Description of Occupancy: There are no students in this building. There are 15 facilities personnel and staff members.
Number of Computers: The building has approximately 35 desktop and laptop computers.
Building Usage: Hours of operation are 7:00 AM – 3:30 PM Monday through Friday. In general, 50 hours per week, 10 months per year

Construction Materials: Steel frame having pre-cast reinforced concrete tilt-up panel exterior walls. Steel bar joist roof support with corrugated metal decking. Interior walls are painted CMU and metal studding having sheetrock finishes. It is assumed that there is minimal rigid insulation within the pre-cast panels. As the exterior walls are solid concrete with corrugated metal decking, there is a fair amount of heat loss through the walls even with a small amount of insulation. An ECM for adding more insulation has been evaluated in Section 5.
Façade: Textured pre-cast concrete
Roof: Flat EPDM membrane with an unknown quantity of rigid insulation. The roof is in good condition and therefore there are no ECMs associated with improving the roof.
Windows: Minimal glazing. Single pane sliding windows having aluminum frames. The windows are in good condition; there are no ECMs associated with the windows.

Exterior Doors: Reinforced insulated fiberglass doors having steel frames. The exterior doors in addition to seals and sweeps are in good condition and do not need to be replaced at this time.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: This building is electrically heated using two Weil McLain 78KW hot water boilers and multiple electric resistance heaters located within Trane air handling equipment. The boilers provide heating hot water to duct mounted coils. Hot water is pumped throughout the building by two (2) 5 HP pumps. The pumps operate at constant speed regardless of how much hot water is needed in the building. An ECM is included in Section 5 which evaluates the installation of VFDs to control the HW pump motors. Air is recirculated to each space by several air handling units having various capacities. The air handling units are located in two mechanical rooms on the second floor and at the ceiling of the gym. All air handling units distribute air through constant volume ducted distribution systems. Stair towers and entrances have supplemental electric cabinet heaters. Mechanical spaces are heated using ceiling mounted electric unit heaters.

Electric heating is more costly than heating with natural gas. Presently the building only has an electric utility service and does not have natural gas. If the building were to set up a natural gas utility; they could generate heat using condensing natural gas fired hot water boilers rather than electric boilers. A fuel switch ECM is provided in Section 5 which evaluates converting from electric heat to natural gas.

Cooling: This building is 100% cooled using a chilled water system. Two Trane reciprocating chillers provide 44F/55F chilled water to coils located within the air handling units. Heat is rejected by two exterior mounted Baltimore Air Coil cooling towers. Chilled and condenser water is pumped at constant flow by base mounted pumps. The chillers are fairly old and are estimated to be 0.70 kW/ton; they can be upgraded with more efficient units which operate at part loads. An ECM is included which evaluates replacing the existing chillers with higher efficiency units.

Ventilation: The heating / cooling air handling units (AHU) can provide outdoor air through ducted exterior louvers and motorized dampers. It does not appear that the dampers are operable. There are six (6) AHUs in this building labeled AC-1,2,3,4,5 and AC-6 which vary in capacity and CFM. The AHUs are outdated and the supply fans run at constant speed regardless of cooling or heating needs. An ECM is included in Section 5 which evaluates replacing the AHUs with new equivalent units.

Exhaust: Each air handling unit has a separate in-line exhaust/ return air fan that provides exhaust of the spaces or re-circulation back to the units. Additionally, there are several smaller general exhaust systems for toilet rooms and the kitchen hood (which is not used).

Controls Systems

The building appears to have an electric controls system although there is evidence of some digital controls. For the most part, the controls are inoperative and the system is manually controlled. Night set-back is not implemented. Heating and cooling is enabled by the building operator based on weather conditions. Pumps and fans run 24/7 /365. The boilers have a Weil McLain sequencing controller, but one boiler is physically turned “off”. All spaces were

overheated at the time of our field. The building would benefit from better controls which could sequence all components of the HVAC system to operate at the highest possible efficiency. An ECM which evaluates the installation of a full DDC system is included in Section 5.

Domestic Hot Water Systems

Domestic hot water is produced by two tank type electric water heaters and re-circulated to all toilet rooms and the kitchen by a fractional horsepower pump. A shell and tube heat exchanger is also available that uses the boiler heating hot water to heat the domestic water. This heat exchanger appears to be valved off and no longer in service. The electric water heaters appear to be sized for the original occupancy of an elementary school having a full kitchen and locker rooms. These areas are no longer used and therefore the water heaters are grossly oversized. An ECM for replacing the existing DHW system with a high efficiency condensing DHW heater with a higher recovery rate is included in Section 5.

Kitchen Equipment

The building does have a full kitchen which includes walk in cooler and freezer, electric cooking equipment (ovens, steam kettle, range) a dishwasher having an electric booster heater and an exhaust hood. The walk in cooler and freezer are still operating while all other equipment is turned off and not in use. An ECM has been included which evaluates installing control systems for the walk-in cooler and walk-in freezer.

Plumbing Systems

There are multiple gang toilet rooms located on each floor that have high-flow plumbing fixtures, assumed to be 3.5 gallon per flush or greater. Lavatory faucets are metering type. Modern electric water coolers are provided in the corridors. Water usage is presumed to be minimal based on the current occupancy. An ECM has been included to evaluate the water savings associated with the installation of low flow plumbing fixtures.

Plug Load

This school has computers, copiers, smart boards, residential appliances (microwave, refrigerator), printers and vending machines which contribute to the plug load in the building. Vending machine controls have been recommended in section 5.0 in order to help reduce the plug load in the building.

Lighting Systems

The lighting in the entire building was replaced approximately four years ago during an energy project. All lights have T-8 28 watt fluorescent lamps. There are a dozen LED screw-in lamps used in the small stage area. The gym uses T-5 HO lamps. All classroom, gym and office lighting is controlled using passive infrared occupancy sensors located at the ceilings. All corridor and stair well lights are controlled by circuit breakers.

Exterior lighting consists of LED wall packs above doors and 250 watt metal halide parking lot lights. There are multiple utility owned cobra head lights that provide additional perimeter lighting. Exterior lighting appears to be daylight senor controlled.

There were no exterior light fixtures on sides of the building which face a public street. Three lighting ECMs alternatives have been evaluated that include adding occupancy sensors to the existing lighting, replacing the lighting with LED lighting and a third ECM that calculates the savings associated with installing occupancy sensors to control the proposed LED lighting.

3.0 UTILITIES

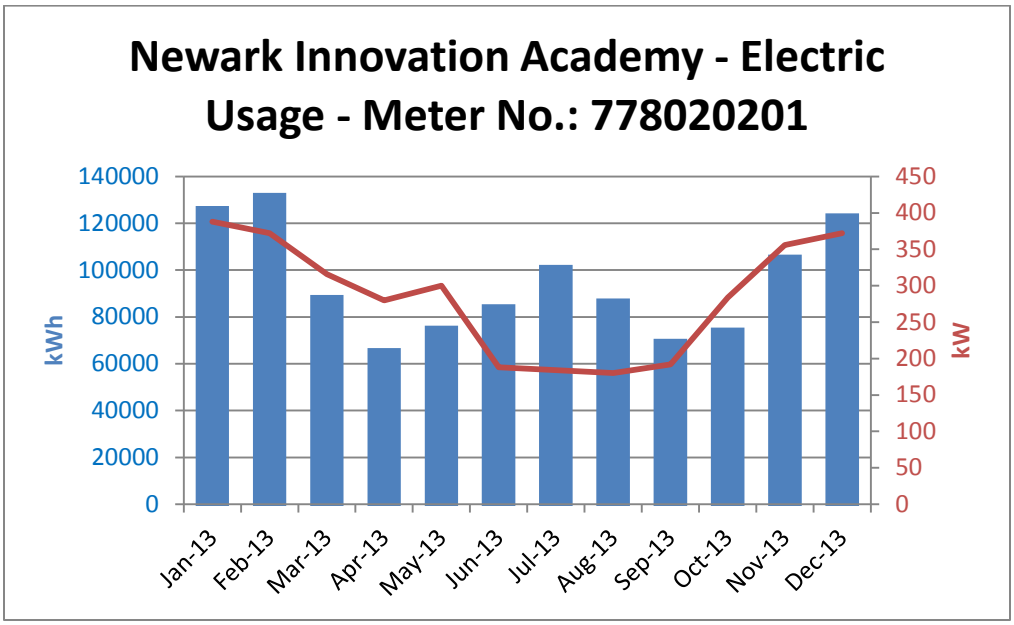
Utilities used by the building are delivered and supplied by the following utility companies:

	Electric
Deliverer	PSEG
Supplier	Nextera Energy Services

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

Electric		
Annual Consumption	1,118,400	kWh
Annual Cost	152,102	$
Blended Unit Rate	0.14	$/kWh
Supply Rate	0.13	$/kWh
Demand Rate	3.54	$/kW
Peak Demand	388	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)



This building uses electricity for both heating and cooling. The usage profile above shows what is expected in this scenario; usage goes up in the winter for heating and up in the summer for cooling. The usage goes down during the shoulder months because not as much heating or cooling is necessary.

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

See Appendix A for a detailed utility analysis.

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

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	School Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.13	$0.12	Y

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

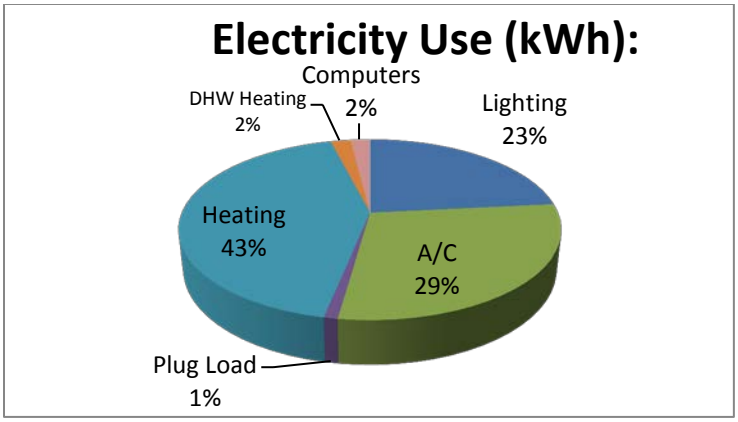
Additional information on selecting a third party energy supplier is available here:

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

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

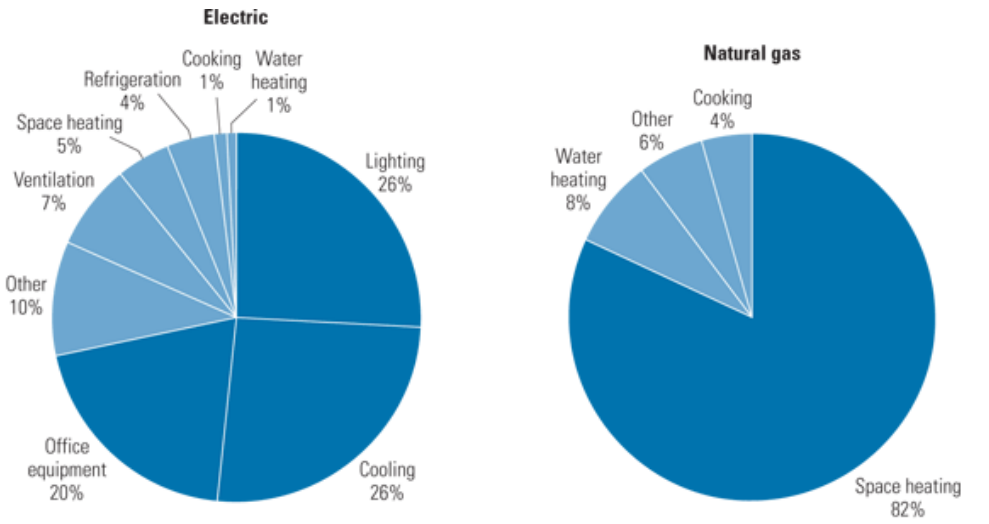
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



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

Typical End-Use Utility Profile for Educational Facilities



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

4.0 BENCHMARKING

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

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

Site EUI kBtu/ft^2/yr	Energy Star Rating (1-100)
52.0*	-**

* Calculated by CHA using Utility Data provided by NPS
** The building is being transitioned to office space from school space. As such, a Portfolio Manager score was not evaluated.

5.0 ENERGY CONSERVATION MEASURES

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

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

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

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Install Wall and Ceiling Insulation

Presently there is minimal rigid board insulation in the walls and ceiling

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

Implementation will include the following work to be done. In order to add insulation to the walls, they will first have to be filled out on the interior side with metal studding then have 3-4" of rigid or 6" of batt-insulation added with sheetrock on top. There are two options for improving the ceiling: the first would include replacing the drop ceiling tiles with 3" thick insulated tiles and installing a new ceiling grid in the corridors as there is currently no grid; the second option would be to remove the existing roof, increase the rigid insulation by 3" and then install a new roof. Pricing for this ECM only includes the wall insulation and first ceiling option.

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

ECM-1 Install Wall and Ceiling Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
141,181	0	79,835	0	10,858	0.5	0	13.0	13.0

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

This measure is recommended.

5.2 ECM-2 Heating Fuel Conversion (Fuel Switch)

The existing boilers are 78kW electric resistance boilers. New modulating condensing natural gas burners are available that minimally operates at 88%, and can operate as high as 95%. For the purpose of this calculation, 90% efficiency is used to remain conservative. Electric heating is significantly more expensive than natural gas on a per-btu basis. This ECM assesses the replacement of the existing electric with new condensing natural gas fired boilers.

To implement this ECM, the building must set up a natural gas utility at the building and replace the old boilers with natural gas fired ones. Piping, venting and wiring modifications would be needed.

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

ECM-2 Heating Fuel Conversion (Fuel Switch)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
111,106	0	480,912	(18,237)	48,079	12.0	1,400	2.3	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 Install Premium Efficiency Motors with VFDs on HHW Pumps

The HHW in the HHW system is currently circulated by pumps that run at constant speed. Installing premium efficiency motors driven by VFDs and two-way valves will save energy when full load operation is not required. As the heating load is reduced and the two-way valves on the HHW coils close, the VFD will slow the motor down to maintain the required system pressure and the energy consumption of the HHW pump motors will be reduced.

The savings of this measure are calculated from the motor efficiency improvement and the motor speed reduction the results when the HHW system is only partially loaded.

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

ECM-3 Install Premium Efficiency Motors with VFDs on HHW Pumps

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
7,130	1.7	21,399	0	2,746	5.3	1,550	2.6	2.0

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

This measure is recommended.

5.4 ECM-4 Replace Chillers

The building is currently cooled with chilled water supplied from two Trane CGHA 100 ton units. The existing chillers are past their service life according to ASHRAE and operate at a lower efficiency than what is currently available. The addition of a high efficiency water cooled chiller was assessed.

The assumption of this calculation is that the operating hours and capacity stay the same while the full load and part load efficiencies differ. The energy savings result from operating a higher efficiency water cooled chiller and variable speed primary pump control. The existing chillers have very limited turndown capacity, and their efficiency has been heavily degraded due to age; also, modern technology equipment has become much more advanced in terms of operating sequences to improve efficiency, reliability and turndown capacity.

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

ECM-4 Replace Chillers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
227,217	21.8	44,173	0	6,446	(0.5)	6,400	35.2	34.3

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

This measure is recommended.

5.5 ECM-5 Replace Air Handling Units

The air handling units are outdated and can be replaced with more modern equipment. New AHUs will have the same size fans as well as cooling and heating coils. Therefore they will be no heating or cooling savings. Savings are derived from better control of the AHU fans. Savings are calculated by replacing the existing AHU supply fan motors with premium efficiency motors that are controlled by VFDs.

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

ECM-5 Replace Air Handling Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
175,000	10.6	40,947	0	5,568	(0.5)	0	31.4	31.4

* 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 Install Full DDC Controls

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

also allows for remote access and control of the building's systems. This ECM is recommended only if the building HVAC system is to be fully renovated to include new boilers, pumps and ventilation equipment as it will optimize the energy savings potential of the new systems.

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

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

ECM-6 Install Full DDC Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
229,731	0	80,525	0	10,951	(0.3)	0	21.0	21.0

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

This measure recommended.

5.7 ECM-7 Domestic Hot Water System Improvements

The existing domestic hot water heating system consists of two (2) electric type DHW heaters connected to an addition storage tank; the combined capacity is 357 gallons. The amount of stored water is oversized for this type of school which only uses hot water at hand sinks.

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

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

ECM-7 Domestic Hot Water System Improvements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
18,092	90	56,661	(1,461)	9,518	7.4	50	1.9	1.9

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

This measure is recommended if ECM-2 is pursued.

5.8 ECM-8 Install Walk-in Cooler / Freezer Controls

Presently there is one (1) walk-in cooler and one (1) walk-in freezer in this building.

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

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

ECM-8 Install Walk-in Cooler / Freezer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
41,250	0	9,142	0	1,243	(0.5)	0	33.2	33.2

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

This measure is recommended.

5.9 ECM-9 Install Vending Misers

The building presently has two (2) cold beverage and one (1) snack-type vending machine in the building.

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

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

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

ECM-9 Install Vending Misers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
840	0	7,343	0	999	16.8	0	0.8	0.8

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

This measure is recommended.

5.10 ECM-10 Install Low Flow Plumbing Fixtures

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

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

ECM-10 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
$	kW	kWh	Therms	kGal	$	%	$	Years	Years
104,528	0	0	0	80	601	(0.8)	0	173.8	173.8

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

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

5.11.1 ECM-L1 Lighting Replacement / Upgrades

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

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

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

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
197,566	37.4	140,296	0	19,127	0.0	7,950	10.3	9.9

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

This measure is not recommended in lieu of ECM L3.

5.11.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

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

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in Section 5.11.1, 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
3,240	0	4,032	0	504	0.7	420	6.4	5.6

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

This measure is not recommended in lieu of ECM L3.

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

This measure is a combination of ECM-L1 and ECM-L2; recommending replace/upgrade the current lighting fixtures to more efficient ones and installing occupancy sensors on

the new lights. Interactive effects of the higher efficiency lights and occupancy sensors lead the energy and cost savings for this measure to not be cumulative or equivalent to the sum of replacing the lighting fixtures alone and installing occupancy sensors without the lighting upgrade. The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200,806	37.4	142,513	0	19,404	0.0	8,370	10.3	9.9

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

This measure is recommended.

