

COUNTY OF ESSEX

KIP'S CASTLE
22 Crestmont Road, Verona, NJ 07004

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

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REPORT DISCLAIMER

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

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

List of Common Energy Audit Abbreviations

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

1.0 EXECUTIVE SUMMARY

This report summarizes the energy audit performed by CHA for Kip's Castle 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
Kip's Castle	22 Crestmont Road, Verona, NJ 07004	15,000	1905

The potential total 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)
Kip's Castle	94,526	8,938	22,427	16.8

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

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

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs (\$)	Est. Savings (\$/year)	Payback w/o Incentive	Potential Incentive (\$)*	Payback w/ Incentive	Recommended
1	Add Attic Insulation	4,818	219	22.0	0	22.0	Y
2A	Install a Variable Refrigerant Flow (VRF) System	299,700	16,345	18.3	1,300	18.3	Y
2B	Replace Condensing Units with High SEER Units	46,900	2,613	17.9	900	17.6	N
3	Install Timers onto Window A/C Units	600	208	2.9	0	2.9	Y
4	Replace DHW Heater with a Condensing DHW Heater	16,385	975	16.8	300	16.5	Y
5	Low Flow Plumbing Fixtures	85	18	4.7	0	4.7	Y
L1**	Lighting Replacements	4,208	1,812	2.3	0	2.3	N
L2**	Lighting Controls	4,617	449	10.3	720	8.7	N
L3	Lighting Replacements with Controls	8,825	2,049	4.3	720	4.0	Y
Total**		377,313	22,427	16.8	3,220	16.7	
Total (Recommended)		330,413	19,814	16.7	2,320	16.6	

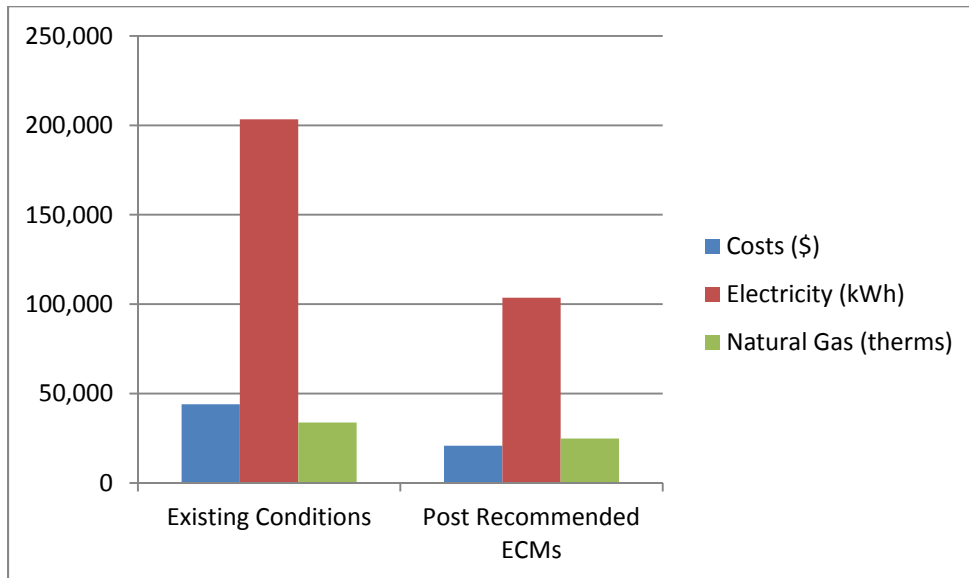
* Incentive shown is per the New Jersey SmartStart Program.

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

The alternative energy measure *Solar PV Electricity Generation* is not recommended due to the fact that the building has a pitched tile roof, and is located on a property with numerous tall trees.

If Kip’s Castle implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	43,973	21,546	51%
Electricity (kWh)	203,320	108,794	46%
Natural Gas (therms)	12,512	3,574	71%
Site EUI (kbtu/SF/Yr)	129.7	48.6	



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: Kip's Castle

Address: 22 Crestmont Road, Verona, NJ 07009

Gross Floor Area: 15,000 Square Feet

Number of Floors: 4 and basement

Year Built: 1905



Description of Spaces: Offices, conference rooms, catering rooms, storage rooms, kitchen, mechanical spaces, and toilet rooms.

Description of Occupancy: There are approximately 5 full time staff members. This building is used frequently for parties, weddings, and conferences, in addition to regular tours throughout the summer.

Number of Computers: The building has approximately 3 desktop and laptop computers.

Building Usage: Hours of operation for Kip's Castle are 8:30 AM – 5:00 PM Monday through Friday.

Building Envelope

Construction Materials: The walls are constructed of stone masonry two to three feet thick, with stone and brick facade. Interior walls are primarily plaster and sheetrock. The building underwent an exterior refurbishment in 2013, and portions of the interior are slated for renovation in the near future.

Roof: The roof is pitched and primarily surfaced with red terra cotta tiles, as well metal roofing in a few areas. The roof was re-done in 2013 and is in good condition. Insulation in the attic, however, is minimal or missing in many areas. An ECM which reviews installing additional insulation is included.

Windows The building has mostly wooden framed thermal pane windows, some of which are outfitted with exterior storms. The windows are new and in good condition and no ECMs are included for window replacement.

Exterior Doors: Exterior doors throughout the building are mostly solid wood, with sweeps and seals in good condition. No ECMs are evaluated for exterior doors.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Heat is provided by multiple systems. A dual fuel, Peerless 750,000 BTU/hr boiler built in 2013 provides steam to radiators throughout the Castle. The building also has supplemental perimeter and corridor electric baseboard heat. Personal electric heaters were observed under desks, possibly indicating insufficient heating. Four Lennox air handler units with electric heating coils and cooling coils that are located in the basement; of these four only one has functioning heat. Two Lennox furnaces with natural gas fired heat are also located in the basement; of these only one is functioning. On the second floor there is one York air handler unit with electric heating coils and DX cooling coils; this unit is operational. On the second floor there is one Lennox air handler unit with an electric heating coil and cooling coil; this unit is also operational. In the fourth floor attic, there are two operational Lennox air handler units. Only 6 of the 12 air handler units have functioning heating. It could not be determined if the electric elements have failed or are turned off. The multiple heating/cooling units are at or nearing the end of their useful lives, and are in need of repairs.

An ECM is included which considers removing the individual air handlers in closets and installing a Variable Refrigerant Flow heating/cooling system.

Cooling: Cooling is provided through twelve DX split systems varying from 1 to 5 tons with condensers located outside on grade and on the roof. Two 5,000 BTUH window air conditioners also are tasked with cooling. An ECM is included which analyzes replacing existing condensing units with higher EER units.

Ventilation: Fresh air is brought into the building through operable doors and windows.

Exhaust: None

Controls Systems

The building does not have a centralized BMS control system. The steam heating system is manually controlled by valves on the radiators and dial thermostats on the walls. The air handler units and furnaces are controlled by individual wall mounted thermostats. Temperatures vary as a result of the multiple zones.

Domestic Hot Water Systems

A 50 gallon gas-fired A.O. Smith domestic hot water heater with 75,000 BTUH capacity was installed in 2013. An ECM is included which considers replacing this with a condensing gas fired unit.

Kitchen Equipment

The building has a small residential style kitchen with one residential electric range, a microwave, a refrigerator and other electrical appliances. No ECMs were included for kitchen equipment.

Plug Load

Kips Castle has computers, a copier, residential appliances (microwave, refrigerator), printers, and portable heaters which contribute to the plug load in the building.

Plumbing Systems

Plumbing systems include a few toilet rooms and the small kitchen. Toilet rooms are equipped with high flow water consumption fixtures—at the water closets and lavatories. An ECM that evaluates the replacement of lavatory fixture aerators is included.

Lighting Systems

The building lighting consists of T12- 2x2 U-lamps and 4' linear fluorescent lamps with magnetic ballasts, compact fluorescent lamps, and T8 fluorescent lamps with electronic ballasts. There are multiple chandeliers having many candelabra type incandescent light bulbs. A few miscellaneous lights and exit signs are incandescent.

Exterior lighting includes 150 watt metal halide wall-pack lamps, par 38 halogen spotlights, and two (2) 1,000 watt metal halide flood-lamps. Exterior lighting is controlled by photocell.

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

3.0 UTILITIES

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

	Electric	Natural Gas
Deliverer	PSE&G	PSE&G
Supplier	PSE&G	Hess Corp.

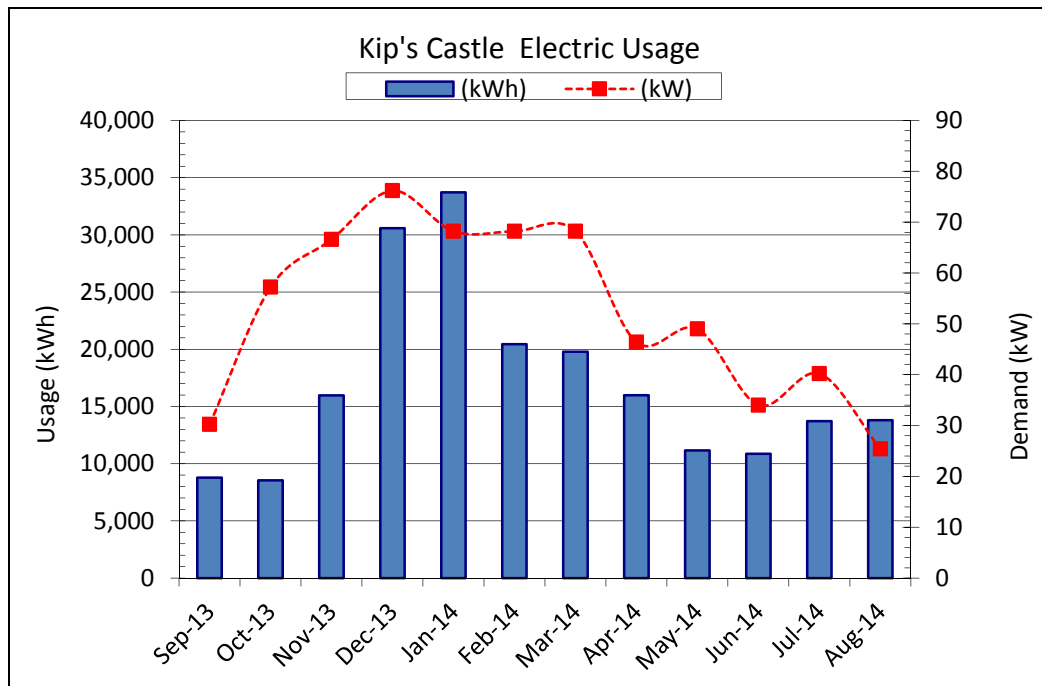
For the 12-month period ending in August 2014, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	203,320	kWh/yr.
Annual Cost	32,338	\$
Blended Unit Rate	0.159	\$/kWh
Supply Rate	0.133	\$/kWh
Demand Rate	8.35	\$/kW
Peak Demand	76.2	kW
Natural Gas		
Annual Usage	12,512	Therms/yr.
Annual Cost	11,635	\$
Rate	0.93	\$/therm

