COUNTY OF ESSEX

RICHARD J. CODEY ARENA

560 Northfield Avenue, West Orange, NJ 07052

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

January 2015

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CHA PROJECT NO. 29142

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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 ±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 the Richard J. Codey Arena 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
Richard J. Codey Arena	560 Northfield Ave., West Orange, NJ 07052	104,695	1958

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)
Richard J. Codey Arena	296,203	58,697	17,885	6.2

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 choses to pursue an Energy Savings Improvement Plan (ESIP), high payback measures could be bundled with lower payback measures which ultimately can result in a payback which is favorable for an ESIP project to proceed. Occasionally, we will recommend an ECM that has a longer payback period, based on the need to replace that piece(s) of equipment due to its age, such as a boiler for example.

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
1	Door Sweeps and Seals	1,613	234	6.9	0	6.9	Y
2	Install Prem. Effic. Motors & VFDs on Hot Water Pumps	47,212	7,740	6.1	4,050	5.6	Y
3	Re-program Temperature Controls with Night Setback	21,309	24,071	0.9	0	0.9	Y
4	Install Kitchen Hood Controller	30,787	3,552	8.7	0	8.7	Y
5	Install Walk-In Cooler / Freezer Controls	41,250	690	59.8	100	59.6	Y
6	Vending Misers	1,120	1,326	0.8	0	0.8	Y
7	Low Flow Plumbing Fixtures	117,780	10,296	11.4	0	11.4	Y
L1**	Lighting Replacements	99,709	9,947	10.0	13,415	8.7	N
L2**	Lighting Controls	2,052	1,532	1.3	320	1.1	N
L3	Lighting Replacements with Controls	101,761	10,788	9.4	13,735	8.2	Y
	Total**	**362,833**	**58,697**	**6.2**	**17,885**	**5.9**	
	Total (Recommended)	**362,833**	**58,697**	**6.2**	**17,885**	**5.9**	

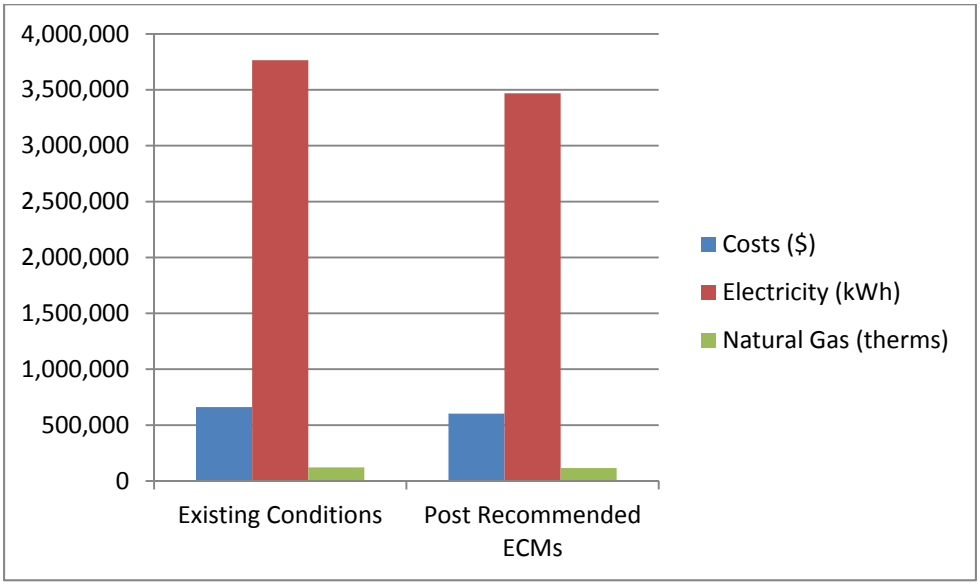
* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 120 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	660,735	601,551	9%
Electricity (kWh)	3,764,565	3,468,362	8%
Natural Gas (therms)	121,158	115,159	5%
Site EUI (kbtu/SF/Yr)	238.4	223.0	



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: Richard J. Codey Arena
Address: 560 Northfield Ave., West Orange, NJ 07052
Gross Floor Area: 104,695 Square Feet
Number of Floors: 2
Year Built: 1958, addition in 2005

Description of Spaces: Two ice rinks, administration offices, ticketing & information booths, locker rooms, restrooms, concessions facilities and rental spaces.
Description of Occupancy: There are approximately 20 staff members.
Number of Computers: The building has approximately 20 desktop and laptop computers.
Building Usage: Hours of operation for the Arena are 6:00 AM – 11:00 PM every day of the week.

Building Envelope

Construction Materials: The building is constructed of structural steel framing with block and brick exterior. Interior walls are primarily masonry with some sheetrock. A front addition was added in 2005.
Roof: The building has several roofs. The 1958 skating rink has a steel supported barrel roof with a silver coated EPDM surface. Flat areas are covered with either rolled asphalt sheeting or black rubber membrane. All roof surfaces appear to be in fair condition, and no roof associated ECMs are considered.
Windows The building has aluminum framed double pane windows. Seals are intact, and most of the windows are in good condition. No window replacement ECMs are included.

Exterior Doors: Exterior doors are either aluminum with single pane safety glass, or solid metal doors. The condition of sweeps and seals is variable—on a few of the utility doors the sweeps and/or seals are in poor condition. An ECM is evaluated for sweeps and seals on exterior doors.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The primary heat source for the Richard J. Codey Arena are two (2) Aerco Benchmark 2,000 MBH gas fired hot water boilers. The hot water is circulated to finned tube radiation and unit heaters via two (2) base mounted 7.5 HP B&G pumps equipped with 88.5% efficient Baldor industrial motors, that function in a lead/lag manner. The boilers are sequenced and controlled by a proprietary AERCO Boiler Management System. The 2005 front concession/ticketing/rental areas are heated and cooled by eight (8) packaged DX/gas Aaon RTUs. Additional arena heating is provided by gas fired York rooftop units. Electric finned radiation is also found in some areas. An ECM is evaluated for replacing the pump motors with more efficient motors and adding VFDs.

Cooling/Dehumidification: Arena #1 is dehumidified by two (2) Munters dessicant dehumidifiers model# DDS-3030 each with 65 ton capacity. Additional cooling to Arena #1 is provided by an Aaon DX split system with 75 tons of capacity. Arena #2 is dehumidified by two (2) 2005 Munters dehumidifiers model# AM20G that are located on the roof. Supplemental cooling is provided to Arena #2 by three (3) 25 ton 2014 Trane rooftop units and one York 25 ton RTU, all of which also provide gas-fired heat. The 2005 front addition is cooled by eight (8) gas fired DX Aaon rooftop units.

Process: The arena #1 ice sheet is maintained by a 2010 Toromont Cimco 250 ton reciprocating compressor water-cooled chiller and secondary calcium chloride brine solution loop. The two (2) model C6 Cimco compressors are driven by 125 HP 94.1% efficient 90kW motors. The secondary brine loop pumps are Cimco, 40 HP 1500 gpm and 90.4% efficient. These pumps operate in a lead/lag manner. Condenser pumps are 7.5 HP and 89.5% efficient. The dual condenser fan Cimco water tower is located on the roof above the mechanical room. An ECM is evaluated for replacing the secondary brine pump motors with efficient inverter ready motors and adding VFDs.

The arena #2 ice sheet is maintained by a 2014 Toromont Cimco R507A 3000 lb rotary screw compressor chiller with a secondary calcium chloride brine solution loop. The secondary Brine loop pumps are US electric, 20 HP premium efficiency motors. The condenser pumps are 7.5 Hp, 89.5 % eff. The Evapco cooling tower located on the roof above mechanical room #2. An ECM is evaluated for replacing the secondary brine pump motors with efficient inverter ready motors and adding VFDs.

Ventilation: The Munters dehumidifiers serving both arenas provide outdoor ventilation air as a function of removing moisture from the space. Trane as well as Aaon rooftop units are equipped with fans that draw in outside ventilation air, that then gets mixed with return air and delivered into the building. In general, building ventilation is adequate and no associated ECMs are included.

Exhaust: The facility utilizes exhaust fans of various sizes located on the roof to exhaust air from the kitchen, restrooms and storage areas, and provide general pressure relief.

Controls Systems

The building has a SBT DDC BMS controls system, which is serviced by SBT. Adjustments are made internally by building staff personnel. However the temperature setpoint in offices,

concession and rental areas is set to 72°F day and night. Neither weekend nor night-time setback is implemented, which could provide substantial energy savings. An ECM for night-time setback is included.

Domestic Hot Water Systems

Two (2) Laars Pennant domestic hot water boilers with a capacity of 1,062,000 BTUH each and 85% efficiency provide domestic hot water for the facility. Water is distributed around the building by two (2) fractional horsepower Taco circulation pumps. Additionally there is a 500 gallon DHW storage tank located in the new arena mechanical room. Hot water usage is primarily restroom lavatory use, as well as kitchen and showers.

Kitchen Equipment

The Codey Arena has a full kitchen, with cooking equipment (such as the range and the pizza ovens) manufactured by both Vulcan and Market Force Industries, and are natural gas fired. The gas range is vented by (approximate size) two 6' x 4' hoods connected to rooftop exhaust fan(s). There is also a Metro HM2000 heated holding cabinet. Dishes are washed by hand in a conventional stainless steel triple sink. One (1) large walk-in refrigerator keeps food at 35°F; a walk-in freezer to the back provides frozen food storage at 3°F. ECMs for a kitchen hood controller and a walk-in cooler controller are included in this report.

Plug Load

The Codey Arena has computers, printers, vending machines, and portable heaters which contribute to the plug load in the building. The installation of vending machine occupancy sensors has been evaluated in an effort to reduce the plug load in the building.

Plumbing Systems

Plumbing systems include a variety of toilet rooms and a kitchen. Toilet rooms are equipped with high flow water consumption (3.5 GPF) toilets; urinals (1.0 GPF) and lavatories are low flow, with lavatories utilizing push button faucets. An ECM that evaluates the replacement of the toilet fixtures, showerheads, and the installation of waterless urinals, is included.

Lighting Systems

Areas within the facility that have high ceilings, such as the new front common area and the skating arenas, have pendant hung fixtures containing three CFL lamps each. Arena #1 had been completely outfitted with LED fixtures, but due to the failure of many of the lamps, have been recently switched back to CFLs. Arena #1 is also equipped with 1000 watt metal halide lamps at the underside of the arena roof. Corridors and offices have 4' long fluorescent fixtures with either T8 or T12 lamps. LEDs are found in the Ticket booths. A combination of occupancy sensors and wall switches control the interior lighting.

Exterior lighting includes 150 watt metal halide wall-pack lamps, par 38 halogen spotlights, and CFLs in decorative wall sconces. The parking lots are illuminated with 250 watt halogen lamps. Exterior lighting is controlled by photocells.

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

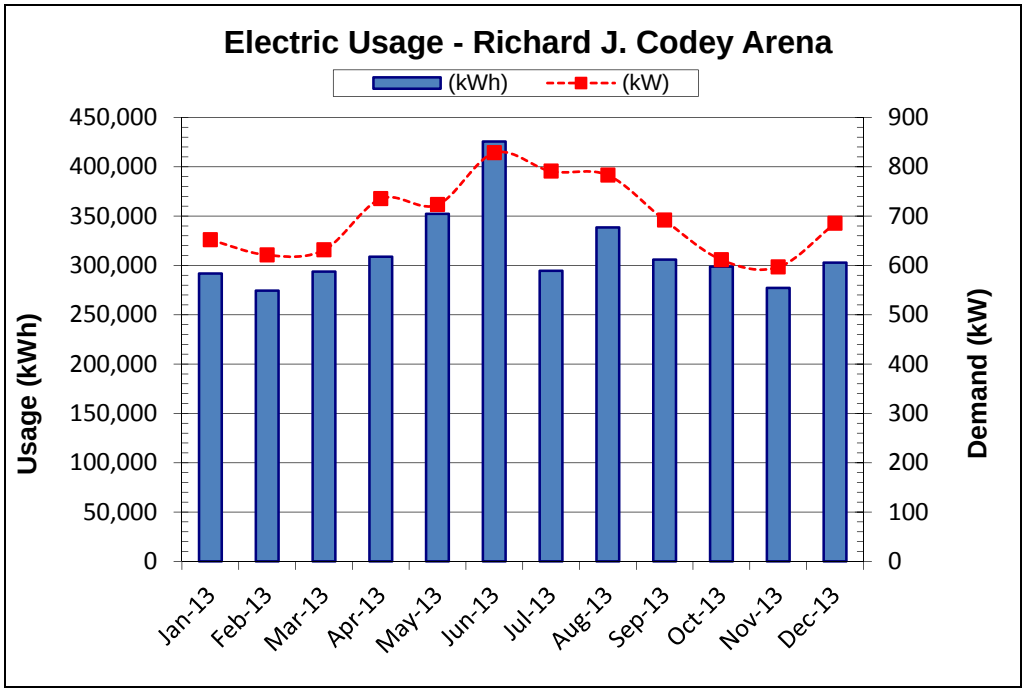
Utilities used by the building are delivered and supplied by the following utility companies:

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

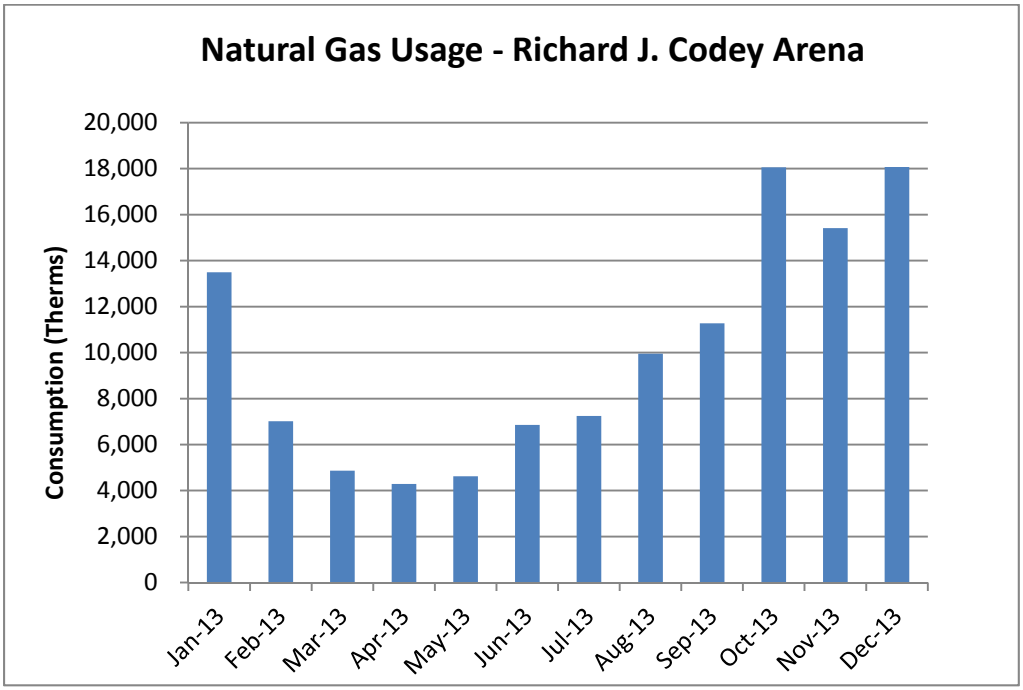
For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	3,764,565	kWh/yr.
Annual Cost	566,631	$
Blended Unit Rate	0.151	$/kWh
Supply Rate	0.143	$/kWh
Demand Rate	3.54	$/kW
Peak Demand	828.4	kW
Natural Gas		
Annual Usage	121,158	Therms/yr.
Annual Cost	94,104	$
Rate	0.777	$/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 summer but has steady electrical consumption year-round. Summer peaks occur during the maximum cooling season. Year-round ice-making accounts for high annual electricity consumption.