5.12 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 AHU filters every year, or when dirty
- Set computers monitors to turn off and computers to sleep mode when not in use
- Look for the ENERGY STAR® label when purchasing 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

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

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

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

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

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

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

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

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

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

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

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

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

Electric

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

Gas

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

Incentive cap: 25% of total project cost

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

Electric

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

Gas

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

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

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

6.1.4 Energy Savings Improvement Plan

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

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

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

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
25,290	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 $155/SREC for 2013 and this number was utilized in the cash flow for this report.

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

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

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

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
800,000	200	249,793	0	33,972	38,718	23.5	11.0	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 building.

Solar Thermal Hot Water Generation

Budgetary Cost	Annual Utility Savings			Total Savings	Incentives*	Payback (without incentives)	Payback (with incentives)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
97,600	0	27,960	0	3,803	0	25.7	25.7	N

*Presently, there are no incentives available for the installation of solar hot water systems.

Note: This measure partially competes with the solar PV ECM because it uses some of the same roof area. This ECM is not recommended due to the long payback and because PV solar is recommended for further study.

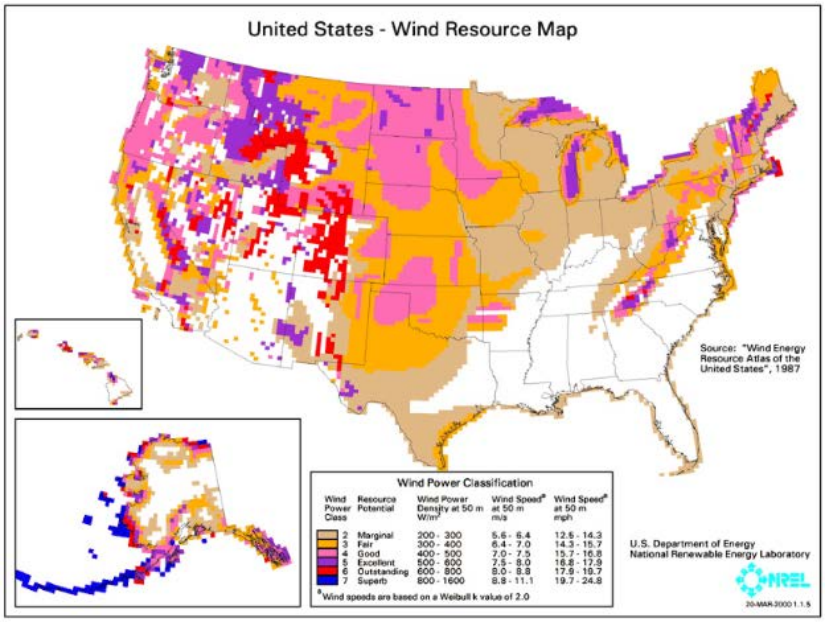
7.2 Solar Daylighting Tubes

The Innovation Academy is unique in that it has very few windows. All interior illumination is provided the lighting systems. The lack of vistas may have a negative impact on the occupants as most workers prefer to have natural light in their office. Adding windows would require a substantial amount of cutting of the exterior pre-stressed concrete walls to accommodate new windows which would be cost prohibitive. Another less intrusive option is to add solar tube skylights. The solar tubes consist of a prismatic lens that gets installed on the roof which is then connected to a 10-12" diameter metal tube which can be extended up to 20 feet down from the roof. Sunlight is captured and magnified by the lens and transferred down the tube to a reflector at the room termination. Generally these are designed for smaller spaces such as corridors, toilet rooms and smaller offices, but multiple units could be installed for larger spaces. The roof penetration must be flashed and sealed to prevent leakage. There are several manufactures of these tubes, such as Solatube and Velux, but the basic designs are similar. By implementing solar tubes, the lighting can be controlled using daylight sensors to provide additional energy savings. The amount of energy savings is difficult to calculate as it is somewhat dependent on each spaces size and lighting needs, but manufactures published data indicates up to a 50% reduction in electric lighting can be obtained for summer months. CHA recommends that a separate evaluation be performed with the assistance of a manufacturer's representative and a lighting design engineer.

7.3 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are mounted onto a tower. Newer wind turbines also use advanced technology to generate electricity at a variety of frequencies depending on the wind speed, convert it to DC and then back to AC before sending it to the grid. Wind turbines range from 50 – 750 kW for utility scale turbines down to below 50 kW for residential use. On a scale of 1 (the lowest) to 7 (the highest), Class 3 and above (wind speeds of 13 mph or greater) are generally considered "good wind resource" according to the Wind Energy Development

Programmatic EIS Information Center hosted by the Bureau of Land Management. According to the map below, published by NREL, Newark, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



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

7.4 Combined Heat and Power Plant

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

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

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

7.5 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
388	180	284	Y	N

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

7.6 Geothermal Heat Pumps

Geothermal heat pumps utilize the relatively constant ground temperature as a heat source/ heat sink which transfers the building's heating and cooling loads. There are two types of geothermal systems; an open loop system uses a pond, stream or body of water to directly transfer the heat from the water to/from the heat pumps. The second, more common system uses a closed loop that circulates water (or commonly glycol) to/ from vertical wells known as "bores" back to the heat pumps. The water (or glycol) within the loop never leaves the piping in a closed loop system making this a more environmentally friendly alternative. Pumps are used to circulate the water (or glycol) from the bore field to the building heat pump loop which then serves each individual unit. Heat pump units range in size from 12,000 BTU/ Hr up to 120,000 BTU/Hr or larger and consist of a refrigeration compressor, condenser coil, evaporator coil and a fan. The heat created by the refrigeration cycle is transferred to/ from each heat pump to the geothermal loop water. During the heating season the loop temperature enters the heat

pumps at 55-60 F and return to the bore field at 30-32 F. In cooling mode, the entering water temperature is still 55-60 F, but returns to the bore field at 70-75 F.

The required bore field size is determined by the monthly peak heating and cooling loads of the building and the heat transfer properties of the ground. Rock for example transfers the heat better than sand or gravel. The depths of the bores (wells) are determined based on the economics of drilling and the available land, but typically range in the 300-400 foot depth for shale which is prevalent in the HTS area. Assuming 400 foot depth bores at 200 ft/ ton estimated quantity of bores for the terminal building would be 60. It may be more cost effective to have fewer deep bores than many shallow bores. All of the bores are connected together underground to form common supply and return headers which then enter the building. The underground piping used is typically a high density polyethylene composite (HDPE). Each bore receives a loop of this piping which is connected at the bottom by a U-bend. Special high heat transfer grout is pumped into each bore to support the piping within the bore.

Geothermal heat pumps system are more energy efficient and emit fewer pollutants than most other heating/cooling systems as there is no combustion process or associated heat transfer losses. Geothermal systems do have relatively high first costs, especially for retro-fit applications due to the need for drilling multiple bores, installation of underground piping, installation of ceiling mounted heat pumps and associated ducting, piping and electrical work. The table below shows the estimated cost, energy savings and simple payback associated with the installation of a geothermal heat pump system for the school:

Geothermal Screening Analysis

Budgetary Cost	Annual Utility Savings			Total Savings	Incentives*	Payback (without incentives)	Payback (with incentives)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N/RS
1,549,425	0	587,124	0	73,390	0	21	21	RS

*There may be incentive program available that would help offset the first cost and reduce the payback period. Before implementing this system, it will be necessary to drill one test well to determine the conductivity (heat transfer) and drilling properties of the area. The cost for this is typically $15,000. Once completed a computer model of the building can be developed to determine accurate equipment sizing and selections.

It is recommended that further, more detailed study be conducted as described above for this alternative energy measure to determine whether this type of system is feasible for this school.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of $115,812/yr with an overall payback of 10.0 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)
963,449	(19,698)	115,812	10.0

The following projects should be considered for implementation:

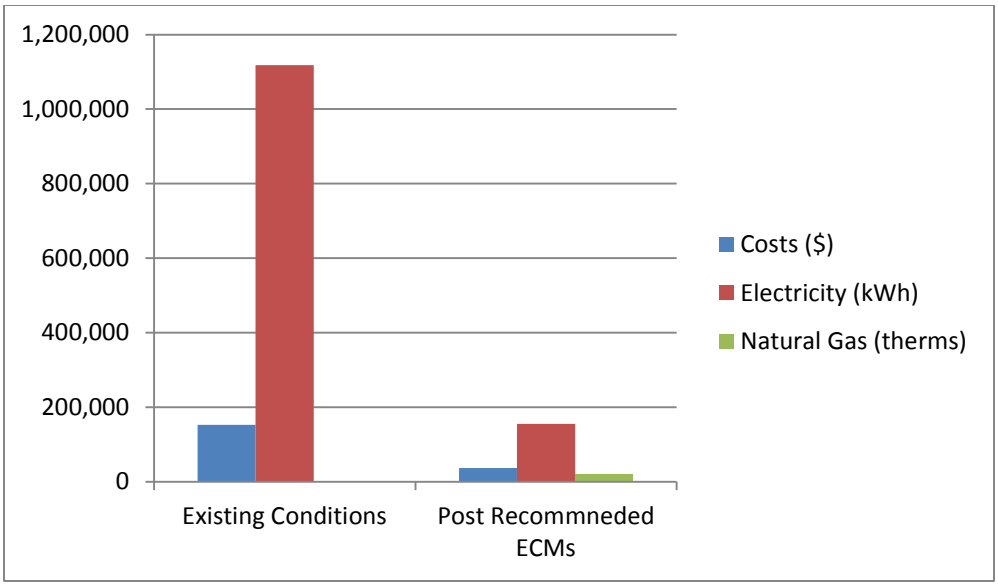
- Add Wall and Ceiling Insulation
- Heating Fuel Conversion
- Heating Hot Water Pump VFDs
- Replace Chiller
- Replace Air Handling Units
- Full DDC Controls
- Domestic Hot Water System Improvements
- Walk-in Cooler/Freezer Controls
- Vending Machine Controls
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

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

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	152,102	36,291	76%
Electricity (kWh)	1,118,400	154,951	86%
Natural Gas (therms)	0	19,698	-100%
Site EUI (kbtu/SF/Yr)	52.0	34.1	



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

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

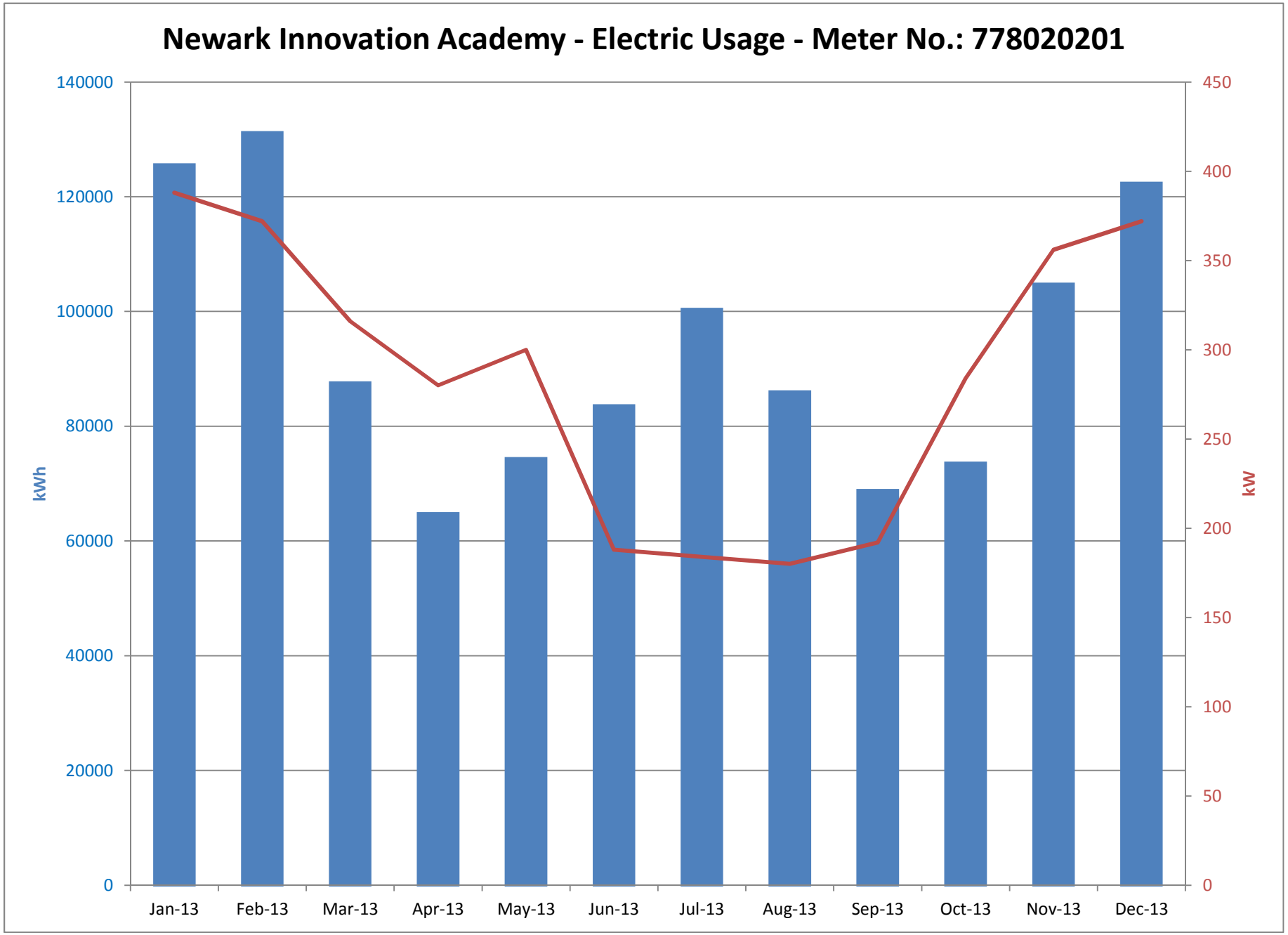
Newark Innovation Academy - Electric Usage

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	99200	308	16,765.00	0	2,282.72	1,073.87	15,691.13	$ 0.17	$ 0.16	$ 3.49
2/3/2012	3/5/2012	95200	308	16,090.00	0	2,170.41	1,073.87	15016.13	$ 0.17	$ 0.16	$ 3.49
3/6/2012	4/3/2012	65200	312	11,020.00	0	1,316.62	1,087.82	9932.18	$ 0.17	$ 0.15	$ 3.49
4/4/2012	5/3/2012	63600	264	10,750.00	0	1,409.93	920.46	9829.54	$ 0.17	$ 0.15	$ 3.49
5/4/2012	6/4/2012	78800	216	13,315.00	0	3,766.61	753.11	12561.89	$ 0.17	$ 0.16	$ 3.49
6/5/2012	7/3/2012	84800	220	12,749.55	7,903.95	4,078.55	767.05	11982.5	$ 0.15	$ 0.14	$ 3.49
7/4/2012	8/2/2012	90000	192	13,205.82	8,446.47	4,089.92	669.43	12,536.39	$ 0.15	$ 0.14	$ 3.49
8/3/2012	8/31/2012	82000	184	12,168.24	7,712.34	3,814.37	641.53	11526.71	$ 0.15	$ 0.14	$ 3.49
9/1/2012	12/3/2012	220000	296	29,179.88	21,102.94	5,538.70	2,538.24	26641.64	$ 0.13	$ 0.12	$ 8.58
12/4/2012	1/3/2013	106800	340	12,927.07	9,198.50	2,541.23	1,187.34	11739.73	$ 0.12	$ 0.11	$ 3.49
1/4/2013	2/1/2013	125200	388	14,813.34	10,417.88	3,020.23	1,375.23	13438.11	$ 0.12	$ 0.11	$ 3.54
2/2/2013	3/5/2013	130800	372	15,146.09	10,840.98	2,986.59	1,318.52	13827.57	$ 0.12	$ 0.11	$ 3.54
3/6/2013	4/4/2013	87200	316	11,310.43	8,270.35	1,920.05	1,120.03	10190.4	$ 0.13	$ 0.12	$ 3.54
4/5/2013	5/3/2013	64400	280	9,226.15	6,852.06	1,381.66	992.43	8233.72	$ 0.14	$ 0.13	$ 3.54
5/4/2013	6/4/2013	74000	300	13,195.30	7,555.82	4,576.15	1,063.33	12131.97	$ 0.18	$ 0.16	$ 3.54
6/5/2013	7/3/2013	83200	188	12,896.93	8,031.19	4,199.39	666.35	12230.58	$ 0.16	$ 0.15	$ 3.54
7/4/2013	8/2/2013	100000	184	14,281.70	8,951.19	4,678.34	652.17	13629.53	$ 0.14	$ 0.14	$ 3.54
8/3/2013	9/3/2013	85600	180	12,549.81	7,729.68	4,182.14	637.99	11911.82	$ 0.15	$ 0.14	$ 3.54
9/4/2013	10/2/2013	68400	192	9,019.41	6,176.52	2,162.37	680.52	8338.89	$ 0.13	$ 0.12	$ 3.54
10/3/2013	10/31/2013	73200	284	9,798.29	6,609.96	2,181.72	1,006.61	8791.68	$ 0.13	$ 0.12	$ 3.54
11/1/2013	12/3/2013	104400	356	13,711.80	9,427.32	3,022.67	1,261.81	12449.99	$ 0.13	$ 0.12	$ 3.54
12/4/2013	1/3/2014	122000	372	15,849.25	11,016.60	3,514.13	1,318.52	14530.73	$ 0.13	$ 0.12	$ 3.54

Harold Wilson (Facilities, Food, Security, IT, Fixed Assets)		Start Date	End Date	Months
190 Muhammad Ali Blvd., 07108		1/5/2012	1/3/2014	23
Account Number	2147483647			
Meter Number	778020201			

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

Total Usage	1,118,400	**kwh**
Total Charges	$151,799	
Blended Rate	$0.14	**$/kWh**
Consumption Rate	$0.12	**$/kWh**
Demand Rate	$3.54	**$/kW**
Max Demand	388	**kW**
Min Demand	180	**kW**
Avg Demand	284	**kW**


Newark Innovation Academy - Electric Usage - Meter No.: 778020201
kWh
kW
140000
120000
100000
80000
60000
40000
20000
0
450
400
350
300
250
200
150
100
50
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13

PSE&G GAS SERVICE TERRITORY
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***CUSTOMER CLASS** - **R – RESIDENTIAL C – COMMERCIAL I - INDUSTRIAL**