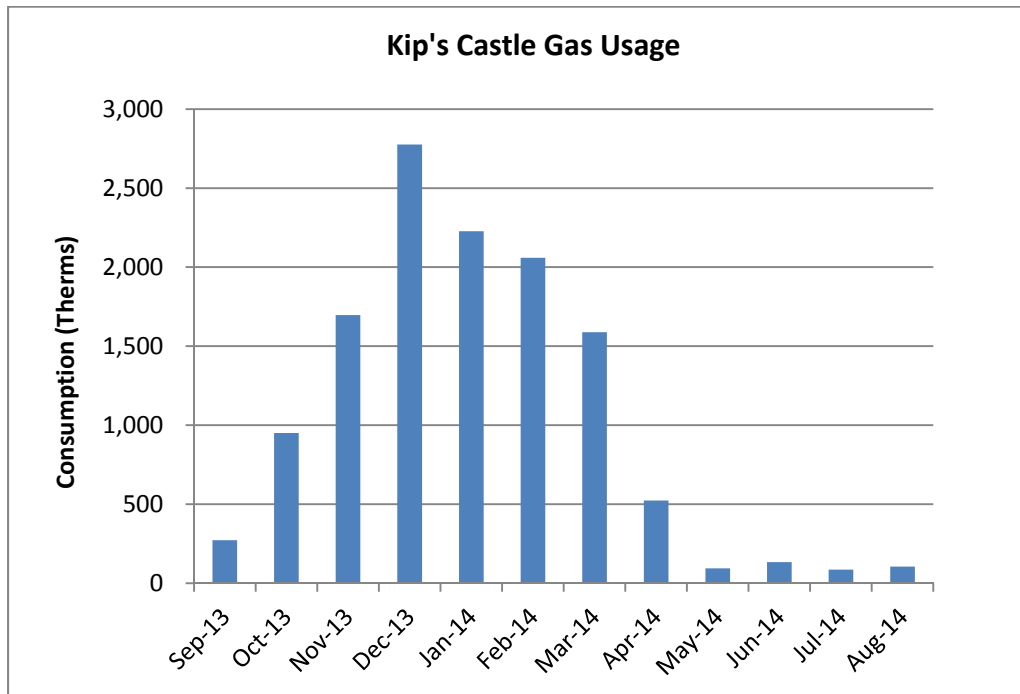
Blended Rate: Average rate charged determined by the annual cost / annual usage

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

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



The electrical usage for this building peaks in the winter, with a smaller peak in the winter with valleys in the spring and fall. The winter peak is associated with electric heating. The smaller summer peak occurs during the cooling season.



The natural gas usage is mostly driven by space heating in the winter months with minimal usage during the summer months. The building does not have major kitchen use but domestic hot water is generated by a gas-fired water heater.

See Appendix A for 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	Building Average Rate	NJ Average Rate	
Electricity	\$/kWh	\$0.16	\$0.13	Y
Natural Gas	\$/Therm	\$0.93	\$0.96	N

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

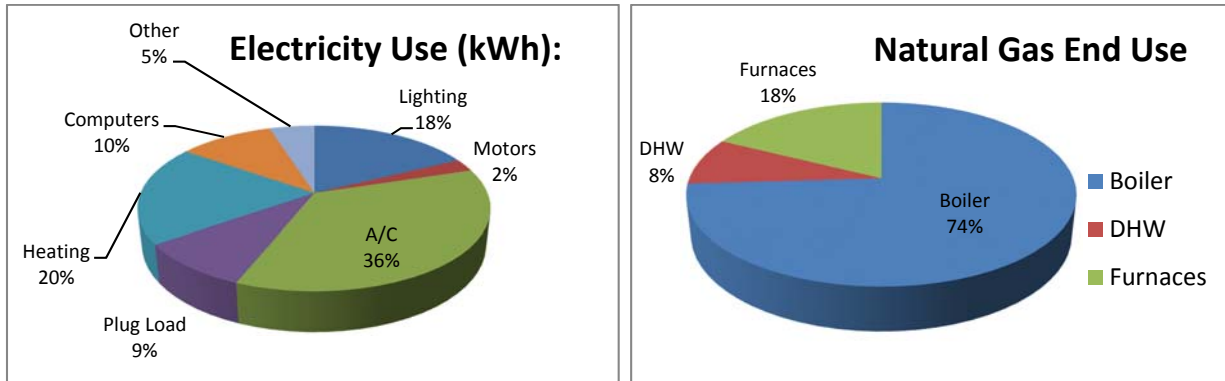
Additional information on selecting a third party energy supplier is available here:

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

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

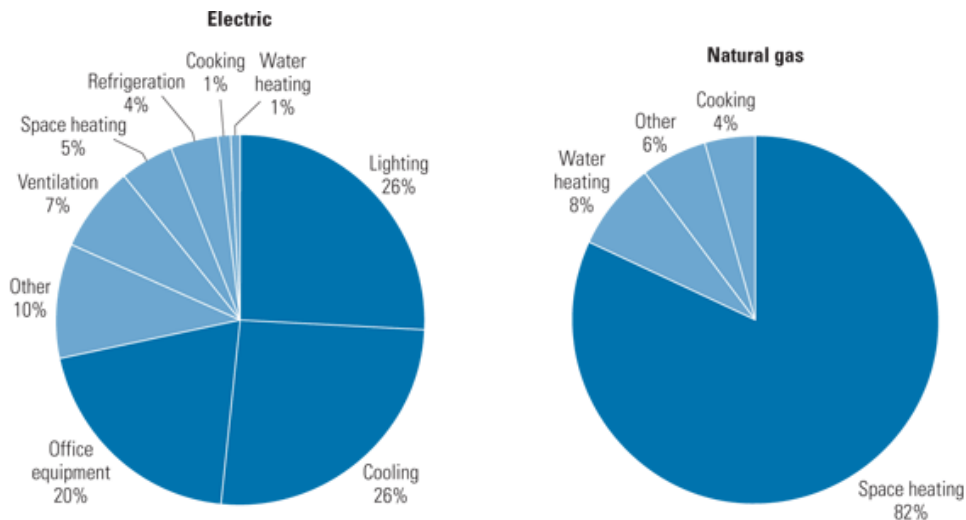
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



Most of the electricity consumed by municipal buildings 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 building’s energy profile is different, and the following charts represent typical utility profiles for commercial buildings per U.S. Department of Energy.

Typical End-Use Utility Profile for Commercial Buildings



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/ft²/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive an Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase.

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

Building	Site EUI kBtu/ft ² /yr	Source EUI Btu/ft ² /yr	Energy Star Rating (1-100)
Kip's Castle	1,664	3,536.9	1

The building has a below average Energy Star Rating Score (50 being the median score). It is likely that one of the largest contributing factors to the low Energy Star Rating are the inefficient DX air conditioning units that are utilized. Another factor is likely the poor control of the heating & cooling systems. By implementing the measures discussed in this report, it is expected that the EUI can be reduced and the Energy Star Rating increased.

5.0 ENERGY CONSERVATION MEASURES

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

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

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Add Insulation into Attic

Kip's Castle has a pitched, tiled roof that is new, however, investigation of the attic area revealed that the original fiberglass insulation is either missing or has been degraded by previous water damage. This ECM addresses adding insulation to minimize heating and cooling energy losses.

To calculate the savings, the heat losses through the roof assembly of the building was found using the existing roof's R-value of 15.0 and bin weather data for nearby Newark, NJ. The values were totaled to determine the existing annual energy losses. Heating and cooling energy loss values were then determined with a thermal resistance which included the replacement roof R-value of 30.0. The annual energy savings of replacing the roof is detailed in the summary table below.

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

ECM-1 Add Insulation into Attic

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Natural Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
4,818	0	877	86	219	0.1	0	22.0	22.0

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

This measure is recommended.

5.2 ECM-2A Install a Variable Refrigerant Flow (VRF) System

Kip's Castle is a relatively small building consisting of mainly offices and is 100% air conditioned. It has a primary steam heating system along with miscellaneous electric resistance heat and aging gas residential style air handlers. Cooling is entirely direct expansion, with split and window A/C units; and some of the condensing units are nearing the end of their useful lives.

It is recommended that the existing electric resistance heaters, air handlers, condensing units and window A/C units be removed and replaced with a variable refrigerant flow (VRF) system. The VRF system is capable of simultaneous heating and cooling for different spaces within the building. The system consists of indoor fan coil units interconnected with refrigerant piping, which are connected to an outdoor heat recovery condensing unit. Heat rejected from areas requiring air conditioning can be utilized in areas that need it; thus energy is saved.

Implementation of the VRF system will first require the removal of existing electric baseboard heaters and air handling units in closets. It is recommended that the existing steam system of radiators and piping will remain to provide supplemental heat. VRF fan coil units will be installed into each office, and refrigerant piping will be routed and connected to each unit.

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

ECM-2A Install a Variable Refrigerant Flow System

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
299,700	6.3	63,672	7,795	16,345	(0.1)	1,300	18.3	18.3

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

This measure is currently recommended based on the condition of the current systems.

5.3 ECM-2B Replace Condensing Units with High SEER Units

Kip’s Castle utilizes a number of outdoor condensing units of 1-5 tons capacity that provide DX heat rejection for air handler evaporator coils. It is recommended that these units be replaced with new models that will operate at a higher energy efficiency ratio (EER). This ECM assesses the replacement of the condensing units and provides the resulting energy savings.

It is assumed in the performance of this calculation that the operating hours, number of units, and capacity stays the same. The energy savings result from properly operating units and higher efficiency units over existing units.

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

ECM-2B Replace Condensing Units with High SEER Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
46,900	3.9	16,727	0	2,613	0.3	900	17.9	17.6

* 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 2A.

5.4 ECM-3 Install Window A/C Timers

There are approximately 3 window air conditioners serving various offices.

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

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

ECM-3 Install Window A/C Timers

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Natural Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
600	0	1,309	0	208	2.5	0	2.9	2.9

* 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-4 Replace DHW Heater with a Condensing DHW Heater

Domestic hot water is generated by a gas-fired A.O. Smith Domestic DHW heater that has a capacity of 75,000 BTUH and holds 50 gallons, and is located in the basement. According to the U.S. Department of Energy, 2.5% of stored thermal capacity is lost every hour during DHW heater standby. In other words, stored hot water that is not being used loses heat unnecessarily to the surroundings.

Converting a standard natural gas DHW heater to a condensing natural gas DHW heater will result in an annual energy savings. The new water heater requires exhaust venting that will necessitate some modifications to the existing mechanical room.

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

ECM-4 Replace DHW Heater with a Condensing DHW Heater

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Natural Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
16,385	0	0	1,048	975	(0.4)	300	16.8	16.5

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

This measure is recommended.

5.6 ECM-5 Install Low Flow Faucet Aerators

Most of the faucet fixtures in this building are older high flow aerators. The water savings associated from replacing existing high flow lavatory aerators with low-flow aerators is 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 aerators in the restrooms with 0.5 gpm aerators will conserve water, which will result in lower annual water and sewer charges.

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

ECM-5 Install Low Flow Faucet Aerators

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	
85	0	0	8	1	18	4.3	0	4.7	4.7

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

This measure is recommended.

5.7.1 ECM-L1 Lighting Replacement / Upgrades

The lighting within Kip’s Castle consists of T12- 2x2 U-lamps and 4’ linear fluorescent lamps with magnetic ballasts, compact fluorescent lamps, and T8 fluorescent lamps with electronic ballasts. There are multiple chandeliers having many candelabra type incandescent light bulbs. A few miscellaneous lights and exit signs are incandescent.

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	
4,208	4.6	10,159	0	1,812	3.9	0	2.3	2.3

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

This measure is not recommended in lieu of ECM L3.

5.7.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Presently, interior lighting fixtures are controlled by a combination of wall mounted switches and occupancy sensors. 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 5.7.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Natural Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
4,617	0	3,376	0	449	0.2	720	10.3	8.7

* 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.

5.7.3 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	
8,825	4.6	11,941	0	2,049	1.7	720	4.3	4.0

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

This measure is recommended.

5.8 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:

- Clean Window AC filters before each season
- Set computers monitors to turn off and computers to sleep mode when not in use
- Purchase ENERGY STAR® label appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train staff 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
- During the winter at the end of the day, staff should ensure all windows are closed as part of a basic routine.