The natural gas usage is mostly driven by space heating in the winter months with a reduction in usage during the summer months. The building does have year-round kitchen natural gas use, and domestic hot water is generated by gas water heaters.

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	$0.15	$0.13	Y
Natural Gas	$/Therm	$0.78	$0.96	N

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

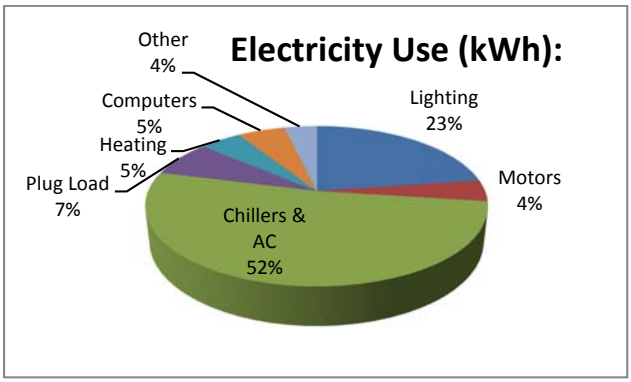
Additional information on selecting a third party energy supplier is available here:

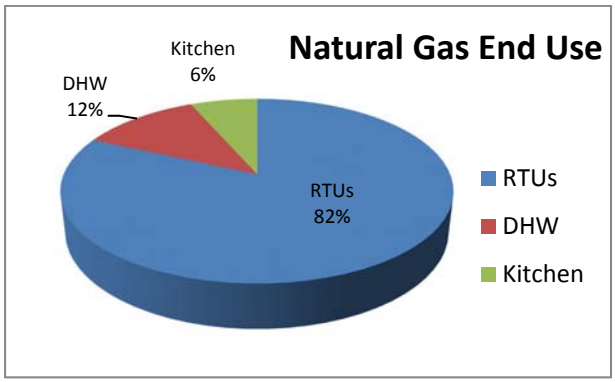
http://www.state.nj.us/bpu/commercial/shopping.html.

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.

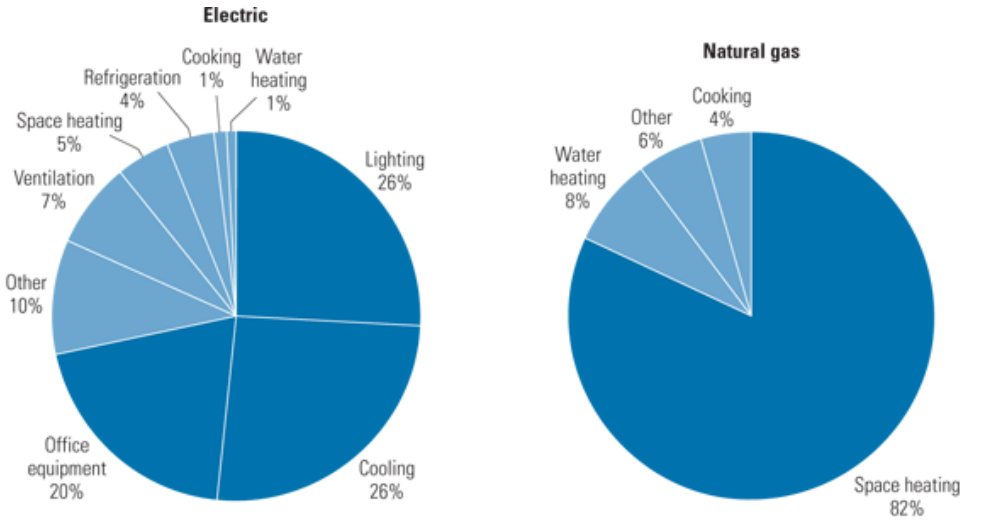
Site End-Use Utility Profile





Most of the electricity consumed by municipal buildings is used 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/ft^2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive and Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase.

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

Building	Site EUI kBtu/ft^2/yr	Source EUI Btu/ft^2/yr	Energy Star Rating (1-100)
Richard J. Codey Arena	238.4	506.7	N/A

This type of building is ineligible for an Energy Star Rating. By implementing the measures discussed in this report, it is expected that the site and source EUIs can be further reduced.

5.0 ENERGY CONSERVATION MEASURES

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

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

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

Energy savings were quantified in the form of:

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

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

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

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

5.1 ECM-1 Replace Door Sweeps and Seals

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

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

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

ECM-1 Replace Door Sweeps & Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,613	0	0	301	234	1.2	0	6.9	6.9

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

This measure is recommended.

5.2 ECM-2 Install Premium Efficiency Motors and Variable Speed Drives on Pumps

The Richard J. Codey Arena has a hot water heating system and two brine water systems that are currently circulated by pumps that run at constant speed. They consist of three sets of base mounted pumps that could provide an energy savings if out-fitted with premium efficiency motors and variable speed drives. These are two (2) 7.5 HP hot water pumps, 88.5% efficient; two (2) 40 HP Rink #1 brine pumps, 90.4% efficient; and two (2) 20 HP Rink #2 brine pumps, 80.3% efficient. New 7.5 HP motors can operate as high as 91.6% efficient; new 40 HP motors can operate as high as 93.5% efficient; and new 20 HP motors can operate as high as 92.2% efficient.

The savings of this measure are calculated from the motor efficiency improvements and the motor speed reduction which results when the systems are only partially loaded. Savings can be seen in reduced kW demand and total kWh usage.

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

ECM-2 Install Premium Efficiency Motors and Variable Speed Drives on Pumps

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
47,212	26.3	46,320	0	7,740	1.6	4,050	6.1	5.6

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

This measure is recommended.

5.3 ECM-3 Re-Program Temperature Controls with Night Setback

Although the facility opens at 6:00 AM and closes at 11:00 PM most days, it is not open 24/7, and could benefit from night setback. The interior unoccupied set-point temperature could be reduced from 72 degrees to 60 degrees during the heating season. During unoccupied hours in the cooling season, the cooling equipment for the front area offices and service desks could be turned off completely. At all times of the year RTUs should be programmed to close outside air dampers during unoccupied hours.

Energy savings are generated from temperature reduction as well as the other energy efficient sequences mentioned above. The savings is estimated at 10% overall energy reduction based on past experience with similar sized buildings having fully functioning digital controls.

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

ECM-3 Re-Program Temperature Controls with Night Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
21,309	0	145,453	2,712	24,071	15.9	0	0.9	0.9

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

This measure is recommended.

5.4 ECM-4 Install Kitchen Hood Controller

The kitchen contains two 6'x4' (approximate size) range exhaust hoods that are ducted and exhausted via exhaust fans located on the roof. A rooftop unit supplies the make-up air for the kitchen.

Installing a variable speed hood control system was evaluated. Upon activation of the system, the hood lights will turn on and the fans reach a preset minimum speed of 10 and 50 percent. When cooking appliances are turned on, the fan speed will increase based on temperature sensed in the exhaust duct. During cooking, an optical sensor

will sense particulates entering the hood and the speed will increase to 100 percent until smoke and heat are removed.

Energy saving is calculated from reduction of exhaust fan speed and the amount of heated air diffused from other heated rooms.

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

ECM-4 Install Kitchen Hood Controller

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
30,787	0	9,427	2,739	3,552	0.7	0	8.7	8.7

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

This measure is recommended.

5.5 ECM-5 Install Walk-in Cooler / Freezer Controls

In the Richard J. Codey Arena kitchen, one (1) large walk-in refrigerator keeps food at 35°F; and a walk-in freezer to the back provides frozen food storage at 3°F. Installing a walk-in cooler/ freezer control system was assessed. The system will monitor both dry and wet bulb temperature within the walk-in unit and allow evaporators and compressors to modulate up and down based on enthalpy set points rather than by dry bulb temperature alone. Savings is a result of reduced run time of evaporator fans, compressors and door heaters.

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

ECM-5 Install Walk-in Cooler / Freezer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	%	$	Years	Years
41,250	0	4,571	0	690	(0.8)	100	59.8	59.6

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

This measure is recommended.

5.6 ECM-6 Install Vending Misers

The building presently has one (1) cold beverage and one (1) snack type vending machines.

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

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

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

ECM-6 Install Vending Machine Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,120	0	8,780	0	1,326	10.8	0	0.8	0.8

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

This measure is recommended.

5.7 ECM-7 Install Low Flow Plumbing Fixtures

The facility's locker rooms have showerheads with flow rates of 2.5 gallons per minute. Overall water consumption can be reduced by replacing these showerheads with fixtures that have a flow rate of 1.6 gallons per minute. Most of the toilet and urinal plumbing fixtures in this building are older high flow fixtures. The water savings associated from replacing existing high flow fixtures with low-flow fixtures was calculated by taking the difference of the annual water usage for the proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures.

Replacing the existing toilets, urinals, and showerheads will result in lower water usage and sewer charges, as well as less natural gas consumption associated with heating the hot water.

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

ECM-7 Install Low Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
$	kW	kWh	Therms	kGal	$		$	Years	Years
117,780	0	0	27	1,067	10,296	1.2	0	11.4	11.4

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

This measure is recommended.

5.7.1 ECM-L1 Lighting Replacement / Upgrades

In terms of lighting, there are two main types of spaces within the Richard J. Codey Arena: 1) the skating rinks, and 2) all other areas. The skating rinks consist of pendant suspended down-lights with 42 watt and 34 watt CFLs; 1000 watt and 750 watt halogen fixtures, and a few LED downlights. The remainder of the building consists of 42 watt and 34 watt CFLs, 2x4 and 2x2 recessed and ceiling mounted troffers having 32W T8 and T12 fluorescent lamps. Wall switches control the interior lighting.

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
99,709	25.4	73,794	0	9,947	0.2	13,415	10.0	8.7

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

This measure is not recommended in lieu of ECM L3.

5.7.2 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
2,052	0	14,314	0	1,532	9.5	320	1.3	1.1

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

This measure is not recommended in lieu of ECM L3.

5.7.3 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
101,761	25.4	81,653	0	10,788	0.3	13,735	9.4	8.2

* 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:

- Paint the underside of the skating area roof decks with low emissivity paint, to reduce the radiant thermal cooling load on the ice.
- During nighttime, reduce the electrical peak demand by turning off lights when the compressors turn on to cool the ice.
- Instead of running brine pumps continuously, install an ice slab thermostat to control brine pump operation.
- 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.

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 Essex County 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 does not qualify for this program because its electrical demand is greater than the maximum peak electrical demand of 200 kW for the last 12 month period.

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

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.

<u>Electric</u>

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

Gas

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

Incentive cap: 25% of total project cost

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

Electric

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

Gas

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

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

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

6.1.4 Energy Savings Improvement Plan

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

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

the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

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

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

6.1.5 Renewable Energy Incentive Program

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

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

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

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
16,226	120

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of $155/SREC for 2014 and this number was utilized in the cash flow for this report.

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

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

Photovoltaic (PV) Rooftop Solar Power Generation – 120 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
480,000	120.0	158,911	0	23,919	27,015	20.1	9.4	FS

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

7.1.1 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 and 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. The amount of water currently used by this building is appropriate for a solar domestic hot water system, and there appears to be sufficient rooftop space for collectors.

A 3rd party analysis was conducted of the potential for implementing solar domestic hot water heating, based upon the site latitude and roof characteristics. The implementation cost and possible savings are summarized as follows:

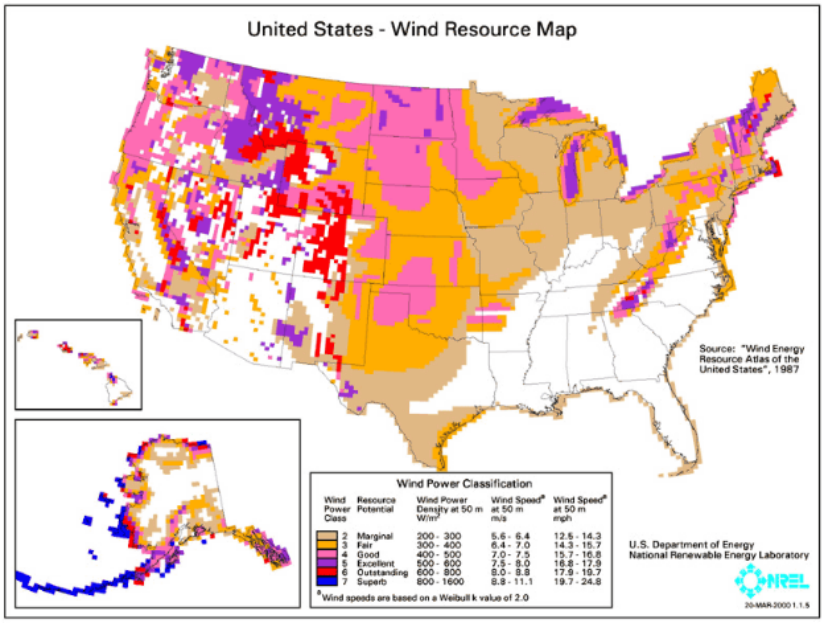
Solar Thermal Hot Water Generation – 2000 gallons per day

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
79,361	0	0	1,773	1,383	10,059	57	50	N

Note: CHA typically recommends a more detailed evaluation be conducted for the installation of DHW Thermal Solar systems when the screening evaluation shows a payback of less than 20 years. Since a preliminary analysis results in a payback of greater than 50 years, this ECM is not recommended for further study.

7.2 Wind Powered Turbines

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



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

7.3 Combined Heat and Power Plant

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

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

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

7.4 Demand Response Curtailment

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

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

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

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
828.4	596.7	695.9	N	Y

This measure is recommended for further review because the building does in fact 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 the Richard J. Codey Arena.