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

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

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

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

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

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

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

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

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

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

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

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

Back to the main supplier page

APPENDIX B

Equipment Inventory

Newark Schools
CHA Project# 27999
Newark Innovation Academy

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)
B-1	1	Weil McLain	CE60-128	N/A	Electric Hydronic Boiler	436,864 BTU	MR 157	School	1983	-16
B-2	1	Weil McLain	CE60-128	N/A	Electric Hydronic Boiler	436,864 BTU	MR 157	School	1983	-16
HHW Pumps	2	Bell & Gossett/Baldor	1341N	F1299	Hydronic Heat Pumps	5 HP (2) / 92%	MR 157	HHW	1983	-21
DHW Storage Tank	1	A.O. Smith	TJV 120M	NA	DHW Storage	119 Gal	MR 157	TR Sinks	1995	-4
DHW Heater	2	Ruud Glass	EGL120-45-G	NA	DHW Heater	119 Gal Ea	MR 157	TR Sinks	1995	-4
Cooling Tower	1	BAC	VTO-078-AC	97117191	Cooling Tower	78 Tons	Outside	Cooling/Chillers	1997	3
Chillers	2	Trane	CGHA1001EA51CH3A4 C361BDE	L82H05859	Electric Water Cooled Chiller	100 Ton	MER	Chilled Water Loop	1983	-8
CHW Pumps	3	Bell & Gossett/Baldor	Unknown	N/A	CHW Pumps / Elec	7.5 HP / 85.8%	MR 157	Cooling/CHW Supply	1983	-31
CW Pumps	3	Bell & Gossett/Baldor	Unknown	N/A	CW Pumps / Elec	5 HP / 82%	MR 157	Cooling/Condenser Water	1983	-31
UH	2	Dayton	Unknown	N/A	Unit Heater / Elec	10 kW	MR 157	MR Heat	1983	-31
AHU	1	Trane	Unknown	N/A	Air Handling Unit	1 HP SF	MR 209	Old Locker Room (off)	1983	-31
EF	1	Trane	Unknown	N/A	Exhaust Fan	1/2 HP	MR 209	Old Locker Room (off)	1983	-31
AC-1	1	Trane	Unknown	N/A	AHU	7.5 HP / 86.5%	MR 225			
AC-2	1	Trane	Unknown	N/A	AHU	1 HP SF	MR 225			
AC-3	1	Trane	Unknown	N/A	AHU	5 HP / 87.5%	MR 225			
AC-4	1	Trane	Unknown	N/A	AHU	5 HP / 85%	MR 225			
RF-1	1	Trane	Unknown	N/A	Return Fan	1 HP	MR 225			
RF-2	1	Trane	Unknown	N/A	Return Fan	1/2 HP	MR 225			
RF-3	1	Trane	Unknown	N/A	Return Fan	3/4 HP	MR 225			
RF-4	1	Trane	Unknown	N/A	Return Fan	3/4 HP	MR 225			
UV	2	Unknown	Unknown	N/A	Unit Ventilator/ Elec	Unknown	Sci Lab 200A	Science Lab		
FCU	3	Unknown	Unknown	N/A	Fan Coil / Elec	Unknown	Gym	Gym		
AHU	2	Trane	Unknown	N/A	AHU / Elec	Unknown	Gym Ceiling	Gym		

Energy Audit of Newark Public Schools - Newark Innovation Academy
CHA Project No.27999
Existing Lighting & Audit Input

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
20LED	253 Mech	Mechanical Room	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	1600	83	NONE	
35LED	209 Class	Classrooms	6	T 32 R F 3 (ELE)	F43SSILL	72	0.43	SW	1000	432	C-OCC	
55LED	209 Class	Classrooms	1	2T 17 R F 3 (ELE)	F23ILL	47	0.05	SW	1000	47	C-OCC	
20LED	Corr 260 East	Hallways	22	S 28 P F 1 (ELE)	F41SSILL	26	0.57	BR	6240	3,569	NONE	
20LED	Corr 260 South	Hallways	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	BR	6240	1,947	NONE	
20LED	Corr 260 West	Hallways	28	S 28 P F 1 (ELE)	F41SSILL	26	0.73	BR	6240	4,543	NONE	
20LED	Corr 260 North	Hallways	12	S 28 P F 1 (ELE)	F41SSILL	26	0.31	BR	6240	1,947	NONE	
20LED	Mechanical Room 225	Mechanical Room	22	S 28 P F 1 (ELE)	F41SSILL	26	0.57	SW	1600	915	NONE	
40LED	Mens Room	Restroom	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	4300	413	NONE	
40LED	Womens Room	Restroom	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	4300	413	NONE	
20LED	Stair #1	Hallways	4	S 28 P F 1 (ELE)	F41SSILL	26	0.10	BR	6240	649	NONE	
198LED	Safe Haven (UN)	Classrooms	8	2T 17 R F 2 (ELE)	F22LL	31	0.25	C-OCC	1000	248	NONE	
40LED	Safe Haven Mens	Restroom	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	4300	413	NONE	
40LED	Safe Haven Womens	Restroom	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	4300	413	NONE	
40LED	Community Room 217	Offices	25	T 28 R F 2 (ELE)	F42SSILL	48	1.20	C-OCC	2400	2,880	NONE	
35LED	Parent Center UN-66	Offices	55	T 32 R F 3 (ELE)	F43SSILL	72	3.96	C-OCC	2400	9,504	NONE	
35LED	210	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	211	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	212	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	213	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	214	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	216	Offices	28	T 32 R F 3 (ELE)	F43SSILL	72	2.02	C-OCC	2400	4,838	NONE	
35LED	UN-76	Storage	2	T 32 R F 3 (ELE)	F43SSILL	72	0.14	C-OCC	500	72	NONE	
35LED	Office in 216	Offices	4	T 32 R F 3 (ELE)	F43SSILL	72	0.29	C-OCC	2400	691	NONE	
35LED	200 Office	Offices	11	T 32 R F 3 (ELE)	F43SSILL	72	0.79	C-OCC	2400	1,901	NONE	
35LED	200 Small Office	Offices	4	T 32 R F 3 (ELE)	F43SSILL	72	0.29	C-OCC	2400	691	NONE	
35LED	210 Conference	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	200A Vacant	Vacant	17	T 32 R F 3 (ELE)	F43SSILL	72	1.22	C-OCC	400	490	NONE	
35LED	200A Office #1	Offices	4	T 32 R F 3 (ELE)	F43SSILL	72	0.29	SW	2400	691	C-OCC	
35LED	200A Office #2	Offices	5	T 32 R F 3 (ELE)	F43SSILL	72	0.36	SW	2400	864	C-OCC	
35LED	200A Office #3	Offices	3	T 32 R F 3 (ELE)	F43SSILL	72	0.22	SW	2400	518	C-OCC	
35LED	200A Dark Room	Offices	1	T 32 R F 3 (ELE)	F43SSILL	72	0.07	SW	2400	173	NONE	
35LED	203 Copy/Storage	Storage	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	500	324	NONE	
35LED	205 Office	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	C-OCC	
35LED	208 Vacant	Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	400	259	NONE	
35LED	207 Vacant	Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	400	259	NONE	
35LED	206 Office	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	C-OCC	
35LED	204 Office	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	C-OCC	
20LED	Stair #4	Hallways	5	S 28 P F 1 (ELE)	F41SSILL	26	0.13	BR	6240	811	NONE	
20LED	Stair #5	Hallways	4	S 28 P F 1 (ELE)	F41SSILL	26	0.10	BR	6240	649	NONE	
20LED	Gym 110A Storage	Storage	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	500	26	NONE	
250	Gym 110A	Gymnasium	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.43	SW	1600	7,080	NONE	
35LED	Gym 110A Storage	Storage	1	T 32 R F 3 (ELE)	F43SSILL	72	0.07	SW	500	36	NONE	
40LED	Girls Locker 177	Locker Room	5	T 28 R F 2 (ELE)	F42SSILL	48	0.24	SW	2800	672	NONE	
46LED	Girls Locker 177	Locker Room	1	W 28 C F 2 (ELE)	F42SSILL	48	0.05	SW	2800	134	NONE	
40LED	183	Offices	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	2400	230	C-OCC	
46LED	182 Restroom	Restroom	1	W 28 C F 2 (ELE)	F42SSILL	48	0.05	SW	4300	206	NONE	
20LED	184 Gym Stor	Storage	2	S 28 P F 1 (ELE)	F41SSILL	26	0.05	SW	500	26	NONE	
40LED	198	Offices	2	T 28 R F 2 (ELE)	F42SSILL	48	0.10	SW	2400	230	C-OCC	
40LED	194 Boys Locker Room	Locker Room	5	T 28 R F 2 (ELE)	F42SSILL	48	0.24	SW	2800	672	NONE	
46LED	193 Office	Offices	1	W 28 C F 2 (ELE)	F42SSILL	48	0.05	SW	2400	115	C-OCC	
46LED	193 Boys Locker Room	Locker Room	1	W 28 C F 2 (ELE)	F42SSILL	48	0.05	SW	2800	134	NONE	
20LED	Corridor 198 South	Hallways	10	S 28 P F 1 (ELE)	F41SSILL	26	0.26	BR	6240	1,622	NONE	
20LED	Corridor 198 West	Hallways	28	S 28 P F 1 (ELE)	F41SSILL	26	0.73	BR	6240	4,543	NONE	
20LED	Corridor 198 East	Hallways	24	S 28 P F 1 (ELE)	F41SSILL	26	0.62	BR	6240	3,894	NONE	
20LED	Corridor 198 North	Hallways	10	S 28 P F 1 (ELE)	F41SSILL	26	0.26	BR	6240	1,622	NONE	
20LED	Stair #4	Hallways	4	S 28 P F 1 (ELE)	F41SSILL	26	0.10	SW	6240	649	NONE	
20LED	Gym Vestibule	Hallways	1	S 28 P F 1 (ELE)	F41SSILL	26	0.03	SW	6240	162	NONE	
20LED	Mechanical Room 157	Mechanical Room	14	S 28 P F 1 (ELE)	F41SSILL	26	0.36	SW	1600	582	NONE	
35LED	112	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	110	Offices	9	T 32 R F 3 (ELE)	F43SSILL	72	0.65	C-OCC	2400	1,555	NONE	
35LED	Industrial Art 162	Offices	12	T 32 R F 3 (ELE)	F43SSILL	72	0.86	C-OCC	2400	2,074	NONE	
35LED	113 Vacant	Vacant	15	T 32 R F 3 (ELE)	F43SSILL	72	1.08	C-OCC	400	432	NONE	
35LED	150 Kitchen Vacant	Vacant	13	T 32 R F 3 (ELE)	F43SSILL	72	0.94	C-OCC	400	374	NONE	
35LED	Cafeteria	Cafeteria	38	T 32 R F 3 (ELE)	F43SSILL	72	2.74	C-OCC	2000	5,472	NONE	
268	Stage	Auditorium	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.26	SW	1200	306	NONE	
46LED	Exit by Stair #1	Hallways	1	W 28 C F 2 (ELE)	F42SSILL	48	0.05	BR	6240	300	NONE	
46LED	116 Vacant	Vacant	2	W 28 C F 2 (ELE)	F42SSILL	48	0.10	C-OCC	400	38	NONE	
46LED	Break Room	Offices	6	W 28 C F 2 (ELE)	F42SSILL	48	0.29	C-OCC	2400	691	NONE	
55LED	Break Room Restroom	Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.05	SW	4300	202	NONE	
46LED	107	Offices	4	W 28 C F 2 (ELE)	F42SSILL	48	0.19	C-OCC	2400	461	NONE	

Energy Audit of Newark Public Schools - Newark Innovation Academy
CHA Project No.27999
Existing Lighting & Audit Input

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
20LED	125 Storage	Storage	6	S 28 P F 1 (ELE)	F41SSILL	26	0.16	SW	500	78		NONE	
55LED	Mens Room	Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.05	C-OCC	4300	202		NONE	
55LED	Womens Room	Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.05	C-OCC	4300	202		NONE	
40LED	101 Vacant	Vacant	9	T 28 R F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
40LED	101 Office #1	Offices	4	T 28 R F 2 (ELE)	F42SSILL	48	0.19	C-OCC	2400	461		NONE	
40LED	101 Office #2	Offices	1	T 28 R F 2 (ELE)	F42SSILL	48	0.05	C-OCC	2400	115		NONE	
217	101 Restroom	Restroom	1	2B 17 C F 2 (ELE)	F22ILL	33	0.03	SW	4300	142		NONE	
20LED	Stair #2	Hallways	5	S 28 P F 1 (ELE)	F41SSILL	26	0.13	BR	6240	811		NONE	
46LED	100 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	101 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	102	Offices	14	W 28 C F 2 (ELE)	F42SSILL	48	0.67	C-OCC	2400	1,613		NONE	
46LED	102 Office	Offices	4	W 28 C F 2 (ELE)	F42SSILL	48	0.19	SW	2400	461		C-OCC	
55LED	102 Restroom	Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.05	SW	4300	202		NONE	
46LED	103 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	104 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	105 Vacant	Vacant	12	W 28 C F 2 (ELE)	F42SSILL	48	0.58	C-OCC	400	230		NONE	
46LED	106 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	108 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	107 Vacant	Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	400	173		NONE	
46LED	109 Storage	Storage	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	500	216		NONE	
46LED	107 Computer	Offices	9	W 28 C F 2 (ELE)	F42SSILL	48	0.43	C-OCC	2400	1,037		NONE	
231LED	Exterior	Exterior	47	WP400MH1	MH400/1	458	21.53	BR	5000	107,630		NONE	
169LED	Exterior	Exterior	12	WP 250 MH	MH250/1	295	3.54	BR	5000	17,700		NONE	
227LED	Exterior	Exterior	5	70 W MH Wall Pack	MH70/1	95	0.48	BR	5000	2,375		NONE	
	Total		**869**				**70.29**			**226,600**			

APPENDIX C

ECM Calculations

Newark Board of Education - NJBPU
CHA Project Numer: 27998

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
					Electric	Natural Gas	Fuel Oil
$ 0.136	$/kWh blended		0.000420205	73,347	$ 152,102	$ -	$ -
$ 0.125	$/kWh supply	1,118,400	0.000420205				
$ 3.54	$/kW	388.0	0				
$ 0.95	$/Therm	0	0.00533471				
$ 7.55	$/kgals	10,000	0				
$ -	$/Gal	0					

Newark Innovation Academy

Recommend?		Item	Savings						Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR
Y or N			kW	kWh	therms	No. 2 Oil gal	Water kgal	$								kW	kWh	therms	kgal/yr	$			
Y	ECM-1	Add Wall and Ceiling Insulation	0.0	79,835	0	0	0	10,858	$ 141,181	13.0	20	33.5	$ -	N	13.0	0.0	1,596,709	0	0	$ 217,152	0.5	$20,353	4.5%
Y	ECM-2	Heating Fuel Conversion	0.0	480,912	(18,237)	0	0	48,079	$ 111,106	2.3	30	104.8	$ 1,400	N	2.3	0.0	14,427,360	(547,118)	0	$ 1,442,359	12.0	$832,657	43.8%
Y	ECM-3	Heating Hot Water Pump VFDs	1.7	21,399	0	0	0	2,746	$ 7,130	2.6	15	9.0	$ 1,550	N	2.0	25.1	320,986	0	0	$ 44,722	5.3	$27,202	49.1%
Y	ECM-4	Replace Chillers	21.8	44,173	0	0	0	6,446	$ 227,217	35.2	15	18.6	$ 6,400	N	34.3	326.4	662,592	0	0	$ 103,979	(0.5)	($143,864)	-8.9%
Y	ECM-5	Replace Air Handling Units	10.6	40,947	0	0	0	5,568	$ 175,000	31.4	15	17.2	$ -	N	31.4	158.7	614,198	0	0	$ 90,273	(0.5)	($108,532)	-8.1%
Y	ECM-6	Full DDC Controls	0.0	80,525	0	0	0	10,951	$ 229,731	21.0	15	33.8	$ -	N	21.0	0.0	1,207,872	0	0	$ 164,271	(0.3)	($98,994)	-3.9%
Y	ECM-7	Domestic Hot Water System Improvements	90.0	56,661	(1,461)	0	0	9,518	$ 18,092	1.9	15	16.0	$ 50	N	1.9	1,350.0	849,912	(21,908)	0	$ 152,123	7.4	$95,586	52.7%
Y	ECM-8	Walk-In Cooler/Freezer Controls	0.0	9,142	0	0	0	1,243	$ 41,250	33.2	15	3.8		N	33.2	0.0	137,129	0	0	$ 18,650	(0.5)	($26,407)	-8.6%
Y	ECM-9	Vending Machine Controls	0.0	7,343	0	0	0	999	$ 840	0.8	15	3.1		N	0.8	0.0	110,138	0	0	$ 14,979	16.8	$11,081	118.8%
N	ECM-10	Install Low Flow Plumbing Fixtures	0.0	0	0	0	80	601	$ 104,528	173.8	30	0.0	$ -	N	173.8	0.0	0	0	2,390	$ 18,042	(0.8)	($92,740)	-8.9%
N	ECM-L1	Lighting Replacements / Upgrades	37.4	140,296	0	0	0	19,127	$ 197,566	10.3	10	59.0	$ 7,950	N	9.9	374.3	1,402,963	0	0	$ 206,702	0.0	($26,459)	0.2%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	4,032	0	0	0	504	$ 3,240	6.4	10	1.7	$ 420	N	5.6	0.0	40,317	0	0	$ 5,483	0.7	$1,479	12.2%
Y	ECM-L3	Lighting Replacements with Controls (Occupany Sensors)	37.4	142,513	0	0	0	19,404	$ 200,806	10.3	10	59.9	$ 8,370	N	9.9	374.3	1,425,130	0	0	$ 209,717	0.0	($26,916)	0.2%
		Total (Does Not Include ECM-L1 & ECM-L2)	**161.4**	**963,449**	**(19,698)**	**0**	**80**	**$ 116,413**	**$ 1,256,882**	**10.8**	**17.7**	**300**	**$ 17,770**		**10.6**	**2,235**	**21,352,027**	**(569,026)**	**2,390**	**$ 2,476,266**	**1.0**	**293596.54**	**5.8%**
		Recommended Measures (highlighted green above)	**161.4**	**963,449**	**(19,698)**	**0**	**0**	**$ 115,812**	**$ 1,152,354**	**10.0**	**16.5**	**300**	**$ 17,770**	**0**	**9.8**	**2,235**	**21,352,027**	**(569,026)**	**-**	**$ 2,458,224**	**1.1**	**320138.19**	**6.5%**
		% of Existing	**42%**	**86%**	**-100%**	**-**	**0%**																