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

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

6.1.1 New Jersey Smart Start Program

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

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

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

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

6.1.2 Direct Install Program

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

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

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

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

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

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

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

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

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

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

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

Electric

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

Gas

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

Incentive cap: 25% of total project cost

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

Electric

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

Gas

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

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

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

6.1.4 Energy Savings Improvement Plan

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

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

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

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

The building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. However due to the new, pitched, tile, historic roof and the prevalence of tall surrounding trees, a solar PV system of sufficient capacity was determined to be not feasible.

7.1.2 Solar Thermal Hot Water Generation

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

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

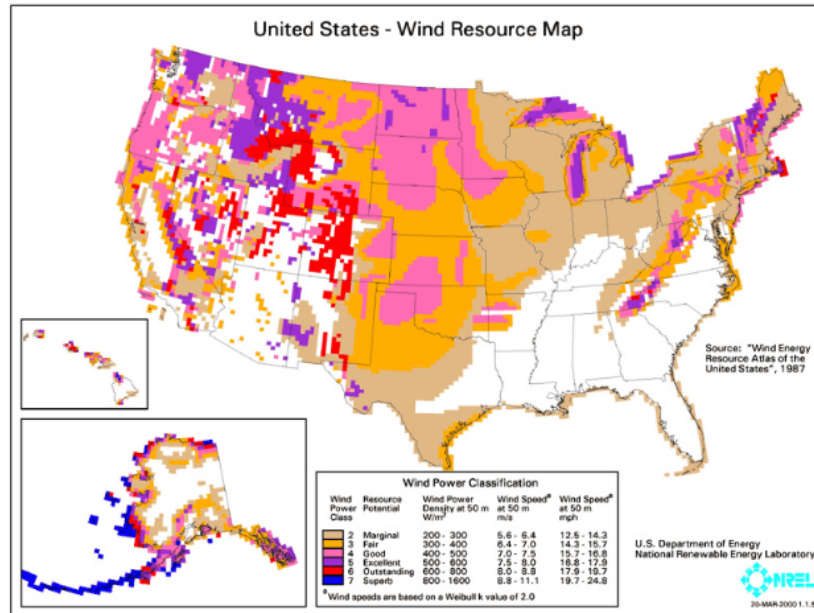
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping).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

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

7.2 Wind Powered Turbines

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

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



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

7.3 Combined Heat and Power Plant

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

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

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

7.4 Demand Response Curtailment

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

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

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From September 2013 through August 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
76.2	34.0	59.6	N	N

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

8.0 CONCLUSIONS & RECOMMENDATIONS

The following section summarizes the LGEA energy audit conducted by CHA for Building Name.

The following projects should be considered for implementation:

- Add Attic Insulation
- Install a VRV Heat Pump System to replace current systems
- Install Window A/C Unit Controllers
- Replace Gas DHW Heater with Condensing DHW Heater
- Lighting Replacements with Controls (Occupancy Sensors)

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
94,526	8,938	22,427	16.8

If the recommended ECMs are implemented, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	43,973	21,546	51%
Electricity (kWh)	203,320	108,794	46%
Natural Gas (therms)	12,512	3,574	71%
Site EUI (kbtu/SF/Yr)	129.7	48.6	

Next Steps: This energy audit has identified several areas of potential energy savings. Essex County can use this information to pursue incentives offered by the NJBPU's NJ Clean Energy Program.

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

**Essex County
Kip's Castle**

**Annual Utilities
12-month Summary**

Electric		
Annual Usage	203,320	kWh/yr
Annual Cost	32,338	\$
Blended Rate	0.159	\$/kWh
Consumption Rate	0.133	\$/kWh
Demand Rate	8.35	\$/kW
Peak Demand	76.2	kW
Min. Demand	34.0	kW
Avg. Demand	59.6	kW
Natural Gas		
Annual Usage	12,512	therms/yr
Annual Cost	11,635	\$
Rate	0.930	\$/therm

**Essex County
Kip's Castle**

Utility Bills: Account Numbers

<u>Account Number</u>	<u>Building Name</u>	<u>Location</u>	<u>Type</u>	<u>Notes</u>
6950741618	Kip's Castle	22 Crestmont Road, Verona, NJ 07004	Electricity	
PG000009607018047648	Kip's Castle	22 Crestmont Road, Verona, NJ 07004	Natural Gas	

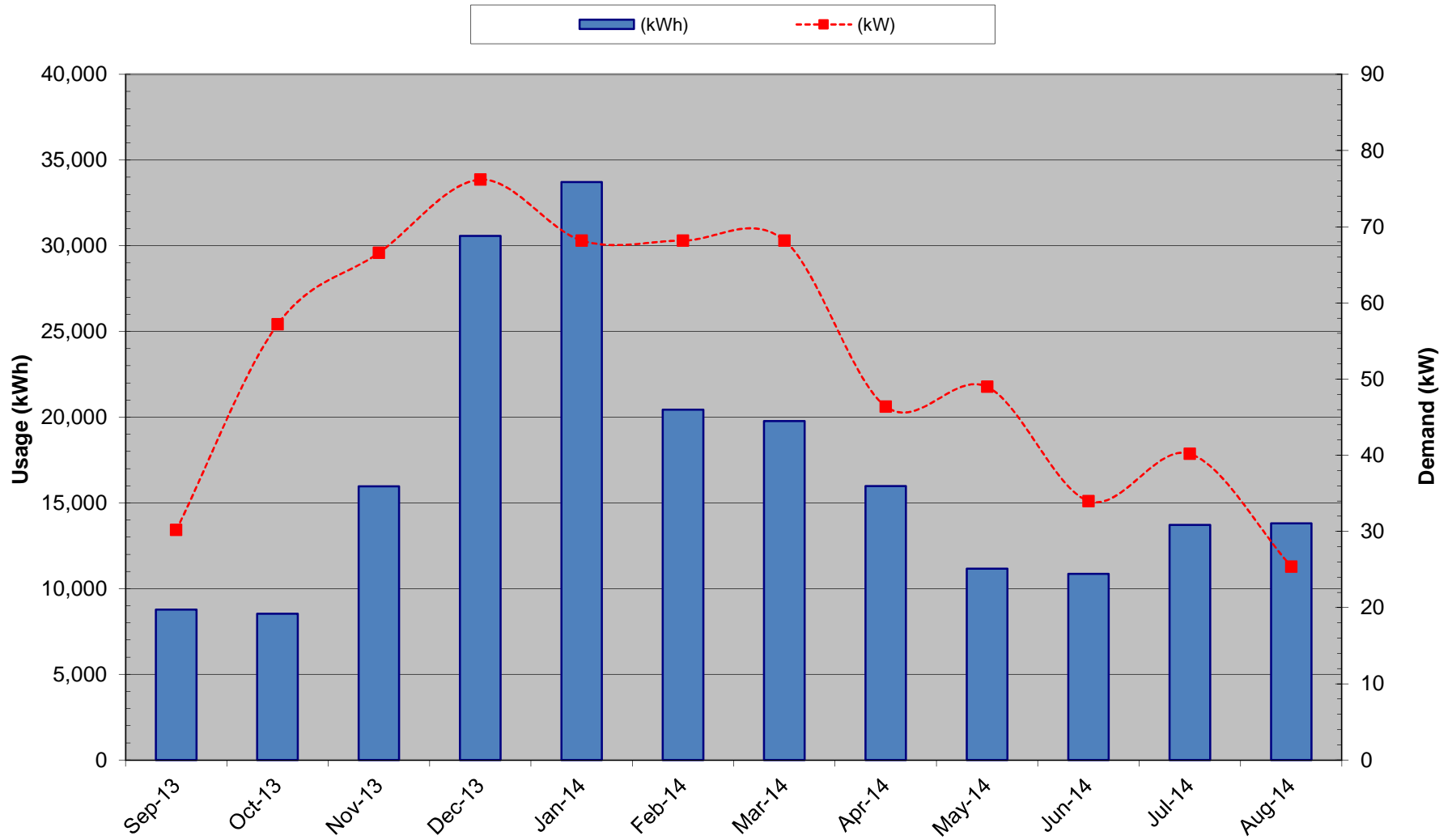
Essex County
Kip's Castle Electric Usage

For Service at: 22 Crestmont Road, CedarGrove, NJ 07009
 Account No.: 6950741618 Delivery - PSE&G
 Meter No.: 728003272 Supplier - N/A
 Electric Service

Month	Usage (kWh) vs. Demand (kW) Charges		Provider Charges			Unit Costs		
	Consumption (\$)	Demand (\$)	Delivery (\$)	Supplier (\$)	Total (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
September-13	1,126.92	227.41	432.43	921.90	1,354.33	0.15	0.13	7.53
October-13	1,006.62	430.72	540.64	896.70	1,437.34	0.17	0.12	7.53
November-13	1,991.83	501.50	817.53	1,675.80	2,493.33	0.16	0.12	7.53
December-13	3,985.03	573.79	1,347.92	3,210.90	4,558.82	0.15	0.13	7.53
January-14	4,459.08	513.55	1,432.03	3,540.60	4,972.63	0.15	0.13	7.53
February-14	2,583.36	513.55	950.71	2,146.20	3,096.91	0.15	0.13	7.53
March-14	2,492.93	513.55	929.58	2,076.90	3,006.48	0.15	0.13	7.53
April-14	2,043.09	349.39	714.58	1,677.90	2,392.48	0.15	0.13	7.53
May-14	1,839.97	368.97	1,037.14	1,171.80	2,208.94	0.20	0.16	7.53
June-14	1,226.26	774.34	860.30	1,140.30	2,000.60	0.18	0.11	7.53
July-14	2,189.97	302.71	1,052.08	1,440.60	2,492.68	0.18	0.16	7.53
August-14	2,132.14	191.26	874.40	1,449.00	2,323.40	0.17	0.15	7.53
Total (All)	\$30,504.17	\$6,218.53	\$13,389.90	\$23,332.80	\$36,722.70	\$0.16	\$0.13	\$8.21
Total (12 Months)	\$27,077.23	\$5,260.71	\$10,989.34	\$21,348.60	\$32,337.94	\$0.16	\$0.13	\$8.35

- Notes
- 1.) Number of kWh of electric energy used per month
 - 2.) Number of kW of power measured
 - 3.) Electric charges from Delivery provider
 - 4.) Electric charges from Supply provider
 - 5.) Total charges (Delivery + Supplier)
 - 6.) Charges based on the number of kWh of electric energy used \$0.105 /kWh Estimated supply rate due to missing data
 - 7.) Charges based on the number of kW of power measured
 - 8.) Total Charges (\$) / Consumption (kWh)
 - 9.) Consumption Charges (\$) / Consumption (kWh)
 - 10.) Demand Charges (\$) / Demand (kW)