The following projects should be considered for implementation:

- Install Door Sweeps and Seals
- Install Premium Motors and VFDs on Pumps
- Program BMS to Include Night Setback
- Install Kitchen Hood Controller
- Install Walk-In Cooler Controls
- Vending Misers
- Install Low Flow Plumbing Fixtures
- 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)
296,203	58,697	17,885	6.2

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	660,735	601,551	9%
Electricity (kWh)	3,764,565	3,468,362	8%
Natural Gas (therms)	121,158	115,159	5%
Site EUI (kbtu/SF/Yr)	238.4	223.0	

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

- Photovoltaic (PV) Rooftop Solar Power Generation – 120 kW System

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
Richard J. Codey Arena

Annual Utilities

12-month Summary

Electric		
Annual Usage	3,764,565	kWh/yr
Annual Cost	566,631	$
Blended Rate	0.151	$/kWh
Consumption Rate	0.143	$/kWh
Demand Rate	3.54	$/kW
Peak Demand	828.4	kW
Min. Demand	596.7	kW
Avg. Demand	695.9	kW
Natural Gas		
Annual Usage	121,158	Therms/yr
Annual Cost	94,104	$
Rate	0.777	$/Therm

Essex County
Richard J. Codey Arena

Utility Bills: Account Numbers

Account Number	Building	Location	Type	Notes
420440601	Richard J. Codey Arena	560 Northfield Avenue, West Orange, NJ 07052	Electricity	
PG000008379591447648	Richard J. Codey Arena	560 Northfield Avenue, West Orange, NJ 07052	Natural Gas	
			Water	

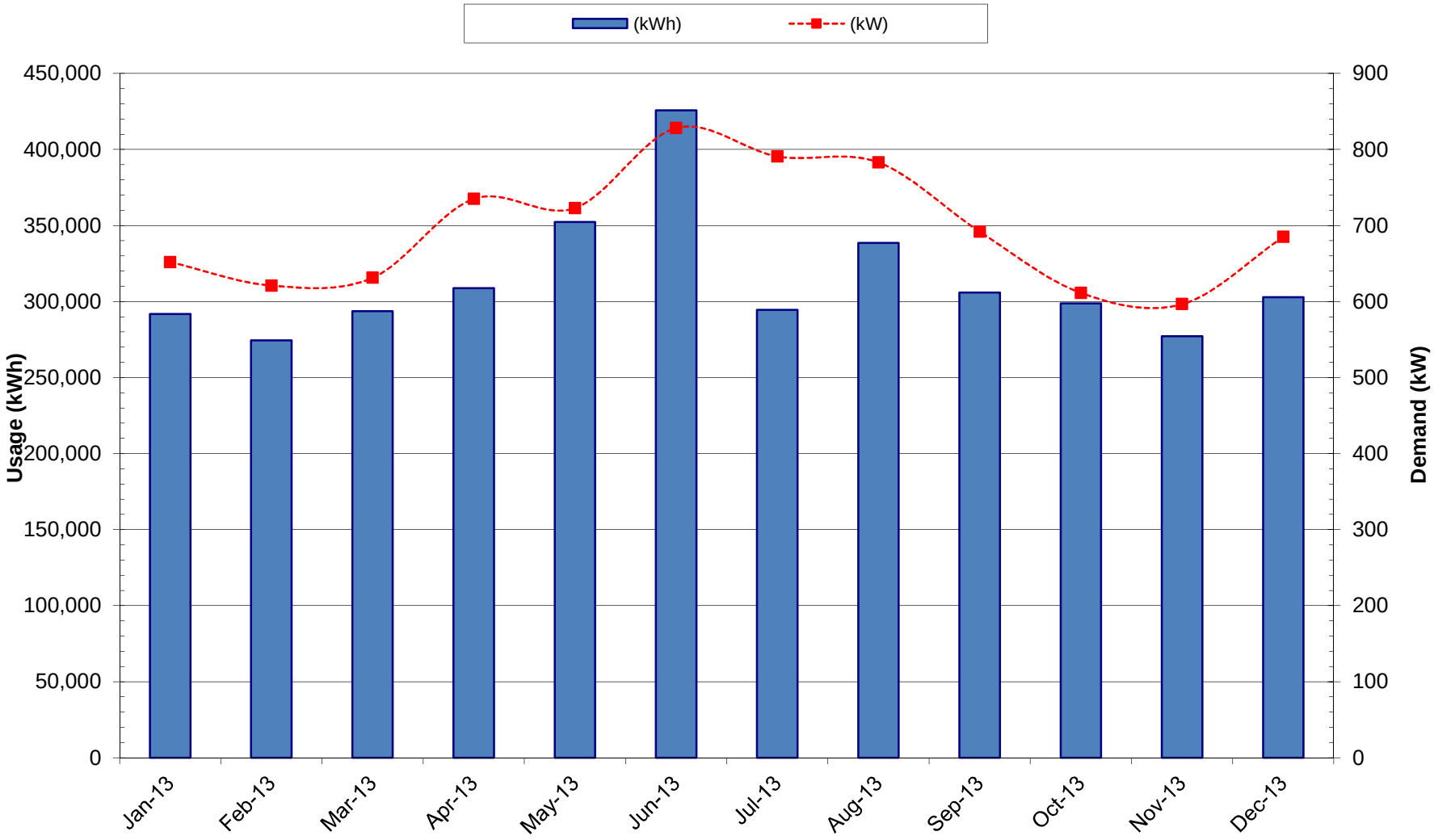
Essex County
Richard J. Codey Arena

For Service at: 560 Northfield Avenue, West Orange, NJ 07052
Account No.: **420440601** **Delivery -** PSE&G
Meter No.: **778010984** **Supplier -** N/A
Electric Service

			Provider Charges			Usage (kWh) vs. Demand (kW) Charges		Unit Costs		
Month	**Consumption (kWh)**	**Demand (kW)**	**Delivery ($)**	**Supplier ($)**	**Total ($)**	**Consumption ($)**	**Demand ($)**	**Blended Rate ($/kWh)**	**Consumption ($/kWh)**	**Demand ($/kW)**
January-13	291,755	652.00	11,929.64	30,634.28	42,563.92	40,255.84	2,308.08	0.15	0.14	3.54
February-13	274,408	621.10	10,297.26	28,812.84	39,110.10	36,911.41	2,198.69	0.14	0.13	3.54
March-13	293,690	631.40	10,955.97	30,837.45	41,793.42	39,558.26	2,235.16	0.14	0.13	3.54
April-13	308,860	735.20	11,442.55	32,430.30	43,872.85	41,270.24	2,602.61	0.14	0.13	3.54
May-13	352,312	723.10	12,682.85	36,992.76	49,675.61	47,115.84	2,559.77	0.14	0.13	3.54
June-13	425,657	828.40	18,781.29	44,693.99	63,475.28	60,542.74	2,932.54	0.15	0.14	3.54
July-13	294,501	791.00	23,207.70	30,922.61	54,130.31	51,330.17	2,800.14	0.18	0.17	3.54
August-13	338,521	783.00	19,721.72	35,544.71	55,266.43	52,494.61	2,771.82	0.16	0.16	3.54
September-13	305,944	691.90	18,287.16	32,124.12	50,411.28	47,961.95	2,449.33	0.16	0.16	3.54
October-13	298,797	611.40	11,551.46	31,373.69	42,925.15	40,760.79	2,164.36	0.14	0.14	3.54
November-13	277,257	596.70	10,928.07	29,111.99	40,040.06	37,927.74	2,112.32	0.14	0.14	3.54
December-13	302,863	685.30	11,565.59	31,800.62	43,366.21	40,940.24	2,425.96	0.14	0.14	3.54
Total (All)	**3,764,565**	**828.40**	**$171,351.26**	**$395,279.33**	**$566,630.59**	**$537,069.82**	**$29,560.77**	**$0.15**	**$0.14**	**$3.54**
Total (last 12-months)	**3,764,565**	**828.40**	**$171,351.26**	**$395,279.33**	**$566,630.59**	**$537,069.82**	**$29,560.77**	**$0.15**	**$0.14**	**$3.54**
Notes	1	2	3	4	5	6	7	8	9	10

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)

Electric Usage - Richard J. Codey Arena



Utility Data -Richard J. Codey Arena 2-19-15
Electric Graph

Essex County
Richard J. Codey Arena

For Service at: **560 Northfield Avenue**
Account No.: **PG000008379591447648**
Meter No: **3166107**
Natural Gas Service **Delivery -** **PSE&G**
Supplier - **Hess Corporation**

		Charges			Unit Costs		
Month	**Consumption (Therms)**	**Delivery ($)**	**Supply ($)**	**Total ($)**	**Delivery ($/Therm)**	**Supply ($/Therm)**	**Total ($/Therm)**
January-13	13,494	$ 4,401.03	$ 9,293.23	$ 13,694.26	$ 0.326	$ 0.689	$ 1.015
February-13	7,014	$ 3,126.68	$ 7,926.58	$ 11,053.26	$ 0.446	$ 1.130	$ 1.576
March-13	4,866	$ 653.22	$ 9,284.28	$ 9,937.50	$ 0.134	$ 1.908	$ 2.042
April-13	4,286	$ 608.59	$ 5,795.18	$ 6,403.77	$ 0.142	$ 1.352	$ 1.494
May-13	4,619	$ 645.17	$ 5,117.56	$ 5,762.73	$ 0.140	$ 1.108	$ 1.248
June-13	6,853	$ 890.43	$ 3,726.61	$ 4,617.04	$ 0.130	$ 0.544	$ 0.674
July-13	7,248	$ 926.62	$ 3,523.57	$ 4,450.19	$ 0.128	$ 0.486	$ 0.614
August-13	9,954	$ 1,197.97	$ 2,374.95	$ 3,572.92	$ 0.120	$ 0.239	$ 0.359
September-13	11,272	$ 1,338.33	$ 2,203.68	$ 3,542.01	$ 0.119	$ 0.196	$ 0.314
October-13	18,058	$ 5,747.29	$ 2,501.92	$ 8,249.21	$ 0.318	$ 0.139	$ 0.457
November-13	15,417	$ 5,150.27	$ 4,024.16	$ 9,174.43	$ 0.334	$ 0.261	$ 0.595
December-13	18,075	$ 5,481.27	$ 8,165.71	$ 13,646.98	$ 0.303	$ 0.452	$ 0.755
Total	**121,158**			**$ 94,104.30**			**$ 0.777**

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 5th 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**
Community Energy Inc. 51 Sandbrook Headquarters Road Stockton, NJ 08559	(866)946-3123 www.communityenergyinc.com	**R/C/I** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**

ConocoPhillips Company 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	**C** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 http://www.business.directenergy.com/	**R** **ACTIVE**
Direct Energy Business Marketing, LLC (fka Hess Energy Marketing) 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergy.com	**R** **ACTIVE**
Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC) One Hess Plaza Woodbridge, NJ 07095	(888) 464-4377 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**
DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**

Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
Energy Service Providers, Inc., d/b/a New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.njgande.com	**R/C** **ACTIVE**
FirstEnergy Solutions 150 West State Street Trenton, NJ 08608	(866) 625-7318 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866)348-4193 www.directenergybusiness.com	**R/C** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
GDF Suez Retail Energy Solutions LLC d/b/a THINK ENERGY 333 Thornall St. Sixth Floor Edison, NJ 08819	1-866-252-0078 www.mythinkenergy.com	**R/C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	**R/C/I** **ACTIVE**

Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**
Harborside Energy LLC 101 Hudson Street Suite 2100 Jersey City, NJ 07302	(877) 940-3835 www.harborsideenergynj.com	**R/C** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C/I** **ACTIVE**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Inspire Energy Holdings LLC 923 Haddonfield Road 3rd Fl. Building B2 Cherry Hill, NJ 08002	(866) 403-2620 www.inspireenergy.com	**R/C/I**
Integrys Energy Services, Inc. 33 Wood Ave, South, Suite 610 Iselin, NJ 08830	(800) 536-0151 www.integrysenergy.com	**C/I** **ACTIVE**
Jsynergy, LLC 445 Central Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020 Jsynergyllc.com	**R/C/I** **ACTIVE**
Kuehne Chemical Company, Inc. 86 North Hackensack Avenue South Kearney, NJ 07032	(973) 589-0700 kuehnechemical@comcast.net	**I**

Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	**R/C/I** **ACTIVE**
MP2 Energy NJ, LLC 111 River Street, Suite 1204 Hoboken, NJ 07030	(877) 238-5343 www.mp2energy.com	**R/C/I** **ACTIVE**
Natures Current, LLC 95 Fairmount Avenue Philadelphia, Pennsylvania 19123	(215) 464-6000 www.naturescurrent.com	**R/C/I** **ACTIVE**
MPower Energy NJ LLC One University Plaza, Suite 507 Hackensack, NJ 07601	(877) 286-7693 www.mpowerenergy.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. (Supreme Energy, Inc.) 532 Freeman St. Orange, NJ 07050	(800) 840-4427 www.supremeenergyinc.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 10 North Park Place Suite 420 Morristown, NJ 07960	(866) 568-0290 www.njgande.com	**R/C/** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**

Nordic Energy Services, LLC 50 Tice Boulevard, Suite 340 Woodcliff Lake, NJ 07677	(877) 808-1027 www.nordiceenergy.us.com	**R/C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
North Eastern States, Inc. d/b/a Entrust Energy 90 Washington Valley Road Bedminster, NJ 07921	(888) 535-6340 www.entrustenergy.com	**R/C/I** **ACTIVE**
Oasis Power, LLC d/b/a Oasis Energy 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046 www.oasisenergy.com	**R/C** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Park Power, LLC 1200 South Church St. Suite 23 Mount Laurel, NJ 08054	(856) 778-0079 www.parkpower.com	**R/C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
Power Management Co., LLC b/b/a PMC Lightsavers Limited Liability Company 1600 Moseley Road Victor, NY 14564	(585) 249-1360 www.powermanagementco.com	**C/I** **ACTIVE**
PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
PPL EnergyPlus Retail, LLC 788 Shrewsbury Avenue, Suite 220 Tinton Falls, NJ 07724	(732) 741-0505 – 2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Progressive Energy Consulting, LLC	(917) 837-7400	**R/C/I**

PO Box 4582 Wayne, New Jersey 07474	Progressivenrg@optionline.net	**ACTIVE**
Prospect Resources, Inc. 208 W. State Street Trenton, NJ 08608-1002	(847) 673-1959 www.prospectresources.com	**C** **ACTIVE**
Public Power & Utility of New Jersey, LLC One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Residents Energy, LLC 550 Broad Street Newark, NJ 07102	(888) 828-7374 www.residentsenergy.com	**R/C**
Respond Power LLC 1001 East Lawn Drive Teaneck, NJ 07666	(877) 973-7763 www.majorenergy.com	**R/C/I** **ACTIVE**
Save on Energy, LLC 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877)-658-3183 www.saveonenergy.com	**R/C**
SFE Energy One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 www.sfeenergy.com	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666 www.sjnaturalgas.com	**C** **ACTIVE**
SmartEnergy Holdings, LLC 100 Overlook Center 2nd Floor Princeton, NJ NJ 08540 United States of America	(800) 443-4440 www.smartenergy.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**