City: Newark, NJ

Occupied Hours/Week			70	70	70	70	50
			Building Operating	Auditorium Occupied	Gymnasium Occupied	Library Occupied	Classrooms Occupied
Temp	Enthalpy h (Btu/lb)	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5							
97.5	35.4	6	3	3	3	3	2
92.5	37.4	31	13	13	13	13	9
87.5	35.0	131	55	55	55	55	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	189
67.5	27.2	854	356	356	356	356	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	16.0	491	205	205	205	205	146
42.5	14.5	656	273	273	273	273	195
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	252	105	105	105	105	75
17.5	5.4	125	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.027
Labor:	1.240
Equipment:	1.124

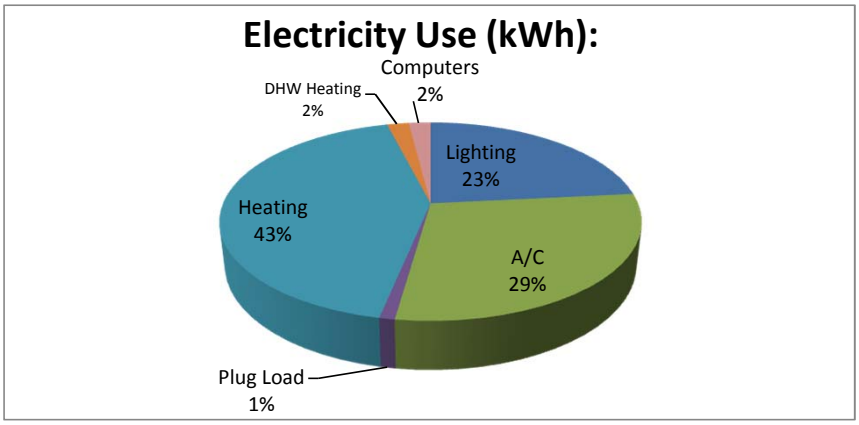
Heating System Efficiency	80%
Cooling Eff (kW/ton)	0.70

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

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

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Utility End Use Analysis			
Electricity Use (kWh):		**Notes/Comments:**	
1,118,400	Total	Based on utility analysis	
263,071	Lighting	From Lighting Calculations	0.235220851
	Motors	Estimated	0
324,336	A/C	Based on Chiller Replacement Calculation	0.29
11,184	Plug Load	Estimated	0.01
480,912	Heating	Based on Full DDC Controls Calculation	0.43
22,368	DHW Heating	Calculated based on nameplate data	0.02
	Kitchen	Estimated	0
22,368	Computers	Estimated	0.02
	Other	Remaining	0
Natural Gas Use (Therms):		**Notes/Comments:**	
0	Total	Based on utility analysis	
0	Boilers	Therms/SF x Square Feet Served	1
	RTU, AHU	Based on utility analysis	0
	DHW	Based on utility analysis	0



Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-1 Install Additional Exterior Wall & Ceiling Insulation

Existing: Uninsulated Ceiling and Exterior Walls can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 3" extruded polystyrene insulation on walls and ceiling to reduce heat transfer.

Area of Ceiling & Ext Walls	54,380 SF	Cooling System Efficiency	0.70 kW/ton	Heating System Efficiency	80%			
Existing Infiltration Factor	**0.20 cfm/SF**	Ex Occupied Clng Temp.	72 *F	Heating On Point	55 *F			
Proposed Infiltration Factor	**0.20 cfm/SF**	Ex Unoccupied Clng Temp.	80 *F	Ex Occupied Htg Temp.	80 *F			
Existing U Value (R-19)	**0.053 Btuh/SF/°F**	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	75 *F			
Proposed U Value (R-34)	**0.029 Btuh/SF/°F**	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Cooling Electricity	$ 0.136 $/kWh			
				Heating Electricity	$ 0.136 $/kWh			

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	Unoccupied	Occupied	Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy kWh	Proposed Heating Energy kWh
A		B	C	D	E	F	G	H	I	J	K	L
102.5	0.0	0	0	0	1,258,611	1,281,508	1,297,123	1,309,918	0	0	0	0
97.5	35.4	6	3	4	-459,979	-437,083	-427,781	-414,985	157	148	0	0
92.5	37.4	31	13	18	-543,295	-520,398	-517,410	-504,614	963	927	0	0
87.5	35.0	131	55	76	-410,680	-387,784	-391,109	-378,313	3051	2946	0	0
82.5	33.0	500	208	292	-301,537	-278,640	-288,278	-275,483	8446	8230	0	0
77.5	31.5	620	258	362	-213,849	0	-206,905	0	3238	3133	0	0
72.5	29.9	664	277	387	-119,183	0	-118,552	0	1933	1923	0	0
67.5	27.2	854	356	498	0	0	0	0	0	0	0	0
62.5	24.0	927	386	541	0	0	0	0	0	0	0	0
57.5	20.3	600	250	350	0	0	0	0	0	0	0	0
52.5	18.2	730	304	426	401,725	328,684	367,001	300,274	0	0	96,042	87,740
47.5	16.0	491	205	286	474,766	401,725	433,728	367,001	0	0	77,737	71,017
42.5	14.5	656	273	383	547,807	474,766	500,456	433,728	0	0	121,414	110,919
37.5	12.5	1,023	426	597	620,848	547,807	567,183	500,456	0	0	216,713	197,981
32.5	10.5	734	306	428	693,889	620,848	633,911	567,183	0	0	175,132	159,994
27.5	8.7	334	139	195	766,930	693,889	700,638	633,911	0	0	88,630	80,969
22.5	7.0	252	105	147	839,971	766,930	767,366	700,638	0	0	73,614	67,251
17.5	5.4	125	52	73	913,012	839,971	834,093	767,366	0	0	39,860	36,414
12.5	3.7	47	20	27	986,053	913,012	900,821	834,093	0	0	16,245	14,841
7.5	2.1	34	14	20	1,059,093	986,053	967,548	900,821	0	0	12,661	11,567
TOTALS		**8,759**	**3,650**	**5,109**					17788	17306	918,047	838,693

Existing Ceiling Infiltration	**10,876**	**cfm**
Existing Ceiling Heat Transfer	**2,862**	**Btuh/°F**
Proposed Ceiling Infiltration	**10,876**	**cfm**
Proposed Ceiling Heat Transfer	**1,599**	**Btuh/°F**

Savings	**79,354**	**kWh**	**$ 10,792**
	482	**kWh**	**$ 66**
			$ 10,858

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1 Install Additional Exterior Wall & Ceiling Insulation - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
3" Extruded Polystyrene (R-15)	54,380	SF	$ 1.440	$ 0.480	$ -	$ 80,421	$ 32,524	$ -	$ 112,945	
						$ -	$ -	$ -	$ -	

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

$ 112,945	Subtotal
$ 28,236	25% Contingency
$ 141,181	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-2: Heating Fuel Conversion

Existing Fuel Electric
Proposed Fuel Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.14	/ kWh	Based on Utility Analysis - blended rate
Proposed Fuel Cost	$ 0.95	/ Therm	Based on NJ Average Rate
Baseline Fuel Use	480,912	kWh	Based on historical utility data
Existing Boiler Plant Efficiency	100%		Estimated based on electric boiler
Baseline Boiler Load	1,641,353	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 3.413 Mbtu/kWh
Baseline Fuel Cost	$ 65,404		
Proposed Boiler Plant Efficiency	90%		New Boiler Efficiency
Proposed Fuel Use	18,237	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 17,325		
Calculated Gas Penalty	(18,237)	Therms	
Estimated Annual Savings	480,912	kWh	

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

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-2: Heating Fuel Conversion - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
750 MBH NG Condensing Boiler	2	EA	$ 18,000	$ 18,000		$ 36,972	$ 44,856	$ -	$ 81,828	Vendor Estimate
Flue Installation	25	LF	$ 75.0	$ 15.00		$ 1,926	$ 467	$ -	$ 2,393	Vendor Estimate
Reprogram DDC system	1	EA	$ 100.0	$ 350.00		$ 103	$ 436	$ -	$ 539	RS Means 2012
Miscellaneous Electrical	1	LS	$ 500	$ 250		$ 514	$ 312	$ -	$ 825	RS Means 2012
Miscellaneous HW Piping	1	LS	$ 2,000	$ 1,000		$ 2,054	$ 1,246	$ -	$ 3,300	RS Means 2012
						$ -	$ -	$ -	$ -	

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

$ 88,885	Subtotal
$ 22,221	25% Contingency
$ 111,106	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-3: Premium Efficiency Motors w/ VFDs

Description: This ECM evaluates the energy (electrical) savings associated with replacing existing motors with high efficiency motors (based on ASHRAE 2010 NEMA ratings) and adding variable frequency drives to control motor speed based on actual load verses constant volume / constant flow.

Variable Inputs

Electric Rate	$0.13	$/kWh
Demand Rate	$3.54	$/kW

MOTOR SCHEDULE										Savings Factor		Existing Motor Savings		Proposed Motor Savings		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)	Peak Demand Savings (kW)	Annual Energy Savings (kWh)
HHWP	CHW/HW	2	5.0	10.0	Y	0.75	82.5%	89.5%	4,427	0.201	0.580	-	-	1.7	21,399	1.7	21,399
															Total:	1.7	21,399
															Annual Cost Savings	$ 71	$ 2,675
																	$ 2,746

Savings calculation formulas are taken from NJ Protocols document for VFDs

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-5: Replace Air Handling Units - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
VFD	2	ea	$ 1,706	$ 431		$ 3,505	$ 1,073	$ -	$ 4,577	RS Means 2012
Motor	2	ea	$ 373	$ 79		$ 766	$ 196	$ -	$ 962	RS Means 2012
Electrical - misc.	1	ls	$ 100	$ 50		$ 103	$ 62	$ -	$ 165	RS Means 2012
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 5,704	Subtotal
$ 1,426	25% Contingency
$ 7,130	**Total**

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

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CHA Project Numer: 27998
Newark Innovation Academy

ECM-4: Replace Existing Chiller with High Efficiency Chiller

Description: This ECM evaluates the electrical energy savings associated with replacing older, less efficenct air and water cooled chillers with modern high efficiency chillers.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 3.54	/ kW	
	$ 0.13	/ 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	0.57	kW/ton	
Demand Savings	13.1	kW	
Energy Savings	26,656	kWh	
FULL LOAD OPERATION			
Baseline FLV	0.70	kW/ton	
Proposed FLV	0.64	kW/ton	
Demand Savings	8.6	kW	
Energy Savings	17,517	kWh	
ENERGY SAVINGS			
Demand Savings	22	kW	
Energy Savings	44,173	kWh	
Cost Savings	$ 6,446		

Savings calculation formulas are taken from NJ Protocols document for Electric Chiller

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CHA Project Numer: 27998
Newark Innovation Academy

ECM-4: Replace Existing Chiller with High Efficiency Chiller

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
100 Ton Chiller	2	EA	$ 49,600	$ 27,500	$ -	$ 101,878	$ 68,530	$ -	$ 170,408	RS Means 2012
Re-program DDC	1	LS	$ 5,000	$ 5,000		$ 5,135	$ 6,230	$ -	$ 11,365	RS Means 2012
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

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

$ 181,773	Subtotal
$ 45,443	25% Contingency
$ 227,217	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-5: Replace Air Handling Units

Description: This ECM evaluates the energy (electrical) savings associated with replacing existing AHU motors with high efficiency motors (based on ASHRAE 2010 NEMA ratings) and adding variable frequency drives to control motor speed based on actual load verses constant flow. These new motors and VFDs will be part of the new AHU package, however the remaining increased efficiency for the new AHUs is calculated within the DDC controls calculation, the Boiler Replacement calculation, and the Chiller Replacement calculation.

Variable Inputs

Electric Rate	$0.13	**$/kWh**
Demand Rate	$3.54	**$/kW**

MOTOR SCHEDULE										Savings Factor		Existing Motor Savings		Proposed Motor Savings		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)	Peak Demand Savings (kW)	Annual Energy Savings (kWh)
AC-2	AF/BI	1	1.0	1.0	Y	0.75	78.0%	87.9%	3,650	0.448	0.475	-	-	0.4	1,471	0.4	1,471
AC-1	AF/BI	1	7.5	7.5	Y	1.75	88.5%	91.7%	3,650	0.448	0.475	-	-	2.7	10,577	2.7	10,577
AC-3	AF/BI	1	5.0	5.0	Y	2.75	87.5%	89.5%	3,650	0.448	0.475	-	-	1.9	7,225	1.9	7,225
AC-4	AF/BI	1	5.0	5.0	Y	3.75	87.5%	89.5%	3,650	0.448	0.475	-	-	1.9	7,225	1.9	7,225
AC-5	AF/BI	1	5.0	5.0	Y	4.75	87.5%	89.5%	3,650	0.448	0.475	-	-	1.9	7,225	1.9	7,225
AC-6	AF/BI	1	5.0	5.0	Y	-0.25	87.5%	89.5%	3,650	0.448	0.475	-	-	1.9	7,225	1.9	7,225
														Total:		10.6	40,946.6
														Annual Cost Savings		$ 449	$ 5,118
																	$ 5,568

Savings calculation formulas are taken from NJ Protocols document for VFDs

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-5: Replace Air Handling Units - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Existing (6) AHU Demolition	6	EA	$ 500	$ 500		$ 3,081	$ 3,738	$ -	$ 6,819	RS Means 2012
(1) 1 HP AHU, 2000 CFM	1	EA	$ 12,500	$ 1,000		$ 12,838	$ 1,246	$ -	$ 14,084	RS Means 2012
(4) 5 HP AHUs, 3000 CFM	4	EA	$ 18,000	$ 1,800		$ 73,944	$ 8,971	$ -	$ 82,915	RS Means 2012
(1) 7.5 HP AHUs, 5000 CFM	1	EA	$ 22,500	$ 2,500		$ 23,108	$ 3,115	$ -	$ 26,223	RS Means 2012
- Reprogram DDC system for (6) AHUs	6	EA	$ 75	$ 300		$ 462	$ 2,243	$ -	$ 2,705	RS Means 2012
Electrical - misc.	1	LS	$ 1,000	$ 5,000		$ 1,027	$ 6,230	$ -	$ 7,257	RS Means 2012

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

$ 140,002	Subtotal
$ 35,001	25% Contingency
$ 175,000	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-6: Install Full DDC Controls

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

Building Information:

73,347	Sq Footage	$0.14	$/kWh Blended
Y	Cooling	$0.14	$/kWh Blended
Y	Heating		

FULL DDC - CONTROLS SAVINGS CALCULATION

EXISTING CONDITIONS		
Existing Facility Total Electric usage	1,118,400	kWh
Existing Facility Total Gas usage	0	Therms
Existing Facility Cooling Electric usage	324,336	kWh[1]
Existing Facility Heating Electric usage	480,912	kWh[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	32,434	kWh
Proposed Facility Heating Electric Savings	48,091	kWh
SAVINGS		
Electric Cooling Savings	32,434	**kWh**
Electric Heating Savings	48,091	**kWh**

Assumptions

1		29% of facility total electricity dedicated to Cooling; based on utility information
2		43% of facility total electricity dedicated to Heating; based on utility information
3	10%	Typical Savings associated with installation of DDC controls

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-6: Install Full DDC Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Air Handling Unit Control	6	ea		$ 8,000		$ -	$ 59,808	$ -	$ 59,808	Vendor Quote
Radiator Control (Group of 4)	15	ea		$ 4,500		$ -	$ 84,105	$ -	$ 84,105	Vendor Quote
Head End Controller & Programming	1	ls		$ 32,000		$ -	$ 39,872	$ -	$ 39,872	Vendor Quote
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

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

$ 183,785	Subtotal
$ 45,946	25% Contingency
$ 229,731	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-7: Replace Electric DHW Heater Condensing Gas-Fired DHW Heater

Description: This ECM evaluates the energy savings associated with replacing an electric tank type water heater with a high efficiency natural gas fired water 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	Termperature of water coming into building
Hot Water Temperature	160	˚F	
Hot Water Usage per day	581	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	132,181	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	357	Gallons	Per manufacturer nameplate
Hot Water Temperature	160	˚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)	6.5	MBH	
Annual Standby Hot Water Load	57,334	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	189,516	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	98%		Per Manufacturer
Total Annual Energy Required	193,383	Mbtu/yr	
Total Annual Electric Required	**56,661**	**kWh/yr**	**Electrical Savings**
Average Annual Electric Demand	6.47	kW	
Peak Electric Demand	**90.00**	**kW**	**Per Manufacturer's Nameplate (Demand Savings)**
New Tank Size	50	Gallons	AO Smith Cyclone Condensing NG Water Heater
Hot Water Temperature	160	˚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)	0.9	MBH	
Annual Standby Hot Water Load	8,030	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	140,211	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on AO Smith, condensing DHW Heater
Proposed Total Annual Energy Required	146,054	MBTU/yr	
Proposed Fuel Use	1,461	Therms/yr	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	$3.54	$/kW	
Elec Utility Supply Unit Cost	$0.13	$/kWh	
NG Utility Unit Cost	$0.95	$/Therm	
Existing Operating Cost of DHW	$10,906	$/yr	
Proposed Operating Cost of DHW	$1,388	$/yr	
Annual Utility Cost Savings	**$9,518**	**$/yr**	

Daily Hot Water Demand

			#USES PER DAY		FULL TIME OCCUPANTS**				
FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	MALE	FEMALE	MALE	FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY
LAVATORY	2.5	0.5	3	3	150	150	1125	50%	563
SHOWER	2.5	5	0	0	0	0	0	75%	0
KITCHEN SINK	2.5	0.5	1	1	2	2	5	75%	4
MOP SINK	2.5	2	1	1	2	2	20	75%	15
Dishwasher (gal per use)	10	1	0	0	0	0	0	100%	0
						TOTAL	1150		**581**

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.
**These are the occupanct that use the fixtures. If fixture does not exist change to (0).