Kip's Castle Electric Usage



**Essex County
Kip's Castle Gas Usage**

For Service at: 22 Crestmont Road, CedarGrove, NJ 07009

Account No.: PG000009607018047648


Meter No: 3274416

Natural Gas Service

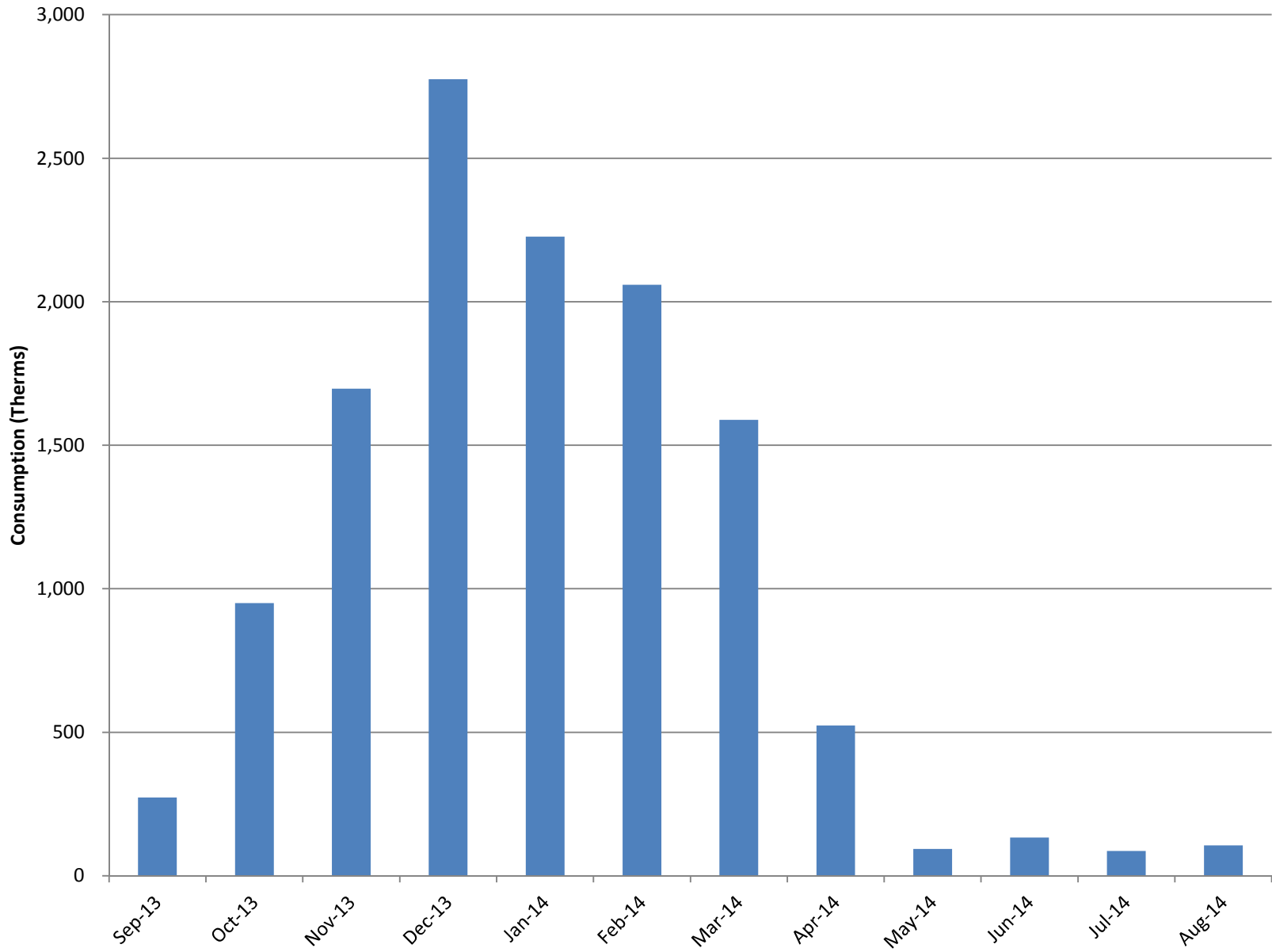
Delivery - PSE&G

Supplier - Hess Corporation

Month	Consumption (I herms)	Charges			Unit Costs		
		Delivery (\$)	Supply (\$)	Total (\$)	Delivery (\$/I herm)	Supply (\$/I herm)	Total (\$/I herm)
September-13	273	\$ 104.22	\$ 140.12	\$ 244.34	\$ 0.382	\$ 0.514	\$ 0.897
October-13	950	\$ 428.84	\$ 471.72	\$ 900.56	\$ 0.451	\$ 0.496	\$ 0.948
November-13	1,697	\$ 756.93	\$ 1,026.80	\$ 1,783.73	\$ 0.446	\$ 0.605	\$ 1.051
December-13	2,776	\$ 1,233.03	\$ 1,069.50	\$ 2,302.53	\$ 0.444	\$ 0.385	\$ 0.830
January-14	2,227	\$ 1,014.95	\$ 1,145.04	\$ 2,159.99	\$ 0.456	\$ 0.514	\$ 0.970
February-14	2,059	\$ 958.98	\$ 1,058.84	\$ 2,017.82	\$ 0.466	\$ 0.514	\$ 0.980
March-14	1,588	\$ 548.65	\$ 816.56	\$ 1,365.21	\$ 0.345	\$ 0.514	\$ 0.860
April-14	524	\$ 188.45	\$ 269.24	\$ 457.69	\$ 0.360	\$ 0.514	\$ 0.874
May-14	94	\$ 43.05	\$ 48.19	\$ 91.24	\$ 0.459	\$ 0.514	\$ 0.973
June-14	133	\$ 56.75	\$ 68.45	\$ 125.20	\$ 0.426	\$ 0.514	\$ 0.940
July-14	86	\$ 40.67	\$ 44.25	\$ 84.92	\$ 0.473	\$ 0.514	\$ 0.987
August-14	105	\$ 47.28	\$ 54.17	\$ 101.45	\$ 0.449	\$ 0.514	\$ 0.963
Total (All)	12,703.38			11,729.15			\$ 0.923
Total (12 Months)	12,511.91			11,634.68			\$ 0.930

 Estimated due to missing data

Kip's Castle Gas Usage



PSE&G ELECTRIC SERVICE TERRITORY
Last Updated: 12/11/14

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

Supplier	Telephone & Web Site	*Customer Class
Abest Power & Gas of NJ, LLC 202 Smith Street Perth Amboy, NJ 08861	(888)987-6937 www.AbestPower.com	R/C/I ACTIVE
AEP Energy, Inc. f/k/a BlueStar Energy Services 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	R/C/I ACTIVE
Alpha Gas and Electric, LLC 641 5 th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	R/C ACTIVE
Ambit Northeast, LLC d/b/a Ambit Energy 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284 www.ambitenergy.com	R/C ACTIVE
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C/I ACTIVE
Amerigreen Energy, Inc. 333Sylvan Avenue Englewood Cliffs, NJ 07632	888-559-4567 www.amerigreen.com	R/C ACTIVE
AP Gas & Electric, (NJ) LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apgellc.com	R/C/I ACTIVE
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(888)850-1872 www.AstralEnergyLLC.com	R/C/I ACTIVE
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(800) 526-7000 www.barclays.com	C ACTIVE
BBPC, LLC d/b/a Great Eastern Energy	(888) 651-4121	C

116 Village Blvd. Suite 200 Princeton, NJ 08540	www.greateasternenergy.com	ACTIVE
Berkshire Energy Partners, LLC 9 Berkshire Road Landenberg, PA 19350 Attn: Dana A. LeSage, P.E.	(610) 255-5070 www.berkshireenergypartners.com	C/I ACTIVE
Blue Pilot Energy, LLC 197 State Rte. 18 South Ste. 3000 East Brunswick, NJ 08816	(800) 451-6356 www.bluepilotenergy.com	R/C ACTIVE
Brick Standard, LLC 235 Hudson Street Suite 1 Hoboken, NJ 07030	(201)706-8101 www.standardalternative.com	C/I ACTIVE
CCES LLC dba Clean Currents Energy Services 566 Terhune Street Teaneck, NJ 07666	(877) 933-2453 www.cleancurrents.com	R/C ACTIVE
Champion Energy Services, LLC 1200 Route 22 Bridgewater, NJ 08807	(888) 653-0093 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. 1744 Lexington Avenue Pennsauken, NJ 08110	(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/C ACTIVE
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Alpha Gas and Electric, LLC 641 5 th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	R/C ACTIVE
Ambit Northeast, LLC d/b/a Ambit Energy 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284 www.ambitenergy.com	R/C ACTIVE
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C/I ACTIVE
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116 Village Blvd. Suite 200 Princeton, NJ 08540	www.greasternenergy.com	ACTIVE
Berkshire Energy Partners, LLC 9 Berkshire Road Landenberg, PA 19350 Attn: Dana A. LeSage, P.E.	(610) 255-5070 www.berkshireenergypartners.com	C/I ACTIVE
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APPENDIX B

Equipment Inventory

Essex County
CHA Project# 29412
Kip's Castle

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size	Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
DHW-1	1	A.O.Smith	PLG 75 300	N/A	DHW heater / Gas	75000 BTUH / 50 gallons	N/A	Closet	Building	2013	14	
AHU-1	1	Lennox	E16Q3-10-1P	N/A	Electric Furnace	5400 kW	N/A	Closet	Building	N/A	N/A	
B-1	1	Peerless	Series TC	N/A	Cast Iron Steam Boiler	750,000	~82%	Basement	Building	2013	24	
AHU-2	1	Lennox	CBS18-26-1P	N/A	Electric Furnace	N/A	N/A	Basement	Building	N/A	N/A	
CU-1	1	N/A	HABA-F048SD	WDGP076631	Condensing Unit	~2 tons	N/A	Exterior	Building	N/A	N/A	
CU-2	1	Lennox	MS16-651V	5184K21195	Condensing Unit	~2 tons	N/A	Exterior	Building	N/A	N/A	
CU-3	1	Guardian	GCGD6052152B	W1L1331604	Condensing Unit	~2 tons	N/A	Exterior	Building	N/A	N/A	
CU-X	multiple	various: Lennox, Guardian	N/A	N/A	Condensing Unit	~2 tons	N/A	Exterior	Building	N/A	N/A	
EH-1, 2	2	Dayton	N/A	N/A	Unit heaters	N/A	N/A	Basement	Building	N/A	N/A	
AHU-3, 4	2	Carrier	40QH048300	N/A	Air handling units	N/A	N/A	1st and 2nd floors	Building	N/A	N/A	
AHU-5, 6	2	Lennox	N/A	N/A	Air handling units	N/A	N/A	Attic	Building	N/A	N/A	
AHU-X	multiple	various	N/A	N/A	Air handling units	N/A	N/A	Building	Building	N/A	N/A	
AC-X	2	N/A	N/A	N/A	window AC units	~1/2 ton	N/A	Building	Building	N/A	N/A	