Spark Energy Gas, LP/ Spark Energy 2105 City West Blvd. Suite 100 Houston, TX 77042	(713)600-2600 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082 www.sperianenergy.com	**R/C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 www.streamenergy.net	**R/C** **ACTIVE**
Summit Energy Services, Inc. 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT www.summitenergy.com	**C/I** **ACTIVE**
Texas Retail Energy LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663 Attn: Chris Hendrix	(866) 532-0761 Texasretailenergy.com	**C/I** **ACTIVE**
TransCanada Power Marketing Ltd. 190 Middlesex Essex Turnpike, Suite 200 Iselin, NJ 08830	(877) MEGAWAT www.transcanada.com/powermarketing	**C/I** **ACTIVE**
TriEagle Energy, LP 90 Washington Valley Rd Bedminster, NJ 07921	(877) 933-2453 www.trieagleenergy.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. dba UGI Energy Link 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 427-8545 www.ugienergylink.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 2001 Route 46 Waterview Plaza Suite 301 Parsippany, NJ 07054	(800) 388-3862 www.lowcostpower.com	**R/C** **ACTIVE**

Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
XOOM Energy New Jersey, LLC 744 Broad Street. 16th Floor Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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PSE&G 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 5th 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**
Community Energy Inc. 51 Sandbrook Headquarters Road Stockton, NJ 08559	(866)946-3123 www.communityenergyinc.com	**R/C/I** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**

ConocoPhillips Company 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	**C** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 http://www.business.directenergy.com/	**R** **ACTIVE**
Direct Energy Business Marketing, LLC (fka Hess Energy Marketing) 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergy.com	**R** **ACTIVE**
Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC) One Hess Plaza Woodbridge, NJ 07095	(888) 464-4377 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**
DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**

Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
Energy Service Providers, Inc., d/b/a New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.njgande.com	**R/C** **ACTIVE**
FirstEnergy Solutions 150 West State Street Trenton, NJ 08608	(866) 625-7318 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866)348-4193 www.directenergybusiness.com	**R/C** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
GDF Suez Retail Energy Solutions LLC d/b/a THINK ENERGY 333 Thornall St. Sixth Floor Edison, NJ 08819	1-866-252-0078 www.mythinkenergy.com	**R/C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	**R/C/I** **ACTIVE**

Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**
Harborside Energy LLC 101 Hudson Street Suite 2100 Jersey City, NJ 07302	(877) 940-3835 www.harborsideenergynj.com	**R/C** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C/I** **ACTIVE**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Inspire Energy Holdings LLC 923 Haddonfield Road 3rd Fl. Building B2 Cherry Hill, NJ 08002	(866) 403-2620 www.inspireenergy.com	**R/C/I**
Integrys Energy Services, Inc. 33 Wood Ave, South, Suite 610 Iselin, NJ 08830	(800) 536-0151 www.integrysenergy.com	**C/I** **ACTIVE**
Jsynergy, LLC 445 Central Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020 Jsynergyllc.com	**R/C/I** **ACTIVE**
Kuehne Chemical Company, Inc. 86 North Hackensack Avenue South Kearney, NJ 07032	(973) 589-0700 kuehnechemical@comcast.net	**I**

Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	**R/C/I** **ACTIVE**
MP2 Energy NJ, LLC 111 River Street, Suite 1204 Hoboken, NJ 07030	(877) 238-5343 www.mp2energy.com	**R/C/I** **ACTIVE**
Natures Current, LLC 95 Fairmount Avenue Philadelphia, Pennsylvania 19123	(215) 464-6000 www.naturescurrent.com	**R/C/I** **ACTIVE**
MPower Energy NJ LLC One University Plaza, Suite 507 Hackensack, NJ 07601	(877) 286-7693 www.mpowerenergy.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. (Supreme Energy, Inc.) 532 Freeman St. Orange, NJ 07050	(800) 840-4427 www.supremeenergyinc.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 10 North Park Place Suite 420 Morristown, NJ 07960	(866) 568-0290 www.njgande.com	**R/C/** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**

Nordic Energy Services, LLC 50 Tice Boulevard, Suite 340 Woodcliff Lake, NJ 07677	(877) 808-1027 www.nordiceenergy.us.com	**R/C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
North Eastern States, Inc. d/b/a Entrust Energy 90 Washington Valley Road Bedminster, NJ 07921	(888) 535-6340 www.entrustenergy.com	**R/C/I** **ACTIVE**
Oasis Power, LLC d/b/a Oasis Energy 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046 www.oasisenergy.com	**R/C** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Park Power, LLC 1200 South Church St. Suite 23 Mount Laurel, NJ 08054	(856) 778-0079 www.parkpower.com	**R/C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
Power Management Co., LLC b/b/a PMC Lightsavers Limited Liability Company 1600 Moseley Road Victor, NY 14564	(585) 249-1360 www.powermanagementco.com	**C/I** **ACTIVE**
PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
PPL EnergyPlus Retail, LLC 788 Shrewsbury Avenue, Suite 220 Tinton Falls, NJ 07724	(732) 741-0505 – 2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Progressive Energy Consulting, LLC	(917) 837-7400	**R/C/I**

PO Box 4582 Wayne, New Jersey 07474	Progressivenrg@optionline.net	**ACTIVE**
Prospect Resources, Inc. 208 W. State Street Trenton, NJ 08608-1002	(847) 673-1959 www.prospectresources.com	**C** **ACTIVE**
Public Power & Utility of New Jersey, LLC One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Residents Energy, LLC 550 Broad Street Newark, NJ 07102	(888) 828-7374 www.residentsenergy.com	**R/C**
Respond Power LLC 1001 East Lawn Drive Teaneck, NJ 07666	(877) 973-7763 www.majorenergy.com	**R/C/I** **ACTIVE**
Save on Energy, LLC 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877)-658-3183 www.saveonenergy.com	**R/C**
SFE Energy One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 www.sfeenergy.com	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666 www.sjnaturalgas.com	**C** **ACTIVE**
SmartEnergy Holdings, LLC 100 Overlook Center 2nd Floor Princeton, NJ NJ 08540 United States of America	(800) 443-4440 www.smartenergy.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**

Spark Energy Gas, LP/ Spark Energy 2105 City West Blvd. Suite 100 Houston, TX 77042	(713)600-2600 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082 www.sperianenergy.com	**R/C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 www.streamenergy.net	**R/C** **ACTIVE**
Summit Energy Services, Inc. 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT www.summitenergy.com	**C/I** **ACTIVE**
Texas Retail Energy LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663 Attn: Chris Hendrix	(866) 532-0761 Texasretailenergy.com	**C/I** **ACTIVE**
TransCanada Power Marketing Ltd. 190 Middlesex Essex Turnpike, Suite 200 Iselin, NJ 08830	(877) MEGAWAT www.transcanada.com/powermarketing	**C/I** **ACTIVE**
TriEagle Energy, LP 90 Washington Valley Rd Bedminster, NJ 07921	(877) 933-2453 www.trieagleenergy.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. dba UGI Energy Link 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 427-8545 www.ugienergylink.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 2001 Route 46 Waterview Plaza Suite 301 Parsippany, NJ 07054	(800) 388-3862 www.lowcostpower.com	**R/C** **ACTIVE**

Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
XOOM Energy New Jersey, LLC 744 Broad Street. 16th Floor Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

Back to the main supplier page

APPENDIX B

Equipment Inventory

Essex County
CHA Project# 29412
Richard J. Codey Arena

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.
CH-1	1	Cimco	150 TR	COO14458B	Chiller	1500 lbs	N/A	Closet	Building	2010	16	
AC-X	4	N/A	N/A	N/A	Window AC unit	12,000 BTUH	N/A	Announceer booth	Building	N/A	N/A	
B-1, B-2	2	Aerco	Benchmark 2.0	N/A	Hot water Boiler	2,000 MBH	96%	Mechanical Room	Building	2005	16	
HWP-1, HWP-2	2	B&G	N/A	N/A	Hot water Pump	7.5 HP	88.5%	Mechanical Room	Building	N/A	N/A	
DHW-1, DHW-2	2	Laars Pennant	PNCV1250NACL2PXH	C 12 243829	DHW Boilers	1,062,500 BTUH	85%	Mechanical Room	Building	2012	13	
Circ-1, 2	2	Taco	HPL-75L-B	N/A	Circulation Pump	4.75 HP	N/A	Mechanical Room	Building	2012	13	
Storage tank 1	1	Riverside Hydronics	V 500A-PI	0405115511	DHW Storage Tank	500 gallons	N/A	Mechanical Room	Building	N/A	N/A	
MV-1	3	Lawlor	802	N/A	Mixing valve	100°F	N/A	Mechanical Room	Building	N/A	N/A	
CH-2	1	Toroment Cimco	N/A	8017081	Chiller	3000 lbs R507A	N/A	Mechanical Room	2014 Ice Rink	2014	20	
Brine pumps 1, 2	2	Leag	020180T3E256TC	N/A	Base mtd pumps	20 HP	93%	Mechanical Room	2014 Ice Rink	2014	15	
CU-1	1	Aaon	CL-075-3-0-RA04-000	200809-BCAH00143	Condensing Unit	75 tons	N/A	Exterior	Building	2008	14	
EF-X	multiple	Centri Master	PRN 126 E	04D842301	Roof mounted exhaust fan	1/4 HP	N/A	Roof	Building	N/A	N/A	
CU-2	1	EMI	SCC09DM0000AA0B	1-05-B-0582-07	Condensing Unit	1 ton	N/A	Roof	Building	2005	11	
KEF-1	1	Cook	210 CPS	214S923970-01	Kitchen exhaust fan	3.0 HP	N/A	Roof	Kitchen	2007	13	
RTU-1	1	Aaon	RM-001-1-0-AA01	200501-AMGA15000	Gas-fired DX Rooftop Unit	1 ton	N/A	Roof	Building	2005	11	
RTU-2	1	Aaon	N/A	N/A	Rooftop Unit	3 tons	N/A	Roof	Building	2005	11	
RTU-3	1	Aaon	N/A	N/A	Rooftop Unit	4 tons	N/A	Roof	Building	2005	11	
RTU-4	1	Aaon	N/A	N/A	Rooftop Unit	18 tons	N/A	Roof	Building	2005	11	
RTU-5	1	Aaon	N/A	N/A	Rooftop Unit	5 tons	N/A	Roof	Building	2005	11	
RTU-6	1	Aaon	N/A	N/A	Rooftop Unit	18 tons	N/A	Roof	Building	2005	11	
RTU-7	1	Aaon	N/A	N/A	Rooftop Unit	5 tons	N/A	Roof	Building	2005	11	
RTU-8	1	Aaon	N/A	N/A	Rooftop Unit	3 tons	N/A	Roof	Building	2005	11	
RTU-9	1	Aaon	N/A	N/A	Rooftop Unit	3 tons	N/A	Roof	Building	2005	11	
MU-1, 2	2	Munters	DDS-30303	N/A	Dehumidification unit	65 tons	N/A	Exterior	Arena #1	N/A	N/A	
MU-3, 4	2	Munters	AM20G	N/A	Dehumidification unit	N/A	N/A	Roof	Arena #2	2005	11	
RTU-10, 11	2	Carrier	N/A	N/A	Rooftop Unit	N/A	N/A	Roof	Arena #2	N/A	N/A	
RTU-12	1	Trane	YSD300F4RHA03D	142010519D	Rooftop Unit	Heating: 400,000 BTUH	N/A	Roof	Arena #2	2014	20	
RTU-13	1	Trane	YSD300F4RHA03D	142010503D	Rooftop Unit	Heating: 400,000 BTUH	N/A	Roof	Arena #2	2014	20	
RTU-14	1	Trane	YSD300F4RHA03D	142010487D	Rooftop Unit	Heating: 400,000 BTUH	N/A	Roof	Arena #2	2014	20	
RTU-15	1	Johnson Controls	J25ZJN32P4BZZ10006	N1K1315818	Rooftop Unit	25 tons	N/A	Roof	N/A	2011	17	

Energy Audit of Richard J. Codey Arena
CHA Project No. 29142
Existing Lighting & Audit Input