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Electric DHW Heater Removal	3	LS		$ 50		$ -	$ 187	$ -	$ 187	RS Means 2012
High Efficiency Gas-Fired DHW Heater	1	EA	$ 5,500	$ 5,500		$ 5,649	$ 6,853	$ -	$ 12,502	RS Means 2012
Miscellaneous Electrical	1	LS	$ 300			$ 308	$ -	$ -	$ 308	RS Means 2012
Venting Kit	1	EA	$ 450	$ 650		$ 462	$ 810	$ -	$ 1,272	RS Means 2012
Miscellaneous Piping and Valves	1	LS	$ 200			$ 205	$ -	$ -	$ 205	RS Means 2012

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

$ 14,474	Subtotal
$ 3,618	25% Contingency
$ 18,092	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-8: Walk-in Cooler & Freezer EC Motor Retrofits

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

Utility Cost

$0.14 $/kWh Blended

EXISTING CONDITIONS			
Walk-In Freezer(s)			
Existing Freezer Controls?	N		
Quantity of Walk-In Freezers	1		
Nameplate Amps of Freezer Evaporator Fan	4		AmpsEF
Nameplate Volts of Freezer Evaporator Fan	280		VoltsEF
Phase of Evaporator Fan	1		PhaseEF
Power Factor of Evaporator Fan	0.55		PFEF
Operating Hours	8,760	hrs	
Load Reduction	65%		LR
Electricity Savings (Evaporator Fan)	3,157	kWh	kWhEF
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	kWhRH
Total Walk-In Freezer(s) Electricity Savings	4,571	kWh	
Walk-In Cooler(s)			
Existing Cooler Controls?	N		
Quantity of Walk-In Coolers	1		
Nameplate Amps of Cooler Evaporator Fan	4		
Nameplate Volts of Cooler Evaporator Fan	280		
Phase of Evaporator Fan	1		
Power Factor of Evaporator Fan	0.55		
Operating Hours	8,760	hrs	
Load Reduction	65%		
Electricity Savings (Evaporator Fan)	3,157	kWh	
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	
Total Walk-In Cooler(s) Electricity Savings	4,571	kWh	
SAVINGS			
Total Electricity Savings	**9,142**	**kWh**	
Total Cost Savings	**$ 1,243**		
Estimated Cost	$ 41,250		
Simple Payback	33.2	**years**	

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

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

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-8: Walk-in Cooler & Freezer EC Motor Retrofits - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Turnkey Walk-In Controller & Equipment	2	EA	$ 10,000	$ 5,000	$ -	$ 20,540	$ 12,460	$ -	$ 33,000	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$ 33,000	Subtotal
$ 8,250	25% Contingency
$ 41,250	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-9: Install Vending Machine Controls

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

Unit Cost: $0.136 $/kWh blended

Energy Savings Calculations:

	Existing		
Cold Beverage Vending Machine Electric usage	7,008	kWh[1,4,7]	
Snack Vending Machine Electric usage	1,752	kWh[2,5,7]	
Dual Vending Machine Electric Usage	-	kWh[3,6,7]	
Total Vending Machine Electric Usage	8,760	kWh	
	Proposed		
Cold Beverage Vending Machine Electric usage	1,103	kWh[8]	
Snack Vending Machine Electric usage	315	kWh	
Dual Vending Machine Electric Usage	0	kWh	
Total Vending Machine Electric Usage	1,418	kWh	
Vending Machine Controls Usage Savings	**7,343**	**kWh**	
Total cost savings	**$ 999**		
Estimated Total Project Cost	**$ 840**	[9]	
Simple Payback	**1**	**years**	

Assumptions

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

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-9: Install Vending Machine Controls - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Vending Miser	3	EA	$ 200	$ 15	$ -	$ 616	$ 56	$ -	$ 672	Vendor Estimation
						$ -	$ -	$ -	$ -	

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

$	672	Subtotal
$	168	25% Contingency
$	**840**	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-10: Replace urinals and flush valves with low flow

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Urinals in Building to be replaced	11	
Average Flushes / Urinal (per Day)	3	
Average Gallons / Flush	2.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	11	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	$1,200	RS Means 2012
Proposed Installation Cost of new urinal & valve	$1,000	RS Means 2012
Total cost of new urinals & valves		

SAVINGS		
Current Urinal Water Use	30.11	kGal / year
Proposed Urinal Water Use	1.51	kGal / year
Water Savings	28.61	kGal / year
Cost Savings	$216	/ year

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

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

ECM-10: Replace toilets and flush valves with low flow

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$7.55	$ / kGal
Toilets in Building	21	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	21	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	80.48	kGal / year
Proposed Toilet Water Use	29.43	kGal / year
Water Savings	51.05	kGal / year
Cost Savings	$385	/ year

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Low-Flow Urinal	11	EA	$ 1,200	$ 1,000	$ -	$ 13,556	$ 13,706	$ -	$ 27,262	Vendor Estimate
Low-Flow Toilet	21	EA	$ 1,400	$ 1,000	$ -	$ 30,194	$ 26,166	$ -	$ 56,360	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$ 83,622	Subtotal
$ 20,906	25% Contingency
$ 104,528	**Total**

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

New Jersey Pay For Performance Incentive Program

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

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

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

Total Building Area (Square Feet)	73,347
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$152,102	$0
Existing Usage (from utility)	1,118,400	0
Proposed Savings	963,449	-19,698
Existing Total MMBtus	3,817	
Proposed Savings MMBtus	1,318	
% Energy Reduction	**34.5%**	
Proposed Annual Savings	$115,812	

	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
			$3,667
Incentive #1	$0	$0	$3,667
Incentive #2	$105,979	-$24,622	$81,357
Incentive #3	$105,979	-$24,622	$81,357
Total All Incentives	**$211,959**	**-$49,244**	**$166,382**

Total Project Cost	$1,152,354

		Allowable Incentive
% Incentives #1 of Utility Cost*	2.4%	$3,667
% Incentives #2 of Project Cost**	7.1%	$81,357
% Incentives #3 of Project Cost**	7.1%	$81,357
Total Eligible Incentives***	**$166,382**	
Project Cost w/ Incentives	$985,973	

Project Payback (years)	
w/o Incentives	w/ Incentives
10.0	8.5

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

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

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

Energy Audit of Newark Public Schools - Newark Innovation Academy
CHA Project No.27999
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Number of Fixtures No. of fixtures after the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit Control Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual $ Saved (kWh Saved) * ($/kWh)	Retrofit Cost Cost for renovations to lighting system	NJ Smart Start Lighting Incentive Prescriptive Lighting Measures	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered
20LED	253 Mech	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	1600	83	2	4 ft LED Tube	200732x1	15	0.2	BR	6,240	936	686	0.1	$ 90.47	$ 816.75	$0	9.0	9.0
35LED	209 Class	6	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	1000	432	6	T 59 R LED	RTLED38	38	0.2	SW	1,000	228	204	0.2	$ 34.17	$ 1,417.50	$0	41.5	41.5
55LED	209 Class	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	1000	47	1	2RTLED	2RTLED	25	0.0	SW	1,000	25	22	0.0	$ 3.68	$ 202.50	$50	55.0	41.4
20LED	Corr 260 East	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,569	22	4 ft LED Tube	200732x1	15	0.3	BR	6,240	2,059	1,510	0.2	$ 199.04	$ 1,796.85	$0	9.0	9.0
20LED	Corr 260 South	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,947	12	4 ft LED Tube	200732x1	15	0.2	BR	6,240	1,123	824	0.1	$ 108.57	$ 980.10	$0	9.0	9.0
20LED	Corr 260 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,543	28	4 ft LED Tube	200732x1	15	0.4	BR	6,240	2,621	1,922	0.3	$ 253.32	$ 2,286.90	$0	9.0	9.0
20LED	Corr 260 North	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,947	12	4 ft LED Tube	200732x1	15	0.2	BR	6,240	1,123	824	0.1	$ 108.57	$ 980.10	$0	9.0	9.0
20LED	Mechanical Room 225	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	1600	915	22	4 ft LED Tube	200732x1	15	0.3	SW	1,600	528	387	0.2	$ 58.68	$ 1,796.85	$0	30.6	30.6
40LED	Mens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	SW	4,300	327	86	0.0	$ 11.60	$ 472.50	$0	40.7	40.7
40LED	Womens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	SW	4,300	327	86	0.0	$ 11.60	$ 472.50	$0	40.7	40.7
20LED	Stair #1	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649	4	4 ft LED Tube	200732x1	15	0.1	BR	6,240	374	275	0.0	$ 36.19	$ 326.70	$0	9.0	9.0
198LED	Safe Haven (UN)	8	2T 17 R F 2 (ELE)	F22LL	31	0.2	C-OCC	1000	248	8	2T 25 R LED	2RTLED	25	0.2	C-OCC	1,000	200	48	0.0	$ 8.04	$ 1,620.00	$400	201.5	151.8
40LED	Safe Haven Mens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	SW	4,300	327	86	0.0	$ 11.60	$ 472.50	$0	40.7	40.7
40LED	Safe Haven Womens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	SW	4,300	327	86	0.0	$ 11.60	$ 472.50	$0	40.7	40.7
40LED	Community Room 217	25	T 28 R F 2 (ELE)	F42SSILL	48	1.2	C-OCC	2400	2,880	25	T 38 R LED	RTLED38	38	1.0	C-OCC	2,400	2,280	600	0.3	$ 85.62	$ 5,906.25	$0	69.0	69.0
55LED	Parent Center UN-6	55	T 32 R F 3 (ELE)	F43SSILL	72	4.0	C-OCC	2400	9,504	55	T 59 R LED	RTLED38	38	2.1	C-OCC	2,400	5,016	4,488	1.9	$ 640.44	$ 12,993.75	$0	20.3	20.3
35LED	210	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	211	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	212	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	213	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	214	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	216	28	T 32 R F 3 (ELE)	F43SSILL	72	2.0	C-OCC	2400	4,838	28	T 59 R LED	RTLED38	38	1.1	C-OCC	2,400	2,554	2,285	1.0	$ 326.04	$ 6,615.00	$0	20.3	20.3
35LED	UN-76	2	T 32 R F 3 (ELE)	F43SSILL	72	0.1	C-OCC	500	72	2	T 59 R LED	RTLED38	38	0.1	C-OCC	500	38	34	0.1	$ 7.14	$ 472.50	$0	66.2	66.2
35LED	Office in 216	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691	4	T 59 R LED	RTLED38	38	0.2	C-OCC	2,400	365	326	0.1	$ 46.58	$ 945.00	$0	20.3	20.3
35LED	200 Office	11	T 32 R F 3 (ELE)	F43SSILL	72	0.8	C-OCC	2400	1,901	11	T 59 R LED	RTLED38	38	0.4	C-OCC	2,400	1,003	898	0.4	$ 128.09	$ 2,598.75	$0	20.3	20.3
35LED	200 Small Office	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691	4	T 59 R LED	RTLED38	38	0.2	C-OCC	2,400	365	326	0.1	$ 46.58	$ 945.00	$0	20.3	20.3
35LED	210 Conference	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	200A Vacant	17	T 32 R F 3 (ELE)	F43SSILL	72	1.2	C-OCC	400	490	17	T 59 R LED	RTLED38	38	0.6	C-OCC	400	258	231	0.6	$ 53.45	$ 4,016.25	$0	75.1	75.1
35LED	200A Office #1	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	2400	691	4	T 59 R LED	RTLED38	38	0.2	SW	2,400	365	326	0.1	$ 46.58	$ 945.00	$0	20.3	20.3
35LED	200A Office #2	5	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	2400	864	5	T 59 R LED	RTLED38	38	0.2	SW	2,400	456	408	0.2	$ 58.22	$ 1,181.25	$0	20.3	20.3
35LED	200A Office #3	3	T 32 R F 3 (ELE)	F43SSILL	72	0.2	SW	2400	518	3	T 59 R LED	RTLED38	38	0.1	SW	2,400	274	245	0.1	$ 34.93	$ 708.75	$0	20.3	20.3
35LED	200A Dark Room	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	2400	173	1	T 59 R LED	RTLED38	38	0.0	SW	2,400	91	82	0.0	$ 11.64	$ 236.25	$0	20.3	20.3
35LED	203 Copy/Storage	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	500	324	9	T 59 R LED	RTLED38	38	0.3	C-OCC	500	171	153	0.3	$ 32.12	$ 2,126.25	$0	66.2	66.2
35LED	205 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	208 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259	9	T 59 R LED	RTLED38	38	0.3	C-OCC	400	137	122	0.3	$ 28.30	$ 2,126.25	$0	75.1	75.1
35LED	207 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259	9	T 59 R LED	RTLED38	38	0.3	C-OCC	400	137	122	0.3	$ 28.30	$ 2,126.25	$0	75.1	75.1
35LED	206 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	204 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
20LED	Stair #4	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811	5	4 ft LED Tube	200732x1	15	0.1	BR	6,240	468	343	0.1	$ 45.24	$ 408.38	$0	9.0	9.0
20LED	Stair #5	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649	4	4 ft LED Tube	200732x1	15	0.1	BR	6,240	374	275	0.0	$ 36.19	$ 326.70	$0	9.0	9.0
20LED	Gym 110A Storage	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26	2	4 ft LED Tube	200732x1	15	0.0	SW	500	15	11	0.0	$ 2.31	$ 163.35	$0	70.7	70.7
250	Gym 110A	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	SW	1600	7,080	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	SW	1,600	7,080	-	0.0	$ -	$ -	$0	#DIV/0!	-
35LED	Gym 110A Storage	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	500	36	1	T 59 R LED	RTLED38	38	0.0	SW	500	19	17	0.0	$ 3.57	$ 236.25	$0	66.2	66.2
40LED	Girls Locker 177	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672	5	T 38 R LED	RTLED38	38	0.2	SW	2,800	532	140	0.1	$ 19.62	$ 1,181.25	$0	60.2	60.2
46LED	Girls Locker 177	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134	1	4 ft LED Tube	200732x2	30	0.0	SW	2,800	84	50	0.0	$ 7.06	$ 163.35	$0	23.1	23.1
40LED	183	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230	2	T 38 R LED	RTLED38	38	0.1	SW	2,400	182	48	0.0	$ 6.85	$ 472.50	$0	69.0	69.0
46LED	182 Restroom	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	4300	206	1	4 ft LED Tube	200732x2	30	0.0	SW	4,300	129	77	0.0	$ 10.44	$ 163.35	$0	15.6	15.6
20LED	184 Gym Stor	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26	2	4 ft LED Tube	200732x1	15	0.0	SW	500	15	11	0.0	$ 2.31	$ 163.35	$0	70.7	70.7
40LED	198	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230	2	T 38 R LED	RTLED38	38	0.1	SW	2,400	182	48	0.0	$ 6.85	$ 472.50	$0	69.0	69.0
40LED	194 Boys Locker Room	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672	5	T 38 R LED	RTLED38	38	0.2	SW	2,800	532	140	0.1	$ 19.62	$ 1,181.25	$0	60.2	60.2
46LED	193 Office	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2400	115	1	4 ft LED Tube	200732x2	30	0.0	SW	2,400	72	43	0.0	$ 6.16	$ 163.35	$0	26.5	26.5
46LED	193 Boys Locker Room	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134	1	4 ft LED Tube	200732x2	30	0.0	SW	2,800	84	50	0.0	$ 7.06	$ 163.35	$0	23.1	23.1
20LED	Corridor 198 South	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622	10	4 ft LED Tube	200732x1	15	0.2	BR	6,240	936	686	0.1	$ 90.47	$ 816.75	$0	9.0	9.0
20LED	Corridor 198 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,543	28	4 ft LED Tube	200732x1	15	0.4	BR	6,240	2,621	1,922	0.3	$ 253.32	$ 2,286.90	$0	9.0	9.0
20LED	Corridor 198 East	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,894	24	4 ft LED Tube	200732x1	15	0.4	BR	6,240	2,246	1,647	0.3	$ 217.13	$ 1,960.20	$0	9.0	9.0
20LED	Corridor 198 North	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622	10	4 ft LED Tube	200732x1	15	0.2	BR	6,240	936	686	0.1	$ 90.47	$ 816.75	$0	9.0	9.0
20LED	Stair #4	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	6240	649	4	4 ft LED Tube	200732x1	15	0.1	SW	6,240	374	275	0.0	$ 36.19	$ 326.70	$0	9.0	9.0
20LED	Gym Vestibule	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	SW	6240	162	1	4 ft LED Tube	200732x1	15	0.0	SW	6,240	94	69	0.0	$ 9.05	$ 81.68	$0	9.0	9.0
20LED	Mechanical Room 157	14	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	1600	582	14	4 ft LED Tube	200732x1	15	0.2	SW	1,600	336	246	0.2	$ 37.34	$ 1,143.45	$0	30.6	30.6
35LED	112	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	110	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$0	20.3	20.3
35LED	Industrial Art 162	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	2400	2,074	12	T 59 R LED	RTLED38	38	0.5	C-OCC	2,400	1,094	979	0.4	$ 139.73	$ 2,835.00	$0	20.3	20.3
35LED	113 Vacant	15	T 32 R F 3 (ELE)	F43SSILL	72	1.1	C-OCC	400	432	15	T 59 R LED	RTLED38	38	0.6	C-OCC	400	228	204	0.5	$ 47.16	$ 3,543.75	$0	75.1	75.1
35LED	150 Kitchen Vacant	13	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	400	374	13	T 59 R LED	RTLED38	38	0.5	C-OCC	400	198	177	0.4	$ 40.88	$ 3,071.25	$0	75.1	75.1
35LED	Cafeteria	38	T 32 R F 3 (ELE)	F43SSILL	72	2.7	C-OCC	2000	5,472	38	T 59 R LED	RTLED38	38	1.4	C-OCC	2,000	2,888	2,584	1.3	$ 377.88	$ 8,977.50	$0	23.8	23.8
268	Stage	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	SW	1200	306	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	SW	1,200	306	-	0.0	$ -	$ -	$0		#DIV/0!
46LED	Exit by Stair #1	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	BR	6240	300	1	4 ft LED Tube	200732x2	30	0.0	BR	6,240	187	112	0.0	$ 14.80	$ 163.35	$0	11.0	11.0
46LED	116 Vacant	2	W 28 C F 2 (ELE)	F42SSILL	48	0.1	C-OCC	400	38	2	4 ft LED Tube	200732x2	30	0.1	C-OCC	400	24	14	0.0	$ 3.33	$ 326.70	$0	98.1	98.1
46LED	Break Room	6	W 28 C F 2 (ELE)	F42SSILL	48	0.3	C-OCC	2400	691	6	4 ft LED Tube	200732x2	30	0.2	C-OCC	2,400	432	259	0.1	$ 36.99	$ 980.10	$0	26.5	26.5
55LED	Break Room Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202	1	2T 25 R LED	2RTLED	25	0.0	SW	4,300	108	95	0.0	$ 12.76	$ 202.50	$50	15.9	12.0
46LED	107	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	461	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	2,400	288	173	0.1	$ 24.66	$ 653.40	$0	26.5	26.5
20LED	125 Storage	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	SW	500	78	6	4 ft LED Tube	200732x1	15	0.1	SW	500	45	33	0.1	$ 6.93	$ 490.05	$0	70.7	70.7
55LED	Mens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202	1	2T 25 R LED	2RTLED	25	0.0	C-OCC	4,300	108	95	0.0	$ 12.76	$ 202.50	$50	15.9	12.0
55LED	Womens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202	1	2T 25 R LED	2RTLED	25	0.0	C-OCC	4,300	108	95	0.0	$ 12.76	$ 202.50	$50	15.9	12.0
40LED	101 Vacant	9	T 28 R F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	T 38 R LED	RTLED38	38	0.3	C-OCC	400	137	36	0.1	$ 8.32	$ 2,126.25	$0	255.5	255.5
40LED	101 Office #1	4	T 28 R F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	461	4	T 38 R LED	RTLED38	38	0.2	C-OCC	2,400	365	96	0.0	$ 13.70	$ 945.00	$0	69.0	69.0
40LED	101 Office #2	1	T 28 R F 2 (ELE)	F42SSILL	48	0.0	C-OCC	2400	115	1	T 38 R LED	RTLED38	38	0.0	C-OCC	2,400	91	24	0.0	$ 3.42	$ 236.25	$0	69.0	69.0
217	101 Restroom	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	SW	4,300	142	-	0.0	$ -	$ -	$0		#DIV/0!
20LED	Stair #2	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811	5	4 ft LED Tube	200732x1	15	0.1	BR	6,240	468	343	0.1	$ 45.24	$ 408.38	$0	9.0	9.0
46LED	100 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	101 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	102	14	W 28 C F 2 (ELE)	F42SSILL	48	0.7	C-OCC	2400	1,613	14	4 ft LED Tube	200732x2	30	0.4	C-OCC	2,400	1,008	605	0.3	$ 86.30	$ 2,286.90	$0	26.5	26.5
46LED	102 Office	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	SW	2400	461	4	4 ft LED Tube	200732x2	30	0.1	SW	2,400	288	173	0.1	$ 24.66	$ 653.40	$0	26.5	26.5
55LED	102 Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202	1	2T 25 R LED	2RTLED	25	0.0	SW	4,300	108	95	0.0	$ 12.76	$ 202.50	$50	15.9	12.0
46LED	103 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	104 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	105 Vacant	12	W 28 C F 2 (ELE)	F42SSILL	48	0.6	C-OCC	400	230	12	4 ft LED Tube	200732x2	30	0.4	C-OCC	400	144	86	0.2	$ 19.98	$ 1,960.20	$0	98.1	98.1
46LED	106 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	108 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	107 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	400	108	65	0.2	$ 14.98	$ 1,470.15	$0	98.1	98.1
46LED	109 Storage	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	500	216	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	500	135	81	0.2	$ 17.01	$ 1,470.15	$0	86.4	86.4
46LED	107 Computer	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	2400	1,037	9	4 ft LED Tube	200732x2	30	0.3	C-OCC	2,400	648	389	0.2	$ 55.48	$ 1,470.15	$0	26.5	26.5
231LED	Exterior	47	WP400MH1	MH400/1	458	21.5	BR	5000	107,630	47	WPLED2T78	WPLED2T78	91	4.3	BR	5,000	21,385	86,245	17.2	$ 11,513.36	$ 48,136.98	$4,700	4.2	3.8
169LED	Exterior	12	WP 250 MH	MH250/1	295	3.5	BR	5000	17,700	12	FXLED78	FXLED78/1	78	0.9	BR	5,000	4,680	13,020	2.6	$ 1,738.12	$ 10,130.35	$2,100	5.8	4.6
227LED	Exterior	5	70 W MH Wall Pack	MH70/1	95	0.5	BR	5000	2,375	5	FXLED18	FXLED18/1	18	0.1	BR	5,000	450	1,925	0.4	$ 256.98	$ 2,116.13	$500	8.2	6.3
	Total	**869**				**70.3**			**226,600**	**869**			**3,098**	**32.9**			**86,304**	**140,296**	**37.4**	**$19,127**	**$197,566**	**$7,950**		
																	Demand Savings			**37.4**	**$1,590**			
																	kWh Savings			**140,296**	**$17,537**			
																	Total savings				**$19,127**		**10.3**	**9.9**