Cost of Electricity: \$0.133 \$/kWh
\$8.35 \$/kW

Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	Usage Describe Usage Type using Operating Hours	No. of Fixtures No. of fixtures before the retrofit	EXISTING CONDITIONS							Retrofit Control Retrofit control device	Notes
				Standard Fixture Code Lighting Fixture Code	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)		
71	Alcove: First Floor	General Common	2	I 60	I60/1	60	0.12	SW	2912	349	None	
71	Bath: First Floor	Restroom w/OCC	4	I 60	I60/1	60	0.24	SW	1000	240	None	
71	Hall: First Floor	Hallways	6	I 60	I60/1	60	0.36	SW	2280	821	None	
135	Event Planning: First Floor	Conference	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	1200	18	OCC	
71	Kitchen: First Floor	Kitchen	1	I 60	I60/1	60	0.06	SW	3000	180	None	
71	Service Area: First Floor	Cafeteria Other	1	I 60	I60/1	60	0.06	SW	1600	96	None	
71	ADA Toilet: First Floor	Restroom w/OCC	2	I 60	I60/1	60	0.12	SW	1000	120	None	
71	Dining: First Floor	Cafeteria	1	I 60	I60/1	60	0.06	SW	1600	96	OCC	
248	Buffet Area: First Floor	Cafeteria	4	T 40 R F 2 (MAG)	F42SE	86	0.34	SW	1600	550	OCC	
71	Library: First Floor	Library	6	I 60	I60/1	60	0.36	SW	3640	1,310	OCC	
71	Great Hall: First Floor	General Common	2	I 60	I60/1	60	0.12	SW	2912	349	None	
135	Chapel: First Floor	Auditorium	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	1820	27	None	
71	Chapel: First Floor	Auditorium	2	I 60	I60/1	60	0.12	SW	1820	218	None	
134	Great Hall: First Floor	General Common	2	DC 50 I 4	I60/4	240	0.48	SW	2912	1,398	None	
71	Great Hall: First Floor	General Common	6	I 60	I60/1	60	0.36	SW	2912	1,048	None	
135	Library: First Floor	Library	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	3640	55	OCC	
71	Dining: First Floor	Cafeteria	3	I 60	I60/1	60	0.18	SW	1600	288	OCC	
269	Dining: First Floor	Cafeteria	9	CFS40	CFS40/1	40	0.36	SW	1600	576	OCC	
71	Closet: First Floor	Linen/Utility/Wet/Janitor/Electrical	3	I 60	I60/1	60	0.18	SW	1000	180	OCC	
135	Room A - Office: Second Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
135	Room B - Office: Second Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
218LED	Room C - Storage: Second Floor	Storage Areas	1	W 32 C F 3 (ELE)	F43ILL/2	90	0.09	SW	1000	90	None	
71	Room D - Office: Second Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
135	Room E - Office: Second Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
248	Room F - Office: Second Floor	Offices	6	T 40 R F 2 (MAG)	F42SE	86	0.52	SW	2400	1,238	OCC	
71	Room G - Office: Second Floor	Offices	9	I 60	I60/1	60	0.54	SW	2400	1,296	OCC	
218LED	Room H - Storage: Second Floor	Storage Areas	1	W 32 C F 3 (ELE)	F43ILL/2	90	0.09	SW	1000	90	None	
135	Room I - Office: Second Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
135	Room J - Office: Second Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
71	Room K: Toilet Room: Second Floor	Restroom w/OCC	4	I 60	I60/1	60	0.24	SW	1000	240	None	
266	Room L - Office: Second Floor	Offices	1	Auditorium Globe CFL	CF42/4-L	188	0.19	SW	2400	451	OCC	
71	Hall: Second Floor	Hallways	3	I 60	I60/1	60	0.18	SW	2280	410	None	
71	Hall: Second Floor	Hallways	1	I 60	I60/1	60	0.06	SW	2280	137	None	
71	Room A - Office: Second Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
71	Room D - Office: Second Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
71	Room E - Office: Second Floor	Offices	6	I 60	I60/1	60	0.36	SW	2400	864	OCC	
71	Room E - Office: Second Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
71	Room F - Office: Second Floor	Offices	5	I 60	I60/1	60	0.30	SW	2400	720	OCC	
242	Room G - Office: Second Floor	Offices	1	3I60	I60/3	180	0.18	SW	2400	432	OCC	
218LED	Room F - Office: Second Floor	Offices	1	W 32 C F 3 (ELE)	F43ILL/2	90	0.09	SW	2400	216	OCC	
71	Closet: Second Floor	Linen/Utility/Wet/Janitor/Electrical	3	I 60	I60/1	60	0.18	SW	1000	180	None	
266	Room M - Office: Third Floor	Offices	1	Auditorium Globe CFL	CF42/4-L	188	0.19	SW	2400	451	OCC	
135	Room N - Office: Third Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
269	Room P - Office: Third Floor	Offices	1	CFS40	CFS40/1	40	0.04	SW	2400	96	OCC	
135	Room Q - Office: Third Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
266	Room R - Toilet Room: Third Floor	Restroom w/OCC	1	Auditorium Globe CFL	CF42/4-L	188	0.19	SW	1000	188	None	
135	Room S - Office: Third Floor	Offices	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	2400	36	OCC	
218LED	Room T - Office: Third Floor	Offices	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.27	SW	2400	648	OCC	
93	Room U - Office: Third Floor	Offices	5	I 75	I75/1	75	0.38	SW	2400	900	OCC	
71	Hall: Third Floor	Hallways	3	I 60	I60/1	60	0.18	SW	2280	410	None	
218LED	Room V - Alcove: Third Floor	General Common	1	W 32 C F 3 (ELE)	F43ILL/2	90	0.09	SW	2912	262	None	
71	Room Q - Office: Third Floor	Offices	8	I 60	I60/1	60	0.48	SW	2400	1,152	OCC	
129	Room S - Office: Third Floor	Offices	5	SP 75 I	I75/1	75	0.38	SW	2400	900	OCC	
71	Room S - Office: Third Floor	Offices	2	I 60	I60/1	60	0.12	SW	2400	288	OCC	
71	Room S - Office: Third Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
71	Closets: Third Floor	Linen/Utility/Wet/Janitor/Electrical	3	I 60	I60/1	60	0.18	SW	1000	180	None	
135	Room W - Stairway: Third Floor	Stairway	1	SP 13 R C F 1	CFQ13/1-L	15	0.02	SW	3200	48	None	
93	Hall: Third Floor	Hallways	4	I 75	I75/1	75	0.30	SW	2280	684	None	
71	Office: Fourth Floor	Offices	1	I 60	I60/1	60	0.06	SW	2400	144	OCC	
71	Attic: Fourth Floor	General Common	2	I 60	I60/1	60	0.12	SW	2912	349	None	

APPENDIX C

ECM Calculations

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$ 0.159	\$/kWh blended		0.000420205	15,000	Electric	Natural Gas	Fuel Oil
\$ 0.133	\$/kWh supply	203,320	0.000420205		\$ 32,338	\$ 11,635	
\$ 8.35	\$/kW	76.2					
\$ 0.93	\$/Therm	12,512	0.00533471				
\$ 9.63	\$/kgals	90	0				
	\$/Gal						

Kip's Castle

Recommend? Y or N	Item	Savings					Cost	Simple Payback	Life Expectancy	Equivalent CO ₂ (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR		
		kW	kWh	therms	No. 2 Oil gal	Water kgal								\$	kW	kWh	therms	kgal/vr				\$	
Y	ECM-1	Add Attic Insulation	0.0	877	86	0	0	219	\$ 4,818	22.0	25.0	0.8	\$	N	22.0	0.0	21,932	2,143	0	\$ 5,480	0.1	(\$1,001)	1.0%
Y	ECM-2A	Install a Variable Refrigerant Flow (VRF) System	6.3	63,672	7,795	0	0	16,345	\$ 299,700	18.3	15.0	68.3	\$ 1,300	N	18.3	93.8	955,085	116,928	0	\$ 270,000	(0.1)	(\$103,280)	-2.4%
N	ECM-2B	Replace Condensing Units with High SEER Units	3.9	16,727	0	0	0	2,613	\$ 46,900	17.9	20.0	7.0	\$ 900	N	17.6	77.5	334,530	0	0	\$ 60,959	0.3	(\$7,125)	1.2%
Y	ECM-3	Install Timers onto Window A/C Units	0.0	1,309	0	0	0	208	\$ 600	2.9	10.0	0.6		N	2.9	0.0	13,089	0	0	\$ 2,081	2.5	\$1,175	32.6%
Y	ECM-4	Replace Gas DHW Heater with Condensing DHW Heater	0.0	0	1,048	0	0	975	\$ 16,385	16.8	10.0	5.6	\$ 300	N	16.5	0.0	0	10,484	0	\$ 9,750	-0.40492	(\$7,768)	-8.2%
Y	ECM-5	Install Low Flow Faucet Aerators	0.0	0	8	0	1	18	\$ 85	4.7	25.0	0.0		N	4.7	0.0	0	205	27	\$ 454	4.3	\$231	21.2%
N	ECM-L1	Lighting Replacements / Upgrades	4.6	10,159	0	0	0	1,812	\$ 4,208	2.3	10.0	4.3	\$ -	N	2.3	46.0	101,590	0	0	\$ 20,762	3.9	\$11,249	41.7%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	3,376	0	0	0	449	\$ 4,617	10.3	10.0	1.4	\$ 720	N	8.7	0.0	33,760	0	0	\$ 5,368	0.2	(\$67)	2.7%
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	4.6	11,941	0	0	0	2,049	\$ 8,825	4.3	10.0	5.0	\$ 720	N	4.0	46.0	119,410	0	0	\$ 23,595	1.7	\$9,373	21.7%
Total (Not Including ECMs L1, L2)			10.9	77,800	8,938	0	1	\$ 19,814	\$ 330,413	16.7	13.8	88	\$ 3,220		16.5	140	1,109,516	129,760	27	\$ 311,362	(0.1)	(\$116,471)	-3.3%
Recommended Measures (highlighted green above)			10.9	77,800	8,938	0	1	\$ 19,814	\$ 330,413	16.7	13.8	80	\$ 2,320	0	16.6	140	1,109,516	129,760	27	\$ 311,362	(0.1)	(\$117,371)	-3.3%
% of Existing			14%	38.26%	71.43%	0	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
102.5						
97.5	35.4	6	3	3	3	2
92.5	37.4	31	13	13	13	9
87.5	35.0	131	55	55	55	39
82.5	33.0	500	208	208	208	149
77.5	31.5	620	258	258	258	185
72.5	29.9	664	277	277	277	198
67.5	27.2	854	356	356	356	254
62.5	24.0	927	386	386	386	276
57.5	20.3	600	250	250	250	179
52.5	18.2	730	304	304	304	217
47.5	16.0	491	205	205	205	146
42.5	14.5	656	273	273	273	195
37.5	12.5	1,023	426	426	426	304
32.5	10.5	734	306	306	306	218
27.5	8.7	334	139	139	139	99
22.5	7.0	252	105	105	105	75
17.5	5.4	125	52	52	52	37
12.5	3.7	47	20	20	20	14
7.5	2.1	34	14	14	14	10
2.5	1.3	1	0	0	0	0
-2.5						
-7.5						

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

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

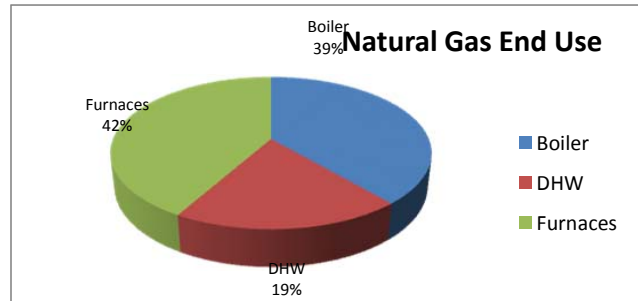
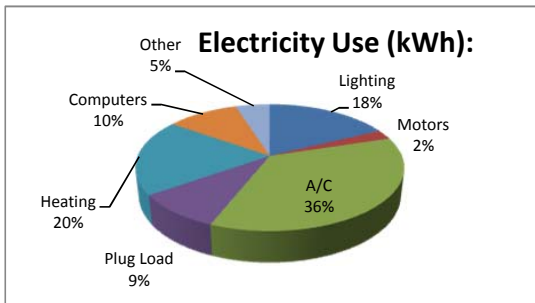
Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	78 F

Essex County
 CHA Project Number: 29142
 Kip's Castle

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
203,320	Total	Based on utility analysis
36,000	Lighting	From Lighting Calculations
5,000	Motors	Estimated
73,000	A/C	Estimated
18,650	Plug Load	Estimated
39,650	Heating	Estimated
21,000	Computers	Estimated
10,020	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
12,512	Total	Based on utility analysis
6,012	Boiler	Therms/SF x Square Feet Served
3,054	DHW	Based on utility analysis
6,500	Furnaces	Based on utility analysis

0.177060791
 0.024591777
 0.359039937
 0.091727326
 0.195012788
 0.103285461
 0.04928192