Cost of Electricity: **$0.107** **$/kWh**
$6.74 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
262	Main Lobby Area	Multi Purpose/Court	24	DC 36 P CF 3	CFT36/3	112	2.69	Breaker	520	1,398	None	
262	Main Lobby Area	Multi Purpose/Court	6	DC 36 P CF 3	CFT36/3	112	0.67	Breaker	520	349	None	
262	Main Lobby Area	Multi Purpose/Court	4	DC 36 P CF 3	CFT36/3	112	0.45	Breaker	520	233	None	
262	Main Lobby Area	Multi Purpose/Court	18	DC 36 P CF 3	CFT36/3	112	2.02	Breaker	520	1,048	None	
218LED	Hallways	Hallways	6	W 32 C F 3 (ELE)	F43ILL/2	90	0.54	Breaker	2280	1,231	None	
168	Hallways	Hallways	24	W 40 C F 2 (MAG)	F42SS	94	2.26	Breaker	2280	5,144	None	
168	Hallways	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.09	Breaker	2280	214	None	
102	Concession Area	Multi Purpose/Court	21	O CF 26	CFQ26/1-L	27	0.57	Breaker	520	295	None	
262	Skate Rental	Storage Areas	6	DC 36 P CF 3	CFT36/3	112	0.67	SW	1000	672	None	
218LED	Front Reception Desk	Multi Purpose/Court	10	W 32 C F 3 (ELE)	F43ILL/2	90	0.90	SW	520	468	None	
262	Large Vestibule	Hallways	6	DC 36 P CF 3	CFT36/3	112	0.67	Breaker	2280	1,532	None	
218LED	Offices	Offices	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.72	SW	2400	1,728	OCC	
262	Kids' Area	Multi Purpose/Court	6	DC 36 P CF 3	CFT36/3	112	0.67	SW	520	349	None	
218LED	Kitchen	Break/Lunch Rooms	13	W 32 C F 3 (ELE)	F43ILL/2	90	1.17	SW	3102.5	3,630	None	
218LED	Kitchen	Break/Lunch Rooms	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.27	SW	3102.5	838	None	
218LED	Offices	Offices	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.18	SW	2400	432	OCC	
263	2014 Skating Rink	Skating Rink	27	Pool MH1000 Fixt	MH1000/1	1080	29.16	Breaker	3500	102,060	None	
216	2014 Skating Rink	Skating Rink	4	High Bay MH 750	MH750/1	850	3.40	Breaker	3500	11,900	None	
216	2014 Skating Rink	Skating Rink	14	High Bay MH 750	MH750/1	850	11.90	Breaker	3500	41,650	None	
218LED	Upper Boxes	Offices	4	W 32 C F 3 (ELE)	F43ILL/2	90	0.36	SW	2400	864	OCC	
218LED	202 Locker Room	Locker	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.18	SW	2800	504	OCC	
90	202 Locker Room	Locker	1	X CF 7.0	ECF7/1	10	0.01	SW	2800	28	OCC	
218LED	203 Locker Room	Locker	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.18	SW	2800	504	OCC	
232	203 Locker Room	Locker	2	R 60 C I 1	I60/1	60	0.12	SW	2800	336	OCC	
218LED	201 Locker Room	Locker	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.18	SW	2800	504	OCC	
232	201 Locker Room	Locker	2	R 60 C I 1	I60/1	60	0.12	SW	2800	336	OCC	
228	Mens Room	Restroom w/ OCC	8	W60CF1	F81EL	60	0.48	OCC	1000	480	None	
228	Ladies Room	Restroom w/ OCC	8	W60CF1	F81EL	60	0.48	OCC	1000	480	None	
263	1958 Skating Rink	Skating Rink	44	Pool MH1000 Fixt	MH1000/1	1080	47.52	Breaker	3500	166,320	None	
262	1958 Skating Rink	Skating Rink	33	DC 36 P CF 3	CFT36/3	112	3.70	Breaker	3500	12,936	None	
263	1958 Skating Rink	Skating Rink	40	Pool MH1000 Fixt	MH1000/1	1080	43.20	Breaker	3500	151,200	None	
218LED	1958 Skating Rink Entrance Vestibule	Hallways	12	W 32 C F 3 (ELE)	F43ILL/2	90	1.08	Breaker	2280	2,462	None	
218LED	Box Rooms	Offices	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.72	SW	2400	1,728	OCC	
218LED	Locker Room 101	Locker	11	W 32 C F 3 (ELE)	F43ILL/2	90	0.99	SW	2800	2,772	OCC	
218LED	Locker Room 102	Locker	11	W 32 C F 3 (ELE)	F43ILL/2	90	0.99	SW	2800	2,772	OCC	
218LED	Locker Room 103	Locker	11	W 32 C F 3 (ELE)	F43ILL/2	90	0.99	SW	2800	2,772	OCC	
218LED	Locker Room 104	Locker	11	W 32 C F 3 (ELE)	F43ILL/2	90	0.99	SW	2800	2,772	OCC	
168	Storage Rm	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Storage Rm	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Storage Rm	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Storage Rm	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Miscellaneous locked room	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Miscellaneous locked room	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Miscellaneous locked room	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Miscellaneous locked room	Storage Areas	1	W 40 C F 2 (MAG)	F42SS	94	0.09	SW	1000	94	None	
168	Back area	Storage Areas	7	W 40 C F 2 (MAG)	F42SS	94	0.66	SW	1000	658	None	
168	Refrigeration Room	Mechanical Room	8	W 40 C F 2 (MAG)	F42SS	94	0.75	SW	1000	752	None	
168	Back Mens Rm	Restroom w/ OCC	4	W 40 C F 2 (MAG)	F42SS	94	0.38	OCC	1000	376	None	
218LED	Staff Room	Offices	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.45	SW	2400	1,080	OCC	
168	Staff Room	Offices	2	W 40 C F 2 (MAG)	F42SS	94	0.19	SW	2400	451	OCC	
168	Rear Vestibule	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.09	Breaker	2280	214	None	
168	Rear Vestibule	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.09	Breaker	2280	214	None	
168	Back area Storage	Storage Areas	5	W 40 C F 2 (MAG)	F42SS	94	0.47	SW	1000	470	None	
218LED	Ladies Room	Restroom w/ OCC	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.45	OCC	1000	450	None	
218LED	Ladies Locker	Locker	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.45	SW	2800	1,260	None	
185LED	Rear Mechanical Room	Mechanical Room	24	T 40 R F 4 (ELE)	F44SE	172	4.13	SW	1000	4,128	None	
261LED	Exterior Lights	Outdoor Lighting	8	PAR 38 SP	H100/1	100	0.80	Breaker	4368	3,494	PHC	
69	Exterior Lights	Outdoor Lighting	16	175 MH GROUND	MH175/1	215	3.44	Breaker	4368	15,026	PHC	
69	Exterior Lights	Outdoor Lighting	4	175 MH GROUND	MH175/1	215	0.86	Breaker	4368	3,756	PHC	
227LED	Exterior Lights	Outdoor Lighting	2	70 W MH Wall Pack	MH70/1	95	0.19	Breaker	4368	830	PHC	
227LED	Exterior Lights	Outdoor Lighting	3	70 W MH Wall Pack	MH70/1	95	0.29	Breaker	4368	1,245	PHC	
227LED	Exterior Lights	Outdoor Lighting	12	70 W MH Wall Pack	MH70/1	95	1.14	Breaker	4368	4,980	PHC	
145LED	Exterior Lights	Outdoor Lighting	22	HPS 150 POLE	HPS150/1	188	4.14	Breaker	4368	18,066	PHC	
	Total		**557**				**181.00**			**583,145**		

APPENDIX C

ECM Calculations

Essex County
CHA Project Number: 29142

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
					Electric	Natural Gas	Fuel Oil
$ 0.151	$/kWh blended		0.000420205	104,695	$ 566,631	$ 94,104	
$ 0.143	$/kWh supply	3,764,565	0.000420205				
$ 3.54	$/kW	828.4	0				
$ 0.78	$/Therm	121,158	0.00533471				
$ 9.63	$/kgals	90	0				
	$/Gal						

Richard J. Codey Arena

Recommend? Y or N		Item	Savings kW	kWh	therms	No. 2 Oil gal	Water kgal	$	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 kW	kWh	therms	kgal/yr	$	ROI	NPV	IRR
Y	ECM-1	Door Sweeps and Seals	0.0	0	301	0	0	234	$ 1,613	6.9	15.0	1.6		N	6.9	0.0	0	4,519	0	$ 3,511	1.2	$1,181	11.8%
Y	ECM-2	Install Premium Motors and VFDs on Pumps	26.3	46,320	0	0	0	7,740	$ 47,212	6.1	15.0	19.5	$ 4,050	N	5.6	394.2	694,803	0	0	$121,661	1.6	$49,239	16.0%
Y	ECM-3	Re-Program Temperature Controls to Include Night Setback	0.0	145,453	2,712	0	0	24,071	$ 21,309	0.9	15.0	75.6		N	0.9	0.0	2,181,789	40,681	0	$361,059	15.9	$266,044	113.0%
Y	ECM-4	Install Kitchen Hood Controller	0.0	9,427	2,739	0	0	3,552	$ 30,787	8.7	15.0	18.6		N	8.7	0.0	141,408	41,090	0	$ 53,280	0.7	$11,616	7.8%
Y	ECM-5	Install Walk-In Cooler / Freezer Controls	0.0	4,571	0	0	0	690	$ 41,250	59.8	10.0	1.9	$ 100	N	59.6	0.0	45,710	0	0	$ 6,902	(0.8)	($35,262)	-23.8%
Y	ECM-6	Vending Machine Controls	0.0	8,780	0	0	0	1,326	$ 1,120	0.8	10.0	3.7		N	0.8	0.0	87,795	0	0	$ 13,257	10.8	$10,188	118.3%
Y	ECM-7	Install Low Flow Plumbing Fixtures	0.0	0	246	0	1,100	10,783	$ 118,655	11.0	25.0	1.3		N	11.0	0.0	0	6,157	27,496	$269,569	1.3	$69,107	7.6%
N	ECM-L1	Lighting Replacements / Upgrades	25.4	73,794	0	0	0	9,947	$ 99,709	10.0	10.0	31.0	$ 13,415	N	8.7	254.0	737,940	0	0	$122,219	0.2	($1,444)	2.7%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	14,314	0	0	0	1,532	$ 2,052	1.3	10.0	6.0	$ 320	N	1.1	0.0	143,140	0	0	$ 21,614	9.5	$11,336	88.3%
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	25.4	81,653	0	0	0	10,788	$ 101,761	9.4	10.0	34.3	$ 13,735	N	8.2	254.0	816,530	0	0	$134,086	0.3	$3,998	3.9%
		Total (Not Including ECMs L1, L2)	**51.7**	**296,203**	**5,999**	**0**	**1,100**	**$ 59,184**	**$ 363,708**	**6.1**	**10.5**	**158**	**$ 17,885**		**5.8**	**648**	**3,968,034**	**92,447**	**27,496**	**$963,325**	**1.6**	**$159,024**	**11.2%**
		Recommended Measures (highlighted green above)	**51.7**	**296,203**	**5,999**	**0**	**1,100**	**$ 59,184**	**$ 363,708**	**6.1**	**10.5**	**156**	**$ 17,885**	**0**	**5.8**	**648**	**3,968,034**	**92,447**	**27,496**	**$963,325**	**1.6**	**$159,024**	**11.2%**
		% of Existing	**6%**	**7.87%**	**4.95%**	**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	Hours
102.5							
97.5	35.4	6	3	3	3	3	2
92.5	37.4	31	13	13	13	13	9
87.5	35.0	131	55	55	55	55	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	198
67.5	27.2	854	356	356	356	356	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	16.0	491	205	205	205	205	146
42.5	14.5	656	273	273	273	273	195
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	252	105	105	105	105	75
17.5	5.4	125	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

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

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

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

Essex County
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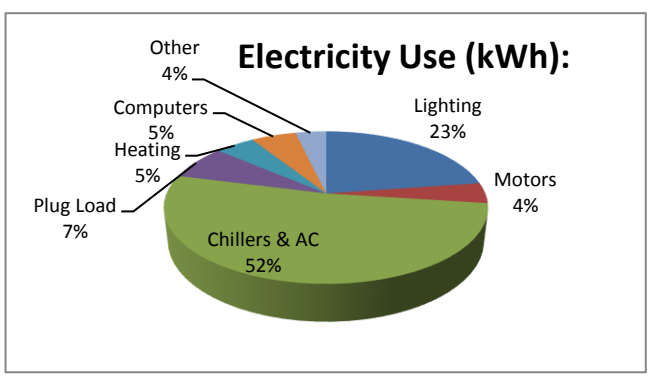
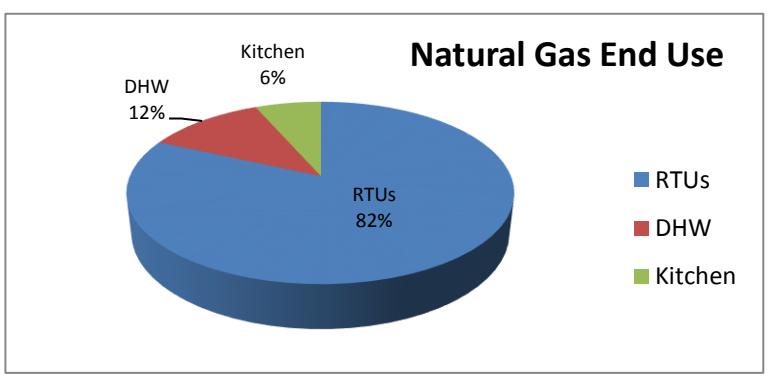
Utility End Use Analysis			
Electricity Use (kWh):		**Notes/Comments:**	
3,764,565	Total	Based on utility analysis	
855,000	Lighting	From Lighting Calculations	0.227117874
163,450	Motors	Estimated	0.043418031
1,955,000	Chillers & AC	Estimated	0.519316309
275,000	Plug Load	Estimated	0.073049609
177,100	Heating	Estimated	0.047043948
201,000	Computers	Estimated	0.053392623
138,015	Other	Remaining	0.036661606
Natural Gas Use (Therms):		**Notes/Comments:**	
121,158	Total	Based on utility analysis	
112,158	RTUs	Therms/SF x Square Feet Served	0.925716833
16,000	DHW	Based on utility analysis	0.132058964
9,000	Kitchen	Based on utility analysis	0.074283167





Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-1: Install Door Seals

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

Heating System Efficiency	80%		Ex Occupied Clng Temp.		*F	Ex Occupied Htg Temp.	72	*F
Cooling System Efficiency	0.00	kW/ton	Ex Unoccupied Clng Temp.		*F	Ex Unoccupied Htg Temp.	72	*F
Linear Feet of Door Edge	70	LF	Cooling Occ Enthalpy Setpoint	27.5	Btu/lb	Electricity	$ 0.15	$/kWh
Existing Infiltration Factor*	1.5	cfm/LF	Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb	Natural Gas	$ 0.78	$/therm
Proposed Infiltration Factor*	0.45	cfm/LF						

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

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	Unoccupied	Occupied	Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Door Infiltration Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L
102.5	0.0	0	0	0	12,994	12,994	3,898	3,898	0	0	0	0
97.5	35.4	6	3	4	-3,736	-3,736	-1,121	-1,121	0	0	0	0
92.5	37.4	31	13	18	-4,679	-4,679	-1,404	-1,404	0	0	0	0
87.5	35.0	131	55	76	-3,537	-3,537	-1,061	-1,061	0	0	0	0
82.5	33.0	500	208	292	-2,621	-2,621	-786	-786	0	0	0	0
77.5	31.5	620	258	362	-1,913	-1,913	-574	-574	0	0	0	0
72.5	29.9	664	277	387	-1,137	-1,137	-341	-341	0	0	0	0
67.5	27.2	854	356	498	149	149	45	45	0	0	2	0
62.5	24.0	927	386	541	1,657	1,657	497	497	0	0	19	6
57.5	20.3	600	250	350	3,426	3,426	1,028	1,028	0	0	26	8
52.5	18.2	730	304	426	4,390	4,390	1,317	1,317	0	0	40	12
47.5	16.0	491	205	286	5,438	5,438	1,631	1,631	0	0	33	10
42.5	14.5	656	273	383	6,139	6,139	1,842	1,842	0	0	50	15
37.5	12.5	1,023	426	597	7,083	7,083	2,125	2,125	0	0	91	27
32.5	10.5	734	306	428	8,033	8,033	2,410	2,410	0	0	74	22
27.5	8.7	334	139	195	8,899	8,899	2,670	2,670	0	0	37	11
22.5	7.0	252	105	147	9,701	9,701	2,910	2,910	0	0	31	9
17.5	5.4	125	52	73	10,424	10,424	3,127	3,127	0	0	16	5
12.5	3.7	47	20	27	11,233	11,233	3,370	3,370	0	0	7	2
7.5	2.1	34	14	20	12,009	12,009	3,603	3,603	0	0	5	2
2.5	1.3	1	0	1	12,374	12,374	3,712	3,712	0	0	0	0
-2.5	0.0	0	0	0	8,448	8,448	2,534	2,534	0	0	0	0
-7.5	0.0	0	0	0	9,015	9,015	2,705	2,705	0	0	0	0
TOTALS		**8,760**	**3,650**	**5,110**					**0**	**0**	**430**	**129**

Existing Door Infiltration	**105**	**cfm**
Existing Unoccupied Door Infiltration	**105**	**cfm**
Proposed Door Infiltration	**32**	**cfm**
Proposed Unoccupied Door Infiltration	**32**	**cfm**

Savings			
	301	**therms**	**$ 234**
	0	**kWh**	**$ -**
			$ 234

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap (in)	gap location	LF of gap	% door w/ gap	Average gap for door (in)
1a	3	7	20	0.125	bottom/seam	10	50%	0.0625
1b	3	7	20	0.125	bottom/seam	10	50%	0.0625
2a	3	7	20	0.125	bottom/seam	10	50%	0.0625
2b	3	7	20	0.125	bottom/seam	10	50%	0.0625
3a	3	7	20	0.125	bottom/seam	10	50%	0.0625
3b	3	7	20	0.125	bottom/seam	10	50%	0.0625
4a	3	7	20	0.125	bottom/seam	10	50%	0.0625
Total	**21**	**49**	**140**	**0.160**		**70**	**50%**	**0.063**

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-1: Install Door Seals - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

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

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

$ 1,291	Subtotal
$ 323	25% Contingency
$ 1,613	**Total**

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-2: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