Energy Audit of Newark Public Schools - Newark Innovation Academy
CHA Project No.27999
ECM-L2 Install Occupancy Sensors

	EXISTING CONDITIONS									RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
20LED	253 Mech	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	1600	83.2	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	1600	83.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	209 Class	6	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	1000	432.0	6	T 32 R F 3 (ELE)	F43SSILL	72	0.4	C-OCC	700	302.4	129.6	0.0	$16.20	$270.00	$35.00	16.7	14.5
55LED	209 Class	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	1000	47.0	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	700	32.9	14.1	0.0	$1.76	$270.00	$35.00	153.2	133.3
20LED	Corr 260 East	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,569.3	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	NONE	6240	3,569.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corr 260 South	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,946.9	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	NONE	6240	1,946.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corr 260 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,542.7	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	NONE	6240	4,542.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corr 260 North	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,946.9	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	NONE	6240	1,946.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Mechanical Room 225	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	1600	915.2	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	NONE	1600	915.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Mens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	412.8	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Womens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	412.8	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Stair #1	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649.0	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	6240	649.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
198LED	Safe Haven (UN)	8	2T 17 R F 2 (ELE)	F22LL	31	0.2	C-OCC	1000	248.0	8	2T 17 R F 2 (ELE)	F22LL	31	0.2	NONE	1000	248.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Safe Haven Mens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	412.8	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Safe Haven Womens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	412.8	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	NONE	4300	412.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Community Room 217	25	T 28 R F 2 (ELE)	F42SSILL	48	1.2	C-OCC	2400	2,880.0	25	T 28 R F 2 (ELE)	F42SSILL	48	1.2	NONE	2400	2,880.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	Parent Center UN-66	55	T 32 R F 3 (ELE)	F43SSILL	72	4.0	C-OCC	2400	9,504.0	55	T 32 R F 3 (ELE)	F43SSILL	72	4.0	NONE	2400	9,504.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	210	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	211	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	212	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	213	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	214	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	216	28	T 32 R F 3 (ELE)	F43SSILL	72	2.0	C-OCC	2400	4,838.4	28	T 32 R F 3 (ELE)	F43SSILL	72	2.0	NONE	2400	4,838.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	UN-76	2	T 32 R F 3 (ELE)	F43SSILL	72	0.1	C-OCC	500	72.0	2	T 32 R F 3 (ELE)	F43SSILL	72	0.1	NONE	500	72.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	Office in 216	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691.2	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	NONE	2400	691.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	200 Office	11	T 32 R F 3 (ELE)	F43SSILL	72	0.8	C-OCC	2400	1,900.8	11	T 32 R F 3 (ELE)	F43SSILL	72	0.8	NONE	2400	1,900.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	200 Small Office	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691.2	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	NONE	2400	691.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	210 Conference	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	200A Vacant	17	T 32 R F 3 (ELE)	F43SSILL	72	1.2	C-OCC	400	489.6	17	T 32 R F 3 (ELE)	F43SSILL	72	1.2	NONE	400	489.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	200A Office #1	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	2400	691.2	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	1200	345.6	345.6	0.0	$43.20	$270.00	$35.00	6.3	5.4
35LED	200A Office #2	5	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	2400	864.0	5	T 32 R F 3 (ELE)	F43SSILL	72	0.4	C-OCC	1200	432.0	432.0	0.0	$54.00	$270.00	$35.00	5.0	4.4
35LED	200A Office #3	3	T 32 R F 3 (ELE)	F43SSILL	72	0.2	SW	2400	518.4	3	T 32 R F 3 (ELE)	F43SSILL	72	0.2	C-OCC	1200	259.2	259.2	0.0	$32.40	$270.00	$35.00	8.3	7.3
35LED	200A Dark Room	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	2400	172.8	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	NONE	2400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	203 Copy/Storage	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	500	324.0	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	500	324.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	205 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	1200	777.6	777.6	0.0	$97.20	$270.00	$35.00	2.8	2.4
35LED	208 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	400	259.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	207 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	400	259.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	206 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	1200	777.6	777.6	0.0	$97.20	$270.00	$35.00	2.8	2.4
35LED	204 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	1200	777.6	777.6	0.0	$97.20	$270.00	$35.00	2.8	2.4
20LED	Stair #4	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811.2	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	6240	811.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Stair #5	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649.0	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	6240	649.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Gym 110A Storage	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26.0	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	500	26.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
250	Gym 110A	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	SW	1600	7,080.0	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	NONE	1600	7,080.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	Gym 110A Storage	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	500	36.0	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	NONE	500	36.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	Girls Locker 177	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672.0	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	NONE	2800	672.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	Girls Locker 177	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134.4	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	NONE	2800	134.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	183	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230.4	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	C-OCC	1200	115.2	115.2	0.0	$14.40	$270.00	$35.00	18.8	16.3
46LED	182 Restroom	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	4300	206.4	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	NONE	4300	206.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	184 Gym Stor	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26.0	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	500	26.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	198	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230.4	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	C-OCC	1200	115.2	115.2	0.0	$14.40	$270.00	$35.00	18.8	16.3
40LED	194 Boys Locker Room	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672.0	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	NONE	2800	672.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	193 Office	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2400	115.2	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	C-OCC	1200	57.6	57.6	0.0	$7.20	$270.00	$35.00	37.5	32.6
46LED	193 Boys Locker Room	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134.4	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	NONE	2800	134.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corridor 198 South	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622.4	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	NONE	6240	1,622.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corridor 198 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,542.7	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	NONE	6240	4,542.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corridor 198 East	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,893.8	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	NONE	6240	3,893.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Corridor 198 North	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622.4	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	NONE	6240	1,622.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Stair #4	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	6240	649.0	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	6240	649.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Gym Vestibule	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	SW	6240	162.2	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	NONE	6240	162.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Mechanical Room 157	14	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	1600	582.4	14	S 28 P F 1 (ELE)	F41SSILL	26	0.4	NONE	1600	582.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	112	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	110	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555.2	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	NONE	2400	1,555.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	Industrial Art 162	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	2400	2,073.6	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	NONE	2400	2,073.6	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	113 Vacant	15	T 32 R F 3 (ELE)	F43SSILL	72	1.1	C-OCC	400	432.0	15	T 32 R F 3 (ELE)	F43SSILL	72	1.1	NONE	400	432.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	150 Kitchen Vacant	13	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	400	374.4	13	T 32 R F 3 (ELE)	F43SSILL	72	0.9	NONE	400	374.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
35LED	Cafeteria	38	T 32 R F 3 (ELE)	F43SSILL	72	2.7	C-OCC	2000	5,472.0	38	T 32 R F 3 (ELE)	F43SSILL	72	2.7	NONE	2000	5,472.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
268	Stage	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	SW	1200	306.0	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	NONE	1200	306.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	Exit by Stair #1	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	BR	6240	299.5	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	NONE	6240	299.5	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	116 Vacant	2	W 28 C F 2 (ELE)	F42SSILL	48	0.1	C-OCC	400	38.4	2	W 28 C F 2 (ELE)	F42SSILL	48	0.1	NONE	400	38.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	Break Room	6	W 28 C F 2 (ELE)	F42SSILL	48	0.3	C-OCC	2400	691.2	6	W 28 C F 2 (ELE)	F42SSILL	48	0.3	NONE	2400	691.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
55LED	Break Room Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202.1	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	NONE	4300	202.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	107	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	460.8	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	NONE	2400	460.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	125 Storage	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	SW	500	78.0	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	NONE	500	78.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
55LED	Mens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202.1	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	NONE	4300	202.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
55LED	Womens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202.1	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	NONE	4300	202.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	101 Vacant	9	T 28 R F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	T 28 R F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	101 Office #1	4	T 28 R F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	460.8	4	T 28 R F 2 (ELE)	F42SSILL	48	0.2	NONE	2400	460.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
40LED	101 Office #2	1	T 28 R F 2 (ELE)	F42SSILL	48	0.0	C-OCC	2400	115.2	1	T 28 R F 2 (ELE)	F42SSILL	48	0.0	NONE	2400	115.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
217	101 Restroom	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	SW	4300	141.9	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	NONE	4300	141.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
20LED	Stair #2	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811.2	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	NONE	6240	811.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	100 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	101 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	102	14	W 28 C F 2 (ELE)	F42SSILL	48	0.7	C-OCC	2400	1,612.8	14	W 28 C F 2 (ELE)	F42SSILL	48	0.7	NONE	2400	1,612.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	102 Office	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	SW	2400	460.8	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	C-OCC	1200	230.4	230.4	0.0	$28.80	$270.00	$35.00	9.4	8.2
55LED	102 Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202.1	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	NONE	4300	202.1	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	103 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	104 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	105 Vacant	12	W 28 C F 2 (ELE)	F42SSILL	48	0.6	C-OCC	400	230.4	12	W 28 C F 2 (ELE)	F42SSILL	48	0.6	NONE	400	230.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	106 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	108 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	107 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	172.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	400	172.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	109 Storage	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	500	216.0	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	500	216.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
46LED	107 Computer	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	2400	1,036.8	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	NONE	2400	1,036.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
231LED	Exterior	47	WP400MH1	MH400/1	458	21.5	BR	5000	107,630.0	47	WP400MH1	MH400/1	458	21.5	NONE	5000	107,630.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
169LED	Exterior	12	WP 250 MH	MH250/1	295	3.5	BR	5000	17,700.0	12	WP 250 MH	MH250/1	295	3.5	NONE	5000	17,700.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
227LED	Exterior	5	70 W MH Wall Pack	MH70/1	95	0.5	BR	5000	2,375.0	5	70 W MH Wall Pack	MH70/1	95	0.5	NONE	5000	2,375.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
															0	#N/A	#VALUE!	#VALUE!	#N/A	#VALUE!			#VALUE!	#VALUE!
															0	#N/A	#VALUE!	#VALUE!	#N/A	#VALUE!			#VALUE!	#VALUE!
	Total	**869**				**70.3**			**226600.4**	**869.0**				**70.3**			**222568.7**	**4031.7**	**0.0**	**504.0**	**3240.0**	**420.0**		
																	Demand Savings			0.0	$0			
																	kWh Savings			4,032	$504			
																	Total Savings				$504		**6.4**	**5.6**