0.480498721
 0.244085678
 0.519501279



Essex County
 CHA Project Number: 29142
 Kip's Castle

ECM-1 Add Attic Insulation

Existing: Insulation in attic is marginal.
 Proposed: Install 9" blown-in loose-fill insulation in attic cavity to reduce heat transfer

Area of roof	2,000 SF	Cooling System Efficiency	1.2 kW/ton	Heating System Efficiency	80%
Existing Infiltration Factor	0.20 cfm/SF	Ex Occupied Cing Temp.	74 °F	Heating On Point	55 °F
Proposed Infiltration Factor	0.20 cfm/SF	Ex Unoccupied Cing Temp.	74 °F	Ex Occupied Htg Temp.	72 °F
Existing U Value	0.067 Btuh/SF°F	Cooling Occ Enthalpy Setpoi	27.5 Btu/lb	Ex Unoccupied Htg Temp.	72 °F
Proposed U Value	0.033 Btuh/SF°F	Cooling Unocc Enthalpy Setp	27.5 Btu/lb	Cooling Electricity	\$ 0.159 \$/kWh
				Heating NG Cost	\$ 0.93 \$/Therm

Outside Air Temp. From Bin °F	Avg Attic Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
						Attic Infiltration & Heat Load BTUH	Attic Infiltration & Heat Load BTUH	Attic Infiltration & Heat Load BTUH	Attic Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy Therms	Proposed Heating Energy Therms
						Occupied	Unoccupied	Occupied	Unoccupied				
97.5	140.0	35.4	6	3	4	-37,312	-37,312	-32,912	-32,912	22	20	0	0
92.5	135.0	37.4	31	13	18	-34,485	-34,485	-30,419	-30,419	107	94	0	0
87.5	130.0	35.0	131	55	76	-31,659	-31,659	-27,925	-27,925	415	366	0	0
82.5	125.0	33.0	500	208	292	-28,832	-28,832	-25,432	-25,432	1442	1272	0	0
77.5	120.0	31.5	620	258	362	-26,005	-26,005	-22,939	-22,939	1612	1422	0	0
72.5	115.0	29.9	664	277	387	-23,179	-23,179	-20,445	-20,445	1539	1358	0	0
67.5	110.0	27.2	854	356	498	-20,352	-20,352	-17,952	-17,952	1738	1533	0	0
62.5	82.5	24.0	927	386	541	-4,805	-4,805	-4,239	-4,239	445	393	0	0
57.5	77.5	20.3	600	250	350	-1,979	-1,979	-1,745	-1,745	119	105	0	0
52.5	62.5	18.2	730	304	426	0	0	0	0	0	0	0	0
47.5	56.5	16.0	491	205	286	0	0	0	0	0	0	0	0
42.5	50.5	14.5	656	273	383	12,155	12,155	10,721	10,721	0	0	100	88
37.5	44.5	12.5	1,023	426	597	15,547	15,547	13,713	13,713	0	0	199	175
32.5	38.5	10.5	734	306	428	18,939	18,939	16,705	16,705	0	0	174	153
27.5	32.5	8.7	334	139	195	22,331	22,331	19,697	19,697	0	0	93	82
22.5	26.5	7.0	252	105	147	25,723	25,723	22,689	22,689	0	0	81	71
17.5	20.5	5.4	125	52	73	29,115	29,115	25,681	25,681	0	0	45	40
12.5	14.5	3.7	47	20	27	32,507	32,507	28,673	28,673	0	0	19	17
7.5	8.5	2.1	34	14	20	35,899	35,899	31,665	31,665	0	0	15	13
2.5	2.5	1.3	1	0	1	39,291	39,291	34,657	34,657	0	0	0	0
TOTALS			8,760	3,650	5,110					7439	6562	727	641

Existing Ceiling Infiltration	400 cfm
Existing Ceiling Heat Transfer	133 Btuh°F
Proposed Ceiling Infiltration	400 cfm
Proposed Ceiling Heat Transfer	67 Btuh°F

Savings	86 Therms	\$ 80
	877 kWh	\$ 139
		\$ 219

Essex County
 CHA Project Number: 29142
 Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1 Add Attic Insulation - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	RS Means 2012
Blown-In Attic Insulation (9" thick)	2,000	SF	\$ 0.900	\$ 0.800		\$ 1,854	\$ 2,000	\$ -	\$ 3,854	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

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

\$ 3,854	Subtotal
\$ 964	25% Contingency
\$ 4,818	Total

ECM-2A: Install a Variable Refrigerant Flow System

Description: This ECM evaluates the energy savings associated with replacing older less efficient heating and cooling unitary equipment with a modern high efficiency variable refrigerant flow volume system. Existing DX coils, condensing units, and window A/C units to be removed. Existing supplemental steam heating system to remain in place. Existing electric resistance heat in the form of finned radiation and electric heaters in air handlers to be removed.

Item	Value	Units	Formula/Comments
Demand Rate	\$ 8.35	/ kW	
Electricity Rate	\$ 0.13	/kWh	
Natural Gas Rate	\$ 0.93	therm	
FORMULA CONSTANTS			
Coincidence Factor	0.67		NJ Protocols
Conversion	3.412	btu/kW	
COOLING - HVAC			
Approximate Existing Cooling TONS	16.0		
Existing Cooling Capacity	192,000	btu/hr	
Existing EER	9.0		Assumed EER based on unit age
Proposed EER	16.0		Proposed EER of new equipment
Equivalent Full Load Hours	2,891	hrs	NJ Protocols
Demand Savings	6.25	kW	
Energy Savings	26,983	kWh	
HEATING - Existing Electric Resistance Heat vs. VRF Heating			
Existing Electric Heating Capacity	80	kW	
Existing Electric Heating COP	1.0		Electric resistance heat
Proposed Heating COP	2.9		Average VRF performance between 47°F and 17°F
Equivalent Full Load Hours	700	hrs	NJ Protocols
Heating Savings	36,690	kWh	
EXISTING BOILER HEATING - Reduction in hours			
Heating Capacity	750,000	btu/h	
Heating Combustion Efficiency	0.8		
Heating Degree-Day Existing	2,783		NJ Protocols
Heating Degree-Day Proposed	2,087		25% reduction in boiler use
Design Temperature Difference	56	°F	
Fuel Conversion	100,000	btu/therm	
SAVINGS			
Demand Savings	6.25	kW	
kWh Energy Savings	63,672	kWh	
Therms Savings	7,795	therms	
Cost Savings	\$ 16,345		

btuh
 EERb
 EERq

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

Essex County
 CHA Project Number: 29142
 Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-2A: Install a Variable Refrigerant Flow System - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Existing equipment demolition & removal	20	EA	\$ 50	\$ 150		\$ 1,027	\$ 3,738	\$ -	\$ 4,765	Engineering Estimate
New 16 ton VRF Heat recovery condensing unit	1	EA	\$ 15,000	\$ 1,000		\$ 15,405	\$ 1,246	\$ 2,000	\$ 18,651	Engineering Estimate
45 VRF floor & clg. model Fan coil units	45	EA	\$ 2,000	\$ 500		\$ 92,430	\$ 28,035	\$ -	\$ 120,465	Engineering Estimate
25 VRF Heat recovery BS box units	25	EA	\$ 1,750	\$ 500		\$ 44,931	\$ 15,575	\$ -	\$ 60,506	Engineering Estimate
-- refrigerant piping, 20 ft. per fan coil	45	EA	\$ 250	\$ 250		\$ 11,554	\$ 14,018	\$ -	\$ 25,571	Engineering Estimate
-- Electrical - misc.	1	LS	\$ 3,000	\$ 3,000		\$ 3,081	\$ 3,738	\$ -	\$ 6,819	Engineering Estimate
-- Controls programming	1	LS	\$ 500	\$ 2,000		\$ 514	\$ 2,492	\$ -	\$ 3,006	Engineering Estimate

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

\$ 239,783	Subtotal
\$ 59,946	25% Contingency
\$ 299,700	Total

Essex County
 CHA Project Number: 29142
 Kip's Castle

ECM-2B: Replace Condensing Units with High EER Condensing Units

Description: This ECM evaluates the energy savings associated with replacing older less efficient heating and cooling equipment with modern high efficiency unitary equipment having the same capacity.

Equipment Tag	Equipment Description	General Type	Cooling Capacity (Btu/h)	Heating Capacity (Btu/h)
CU-X	Condensing Units	HVAC	108,000	

Item	Value	Units	Formula/Comments
Demand Rate	\$ 8.35	/ kW	
Electricity Rate	\$ 0.13	/kWh	
FORMULA CONSTANTS			
Coincidence Factor	0.67		NJ Protocols
Conversion	3.412	btu/kW	
COOLING - HVAC			
Cooling Capacity	108,000	btu/hr	
Baseline EER	8.0		Assumed EER based on unit age
Proposed EER	14.0		Proposed EER of new equipment
Equivalent Full Load Hours	2,891	hrs	NJ Protocols
Demand Savings	3.88	kW	
Energy Savings	16,727	kWh	
SAVINGS			
Demand Savings	3.88	kW	
Energy Savings	16,727	kWh	
Cost Savings	\$ 2,613		

btuh
 EERb
 EERq

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

Essex County
 CHA Project Number: 29142
 Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-2B: Replace Condensing Units with High EER CU's - Cos

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Existing 1.0 ton CU demolition & removal	9	EA	\$ 250	\$ 250		\$ 2,311	\$ 2,804	\$ -	\$ 5,114	RS Means 2012
New 1.0 ton condensing unit	9	EA	\$ 2,200	\$ 250		\$ 20,335	\$ 2,804	\$ 2,000	\$ 25,138	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

\$ 37,509	Subtotal
\$ 9,377	25% Contingency
\$ -	0% Contractor O&P
\$ -	0% Engineering
\$ 46,900	Total

Essex County
CHA Project Number: 29142
Kip's Castle

ECM-3: Window A/C Controller

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

ASSUMPTIONS		Comments
Electric Cost	\$0.159 / kWh	
Average run hours per Week	80 Hours	
Space Balance Point	55 F	
Space Temperature Setpoint	65 deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	18,000 Btu / Hr	Total BTU/hr of DX cooling equipment to be replaced.
Average EER	10.7	
Existing Annual Electric Usage	2,248 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	939	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	1,309 kWh
Annual Cost Savings	\$208
Total Project Cost	\$600
Simple Payback	3 years

OAT - DB Bin Temp F	Annual Hours	Existing Hours of Operation	Proposed % of time of operation	Proposed hrs of Operation
102.5	0	0	100%	0
97.5	6	3	89%	3
92.5	31	15	79%	12
87.5	131	62	68%	43
82.5	500	238	58%	138
77.5	620	295	47%	140
72.5	664	316	37%	116
67.5	854	407	26%	107
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	1,336	42%	558

Essex County
 CHA Project Number: 29142
 Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-3: Window A/C Controller - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	\$ -	\$ -	\$ -	
Window AC Controller	3	EA	\$ 150	\$ -	\$ -	462.15	\$ -	\$ -	\$ 462	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 462	Subtotal
\$ 116	25% Contingency
\$ 600	Total

Essex County
 CHA Project Number: 29142
 Kip's Castle

ECM-4: Replace Gas-Fired DHW Heaters w/ Tankless Condensing Gas-Fired DHW Heaters

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



Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	420	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	504,000	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	78%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	393,120	MBTU/yr	
Existing Tank Size	80	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	Per building personnel
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,549	MBTU/yr	
New Tank Size	0	Gallons	Based on Takagi Flash T-H1 instantaneous, condensing DHW Heater
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.1	MBH	
Annual Standby Hot Water Load	621	MBTU/yr	
Total Annual Hot Water Demand	383,192	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on Takagi Flash T-H1 instantaneous, condensing DHW Heater
Proposed Fuel Use	3,992	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$0.93	\$/Therm	
Existing Operating Cost of DHW	\$4,687	\$/yr	
Proposed Operating Cost of DHW	\$3,712	\$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	1,048	\$975