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

Variable Inputs

Electric Rate	$0.15	**$/kWh**
Demand Rate	$0.14	**$/kW**

MOTOR SCHEDULE										Savings Factor		Existing Motor Energy		Proposed Motor Energy		Energy Savings	
Motor ID	Motor Type	Qty	HP	Total HP	Upgrade Motor	Load Factor	Existing Motor Eff.	New Motor Eff.	Annual Hours	Demand Savings Factor	Energy Savings Factor	Demand Energy (kW)	Electrical Energy (kWh)	Demand Energy (kW)	Electrical Energy (kWh)	Peak Demand Savings (kW)	Annual Energy Savings (kWh)
Hot Water Pumps	**HW**	**1**	**7.5**	**7.5**	**Y**	**0.75**	**88.5%**	**91.6%**	**8,760**	**0.216**	**0.240**	**4.7**	**41,530**	1.0	36,112	3.8	5,418
Rink #1 Brine	**CHW**	**1**	**40.0**	**40.0**	**Y**	**0.75**	**90.4%**	**93.5%**	**8,760**	**0.448**	**0.475**	**24.8**	**216,839**	10.7	197,733	14.0	19,106
Rink #2 Brine	**CHW**	**1**	**20.0**	**20.0**	**Y**	**0.75**	**80.3%**	**92.2%**	**8,760**	**0.448**	**0.475**	**13.9**	**122,056**	5.4	100,260	8.5	21,796
															Total:	26.3	46,320.2
																$ 45	$ 6,994
																	$ 7,039

Savings calculation formulas are taken from NJ Protocols document for VFDs

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-2: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
VFD (7.5 HP motor)	2	ea	$ 550	$ 650		$ 1,130	$ 1,620	$ -	$ 2,750	RS Means 2012
7.5 HP Motor	2	ea	$ 2,025	$ 525		$ 4,159	$ 1,308	$ -	$ 5,468	RS Means 2012
VFD (40.0 HP motor)	2	ea	$ 2,000	$ 180		$ 4,108	$ 449	$ -	$ 4,557	RS Means 2012
40 HP Motor	2	ea	$ 7,225	$ 1,050		$ 14,840	$ 2,617	$ -	$ 17,457	RS Means 2012
VFD (20.0 HP motor)	2	ea	$ 1,100	$ 150		$ 2,259	$ 374	$ -	$ 2,633	RS Means 2012
20 HP Motor	2	ea	$ 3,500	$ 800		$ 2,259	$ 374	$ -	$ 2,633	RS Means 2012
Electrical - misc.	2	ls	$ 500	$ 500		$ 1,027	$ 1,246	$ -	$ 2,273	RS Means 2012
						$ -	$ -	$ -	$ -	

$ 37,770	Subtotal
$ 9,442	25% Contingency
$ 47,212	**Total**

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-3: Basic Controls

Description: This ECM evaluates re-programming the existing controls to include Night-time Setback

Night-time Setback

EXISTING CONDITIONS			
Heating			
Heating Season Facility Temp	70	F	Th
Weekly Occupied Hours	82	hrs	H
Heating Season Setback Temp	60	F	Sh
Heating Season % Savings per Degree Setback	3%		Ph
Annual Boiler Capacity		Mbtu/yr	
Connected Heating Load Capacity	3,000,000	Btu/hr	Caph
Equivalent Full Load Heating Hours	500	hrs	EFLHh
Heating Equipment Efficiency	80%		AFUEh
Cooling			
Cooling Season Facility Temp	74	F	Tc
Weekly Occupied Hours	82	hrs	H
Cooling Season Setback Temp	79	F	Sc
Cooling Season % Savings per Degree Setback	6%		Pc
Connected Cooling Load Capacity	100	Tons	Capc
Equivalent Full Load Cooling Hours	381	hrs	EFLHc
Cooling Equipment EER	14.0		AFUEc
SAVINGS			
Natural Gas Savings	2,712	Therms[3]	
Cooling Electricity Savings	145,453	kWh	

$0.15	$/kWh Blended
$0.78	$/Therm

Essex County
CHA Project Number: 29142
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Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-3: Basic Controls - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Re-Program BMS	--	ls	$ 7,500	$ 7,500		$ 7,703	$ 9,345	$ -	$ 17,048	RS Means 2012
						$ -	$ -	$ -	$ -	

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

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-4: Kitchen Hood Control

Description: This ECM evaluates the thermal and electrical energy savings associated with the implementation of a variable flow controlled exhaust hood (Fan) and make-up air unit. The Hood controller uses infrared heat sensors to detect the level of smoke produced by the cooking operations and automatically adjsustes the

Item	Value	Units	Formula/Comments	
Fuel Cost	$ 0.78	/ Therm		
Electricity Cost	$ 0.15	/kWh		
FORMULA CONSTANTS				
Conversion	0.746	HP/kW		
Constant	24	hrs/day		
Constant	1.08	(btu/hr)/CFM·F		
Conversion	3,412	btu/kWh		
ELECTRIC FAN SAVINGS				
Facility Type	School			
Quantity of Kitchen Hood Fan Motors	2			Q
Kitchen Hood Fan Motor HP	5.0	HP		HP
Motor Load Factor	0.90		NJ Protocols	LF
Efficiency of Fan Motor(s)	86.5%			FEFF
Kitchen Hood Fan Run Hours	2,080			RH
Fan Motor Power Reduction (From VFD)	0.584			PR
Fan Electricity Savings	9,427	kWh		
HEATING SAVINGS				
Kitchen is Heated?	Y			
Square Footage of Kitchen	1,000	ft^2	Estimated	SF
Code Required Ventilation Rate	0.70	CFM/ft^2	NJ Protocols	CFM/SF
Ventilation Oversize Factor	1.40		NJ Protocols	OF
Flow Reductuion (from VFD/Control)	0.310			FR
Heating Degree Day	2,783		NJ Protocols Table	HDD
Heating System Efficiency	80%		AFUE (%)	HEFF
Heating Savings	274	MMbtu		
Heating Savings	2,739	Therms		
COOLING SAVINGS				
Kitchen is Cooled?	N			
Cooling Degree Day	-		NJ Protocols Table	CDD
Cooling System Efficiency	-		COP	CEFF
Cooling Savings	-	kWh		
TOTAL SAVINGS				
Electricity Savings	9,427	kWh		
Fuel Savings	2,739	Therms		
Cost Savings	$ 3,552			

Savings calculation formulas are taken from NJ Protocols document for Kitchen Hood

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-4: Kitchen Hood Control - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Me-Link Kitchen Hood Control System	1	ea	$ 15,000	$ 2,000		$ 15,405	$ 2,492	$ -	$ 17,897	Vendor Estimation
5.0 HP VFDs (1-exhaust fan)	1	ea	$ 1,485	$ 490		$ 1,525	$ 611	$ -	$ 2,136	RS Means 2012
5.0 HP Motor	1	ea	$ 525	$ 85		$ 539	$ 106	$ -	$ 645	RS Means 2012
Reprogram DDC system	1	ea	$ 100	$ 1,200		$ 103	$ 1,495	$ -	$ 1,598	RS Means 2012
Electrical - misc.	1	ls	$ 200	$ 500		$ 205	$ 623	$ -	$ 828	RS Means 2012
Remote bulb thermostat	2	ea	$ 500	$ 200		$ 1,027	$ 498	$ -	$ 1,525	RS Means 2012
						$ -	$ -	$ -	$ -	

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

$ 24,629	Subtotal
$ 6,157	25% Contingency
$ 30,787	**Total**

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-5: Walk-in Cooler & Freezer EC Motor Retrofits

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

Utility Cost

$0.15 $/kWh Blended

EXISTING CONDITIONS			
Walk-In Freezer(s)			
Existing Freezer Controls?	N		
Quantity of Walk-In Freezers	1		
Nameplate Amps of Freezer Evaporator Fan	4		AmpsEF
Nameplate Volts of Freezer Evaporator Fan	280		VoltsEF
Phase of Evaporator Fan	1		PhaseEF
Power Factor of Evaporator Fan	0.55		PFEF
Operating Hours	8,760	hrs	
Load Reduction	65%		LR
Electricity Savings (Evaporator Fan)	3,157	kWh	kWhEF
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	kWhRH
Total Walk-In Freezer(s) Electricity Savings	4,571	kWh	
Walk-In Cooler(s)			
Existing Cooler Controls?	N		
Quantity of Walk-In Coolers	1		
Nameplate Amps of Cooler Evaporator Fan	4		
Nameplate Volts of Cooler Evaporator Fan	280		
Phase of Evaporator Fan	1		
Power Factor of Evaporator Fan	0.55		
Operating Hours	8,760	hrs	
Load Reduction	65%		
Electricity Savings (Evaporator Fan)	3,157	kWh	
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	
Total Walk-In Cooler(s) Electricity Savings	4,571	kWh	
SAVINGS			
Total Electricity Savings	**9,142**	**kWh**	
Total Cost Savings	**$ 1,380**		
Estimated Cost	$ 41,250		
Simple Payback	29.9	**years**	

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

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-5: Walk-in Cooler & Freezer EC Motor Retrofits - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

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

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

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-6: Install Vending Machine Controls

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

Unit Cost: $0.151 $/kWh blended

Energy Savings Calculations:

	Existing	
Cold Beverage Vending Machine Electric usage	7,008	kWh[1,4,7]
Snack Vending Machine Electric usage	3,504	kWh[2,5,7]
Dual Vending Machine Electric Usage	-	kWh[3,6,7]
Total Vending Machine Electric Usage	10,512	kWh

	Proposed	
Cold Beverage Vending Machine Electric usage	1,103	kWh[8]
Snack Vending Machine Electric usage	630	kWh
Dual Vending Machine Electric Usage	0	kWh
Total Vending Machine Electric Usage	1,733	kWh

Vending Machine Controls Usage Savings	**8,780**	**kWh**
Total cost savings	**$ 1,326**	
Estimated Total Project Cost	**$ 1,120**	[9]
Simple Payback	**1**	**years**

Assumptions

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-6: Install Vending Machine Controls - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Vending Miser	4	EA	$ 200	$ 15	$ -	$ 822	$ 75	$ -	$ 896	Vendor Estimation
						$ -	$ -	$ -	$ -	

$ 896	Subtotal
$ 224	25% Contingency
$ 1,120	**Total**

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-7: Replace showers with low flow

Description; This ECM evaluates the water savings resulting from replacing/ upgrading showers to 1.6 gallon per minute flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$9.63	$ / kGal
Showers in Building	10	
Average Uses / Shower (per day)	1	Based on # of occupants
Average Time of Use	10.0	minutes
Average Flowrate	2.5	gpm

PROPOSED CONDITIONS		
Proposed Showerheads to be Replaced	10	
Proposed Flowrate	1.6	gpm

HEATING SAVINGS		
Fuel Cost	$ 1.00	/Therm
Number of Showers	10	
Hours per Day of Usage	0.5	hrs
Days per Year of Facility Usage	365	days
Average Flowrate	2.5	gpm
Proposed Flowrate	1.6	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	91.25	kGal / year
Proposed Shower Water Use	58.40	kGal / year
Water Savings	32.85	kGal / year
Heating Savings	246	Therms
Cost Savings	$563	/ year

Savings calculation formulas are taken from NJ Protocols document for Showers

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

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

Description: This ECM evaluates the water savings associated with replacing/ upgrading urinals with waterless urinals.

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$9.63	$ / kGal
Urinals in Building to be replaced	25	
Average Flushes / Urinal (per Day)	22	Based on # of occupants
Average Gallons / Flush	1.0	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	25	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	$1,200	RS Means 2012
Proposed Installation Cost of new urinal & valve	$1,000	RS Means 2012
Total cost of new urinals & valves		

SAVINGS		
Current Urinal Water Use	200.75	kGal / year
Proposed Urinal Water Use	25.09	kGal / year
Water Savings	175.66	kGal / year
Cost Savings	$1,692	/ year

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

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$9.63	$ / kGal
Toilets in Building	1	
Average Flushes / Toilet (per Day)	1,100	Based on # of occupants
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	1	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	1,405.25	kGal / year
Proposed Toilet Water Use	513.92	kGal / year
Water Savings	891.33	kGal / year
Cost Savings	$8,584	/ year

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

ECM-8: Replace Plumbing Fixtures - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Waterless Urinal	25	EA	$ 450	$ 500	$ -	$ 11,554	$ 15,575	$ -	$ 27,129	Vendor Estimate
Low-Flow Toilet	25	EA	$ 1,400	$ 1,000	$ -	$ 35,945	$ 31,150	$ -	$ 67,095	Vendor Estimate
Low-Flow Showerhead	10	EA	$ 50	$ 15	$ -	$ 514	$ 187	$ -	$ 700	Vendor Estimate
						$ -	$ -	$ -	$ -	

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

$ 94,924	Subtotal
$ 23,731	25% Contingency
$ 118,655	**Total**

Essex County
CHA Project Number: 29142
Richard J. Codey Arena

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2012.
Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
At a minimum, all recommended measures were used for this calculation. To qualify for P4P incentives, the following P4P requirements must be met:

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

Total Building Area (Square Feet)	104,695
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$566,631	$94,104
Existing Usage (from utility)	3,764,565	121,158
Proposed Savings	296,203	5,999
Existing Total MMBtus	24,964	
Proposed Savings MMBtus	1,611	
% Energy Reduction	**6.5%**	
Proposed Annual Savings	$59,184	

	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	$0.00	$0.00
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.00	$0.00

	Incentives $		
	Elec	Gas	Total
			$5,235
Incentive #1	$0	$0	$0
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$0**

Total Project Cost	$363,708

		Allowable Incentive
% Incentives #1 of Utility Cost*	0.0%	$0
% Incentives #2 of Project Cost**	0.0%	$0
% Incentives #3 of Project Cost**	0.0%	$0
Total Eligible Incentives***	**$0**	
Project Cost w/ Incentives	$363,708	