Energy Audit of Newark Public Schools - Newark Innovation Academy
CHA Project No.27999
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS							COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kWspace) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kWspace) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
20LED	253 Mech	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	1600	83	2	4 ft LED Tube	200732x1	15	0.0	NONE	1,600	48	35	0.0	$ 5.33	$ 163.35	$ -	30.6	30.6
35LED	209 Class	6	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	1000	432	6	T 59 R LED	RTLED38	38	0.2	C-OCC	700	160	272	0.2	$ 42.72	$ 1,687.50	$ 35	39.5	38.7
55LED	209 Class	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	1000	47	1	2T 25 R LED	2RTLED	25	0.0	C-OCC	700	18	30	0.0	$ 4.62	$ 472.50	$ 85	102.2	83.8
20LED	Corr 260 East	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,569	22	4 ft LED Tube	200732x1	15	0.3	NONE	6,240	2,059	1,510	0.2	$ 199.04	$ 1,796.85	$ -	9.0	9.0
20LED	Corr 260 South	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,947	12	4 ft LED Tube	200732x1	15	0.2	NONE	6,240	1,123	824	0.1	$ 108.57	$ 980.10	$ -	9.0	9.0
20LED	Corr 260 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,543	28	4 ft LED Tube	200732x1	15	0.4	NONE	6,240	2,621	1,922	0.3	$ 253.32	$ 2,286.90	$ -	9.0	9.0
20LED	Corr 260 North	12	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,947	12	4 ft LED Tube	200732x1	15	0.2	NONE	6,240	1,123	824	0.1	$ 108.57	$ 980.10	$ -	9.0	9.0
20LED	Mechanical Room 225	22	S 28 P F 1 (ELE)	F41SSILL	26	0.6	SW	1600	915	22	4 ft LED Tube	200732x1	15	0.3	NONE	1,600	528	387	0.2	$ 58.68	$ 1,796.85	$ -	30.6	30.6
40LED	Mens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	NONE	4,300	327	86	0.0	$ 11.60	$ 472.50	$ -	40.7	40.7
40LED	Womens Room	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	NONE	4,300	327	86	0.0	$ 11.60	$ 472.50	$ -	40.7	40.7
20LED	Stair #1	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649	4	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	374	275	0.0	$ 36.19	$ 326.70	$ -	9.0	9.0
19LED	Safe Haven (UN)	8	2T 17 R F 2 (ELE)	F22LL	31	0.2	C-OCC	1000	248	8	2T 25 R LED	2RTLED	25	0.2	NONE	1,000	200	48	0.0	$ 8.04	$ 1,620.00	$ 400	201.5	151.8
40LED	Safe Haven Mens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	NONE	4,300	327	86	0.0	$ 11.60	$ 472.50	$ -	40.7	40.7
40LED	Safe Haven Womens	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	4300	413	2	T 38 R LED	RTLED38	38	0.1	NONE	4,300	327	86	0.0	$ 11.60	$ 472.50	$ -	40.7	40.7
40LED	Community Room 217	25	T 28 R F 2 (ELE)	F42SSILL	48	1.2	C-OCC	2400	2,880	25	T 38 R LED	RTLED38	38	1.0	NONE	2,400	2,280	600	0.3	$ 85.62	$ 5,906.25	$ -	69.0	69.0
35LED	Parent Center UN-6	55	T 32 R F 3 (ELE)	F43SSILL	72	4.0	C-OCC	2400	9,504	55	T 59 R LED	RTLED38	38	2.1	NONE	2,400	5,016	4,488	1.9	$ 640.44	$ 12,993.75	$ -	20.3	20.3
35LED	210	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	211	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	212	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	213	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	214	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	216	28	T 32 R F 3 (ELE)	F43SSILL	72	2.0	C-OCC	2400	4,838	28	T 59 R LED	RTLED38	38	1.1	NONE	2,400	2,554	2,285	1.0	$ 326.04	$ 6,615.00	$ -	20.3	20.3
35LED	UN-76	2	T 32 R F 3 (ELE)	F43SSILL	72	0.1	C-OCC	500	72	2	T 59 R LED	RTLED38	38	0.1	NONE	500	38	34	0.1	$ 7.14	$ 472.50	$ -	66.2	66.2
35LED	Office in 216	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691	4	T 59 R LED	RTLED38	38	0.2	NONE	2,400	365	326	0.1	$ 46.58	$ 945.00	$ -	20.3	20.3
35LED	200 Office	11	T 32 R F 3 (ELE)	F43SSILL	72	0.8	C-OCC	2400	1,901	11	T 59 R LED	RTLED38	38	0.4	NONE	2,400	1,003	898	0.4	$ 128.09	$ 2,598.75	$ -	20.3	20.3
35LED	200 Small Office	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	C-OCC	2400	691	4	T 59 R LED	RTLED38	38	0.2	NONE	2,400	365	326	0.1	$ 46.58	$ 945.00	$ -	20.3	20.3
35LED	210 Conference	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	200A Vacant	17	T 32 R F 3 (ELE)	F43SSILL	72	1.2	C-OCC	400	490	17	T 59 R LED	RTLED38	38	0.6	NONE	400	258	231	0.6	$ 53.45	$ 4,016.25	$ -	75.1	75.1
35LED	200A Office #1	4	T 32 R F 3 (ELE)	F43SSILL	72	0.3	SW	2400	691	4	T 59 R LED	RTLED38	38	0.2	C-OCC	1,200	182	509	0.1	$ 69.38	$ 1,215.00	$ 35	17.5	17.0
35LED	200A Office #2	5	T 32 R F 3 (ELE)	F43SSILL	72	0.4	SW	2400	864	5	T 59 R LED	RTLED38	38	0.2	C-OCC	1,200	228	636	0.2	$ 86.72	$ 1,451.25	$ 35	16.7	16.3
35LED	200A Office #3	3	T 32 R F 3 (ELE)	F43SSILL	72	0.2	SW	2400	518	3	T 59 R LED	RTLED38	38	0.1	C-OCC	1,200	137	382	0.1	$ 52.03	$ 978.75	$ 35	18.8	18.1
35LED	200A Dark Room	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	2400	173	1	T 59 R LED	RTLED38	38	0.0	NONE	2,400	91	82	0.0	$ 11.64	$ 236.25	$ -	20.3	20.3
35LED	203 Copy/Storage	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	500	324	9	T 59 R LED	RTLED38	38	0.3	C-OCC	500	171	153	0.3	$ 32.12	$ 2,126.25	$ -	66.2	66.2
35LED	205 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	1,200	410	1,145	0.3	$ 156.10	$ 2,396.25	$ 35	15.4	15.1
35LED	208 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259	9	T 59 R LED	RTLED38	38	0.3	NONE	400	137	122	0.3	$ 28.30	$ 2,126.25	$ -	75.1	75.1
35LED	207 Vacant	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	400	259	9	T 59 R LED	RTLED38	38	0.3	NONE	400	137	122	0.3	$ 28.30	$ 2,126.25	$ -	75.1	75.1
35LED	206 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	1,200	410	1,145	0.3	$ 156.10	$ 2,396.25	$ 35	15.4	15.1
35LED	204 Office	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	C-OCC	1,200	410	1,145	0.3	$ 156.10	$ 2,396.25	$ 35	15.4	15.1
20LED	Stair #4	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811	5	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	468	343	0.1	$ 45.24	$ 408.38	$ -	9.0	9.0
20LED	Stair #5	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	649	4	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	374	275	0.0	$ 36.19	$ 326.70	$ -	9.0	9.0
20LED	Gym 110A Storage	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26	2	4 ft LED Tube	200732x1	15	0.0	NONE	500	15	11	0.0	$ 2.31	$ 163.35	$ -	70.7	70.7
250	Gym 110A	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	SW	1600	7,080	25	T 54 W F 3 (ELE) (T-5)	F43GHL	177	4.4	NONE	1,600	7,080	-	0.0	$ -	$ -	$ -		
35LED	Gym 110A Storage	1	T 32 R F 3 (ELE)	F43SSILL	72	0.1	SW	500	36	1	T 59 R LED	RTLED38	38	0.0	NONE	500	19	17	0.0	$ 3.57	$ 236.25	$ -	66.2	66.2
40LED	Girls Locker 177	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672	5	T 38 R LED	RTLED38	38	0.2	NONE	2,800	532	140	0.1	$ 19.62	$ 1,181.25	$ -	60.2	60.2
46LED	Girls Locker 177	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134	1	4 ft LED Tube	200732x2	30	0.0	NONE	2,800	84	50	0.0	$ 7.06	$ 163.35	$ -	23.1	23.1
40LED	183	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230	2	T 38 R LED	RTLED38	38	0.1	C-OCC	1,200	91	139	0.0	$ 18.25	$ 742.50	$ 35	40.7	38.8
46LED	182 Restroom	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	4300	206	1	4 ft LED Tube	200732x2	30	0.0	NONE	4,300	129	77	0.0	$ 10.44	$ 163.35	$ -	15.6	15.6
20LED	184 Gym Stor	2	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	500	26	2	4 ft LED Tube	200732x1	15	0.0	NONE	500	15	11	0.0	$ 2.31	$ 163.35	$ -	70.7	70.7
40LED	198	2	T 28 R F 2 (ELE)	F42SSILL	48	0.1	SW	2400	230	2	T 38 R LED	RTLED38	38	0.1	C-OCC	1,200	91	139	0.0	$ 18.25	$ 742.50	$ 35	40.7	38.8
40LED	194 Boys Locker Room	5	T 28 R F 2 (ELE)	F42SSILL	48	0.2	SW	2800	672	5	T 38 R LED	RTLED38	38	0.2	NONE	2,800	532	140	0.1	$ 19.62	$ 1,181.25	$ -	60.2	60.2
46LED	193 Office	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2400	115	1	4 ft LED Tube	200732x2	30	0.0	C-OCC	1,200	36	79	0.0	$ 10.66	$ 433.35	$ 35	40.6	37.4
46LED	193 Boys Locker Room	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	SW	2800	134	1	4 ft LED Tube	200732x2	30	0.0	NONE	2,800	84	50	0.0	$ 7.06	$ 163.35	$ -	23.1	23.1
20LED	Corridor 198 South	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622	10	4 ft LED Tube	200732x1	15	0.2	NONE	6,240	936	686	0.1	$ 90.47	$ 816.75	$ -	9.0	9.0
20LED	Corridor 198 West	28	S 28 P F 1 (ELE)	F41SSILL	26	0.7	BR	6240	4,543	28	4 ft LED Tube	200732x1	15	0.4	NONE	6,240	2,621	1,922	0.3	$ 253.32	$ 2,286.90	$ -	9.0	9.0
20LED	Corridor 198 East	24	S 28 P F 1 (ELE)	F41SSILL	26	0.6	BR	6240	3,894	24	4 ft LED Tube	200732x1	15	0.4	NONE	6,240	2,246	1,647	0.3	$ 217.13	$ 1,960.20	$ -	9.0	9.0
20LED	Corridor 198 North	10	S 28 P F 1 (ELE)	F41SSILL	26	0.3	BR	6240	1,622	10	4 ft LED Tube	200732x1	15	0.2	NONE	6,240	936	686	0.1	$ 90.47	$ 816.75	$ -	9.0	9.0
20LED	Stair #4	4	S 28 P F 1 (ELE)	F41SSILL	26	0.1	SW	6240	649	4	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	374	275	0.0	$ 36.19	$ 326.70	$ -	9.0	9.0
20LED	Stair #4	1	S 28 P F 1 (ELE)	F41SSILL	26	0.0	SW	6240	162	1	4 ft LED Tube	200732x1	15	0.0	NONE	6,240	94	69	0.0	$ 9.05	$ 81.68	$ -	9.0	9.0
20LED	Mechanical Room 157	14	S 28 P F 1 (ELE)	F41SSILL	26	0.4	SW	1600	582	14	4 ft LED Tube	200732x1	15	0.2	NONE	1,600	336	246	0.2	$ 37.34	$ 1,143.45	$ -	30.6	30.6
35LED	112	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	110	9	T 32 R F 3 (ELE)	F43SSILL	72	0.6	C-OCC	2400	1,555	9	T 59 R LED	RTLED38	38	0.3	NONE	2,400	821	734	0.3	$ 104.80	$ 2,126.25	$ -	20.3	20.3
35LED	Industrial Art 162	12	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	2400	2,074	12	T 59 R LED	RTLED38	38	0.5	NONE	2,400	1,094	979	0.4	$ 139.73	$ 2,835.00	$ -	20.3	20.3
35LED	113 Vacant	15	T 32 R F 3 (ELE)	F43SSILL	72	1.1	C-OCC	400	432	15	T 59 R LED	RTLED38	38	0.6	NONE	400	228	204	0.5	$ 47.16	$ 3,543.75	$ -	75.1	75.1
35LED	150 Kitchen Vacant	13	T 32 R F 3 (ELE)	F43SSILL	72	0.9	C-OCC	400	374	13	T 59 R LED	RTLED38	38	0.5	NONE	400	198	177	0.4	$ 40.88	$ 3,071.25	$ -	75.1	75.1
35LED	Cafeteria	38	T 32 R F 3 (ELE)	F43SSILL	72	2.7	C-OCC	2000	5,472	38	T 59 R LED	RTLED38	38	1.4	NONE	2,000	2,888	2,584	1.3	$ 377.88	$ 8,977.50	$ -	23.8	23.8
268	Stage	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	SW	1200	306	15	LED Spot Light	DL-P38F-SW38-27K-WH	17	0.3	NONE	1,200	306	-	0.0	$ -	$ -	$ -		
46LED	Exit by Stair #1	1	W 28 C F 2 (ELE)	F42SSILL	48	0.0	BR	6240	300	1	4 ft LED Tube	200732x2	30	0.0	NONE	6,240	187	112	0.0	$ 14.80	$ 163.35	$ -	11.0	11.0
46LED	116 Vacant	2	W 28 C F 2 (ELE)	F42SSILL	48	0.1	C-OCC	400	38	2	4 ft LED Tube	200732x2	30	0.1	NONE	400	24	14	0.0	$ 3.33	$ 326.70	$ -	98.1	98.1
46LED	Break Room	6	W 28 C F 2 (ELE)	F42SSILL	48	0.3	C-OCC	2400	691	6	4 ft LED Tube	200732x2	30	0.2	NONE	2,400	432	259	0.1	$ 36.99	$ 980.10	$ -	26.5	26.5
55LED	Break Room Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202	1	2T 25 R LED	2RTLED	25	0.0	NONE	4,300	108	95	0.0	$ 12.76	$ 202.50	$ 50	15.9	12.0
46LED	107	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	461	4	4 ft LED Tube	200732x2	30	0.1	NONE	2,400	288	173	0.1	$ 24.66	$ 653.40	$ -	26.5	26.5
20LED	125 Storage	6	S 28 P F 1 (ELE)	F41SSILL	26	0.2	SW	500	78	6	4 ft LED Tube	200732x1	15	0.1	NONE	500	45	33	0.1	$ 6.93	$ 490.05	$ -	70.7	70.7
55LED	Mens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202	1	2T 25 R LED	2RTLED	25	0.0	NONE	4,300	108	95	0.0	$ 12.76	$ 202.50	$ 50	15.9	12.0
55LED	Womens Room	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	C-OCC	4300	202	1	2T 25 R LED	2RTLED	25	0.0	NONE	4,300	108	95	0.0	$ 12.76	$ 202.50	$ 50	15.9	12.0
40LED	101 Vacant	9	T 28 R F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	T 38 R LED	RTLED38	38	0.3	NONE	400	137	36	0.1	$ 8.32	$ 2,126.25	$ -	255.5	255.5
40LED	101 Office #1	4	T 28 R F 2 (ELE)	F42SSILL	48	0.2	C-OCC	2400	461	4	T 38 R LED	RTLED38	38	0.2	NONE	2,400	365	96	0.0	$ 13.70	$ 945.00	$ -	69.0	69.0
40LED	101 Office #2	1	T 28 R F 2 (ELE)	F42SSILL	48	0.0	C-OCC	2400	115	1	T 38 R LED	RTLED38	38	0.0	NONE	2,400	91	24	0.0	$ 3.42	$ 236.25	$ -	69.0	69.0
217	101 Restroom	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	SW	4300	142	1	2B 17 C F 2 (ELE)	F22ILL	33	0.0	NONE	4,300	142	-	0.0	$ -	$ -	$ -		
20LED	Stair #2	5	S 28 P F 1 (ELE)	F41SSILL	26	0.1	BR	6240	811	5	4 ft LED Tube	200732x1	15	0.1	NONE	6,240	468	343	0.1	$ 45.24	$ 408.38	$ -	9.0	9.0
46LED	100 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	101 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	102	14	W 28 C F 2 (ELE)	F42SSILL	48	0.7	C-OCC	2400	1,613	14	4 ft LED Tube	200732x2	30	0.4	NONE	2,400	1,008	605	0.3	$ 86.30	$ 2,286.90	$ -	26.5	26.5
46LED	102 Office	4	W 28 C F 2 (ELE)	F42SSILL	48	0.2	SW	2400	461	4	4 ft LED Tube	200732x2	30	0.1	C-OCC	1,200	144	317	0.1	$ 42.66	$ 923.40	$ 35	21.6	20.8
55LED	102 Restroom	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	4300	202	1	2T 25 R LED	2RTLED	25	0.0	NONE	4,300	108	95	0.0	$ 12.76	$ 202.50	$ 50	15.9	12.0
46LED	103 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	104 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	105 Vacant	12	W 28 C F 2 (ELE)	F42SSILL	48	0.6	C-OCC	400	230	12	4 ft LED Tube	200732x2	30	0.4	NONE	400	144	86	0.2	$ 19.98	$ 1,960.20	$ -	98.1	98.1
46LED	106 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	108 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	107 Vacant	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	400	173	9	4 ft LED Tube	200732x2	30	0.3	NONE	400	108	65	0.2	$ 14.98	$ 1,470.15	$ -	98.1	98.1
46LED	109 Storage	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	500	216	9	4 ft LED Tube	200732x2	30	0.3	NONE	500	135	81	0.2	$ 17.01	$ 1,470.15	$ -	86.4	86.4
46LED	107 Computer	9	W 28 C F 2 (ELE)	F42SSILL	48	0.4	C-OCC	2400	1,037	9	4 ft LED Tube	200732x2	30	0.3	NONE	2,400	648	389	0.2	$ 55.48	$ 1,470.15	$ -	26.5	26.5
231LED	Exterior	47	WP400MH1	MH400/1	458	21.5	BR	5000	107,630	47	WPLED2T78	WPLED2T78	91	4.3	NONE	5,000	21,385	86,245	17.2	$ 11,513.36	$ 48,136.98	$ 4,700	4.2	3.8
169LED	Exterior	12	WP 250 MH	MH250/1	295	3.5	BR	5000	17,700	12	FXLED78	FXLED78/1	78	0.9	NONE	5,000	4,680	13,020	2.6	$ 1,738.12	$ 10,130.35	$ 2,100	5.8	4.6
227LED	Exterior	5	70 W MH Wall Pack	MH70/1	95	0.5	BR	5000	2,375	5	FXLED18	FXLED18/1	18	0.1	NONE	5,000	450	1,925	0.4	$ 256.98	$ 2,116.13	$ 500	8.2	6.3
															0	#N/A								#VALUE!
															0	#N/A								#VALUE!
S	Total	869				70.3			226,600	869				32.9				84,087		19,404	200,806	$8,370		
S																		Demand Savings	37.4	37.4	$1,590			
S																		kWh Savings		142,513	$17,814			
S																		Total Savings			$19,404		10.3	9.9

APPENDIX D

New Jersey Board of Public Utilities Incentives

i. **Smart Start**

ii. **Direct Install**

iii. **Pay for Performance (P4P)**

iv. **Energy Savings Improvement Plan (ESIP)**

I. SMART START

NJ SmartStart Buildings

Program Overview

With New Jersey SmartStart Buildings ...

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

Special Notice

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

Visit the Sandy web page for details and important links.