Essex County
 CHA Project Number: 29142
 Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4: Replace N.G. Water Heaters with Condensing DHW Heaters - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
DHW Heater Removal	2	LS		\$ 250		\$ -	\$ 623	\$ -	\$ 623	RS Means 2012
High Efficiency Gas-Fired DHW Heater	2	EA	\$ 4,000	\$ 280		\$ 8,216	\$ 698	\$ -	\$ 8,914	RS Means 2012
Miscellaneous Electrical	2	LS	\$ 300			\$ 616	\$ -	\$ -	\$ 616	RS Means 2012
Venting Kit	2	EA	\$ 450	\$ 650		\$ 924	\$ 1,620	\$ -	\$ 2,544	RS Means 2012
Miscellaneous Piping and Valves	2	LS	\$ 200			\$ 411	\$ -	\$ -	\$ 411	RS Means 2012

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

\$ 13,108	Subtotal
\$ 3,277	25% Contingency
\$ 16,385	Total

Essex County
CHA Project Number: 29142
Kip's Castle

ECM-5: Replace faucet aerators with low flow

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$9.63	\$/ kGal
Faucets in Building	3	
Average Uses / Faucet (per day)	3	Based on # of occupants
Average Time of Use	10.0	seconds
Average Flowrate	2.5	gpm

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	3	
Proposed Flowrate	0.5	gpm

HEATING SAVINGS		
Fuel Cost	\$ 1.00	/Therm
Number of Faucets	3	
Hours per Day of Usage	0.5	hrs
Days per Year of Facility Usage	365	days
Average Flowrate	2.5	gpm
Proposed Flowrate	0.5	gpm
Heat Content of Water	8.33	Btu/gal/F
Temperature Difference (Intake and Output)	50	F
Water Heating Equipment Efficiency	80%	
Conversion Factor	100,000	Btu/Therm

SAVINGS		
Current Faucet Water Use	1.37	kGal / year
Proposed Faucet Water Use	0.27	kGal / year
Water Savings	1.10	kGal / year
Heating Savings	8	Therms
Cost Savings	\$19	/ year

Savings calculation formulas are taken from NJ Protocols document for Faucet

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

Essex County

CHA Project Number: 29142

Kip's Castle

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-5: Replace faucet aerators with low flow - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Low-Flow Faucet-- install low flow aerator	3	EA	\$ 10	\$ 10	\$ -	\$ 31	\$ 37	\$ -	\$ 68	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 68	Subtotal
\$ 17	25% Contingency
\$ 85	Total

Essex County
CHA Project Number: 29142
Kip's Castle

New Jersey Pay For Performance Incentive Program

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

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

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

Total Building Area (Square Feet)	15,000
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$32,338	\$11,635
Existing Usage (from utility)	203,320	12,512
Proposed Savings	77,800	8,938
Existing Total MMBtus	1,945	
Proposed Savings MMBtus	1,159	
% Energy Reduction	59.6%	
Proposed Annual Savings	\$19,814	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	\$/kWh	\$/therm	\$/kWh	\$/therm	\$/kWh	\$/therm	\$/kWh	\$/therm
Incentive #2	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.11	\$1.25
Incentive #3	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.11	\$1.25

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$5,000
Incentive #2	\$8,558	\$11,172	\$19,730
Incentive #3	\$8,558	\$11,172	\$19,730
Total All Incentives	\$17,116	\$22,344	\$44,460

Total Project Cost	\$330,413
---------------------------	------------------

		Allowable Incentive
% Incentives #1 of Utility Cost*	11.4%	\$5,000
% Incentives #2 of Project Cost**	6.0%	\$19,730
% Incentives #3 of Project Cost**	6.0%	\$19,730
Total Eligible Incentives***		\$44,460
Project Cost w/ Incentives		\$285,953

Project Payback (years)	
w/o Incentives	w/ Incentives
16.7	14.4

* 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

APPENDIX D

New Jersey Board of Public Utilities Incentives

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

I. SMART START



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NJ SmartStart Buildings

Program Overview

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

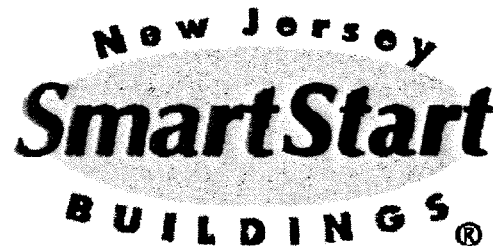
DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM



With New Jersey SmartStart Buildings ...

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

Special Notice

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

Visit the Sandy web page for details and important links.

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

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

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

Getting Started

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

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

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

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

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

Find out more about equipment incentives

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

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Equipment Incentives

Special Notice

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

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

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

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

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



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

Electric Chillers

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

Gas Cooling

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

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

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

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

Ground Source Heat Pumps

Closed Loop (\$450-750 per ton)

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

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

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

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

Prescriptive Lighting

New Linear Fluorescent

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

New Induction (\$70 per replaced HID fixture)

New LED

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

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

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

Display case (\$30 per case)

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

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

Parking garage luminaires (\$100 per fixture)

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

Stairwell and Passageway luminaires (\$40 per fixture)

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

Bollard (\$50 per fixture)

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

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

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

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

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

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

Lighting Controls

Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

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

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

HID or Fluorescent Hi-Bay Controls

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

Daylight dimming (\$45 per fixture controlled)

Refrigeration

Covers and Doors

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

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

Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

Food Service Equipment

Cooking

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

Holding

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

Cooling

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

Cleaning

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

Other Equipment Incentives*

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

Custom electric and gas equipment incentives (not prescriptive)

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

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II. DIRECT INSTALL



Your Power to Save

At Home, for Business, and for the Future

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Direct Install

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL 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

NEW JERSEY'S CLEAN ENERGY PROGRAM

DIRECT Install

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

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

ELIGIBILITY



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

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

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



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

III. PAY FOR PERFORMANCE (P4P)



Your Power to Save

At Home, for Business, and for the Future

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ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

Home » Commercial & Industrial » Programs » Pay for Performance

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

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



Eligibility

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

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

ENERGY STAR Portfolio Manager

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



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

Incentives

**OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS**

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

EDA PROGRAMS

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

SBC CREDIT PROGRAM

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

PAST PROGRAMS



TOOLS AND RESOURCES

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

PROGRAM UPDATES

CONTACT US

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

Steps to Participation

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

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PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2014 – June 30, 2015

Utility Serving Applicant:

<input type="checkbox"/> Atlantic City Electric	<input type="checkbox"/> Jersey Central Power & Light	<input type="checkbox"/> PSE&G
<input type="checkbox"/> New Jersey Natural Gas	<input type="checkbox"/> Elizabethtown Gas	<input type="checkbox"/> Rockland Electric Co.
<input type="checkbox"/> Other Electric Service Provider (please specify): _____		
<input type="checkbox"/> Other Fuel Provider: _____	<input type="checkbox"/> Oil: _____	<input type="checkbox"/> 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 for all accounts, organized in chronological order and separated by account. Utilize Utility Tool for applications with multiple accounts to organize data.
 6. Provide brief description of facility, noting any special or unusual circumstances and/or site conditions.
 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
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Account type	Account number
Account type	Account number
Account type	Account number


Additional Comments:

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

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

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

Visit our website: NJCleanEnergy.com/P4P

New Jersey SmartStart Buildings[®] is a registered trademark. Use of the mark without the permission of the New Jersey Board of Public Utilities, Office of Clean Energy is prohibited. 
 *Incentives/Requirements subject to change.

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

ADMINISTRATOR – New Jersey Board of Public Utilities (NJBPU)

APPLICATION PROCESS – The Program pays incentives in phases upon satisfactory completion of each of three Program milestones - approval of a complete Energy Reduction Plan, installation of all recommended measures per the Energy Reduction Plan, completion of Post-Construction Benchmarking Report (for incentive amounts, please refer to Incentive Amounts). In order to be eligible for Program Incentives, a Participating Customer or an agent authorized by a Customer, must submit to the Market Manager a properly completed application package – application form, Participating Customer's company W-9, twelve consecutive months of the project's utility bills and executed Participation Agreement. All components of the application package must be filled out completely, truthfully and accurately. This application package must be received on or before June 30, 2015 in order to be eligible for the Fiscal Year 2015 Incentives. The Market Manager will review the application package to determine if the project is eligible for a Program Incentive. When approved, the Participating Customer will receive an approval letter from their Case Manager with the estimated authorized first incentive amount and the date by which the Energy Reduction Plan must be submitted. Upon receipt of the approval letter, the Participating Customer and Partner may proceed with work on the Energy Reduction Plan. The Market Manager or agent thereof 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 Energy Reduction Plan approval letter. 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.

CHANGES TO THE PROGRAM – The Program and Participation Agreements may be changed by the Market Manager at any time without notice. Approved applications, however, will be processed to completion under the agreements in effect at the time of the Market Manager's approval.

ELIGIBILITY - Program Incentives are available to existing commercial, industrial and certain multifamily buildings with peak kilowatt demand usage of more than 100 kW in any of the most recent preceding twelve months of utility bills and a customer of the New Jersey Utilities. Market Manager has the discretion to approve applications that fall below the 100 kW minimum by no more than 10%. If the Participant is a municipal electric company customer, and a customer of an investor-owned gas New Jersey utility, only gas measures will be eligible for incentives under the Program. Similarly, if the Participant is an oil/propane customer and a customer of an investor-owned electric New Jersey Utility, only electricity measures will be eligible for incentives under the Program.

Equipment procured by participating Customer through another program offered by the New Jersey Utilities, as applicable, is not eligible for incentives through this Program. Customers who, from July 1, 2013 – June 30, 2014, have not contributed to the Societal benefits Change of the applicable New Jersey Utility may not be eligible for incentives offered through this program.

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

ENERGY-EFFICIENT MEASURES – Any device eligible to receive a Program Incentive payment through the New Jersey's Clean Energy Commercial and Industrial Program. The total package of measures as presented in the Energy Reduction Plan must have at least a 10% internal rate of return (IRR).

ENERGY REDUCTION PLAN – A document created by the Participating Customer's selected Partner that defines several key aspects of the project including (but not limited to) existing conditions as a result of a whole-building technical analysis, benchmarking summaries, recommended measures, financing plan and implementation schedule.

ENERGY REDUCTION PLAN APPROVAL – After application approval, the Participating Customer and Partner must work together to finalize and submit an Energy Reduction Plan which incorporates a work scope that will achieve the minimum 15% reduction in source energy performance target in accordance with the Program rules and policies along with the Benchmarking Tool, modeling software file, a copy of the executed Partner and Participating Customer contract, an original copy of the executed Installation Agreement and a Request for Incentive #1 Payment form. All components of the submittal package must be filled out completely, truthfully and accurately. The Market Manager, agents thereof and/or the selected Partner must be provided reasonable access to the Participating Customer's facility, staff, tenants and/or others necessary to develop an Energy Reduction Plan that will achieve the minimum 15% performance target as well as the necessary utility billing data as dictated by the Program. The Energy Reduction Plan submittal package will be reviewed and must be approved by the Market Manager prior to payment of Incentive #1. Upon approval of the submittal package, the Customer will receive an Incentive #1 approval letter indicating the date by which all measures in the Energy Reduction Plan must be installed (no later than twelve months following the Energy Reduction Plan submittal approval date).