Project Payback (years)	
w/o Incentives	w/ Incentives
6.1	6.1

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

Energy Audit of Richard J. Codey Arena
CHA Project No. 29142
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
262	Main Lobby Area	24	DC 36 P CF 3	CFT36/3	112	2.7	Breaker	520	1,398	24	DC 36 P CF 3	CFT36/3	112	2.7	Breaker	520	1,398	-	0.0	$ -	$ -	$0		#DIV/0!
262	Main Lobby Area	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	520	349	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	520	349	-	0.0	$ -	$ -	$0		#DIV/0!
262	Main Lobby Area	4	DC 36 P CF 3	CFT36/3	112	0.4	Breaker	520	233	4	DC 36 P CF 3	CFT36/3	112	0.4	Breaker	520	233	-	0.0	$ -	$ -	$0		#DIV/0!
262	Main Lobby Area	18	DC 36 P CF 3	CFT36/3	112	2.0	Breaker	520	1,048	18	DC 36 P CF 3	CFT36/3	112	2.0	Breaker	520	1,048	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	Hallways	6	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	Breaker	2280	1,231	6	4 ft LED Tube	200732x3	45	0.3	Breaker	2,280	616	616	0.3	$ 87.71	$ 1,933.20	$210	22.0	19.6
168	Hallways	24	W 40 C F 2 (MAG)	F42SS	94	2.3	Breaker	2280	5,144	24	W 28 C F 2	F42SSILL	48	1.2	Breaker	2,280	2,627	2,517	1.1	$ 358.62	$ 6,480.00	$0	18.1	18.1
168	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	Breaker	2,280	109	105	0.0	$ 14.94	$ 270.00	$0	18.1	18.1
102	Concession Area	21	O CF 26	CFQ26/1-L	27	0.6	Breaker	520	295	21	O CF 26	CFQ26/1-L	27	0.6	Breaker	520	295	-	0.0	$ -	$ -	$0		#DIV/0!
262	Skate Rental	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	1000	672	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	1,000	672	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	Front Reception Desk	10	W 32 C F 3 (ELE)	F43ILL/2	90	0.9	SW	520	468	10	4 ft LED Tube	200732x3	45	0.5	SW	520	234	234	0.5	$ 61.43	$ 3,222.00	$350	52.4	46.7
262	Large Vestibule	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	2280	1,532	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	2,280	1,532	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	Offices	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728	8	4 ft LED Tube	200732x3	45	0.4	SW	2,400	864	864	0.4	$ 121.56	$ 2,577.60	$280	21.2	18.9
262	Kids' Area	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	520	349	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	520	349	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	Kitchen	13	W 32 C F 3 (ELE)	F43ILL/2	90	1.2	SW	3102.5	3,630	13	4 ft LED Tube	200732x3	45	0.6	SW	3,103	1,815	1,815	0.6	$ 241.52	$ 4,188.60	$455	17.3	15.5
218LED	Kitchen	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.3	SW	3102.5	838	3	4 ft LED Tube	200732x3	45	0.1	SW	3,103	419	419	0.1	$ 55.73	$ 966.60	$105	17.3	15.5
218LED	Offices	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	4 ft LED Tube	200732x3	45	0.1	SW	2,400	216	216	0.1	$ 30.39	$ 644.40	$70	21.2	18.9
263	2014 Skating Rink	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	Breaker	3500	102,060	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	Breaker	3,500	102,060	-	0.0	$ -	$ -	$0		#DIV/0!
216	2014 Skating Rink	4	High Bay MH 750	MH750/1	850	3.4	Breaker	3500	11,900	4	C 54 C F 6	F46GHL	351	1.4	Breaker	3,500	4,914	6,986	2.0	$ 908.94	$ 2,214.00	$400	2.4	2.0
216	2014 Skating Rink	14	High Bay MH 750	MH750/1	850	11.9	Breaker	3500	41,650	14	C 54 C F 6	F46GHL	351	4.9	Breaker	3,500	17,199	24,451	7.0	$ 3,181.28	$ 7,749.00	$1,400	2.4	2.0
218LED	Upper Boxes	4	W 32 C F 3 (ELE)	F43ILL/2	90	0.4	SW	2400	864	4	4 ft LED Tube	200732x3	45	0.2	SW	2,400	432	432	0.2	$ 60.78	$ 1,288.80	$140	21.2	18.9
218LED	202 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	SW	2,800	252	252	0.1	$ 34.24	$ 644.40	$70	18.8	16.8
90	202 Locker Room	1	X CF 7.0	ECF7/1	10	0.0	SW	2800	28	1	X CF 7.0	ECF7/1	10	0.0	SW	2,800	28	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	203 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	SW	2,800	252	252	0.1	$ 34.24	$ 644.40	$70	18.8	16.8
232	203 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336	2	CF 26	CFQ26/1-L	27	0.1	SW	2,800	151	185	0.1	$ 25.11	$ 40.50	$0	1.6	1.6
218LED	201 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	SW	2,800	252	252	0.1	$ 34.24	$ 644.40	$70	18.8	16.8
232	201 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336	2	CF 26	CFQ26/1-L	27	0.1	SW	2,800	151	185	0.1	$ 25.11	$ 40.50	$0	1.6	1.6
228	Mens Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480	8	W60CF1	F81EL	60	0.5	OCC	1,000	480	-	0.0	$ -	$ -	$0		#DIV/0!
228	Ladies Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480	8	W60CF1	F81EL	60	0.5	OCC	1,000	480	-	0.0	$ -	$ -	$0		#DIV/0!
263	1958 Skating Rink	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	Breaker	3500	166,320	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	Breaker	3,500	166,320	-	0.0	$ -	$ -	$0		#DIV/0!
262	1958 Skating Rink	33	DC 36 P CF 3	CFT36/3	112	3.7	Breaker	3500	12,936	33	DC 36 P CF 3	CFT36/3	112	3.7	Breaker	3,500	12,936	-	0.0	$ -	$ -	$0		#DIV/0!
263	1958 Skating Rink	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	Breaker	3500	151,200	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	Breaker	3,500	151,200	-	0.0	$ -	$ -	$0		#DIV/0!
218LED	1958 Skating Rink Entrance Vestibule	12	W 32 C F 3 (ELE)	F43ILL/2	90	1.1	Breaker	2280	2,462	12	4 ft LED Tube	200732x3	45	0.5	Breaker	2,280	1,231	1,231	0.5	$ 175.41	$ 3,866.40	$420	22.0	19.6
218LED	Box Rooms	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728	8	4 ft LED Tube	200732x3	45	0.4	SW	2,400	864	864	0.4	$ 121.56	$ 2,577.60	$280	21.2	18.9
218LED	Locker Room 101	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	SW	2,800	1,386	1,386	0.5	$ 188.34	$ 3,544.20	$385	18.8	16.8
218LED	Locker Room 102	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	SW	2,800	1,386	1,386	0.5	$ 188.34	$ 3,544.20	$385	18.8	16.8
218LED	Locker Room 103	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	SW	2,800	1,386	1,386	0.5	$ 188.34	$ 3,544.20	$385	18.8	16.8
218LED	Locker Room 104	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	SW	2,800	1,386	1,386	0.5	$ 188.34	$ 3,544.20	$385	18.8	16.8
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	SW	1,000	48	46	0.0	$ 8.64	$ 270.00	$0	31.2	31.2
168	Back area	7	W 40 C F 2 (MAG)	F42SS	94	0.7	SW	1000	658	7	W 28 C F 2	F42SSILL	48	0.3	SW	1,000	336	322	0.3	$ 60.50	$ 1,890.00	$0	31.2	31.2
168	Refrigeration Room	8	W 40 C F 2 (MAG)	F42SS	94	0.8	SW	1000	752	8	W 28 C F 2	F42SSILL	48	0.4	SW	1,000	384	368	0.4	$ 69.14	$ 2,160.00	$0	31.2	31.2
168	Back Mens Rm	4	W 40 C F 2 (MAG)	F42SS	94	0.4	OCC	1000	376	4	W 28 C F 2	F42SSILL	48	0.2	OCC	1,000	192	184	0.2	$ 34.57	$ 1,080.00	$0	31.2	31.2
218LED	Staff Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2400	1,080	5	4 ft LED Tube	200732x3	45	0.2	SW	2,400	540	540	0.2	$ 75.98	$ 1,611.00	$175	21.2	18.9
168	Staff Room	2	W 40 C F 2 (MAG)	F42SS	94	0.2	SW	2400	451	2	W 28 C F 2	F42SSILL	48	0.1	SW	2,400	230	221	0.1	$ 31.07	$ 540.00	$0	17.4	17.4
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	Breaker	2,280	109	105	0.0	$ 14.94	$ 270.00	$0	18.1	18.1
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	Breaker	2,280	109	105	0.0	$ 14.94	$ 270.00	$0	18.1	18.1
168	Back area Storage	5	W 40 C F 2 (MAG)	F42SS	94	0.5	SW	1000	470	5	W 28 C F 2	F42SSILL	48	0.2	SW	1,000	240	230	0.2	$ 43.21	$ 1,350.00	$0	31.2	31.2
218LED	Ladies Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	OCC	1000	450	5	4 ft LED Tube	200732x3	45	0.2	OCC	1,000	225	225	0.2	$ 42.27	$ 1,611.00	$175	38.1	34.0
218LED	Ladies Locker	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2800	1,260	5	4 ft LED Tube	200732x3	45	0.2	SW	2,800	630	630	0.2	$ 85.61	$ 1,611.00	$175	18.8	16.8
185LED	Rear Mechanical Room	24	T 40 R F 4 (ELE)	F44SE	172	4.1	SW	1000	4,128	24	T 74 R LED	RTLED50	50	1.2	SW	1,000	1,200	2,928	2.9	$ 550.11	$ 5,670.00	$1,200	10.3	8.1
261LED	Exterior Lights	8	PAR 38 SP	H100/1	100	0.8	Breaker	4368	3,494	8	EVO35/10	EVO35/10	39	0.3	Breaker	4,368	1,363	2,132	0.5	$ 267.55	$ 3,510.00	$280	13.1	12.1
69	Exterior Lights	16	175 MH GROUND	MH175/1	215	3.4	Breaker	4368	15,026	16	175 MH GROUND	MH175/1	215	3.4	Breaker	4,368	15,026	-	0.0	$ -	$ -	$0		#DIV/0!
69	Exterior Lights	4	175 MH GROUND	MH175/1	215	0.9	Breaker	4368	3,756	4	175 MH GROUND	MH175/1	215	0.9	Breaker	4,368	3,756	-	0.0	$ -	$ -	$0		#DIV/0!
227LED	Exterior Lights	2	70 W MH Wall Pack	MH70/1	95	0.2	Breaker	4368	830	2	FXLED18	FXLED18/1	18	0.0	Breaker	4,368	157	673	0.2	$ 84.43	$ 846.45	$200	10.0	7.7
227LED	Exterior Lights	3	70 W MH Wall Pack	MH70/1	95	0.3	Breaker	4368	1,245	3	FXLED18	FXLED18/1	18	0.1	Breaker	4,368	236	1,009	0.2	$ 126.65	$ 1,269.68	$300	10.0	7.7
227LED	Exterior Lights	12	70 W MH Wall Pack	MH70/1	95	1.1	Breaker	4368	4,980	12	FXLED18	FXLED18/1	18	0.2	Breaker	4,368	943	4,036	0.9	$ 506.59	$ 5,078.70	$1,200	10.0	7.7
145LED	Exterior Lights	22	HPS 150 POLE	HPS150/1	188	4.1	Breaker	4368	18,066	22	ALED52	ALED52	60	1.3	Breaker	4,368	5,766	12,300	2.8	$ 1,543.89	$ 14,612.40	$3,850	9.5	7.0
	Total	**557**				**181.0**			**583,145**	**557**			**7,353**	**155.6**			**509,351**	**73,794**	**25.4**	**$9,947**	**$99,709**	**$13,415**		
																	Demand Savings			**25.4**	**$2,051**			
																	kWh Savings			**73,794**	**$7,896**			
																	Total savings				**$9,947**		**10.0**	**8.7**