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

- Project Categories
- Custom Measures
- Incentives for Qualifying Equipment and Projects
- Program Terms and Conditions
- Find a Trade Ally

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

Getting Started

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

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

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

Find out more about equipment incentives

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

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COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

Home » Commercial & Industrial » Programs » NJ SmartStart Buildings

Equipment Incentives

Special Notice

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

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

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

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

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

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

Electric Chillers

Water-cooled chillers ($12 - $170 per ton)
Air-cooled chillers ($8 - $52 per ton)

Gas Cooling

Gas absorption chillers ($185-$450 per ton)
Gas Engine-Driven Chillers (Calculated through Custom Measure F

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop ($450-750 per ton)

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-phase motors ($45 - $700 per motor) **(Incentive was discor effective March 1, 2013 except for buildings impacted by Hurri Sandy. Approved applications will have the standard timefram year from the program commitment date to complete the instal**

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

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

Prescriptive Lighting

New Linear Fluorescent

- T-12, HID and Incandescent to T-5 and T-8 ($25 - $200 p fixture) **(Note: T12 replacements are only available for buildings impacted by Hurricane Sandy)**
- New Induction ($70 per replaced HID fixture)
- New LED
  - Screw-in/Plug-in ($10 - $20 per lamp)
  - Refrigerator/Freezer Case ($30 - $65 per fixture)
  - Outdoor pole/arm/wall-mounted luminaires ($100 - $175 p fixture)
  - Display case ($30 per case)
  - Shelf-mounted display and task ($15 per linear foot)
  - Wall-wash, desk, recessed ($20 - $35 per fixture)
  - Parking garage luminaires ($100 per fixture)
  - Track or Mono-Point directional ($50 per fixture)
  - Stairwell and Passageway luminaires ($40 per fixture)
  - High-Bay, Low-Bay ($150 per fixture)
  - Bollard ($50 per fixture)
  - luminaires for Ambient Lighting of Interior Commercial Spa *Linear panels ($50 per fixture)*
  - Fuel pump canopy ($100 per fixture)
  - LED retrofit kits (custom measures)
- New Pulse-Start Metal Hallide ($25 per fixture)
- Linear Fluorescent Retrofit ($10 - $20 per fixture)
- Induction Retrofit ($50 per retrofitted HID fixture)
- New Construction/Complete Renovation (performance-based)

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

Lighting Controls

- Occupancy Sensors
  - Wall mounted ($20 per control)
  - Remote mounted ($35 per control)
  - Daylight dimmers ($25 per fixture controlled, $50 per fixtu office applications only)
  - Occupancy controlled hi-low fluorescent controls ($25 per controlled)
- HID or Fluorescent Hi-Bay Controls
  - Occupancy hi-low ($35 per fixture controlled)
  - Daylight dimming ($45 per fixture controlled)

Refrigeration

- Covers and Doors
  - Energy-Efficient doors for open refrigerated doors/covers per door)
  - Aluminum Night Curtains for open refrigerated cases ($3.5 linear foot)
- Controls
  - Door Heater Control ($50 per control)
  - Electric Defrost Control ($50 per control)
  - Evaporator Fan Control ($75 per control)
  - Novelty Cooler Shutoff ($50 per control)

Food Service Equipment

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

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

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

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

Other Equipment Incentives*

- Performance Lighting ($1.00 per watt per square foot below prograi incentive threshold, currently 5% more energy efficient than ASHR/ 2007 for New Construction only.)
- Custom electric and gas equipment incentives (not prescriptive)

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

II. DIRECT INSTALL

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

PARTICIPATION STEPS

PARTICIPATING CONTRACTORS

SUSTAINABLE JERSEY

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

Direct Install

NEW JERSEY'S CLEAN ENERGY PROGRAM
DIRECT Install

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

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

ELIGIBILITY

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

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

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

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

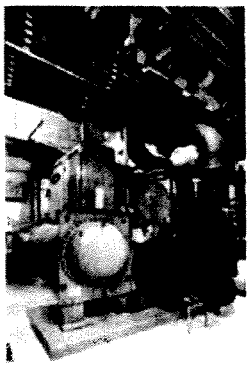
III. PAY FOR PERFORMANCE (P4P)

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

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



Eligibility

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

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

ENERGY STAR Portfolio Manager

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

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

Incentives

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

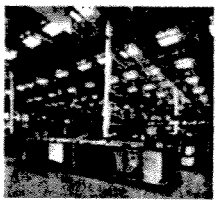
TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

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



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

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

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

Steps to Participation

Click here for a step-by-step description of the program.

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

BPU

PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2013 - June 30, 2014

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

Instructions

1. Read the program material to determine project qualification.
2. Read the Participation Agreement and sign where indicated.
3. Fill out all applicable spaces on this form.
4. Provide a copy of the customer's company W-9 form.
5. Provide the most recent consecutive 12 month period of utility bills for the project.
6. Provide brief description of facility.
7. Partner must submit the application package via e-mail, mail or fax DIRECTLY to the Market Manager – see back of this form.

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

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

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

Partner Information

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

Project Information

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

Funding

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

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

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

Additional Project information

Additional Utility Account(s)

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

Additional Comments:

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

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

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

Visit our website: NJCleanEnergy.com/P4P

*Incentives/Requirements subject to change.

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

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

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

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

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

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

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

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

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

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

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

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

Program Manager – TRC Energy Services.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

Energy Savings Improvement Program

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

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

Local Government
School Districts (K-12)

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

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

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

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

FIRST STEP – ENERGY AUDIT

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

ENERGY REDUCTION PLANS

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

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

ESIP PROGRAM

Final version 42413

BPU RULES

1. Public Entity must decide if they will use an ESCO or DIY method or Hybrid thereof prior to issuing the RFP and the RFP must state the intended method. A change in the project procurement model after the RFP closing date will be cause for immediate rejection and disqualification of potential Clean Energy program incentives.

2. RFP procedures shall be adhered to as per the legislation, including the use of BPU approved forms. Any alteration of the forms, without prior approval from the BPU shall be grounds for rejection.

3. RFP must include copy of an audit (ASHRAE Level II w/Level III for lighting) and audit must be prepared by a firm classified by DPMC in the 036 discipline.

4. All firms, including professional services, whether using ESCO or DIY model, must be DPMC classified.

5. If an Architect is engaged by the public entity, the architectural fees are the responsibility of the public entity and must be paid directly to the firm. These fees may be included in the energy cost savings analysis and payback.

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

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

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

7. There shall be no negative cash flow in any year of the program.
   section 7 (1)(a)
   > "the energy savings resulting from the program will be sufficient to cover the cost of the program's energy conservation measures."

8. SREC values are not permitted to be used in the energy cost savings calculations.

9. Capital cost avoidance values are not to be used in the energy savings calculations.

10. Operational and Maintenance (O&M) cost savings may be permitted in the cost savings calculations, but only with supporting documentation.

11. Blended utility rates shall not be permitted. Use the actual utility tariff or local contracted rates if there is a third party supplier.

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

12. Contracted third party utility rates may only be used for the term of the contract (5 yr. maximum) Subsequent years are to be projected at the utility tariff rates plus the annual BPU escalation rates.

13. Public entity shall conduct M&V (measurement and verification) at the one (1) year operational date and shall provide a copy of the M&V report to the Board of Public Utilities.

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

14. The decisions made by BPU staff regarding compliance or other issues that arise in connection with the RFP procurement process shall be considered a final decision of the BPU. Any appeal will need to be through the New Jersey Superior Court, Appellate Division.

15. For the RFP proposals only, Demand Response (DR) revenues claimed by ESCO's can only be projected for a maximum period of three (3) years. DR revenue projections beyond three years will not be permitted. DR revenues must be included and presented under the "Energy Rebates/Incentives" column of FORM VI.

16. ESCO "fees" proposed during the RFP phase of the project cannot increase post-award. ESCO's are required to maintain the fee percentages through final contract negotiations and construction of the Board approved Energy Savings Plan

17. Public Bid openings shall be held on the due date of the proposal submissions. The public entity shall announce the name of the bidder and the total dollar amount. After award of a contract, all proposals received will be made available by the owner for public inspection

18. Rejection of bids by the public entity shall be conducted in accordance with the appropriate sections of the applicable legislation, as stated in Title 40A:11-13.2. Additionally all proposals must be returned to the respective ESCO's upon rejection.

19. Field changes that exceed 5% of the project cost require BPU approval.

20. Energy Savings Plans (ESP) that is dependent upon incentives from the Clean Energy Program must review the current program requirements, at the time of application, for each incentive to insure eligibility. If any program incentive is denied, resubmission of all ESIP related forms will be necessary to remain ESIP qualified.

APPENDIX E

Photovoltaic Analysis

NEWARK PUBLIC SCHOOL DISTRICT
NEWARK INNOVATION ACEDEMY

Cost of Electricity	$0.14	/kWh
Electricity Usage	1,118,400	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without SREC	Payback (with SREC
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$800,000	**200.0**	**249,793**	**0**	**$33,972**	**0**	**$33,972**	**$0**	**$38,718**	**23.5**	**11.0**

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

Area Output*
3,641 m2
39,192 ft2

Perimeter Output*
288 m
944 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
25,290 ft2

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

8 watt/ft2
202,317 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	07108	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	1,118,400	(from utilities)
PV Generation	249,793	(generated using PV Watts)
% offset	22%	

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

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

Newark Innovation Acedemy

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:	14.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ^{2}/day)	AC Energy (kWh)	Energy Value ($)
1	2.78	14609	2045.26
2	3.54	16832	2356.48
3	4.35	22284	3119.76
4	4.95	23621	3306.94
5	5.69	27425	3839.50
6	5.86	26527	3713.78
7	5.73	26485	3707.90
8	5.47	25020	3502.80
9	4.91	22415	3138.10
10	3.99	19442	2721.88
11	2.68	13050	1827.00
12	2.35	12084	1691.76
Year	4.36	249793	34971.02

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

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

Flat Plate Solar Water Heater

Inputs

Energy Consumption

Electric Consumption	76.32	MMBtu
IncrementalElectricity Cost	39.8593	$/MMBtu
Usable Roof Area	3161	ft ^{2}

Flate Plate Collector Specifications

Optical Efficiency	78.7	%
Conductive Loss Coefficient	0.5778	Btu/hr-ft^2-°F
Radiative Loss Coefficient	0.0013	Btu/hr-ft^2-°F^2
Average Manifold Temperature	120	°F
Water Heater Efficiency	80	%
Piping Efficiency	99.5	%
Thermal Storage Efficiency	97	%

Select a State:	NJ
Select the closest location:	NEWARK

Solar Resource Data

Month	Daily Solar Isolation	Mean Daily Sunshine	Ambient Temperature
	Btu/ft^2/day	hrs/day	°F
January	990	5.0	30.6
February	1080	6.0	33
March	1070	7.0	42.1
April	960	8.0	52.3
May	840	9.0	62.8
June	790	10.0	72.6
July	820	10.0	77.8
August	940	9.0	76.4
September	1060	8.0	68.8
October	1140	7.0	57.5
November	930	5.0	47.3
December	860	5.0	36

Outputs

Energy Savings Summary

Potential Energy Savings 76.3 MMBtu/yr

Potential Cost Savings 3803 $/yr

Solar Collector Summary

Month	System Effiencies %	Monthly Production MMBtu/mo
January	45.7	33.3
February	43.7	31.4
March	42.6	33.5
April	39.7	27.1
May	37.4	23.1
June	38.9	21.9
July	44.5	26.8
August	50.4	34.8
September	51.9	39.2
October	51.5	43.2
November	50.6	33.5
December	43.6	27.5
Potential Annual Production:		**76.3 MMBTU**

References and Equations

References:

- Daily solar insolation and ambient temperature data was collected from the National Renewable Energy Laboratory Solar Resource Data Center
- Mean daily sunshine data was collected from the National Oceanic and Atmospheric Administration (NOAA).
- Assumed solar collector values are based on flat plate collector specifications currently available on the market.
- To determine the solar panel collector area, the usable roof area was multiplied by 75%. This factor was based on a study sponsored by the U.S. Department of Energy.
- A conversion factor used in the calculations is 1 kWh/m^2/day = 317.0784 Btu/ft^2/day.

Equations Symbols:

Ambient Temperature	T_A	Monthly Production	MP
Average Manifold Temperature	T_M	Optical Efficiency	S
Collector Efficiency	η_C	Piping Efficiency	η_P
Conductive Loss Coefficient	A_1	Radiative Loss Coefficient	A_2
Potential Cost Savings	CS	System Efficiencies	η_S
Daily Solar Insolation	I	Thermal Storage Efficiency	η_T
Potential Energy Savings	ES	Usable Roof Area	RA
Incremental Propane Cost	IC_p	Water Heater Efficiency	η_W
Mean Daily Sunshine	S	Mean Daily Sunshine	S

Equations:

$$CS = \frac{(ES \times IC_P)}{\eta_W}$$

$$\eta_C = \eta_o - A_1\left(\frac{T_M - T_A}{I/S}\right) - A_2\left(\frac{(T_M - T_A)^2}{I/S}\right)$$

$$\eta_S = \eta_C \times \eta_P \times \eta_T$$

$$MP = \frac{I \times \eta_S \times Days\ In\ Month \times RA \times 0.75}{1{,}000{,}000\ Btu/MMBtu}$$

Acknowledgements

This tool is based off a similar tool created by the Oregon State University Energy Efficiency Center. More information about the Oregon State University Energy Efficiency Center can be found on the OSU Energy Efficiency Reference (EEREF) website at http://eeref.engr.oregonstate.edu/. Similar tools to the Solar Thermal Heating Tool can be found on the OSU Opportunity Templates website at http://eeref.engr.oregonstate.edu/Opportunities_with_Calculation_Sheets.

Solar Thermal Energy Savings Summary

Location: **FALSE** **FALSE**

Date Created: **4/25/2014**

Case Information

Annual Electric Consumption	76.31962	MMBtu
Incremental Electric Cost	39.8593	$/MMBtu
Usable Roof Area	3161.25	ft^2
Water Heater Efficiency	80	%
Piping Efficiency	99.5	%
Thermal Storage Efficiency	97	%
Optical Efficiency	78.7	%
Conductive Loss Coefficient	0.5778	$Btu/hr\text{-}ft^2\text{-}°F$
Radiative Loss Coefficient	0.0013	$Btu/hr\text{-}ft^2\text{-}°F^2$
Average Manifold Temperature	120	°F

Energy Savings Reccommendation

Energy Savings Summary		
Energy(MMBtu)	Energy (kWh)	Cost Savings
95.4	27,960	$3,803

*1MMBtu = 1,000,000 Btu, 1kWh = 3,413 Btu

Flat plate collector solar water heating is a proven technology that harnesses solar radiation from the sun to heat water in place of conventional methods. It uses an insulated, weather proof box containing a dark absorber plate under one or more layers of transparent or translucent covers. A heat transfer fluid is pumped through a closed loop system, which passes through the absorber plate, to absorb heat. A heat exchanger then transfers the heat from the fluid to water in storage tanks. This hot water can then be used to supplement heating needs. This will significantly reduce hot water heater fuel consumption and associated costs while also reducing CO2 emissions.

Install an active closed-loop flat plate collector style solar water heater. Hot water from the flat plate collector solar water heater can be used as pre-heated feedwater for your hot water heaters. This will provide an alternative source for 1.25% of the facility's natural gas consumption and reduce CO2 emissions associated with heat generation, saving in an annual cost savings of 95.399525 MMBTu and resulting in an annual cost savings of $3802.5582868325 .

Assumptions

Cost savings do not take into account installation cost or costs to pump the heat transfer fluid though the closed loop system.

Energy savings assume the panels are not covered by shading, and are facing south. Daily solar insolation and ambient temperature data was collected from the

National Renewable Energy Laboratory Solar Resource Data Center.

Mean daily sunshine data was collected from the

National Oceanic and Atmospheric Administration (NOAA).

Estimated Cost:

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
40 SF Solar Hot Water Collector (and associated systems included)	80	EA	$ 950	INC	INC	$ 78,052	INC	INC	$ 78,052	Estimated based on previous experience
						$ -	$ -	$ -	$ -	

9600 gal

*Cost Estimates are for energy calulations only . Do not use for procurement

$ 78,052	Subtotal	
$ 19,513	25%	Contingency
$ 97,600	Total	

APPENDIX F

Photos

Figure 1 Typical Exterior Light

Figure 2 Boiler Control Panel (Non Operational)

Figure 3 Disconnected Control Valve

Figure 4 Wiring at Air Handling Unit

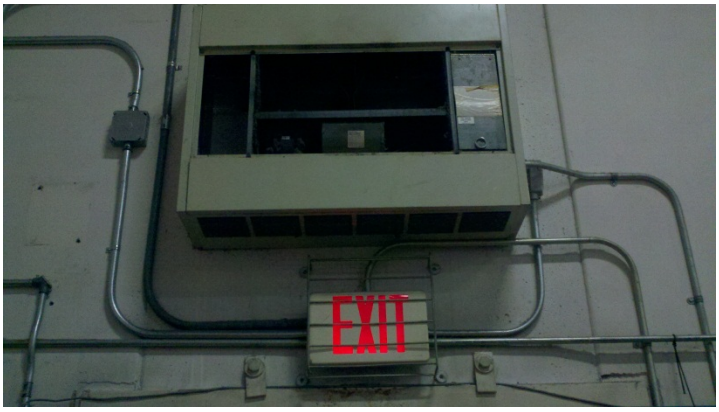

Figure 5 Electric Cabinet Heater in GYM(Missing Cover)

Figure 6 Air Handling Unit In GYM

APPENDIX G

Portfolio Manager

The building is being transitioned to office space from school space. As such, a Portfolio Manager score was not evaluated.

APPENDIX H

Geothermal Screening Analysis

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Building: Newark Innovation Academy

Savings Summary:

Geothermal Screening Analysis

Budgetary Cost	Annual Utility Savings			Total Savings	Incentives*	Payback (without incentives)	Payback (with incentives)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
1,549,425	0	587,124	0	73,390	0	21	21	N

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Geothermal System Screening Calculation

Description: This ECM evaluates the energy savings associated with replacing the existing electric resistance heating and direct expansion (DX) cooling with a full geothermal heat pump system including heat pumps for each space and geothermal bore field.

Item	Value	Units	Formula/Comments
Demand Rate	$ 3.54	/ kW	
Electricity Rate	$ 0.13	/kWh	
FORMULA CONSTANTS			
Coincidence Factor	0.67		NJ Protocols
Conversion	3.412	btu/kW	
HEATING - Heat Pump			
Heating Capacity	873,728	btu/h	
Baseline Heating EER	3.4		Based on Existing Electric Resistance Heat (1.0 COP)
Proposed Heating EER	16.4		Based on Florida Heat Pump LM Model Line (4.8 COP)
Equivalent Full Load Hours	800	hrs	NJ Protocols
Heating Savings	553,361	kWh	
COOLING - Heat Pump			
Cooling Capacity	2,400,000	btu/h	
Baseline Cooling EER	13.0		See Table Below
Proposed Cooling EER	25.0		Based on Florida Heat Pump LM Model Line
Equivalent Full Load Hours	381	hrs	NJ Protocols
Cooling Savings	33,762	kWh	
SAVINGS			
Demand Savings	-	kW	
Energy Savings	587,124	kWh	
Cost Savings	$ 73,390		
Installed Cost	$ 1,549,425		
Simple Payback	21.1	years	

Savings calculation formulas are taken from NJ Protocols document for Electric HVAC Equipment

Newark Board of Education - NJBPU
CHA Project Numer: 27998
Newark Innovation Academy

Geothermal System Screening Calculation - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
(1) Heat Pump Energy Recovery Ventilator	1	EA	$ 45,000	$ 45,000	$ -	$ 46,215	$ 56,070	$ -	$ 102,285	Vendor Estimate
(70) Geothermal Heat Pumps	70	EA	$ 2,500	$ 2,500		$ 179,725	$ 218,050	$ -	$ 397,775	
Geothermal Bore Field	1	LS	$ 250,000	$ 250,000		$ 256,750	$ 311,500	$ -	$ 568,250	
Heat Pump System Piping & Misc Electrical	1	LS	$ 100,000	$ 55,000	$ -	$ 102,700	$ 68,530	$ -	$ 171,230	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$1,239,540	Subtotal
$ 309,885	25% Contingency
$1,549,425	**Total**