INCENTIVE AMOUNTS – Incentive #1 - \$0.10 per square foot of the project with a maximum amount of \$50,000 and minimum of \$5,000, not to exceed 50% of the project's annual energy cost and contingent on installation of measures in the Energy Reduction Plan and receipt of a signed Installation Agreement. If installation does not commence within the required timeframe, Incentive #1 may be required to be returned to the program. In the event the project is cancelled and Incentive #1 is not returned, the project may reapply to the program in the future but another Incentive #1 will not be paid. Incentive #2 – 50% of the total performance-based incentive (combination of Incentives #2 and #3) calculated per Program's incentive structure; Incentive #3 – remaining amount based on the realized energy savings of the project. For customers that have successfully participated in the Local Government Energy Audit Program, Incentive #1 will be reduced by 50% to \$0.05 per square foot up to \$25,000. Actual Incentive #1 paid shall not be higher than 5% over the committed amount. Actual Incentive #2 paid shall not be higher than the committed amount, unless the Energy Reduction Plan has been resubmitted due to changes in the work scope. Actual Incentive #3 paid shall be higher or lower than the committed amount based on actual energy savings but shall not be greater than program Incentive Caps.

The Market Manager will provide incentives according to those described in this section or as modified upon notice to Participating Customer. All incentive payments are paid directly to the Participating Customer or the Participating Customer's designee as indicated on the application form. The Program is not bound to pay any incentive unless the submittal package associated with the incentive payment is approved by the Market Manager who reserves the sole discretion of approving or disapproving the submittal packages.

INCENTIVE CAP – Program Incentives #2 and #3 will be capped not to exceed 50% of the total actual project cost. Incentive #1 will be capped not to exceed 50% of the project's annual energy cost. The Market Manager reserves the right to limit the amount of the Program Incentives (Incentive #1, #2 and #3) to \$1M per gas and electric account (limited to \$2M per project) in a program year. Campus style facilities, which are master-metered, are subject to the annual incentive cap of \$1 million per gas and electric account. The Participating Customer will also be subject to an annual Entity Cap of \$4M (Definition of an Entity can be found in the Board Order Docket No. EO07030203).

INSTALLATION AGREEMENT – The Participating Customer must submit an executed Installation Agreement as part of the Request for Incentive #1 Form. By executing the Installation Agreement, the Customer agrees to install all of the measures in the Energy Reduction Plan, which are estimated to result in meeting or exceeding the minimum 15% performance target. The Customer agrees to the performance-based incentives (Incentives #2 & #3) as indicated in the document which are based on the results of the Energy Reduction Plan. Implementation of the measures must commence in the time period twelve months following the approval date of the Energy Reduction Plan. Failure to complete the installation of the measures in the Energy Reduction Plan may result in the repayment of Incentive #1. In the event the project is cancelled and Incentive #1 is not returned, the project may reapply to the program in the future but another Incentive #1 will not be paid.

LIMITATION OF LIABILITY – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against TRC Energy Services, the Market Manager, and the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market 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 Market Manager under this Program shall be individual, and not joint and/or several.

The Market Manager's review and approval of the Energy Reduction Plan cannot be construed to be a determination as to performance, applicability, dollar savings, energy savings, or any other aspect of the proposed project. The Market Manager and Administrator offer no guarantee or warranty of performance of the project's equipment or system. The participant assumes full responsibility and liability for the installation of all equipment, including but not limited to design, specification, all permits, installation, maintenance, performance and financing. By participating in the program and accepting incentive dollars, you agree to hold harmless the Market Manager and Administrator and their respective staffs with respect to the Project.

MARKET MANAGER – TRC Energy Services is responsible for managing the New Jersey Clean Energy Commercial & Industrial Programs.

MEASUREMENT & VERIFICATION APPROVAL – Twelve months subsequent to the Incentive #2 Payment Submittal package submission date, measurement and verification of the projected energy reduction will be conducted by the Participating Customer's Partner using the project's post-installation utility data (supplied by the Customer). The Participating Customer must work with their Partner to submit the Incentive #3 Payment Submittal, consisting of the Post-Construction Benchmarking Pay For Performance-Existing Buildings Report, Benchmarking Tool, and Request for Incentive #3 form. All components of the submittal package must be filled out

completely, truthfully and accurately. Upon review of the submittal package (by the Market Manager or agent thereof), the remaining 50% of the total performance-based incentive (Incentives #2 & #3) will be released to the Participating Customer. If the Post-Construction Benchmarking Report indicates that the project did not meet the minimum performance target, the post-installation completion period may be extended to up to twenty-four months subsequent to the Incentive Payment #2 package submission date. Upon approval of the submittal package, the Customer will receive an Incentive #3 Submittal approval letter indicating successful completion of the program.

NEW JERSEY UTILITIES – The investor-owned 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.

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

PARTICIPATING CUSTOMER'S CERTIFICATION – Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements per the Program Guidelines. Participating Customer certifies that he/she purchased and installed the equipment listed in the Energy Reduction Plan at their defined New Jersey project location.

PARTNER– An approved professional who provides technical building performance services to Participating Customers, acting as their "energy efficiency expert". Participating Customers are required to hire an approved Pay for Performance Partner to develop the Energy Reduction Plan and facilitate installation of the recommended package of Energy-Efficient Measures. Participants are required to enter into a contractual agreement with a selected Partner which outlines the set of minimum services the Partner will provide to the Participating Customer throughout the life of the project. It is strongly recommended that Participating Customers perform due diligence in selecting a Pay for Performance Partner. Fees charged by the Partner are not regulated by the Program and could vary between Partners.

PERFORMANCE-BASED INCENTIVES – The combination of Incentives #2 and #3, which are based on the projected and actual energy reduction performance of the project.

PERFORMANCE TARGET – A minimum of a 15% annual source energy savings performance target must be achieved in order to participate. The performance target is based on reducing the total energy consumption for the facility. No more than 50% of the total source energy savings may be derived from lighting measures. The total energy savings may not come from a single measure. A 4% performance target may be offered to customers whose annual energy consumption is heavily weighted to manufacturing and process loads. This approach will be reviewed on a case-by-case basis and must be pre-approved by the Market Manager. In order to be considered, the project must involve: A manufacturing facility, including such industries as plastics and packaging, chemicals, petrochemicals, metals, paper and pulp, transportation, biotechnology, pharmaceutical, food and beverage, mining and mineral processing, general manufacturing, equipment manufacturers and data centers; and manufacturing and/or process-related loads, including data center consumption, consume 50% or more of total facility energy consumption. No more than 50% of the total source energy savings may be derived from non-investor owned utilities or fuels.

POST-INSTALLATION APPROVAL – After the complete installation of all measures in the Energy Reduction Plan, the Customer and their Partner must finalize and submit the Incentive #2 Payment Submittal, consisting of the Installation Report, invoices, and Request for Incentive #2 Payment form. All components of the submittal package must be filled out completely, truthfully and accurately. Upon review of the submittal package and verification of the complete installation of all measures in the Energy Reduction Plan (via inspection by the Market Manager or agent thereof), 50% of the total performancebased incentive (Incentives #2 & #3) will be released to the Participating Customer. Upon approval of the submittal package, the Customer will receive an Incentive #2 approval letter indicating the date by which the post-installation Measurement & Verification phase began and will end (twelve months in length).

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing products 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 the service territory of one of the New Jersey Utilities (as defined by the Program) as designated on the Participating Customer's Pay for Performance application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program Guidelines. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease.

PRE-INSTALLED MEASURES - An Energy Reduction Plan must be approved by the program and an approval letter sent to the customer in order for incentives to be committed. Upon receipt of an Energy Reduction Plan, all project facilities must be preinspected. Measures installed prior to pre-inspection of the facility shall not be included as part of the ERP scope of work and will not be eligible for incentives. Measure installation undertaken prior to ERP approval, but after pre-inspection, is done at the customer's own risk. In the event that an Energy Reduction Plan is rejected by the program, the customer will not receive any incentives.

PRODUCT INSTALLATION OR EQUIPMENT INSTALLATION – Installation of the Energy-Efficient Measures.

Projects with a contract threshold of \$15,444 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 – New Jersey's Clean Energy Pay for Performance Program offered herein by the New Jersey Board of Public Utilities pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

PROGRAM GUIDELINES – See Pay for Performance Program Guidelines available from your Partner.

PROGRAM INCENTIVES – Refers to the amount or level of incentive that the Program provides to participating customers pursuant to the Program offered herein (see the description under "Incentive Amount" heading).

PROGRAM OFFER – The Program covers products purchased and/or services rendered on or after July 1, 2014. Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities.

PROJECT – A commercial, industrial or multifamily existing building with peak demand in excess of 100 kW in any of the most recent preceding twelve months of electric usage. Multifamily building(s) must be four (4) stories or greater or three (3) stories and under having central heating, cooling, or metering serving more than one building. The 100 kW requirement is waived for the following customer classes: hospitals, non-profits (as defined by section 501(c)(3) of the Internal Revenue Code), public colleges and universities, local government entities, including K-12 schools, and affordable multifamily customers (defined as low income, subsidized, HUD, etc.)

TAX CLEARANCE CERTIFICATION – Businesses must apply for and receive a Tax Clearance Certificate from the New Jersey Division of Taxation before they can receive any incentive, grant or other financial assistance from the Program.

TAX LIABILITY – The Market 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 on the application form in addition to providing a copy of their W-9 form as part of the application package in order to receive a Program Incentive.

TERMINATION – New Jersey's Clean Energy Program reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

WARRANTIES – THE MARKET 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.

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 Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the Pay For Performance Program, including the release of electric and natural gas utility billing information, as well as make available to the public non-sensitive information. 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. This arrangement supersedes all other communications and representations.

CUSTOMER'S SIGNATURE

PARTNER SIGNATURE

By signing, I certify that I have read, understand and agree to the Participation Agreement listed above.

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)

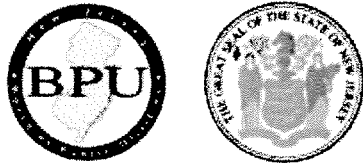


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Energy Savings Improvement Program

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

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HURRICANE SANDY

PROGRAMS

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[LOCAL GOVERNMENT ENERGY AUDIT](#)

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

- Local Government
- School Districts (K-12)

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

The Board also adopted protocols to measure energy savings:

- Measuring Energy Savings
- Procedures for Implementation

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

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

FIRST STEP – ENERGY AUDIT

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

ENERGY REDUCTION PLANS

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

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

ESIP PROGRAM

Final version 42413

BPU RULES

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

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

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

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

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

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

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

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

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

APPENDIX F

Photos



1: Kip's Castle



2: Steam boiler in basement



3: Inoperative condensing unit



4: Domestic hot water heater

APPENDIX G

EPA Benchmarking Report



LEARN MORE AT
energystar.gov

ENERGY STAR[®] Statement of Energy Performance

1

Kip's Castle

Primary Property Function: Office
Gross Floor Area (ft²): 15,000
Built: 1905

For Year Ending: December 31, 2013
Date Generated: October 29, 2014

ENERGY STAR[®]
Score¹

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

Property & Contact Information

Property Address

Kip's Castle
22 Crestmont Road
Verona, New Jersey 07004

Property Owner

,
(____)____-____

Primary Contact

,
(____)____-____

Property ID: 4199025

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

1,664 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu) 12,115,764 (48%)
Electric - Grid (kBtu) 12,844,696 (52%)

National Median Comparison

National Median Site EUI (kBtu/ft²) 55.3
National Median Source EUI (kBtu/ft²) 117.5
% Diff from National Median Source EUI 2910%

Source EUI

3,536.9 kBtu/
ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO₂e/year) 2,363

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

,
(____)____-____



**Professional Engineer Stamp
(if applicable)**