Energy Audit of Richard J. Codey Arena
CHA Project No. 29142
ECM-L2 Install Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
262	Main Lobby Area	24	DC 36 P CF 3	CFT36/3	112	2.7	Breaker	520	1,397.8	24	DC 36 P CF 3	CFT36/3	112	2.7	None	520	1,397.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	Main Lobby Area	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	520	349.4	6	DC 36 P CF 3	CFT36/3	112	0.7	None	520	349.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	Main Lobby Area	4	DC 36 P CF 3	CFT36/3	112	0.4	Breaker	520	233.0	4	DC 36 P CF 3	CFT36/3	112	0.4	None	520	233.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	Main Lobby Area	18	DC 36 P CF 3	CFT36/3	112	2.0	Breaker	520	1,048.3	18	DC 36 P CF 3	CFT36/3	112	2.0	None	520	1,048.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Hallways	6	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	Breaker	2280	1,231.2	6	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	None	2280	1,231.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Hallways	24	W 40 C F 2 (MAG)	F42SS	94	2.3	Breaker	2280	5,143.7	24	W 40 C F 2 (MAG)	F42SS	94	2.3	None	2280	5,143.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214.3	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	2280	214.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
102	Concession Area	21	O CF 26	CFQ26/1-L	27	0.6	Breaker	520	294.8	21	O CF 26	CFQ26/1-L	27	0.6	None	520	294.8	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	Skate Rental	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	1000	672.0	6	DC 36 P CF 3	CFT36/3	112	0.7	None	1000	672.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Front Reception Desk	10	W 32 C F 3 (ELE)	F43ILL/2	90	0.9	SW	520	468.0	10	W 32 C F 3 (ELE)	F43ILL/2	90	0.9	None	520	468.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	Large Vestibule	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	2280	1,532.2	6	DC 36 P CF 3	CFT36/3	112	0.7	None	2280	1,532.2	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Offices	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728.0	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	OCC	1800	1,296.0	432.0	0.0	$46.22	$128.25	$20.00	2.8	2.3
262	Kids' Area	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	520	349.4	6	DC 36 P CF 3	CFT36/3	112	0.7	None	520	349.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Kitchen	13	W 32 C F 3 (ELE)	F43ILL/2	90	1.2	SW	3102.5	3,629.9	13	W 32 C F 3 (ELE)	F43ILL/2	90	1.2	None	3102.5	3,629.9	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Kitchen	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.3	SW	3102.5	837.7	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.3	None	3102.5	837.7	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Offices	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432.0	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	OCC	1800	324.0	108.0	0.0	$11.56	$128.25	$20.00	11.1	9.4
263	2014 Skating Rink	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	Breaker	3500	102,060.0	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	None	3500	102,060.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
216	2014 Skating Rink	4	High Bay MH 750	MH750/1	850	3.4	Breaker	3500	11,900.0	4	High Bay MH 750	MH750/1	850	3.4	None	3500	11,900.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
216	2014 Skating Rink	14	High Bay MH 750	MH750/1	850	11.9	Breaker	3500	41,650.0	14	High Bay MH 750	MH750/1	850	11.9	None	3500	41,650.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Upper Boxes	4	W 32 C F 3 (ELE)	F43ILL/2	90	0.4	SW	2400	864.0	4	W 32 C F 3 (ELE)	F43ILL/2	90	0.4	OCC	1800	648.0	216.0	0.0	$23.11	$128.25	$20.00	5.5	4.7
218LED	202 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504.0	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	OCC	2100	378.0	126.0	0.0	$13.48	$128.25	$20.00	9.5	8.0
90	202 Locker Room	1	X CF 7.0	ECF7/1	10	0.0	SW	2800	28.0	1	X CF 7.0	ECF7/1	10	0.0	OCC	2100	21.0	7.0	0.0	$0.75	$128.25	$20.00	171.2	144.5
218LED	203 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504.0	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	OCC	2100	378.0	126.0	0.0	$13.48	$128.25	$20.00	9.5	8.0
232	203 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336.0	2	R 60 C I 1	I60/1	60	0.1	OCC	2100	252.0	84.0	0.0	$8.99	$128.25	$20.00	14.3	12.0
218LED	201 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504.0	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	OCC	2100	378.0	126.0	0.0	$13.48	$128.25	$20.00	9.5	8.0
232	201 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336.0	2	R 60 C I 1	I60/1	60	0.1	OCC	2100	252.0	84.0	0.0	$8.99	$128.25	$20.00	14.3	12.0
228	Mens Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480.0	8	W60CF1	F81EL	60	0.5	None	1000	480.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
228	Ladies Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480.0	8	W60CF1	F81EL	60	0.5	None	1000	480.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
263	1958 Skating Rink	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	Breaker	3500	166,320.0	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	None	3500	166,320.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
262	1958 Skating Rink	33	DC 36 P CF 3	CFT36/3	112	3.7	Breaker	3500	12,936.0	33	DC 36 P CF 3	CFT36/3	112	3.7	None	3500	12,936.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
263	1958 Skating Rink	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	Breaker	3500	151,200.0	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	None	3500	151,200.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	1958 Skating Rink Entrance Vestibule	12	W 32 C F 3 (ELE)	F43ILL/2	90	1.1	Breaker	2280	2,462.4	12	W 32 C F 3 (ELE)	F43ILL/2	90	1.1	None	2280	2,462.4	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Box Rooms	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728.0	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	OCC	1800	1,296.0	432.0	0.0	$46.22	$128.25	$20.00	2.8	2.3
218LED	Locker Room 101	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772.0	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	OCC	2100	2,079.0	693.0	0.0	$74.15	$128.25	$20.00	1.7	1.5
218LED	Locker Room 102	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772.0	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	OCC	2100	2,079.0	693.0	0.0	$74.15	$128.25	$20.00	1.7	1.5
218LED	Locker Room 103	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772.0	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	OCC	2100	2,079.0	693.0	0.0	$74.15	$128.25	$20.00	1.7	1.5
218LED	Locker Room 104	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772.0	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	OCC	2100	2,079.0	693.0	0.0	$74.15	$128.25	$20.00	1.7	1.5
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94.0	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	1000	94.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Back area	7	W 40 C F 2 (MAG)	F42SS	94	0.7	SW	1000	658.0	7	W 40 C F 2 (MAG)	F42SS	94	0.7	None	1000	658.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Refrigeration Room	8	W 40 C F 2 (MAG)	F42SS	94	0.8	SW	1000	752.0	8	W 40 C F 2 (MAG)	F42SS	94	0.8	None	1000	752.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Back Mens Rm	4	W 40 C F 2 (MAG)	F42SS	94	0.4	OCC	1000	376.0	4	W 40 C F 2 (MAG)	F42SS	94	0.4	None	1000	376.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Staff Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2400	1,080.0	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	OCC	1800	810.0	270.0	0.0	$28.89	$128.25	$20.00	4.4	3.7
168	Staff Room	2	W 40 C F 2 (MAG)	F42SS	94	0.2	SW	2400	451.2	2	W 40 C F 2 (MAG)	F42SS	94	0.2	OCC	1800	338.4	112.8	0.0	$12.07	$128.25	$20.00	10.6	9.0
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214.3	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	2280	214.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214.3	1	W 40 C F 2 (MAG)	F42SS	94	0.1	None	2280	214.3	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
168	Back area Storage	5	W 40 C F 2 (MAG)	F42SS	94	0.5	SW	1000	470.0	5	W 40 C F 2 (MAG)	F42SS	94	0.5	None	1000	470.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Ladies Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	OCC	1000	450.0	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	None	1000	450.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
218LED	Ladies Locker	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2800	1,260.0	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	None	2800	1,260.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
185LED	Rear Mechanical Room	24	T 40 R F 4 (ELE)	F44SE	172	4.1	SW	1000	4,128.0	24	T 40 R F 4 (ELE)	F44SE	172	4.1	None	1000	4,128.0	0.0	0.0	$0.00	$0.00	$0.00		#DIV/0!
261LED	Exterior Lights	8	PAR 38 SP	H100/1	100	0.8	Breaker	4368	3,494.4	8	PAR 38 SP	H100/1	100	0.8	PHC	3500	2,800.0	694.4	0.0	$74.30	$0.00	$0.00	0.0	0.0
69	Exterior Lights	16	175 MH GROUND	MH175/1	215	3.4	Breaker	4368	15,025.9	16	175 MH GROUND	MH175/1	215	3.4	PHC	3500	12,040.0	2,985.9	0.0	$319.49	$0.00	$0.00	0.0	0.0
69	Exterior Lights	4	175 MH GROUND	MH175/1	215	0.9	Breaker	4368	3,756.5	4	175 MH GROUND	MH175/1	215	0.9	PHC	3500	3,010.0	746.5	0.0	$79.87	$0.00	$0.00	0.0	0.0
227LED	Exterior Lights	2	70 W MH Wall Pack	MH70/1	95	0.2	Breaker	4368	829.9	2	70 W MH Wall Pack	MH70/1	95	0.2	PHC	3500	665.0	164.9	0.0	$17.65	$0.00	$0.00	0.0	0.0
227LED	Exterior Lights	3	70 W MH Wall Pack	MH70/1	95	0.3	Breaker	4368	1,244.9	3	70 W MH Wall Pack	MH70/1	95	0.3	PHC	3500	997.5	247.4	0.0	$26.47	$0.00	$0.00	0.0	0.0
227LED	Exterior Lights	12	70 W MH Wall Pack	MH70/1	95	1.1	Breaker	4368	4,979.5	12	70 W MH Wall Pack	MH70/1	95	1.1	PHC	3500	3,990.0	989.5	0.0	$105.88	$0.00	$0.00	0.0	0.0
145LED	Exterior Lights	22	HPS 150 POLE	HPS150/1	188	4.1	Breaker	4368	18,066.0	22	HPS 150 POLE	HPS150/1	188	4.1	PHC	3500	14,476.0	3,590.0	0.0	$384.14	$0.00	$0.00	0.0	0.0
	Total	**557**				**181.0**			**583145.1**	**557.0**				**181.0**			**568830.7**	**14314.5**	**0.0**	**1531.6**	**2052.0**	**320.0**		
																	Demand Savings			**0.0**	**$0**			
																	kWh Savings			**14,314**	**$1,532**			
																	Total Savings				**$1,532**		**1.3**	**1.1**

Energy Audit of Richard J. Codey Arena
CHA Project No. 29142
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	**Unique description of the location - Room number/Room name: Floor number (if applicable)**	**No. of fixtures before the retrofit**	**Lighting Fixture Code**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Fixt No.)**	**Pre-inst. control device**	**Estimated daily hours for the usage group**	**(kW/space) * (Annual Hours)**	**No. of fixtures after the retrofit**	**Lighting Fixture Code**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Number of Fixtures)**	**Retrofit control device**	**Estimated annual hours for the usage group**	**(kW/space) * (Annual Hours)**	**(Original Annual kWh) - (Retrofit Annual kWh)**	**(Original Annual kW) - (Retrofit Annual kW)**	**(kWh Saved) * ($/kWh)**	**Cost for renovations to lighting system**	**Prescriptive Lighting Measures**	**Length of time for renovations cost to be recovered**	**Length of time for renovations cost to be recovered**
262	Main Lobby Area	24	DC 36 P CF 3	CFT36/3	112	2.7	Breaker	520	1,398	24	DC 36 P CF 3	CFT36/3	112	2.7	None	520	1,398	-	0.0	$ -	$ -	$ -		
262	Main Lobby Area	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	520	349	6	DC 36 P CF 3	CFT36/3	112	0.7	None	520	349	-	0.0	$ -	$ -	$ -		
262	Main Lobby Area	4	DC 36 P CF 3	CFT36/3	112	0.4	Breaker	520	233	4	DC 36 P CF 3	CFT36/3	112	0.4	None	520	233	-	0.0	$ -	$ -	$ -		
262	Main Lobby Area	18	DC 36 P CF 3	CFT36/3	112	2.0	Breaker	520	1,048	18	DC 36 P CF 3	CFT36/3	112	2.0	None	520	1,048	-	0.0	$ -	$ -	$ -		
218LED	Hallways	6	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	Breaker	2280	1,231	6	4 ft LED Tube	200732x3	45	0.3	None	2,280	616	616	0.3	$ 87.71	$ 1,933.20	$ 210	22.0	19.6
168	Hallways	24	W 40 C F 2 (MAG)	F42SS	94	2.3	Breaker	2280	5,144	24	W 28 C F 2	F42SSILL	48	1.2	None	2,280	2,627	2,517	1.1	$ 358.62	$ 6,480.00	$ -	18.1	18.1
168	Hallways	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	None	2,280	109	105	0.0	$ 14.94	$ 270.00	$ -	18.1	18.1
102	Concession Area	21	O CF 26	CFQ26/1-L	27	0.6	Breaker	520	295	21	O CF 26	CFQ26/1-L	27	0.6	None	520	295	-	0.0	$ -	$ -	$ -		
262	Skate Rental	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	1000	672	6	DC 36 P CF 3	CFT36/3	112	0.7	None	1,000	672	-	0.0	$ -	$ -	$ -		
218LED	Front Reception Desk	10	W 32 C F 3 (ELE)	F43ILL/2	90	0.9	SW	520	468	10	4 ft LED Tube	200732x3	45	0.5	None	520	234	234	0.5	$ 61.43	$ 3,222.00	$ 350	52.4	46.7
262	Large Vestibule	6	DC 36 P CF 3	CFT36/3	112	0.7	Breaker	2280	1,532	6	DC 36 P CF 3	CFT36/3	112	0.7	None	2,280	1,532	-	0.0	$ -	$ -	$ -		
218LED	Offices	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728	8	4 ft LED Tube	200732x3	45	0.4	OCC	1,800	648	1,080	0.4	$ 144.68	$ 2,705.85	$ 300	18.7	16.6
262	Kids' Area	6	DC 36 P CF 3	CFT36/3	112	0.7	SW	520	349	6	DC 36 P CF 3	CFT36/3	112	0.7	None	520	349	-	0.0	$ -	$ -	$ -		
218LED	Kitchen	13	W 32 C F 3 (ELE)	F43ILL/2	90	1.2	SW	3102.5	3,630	13	4 ft LED Tube	200732x3	45	0.6	None	3,103	1,815	1,815	0.6	$ 241.52	$ 4,188.60	$ 455	17.3	15.5
218LED	Kitchen	3	W 32 C F 3 (ELE)	F43ILL/2	90	0.3	SW	3102.5	838	3	4 ft LED Tube	200732x3	45	0.1	None	3,103	419	419	0.1	$ 55.73	$ 966.60	$ 105	17.3	15.5
218LED	Offices	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2400	432	2	4 ft LED Tube	200732x3	45	0.1	OCC	1,800	162	270	0.1	$ 36.17	$ 772.65	$ 90	21.4	18.9
263	2014 Skating Rink	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	Breaker	3500	102,060	27	Pool MH1000 Fixt	MH1000/1	1080	29.2	None	3,500	102,060	-	0.0	$ -	$ -	$ -		
216	2014 Skating Rink	4	High Bay MH 750	MH750/1	850	3.4	Breaker	3500	11,900	4	C 54 C F 6	F46GHL	351	1.4	None	3,500	4,914	6,986	2.0	$ 908.94	$ 2,214.00	$ 400	2.4	2.0
216	2014 Skating Rink	14	High Bay MH 750	MH750/1	850	11.9	Breaker	3500	41,650	14	C 54 C F 6	F46GHL	351	4.9	None	3,500	17,199	24,451	7.0	$ 3,181.28	$ 7,749.00	$ 1,400	2.4	2.0
218LED	Upper Boxes	4	W 32 C F 3 (ELE)	F43ILL/2	90	0.4	SW	2400	864	4	4 ft LED Tube	200732x3	45	0.2	OCC	1,800	324	540	0.2	$ 72.34	$ 1,417.05	$ 160	19.6	17.4
218LED	202 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	OCC	2,100	189	315	0.1	$ 40.98	$ 772.65	$ 90	18.9	16.7
90	202 Locker Room	1	X CF 7.0	ECF7/1	10	0.0	SW	2800	28	1	X CF 7.0	ECF7/1	10	0.0	OCC	2,100	21	7	0.0	$ 0.75	$ 128.25	$ 20	171.2	144.5
218LED	203 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	OCC	2,100	189	315	0.1	$ 40.98	$ 772.65	$ 90	18.9	16.7
232	203 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336	2	CF 26	CFQ26/1-L	27	0.1	OCC	2,100	113	223	0.1	$ 29.16	$ 168.75	$ 20	5.8	5.1
218LED	201 Locker Room	2	W 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2800	504	2	4 ft LED Tube	200732x3	45	0.1	OCC	2,100	189	315	0.1	$ 40.98	$ 772.65	$ 90	18.9	16.7
232	201 Locker Room	2	R 60 C I 1	I60/1	60	0.1	SW	2800	336	2	CF 26	CFQ26/1-L	27	0.1	OCC	2,100	113	223	0.1	$ 29.16	$ 168.75	$ 20	5.8	5.1
228	Mens Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480	8	W60CF1	F81EL	60	0.5	None	1,000	480	-	0.0	$ -	$ -	$ -		
228	Ladies Room	8	W60CF1	F81EL	60	0.5	OCC	1000	480	8	W60CF1	F81EL	60	0.5	None	1,000	480	-	0.0	$ -	$ -	$ -		
263	1958 Skating Rink	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	Breaker	3500	166,320	44	Pool MH1000 Fixt	MH1000/1	1080	47.5	None	3,500	166,320	-	0.0	$ -	$ -	$ -		
262	1958 Skating Rink	33	DC 36 P CF 3	CFT36/3	112	3.7	Breaker	3500	12,936	33	DC 36 P CF 3	CFT36/3	112	3.7	None	3,500	12,936	-	0.0	$ -	$ -	$ -		
263	1958 Skating Rink	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	Breaker	3500	151,200	40	Pool MH1000 Fixt	MH1000/1	1080	43.2	None	3,500	151,200	-	0.0	$ -	$ -	$ -		
218LED	1958 Skating Rink Entrance Vestibule	12	W 32 C F 3 (ELE)	F43ILL/2	90	1.1	Breaker	2280	2,462	12	4 ft LED Tube	200732x3	45	0.5	None	2,280	1,231	1,231	0.5	$ 175.41	$ 3,866.40	$ 420	22.0	19.6
218LED	Box Rooms	8	W 32 C F 3 (ELE)	F43ILL/2	90	0.7	SW	2400	1,728	8	4 ft LED Tube	200732x3	45	0.4	OCC	1,800	648	1,080	0.4	$ 144.68	$ 2,705.85	$ 300	18.7	16.6
218LED	Locker Room 101	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	OCC	2,100	1,040	1,733	0.5	$ 225.41	$ 3,672.45	$ 405	16.3	14.5
218LED	Locker Room 102	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	OCC	2,100	1,040	1,733	0.5	$ 225.41	$ 3,672.45	$ 405	16.3	14.5
218LED	Locker Room 103	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	OCC	2,100	1,040	1,733	0.5	$ 225.41	$ 3,672.45	$ 405	16.3	14.5
218LED	Locker Room 104	11	W 32 C F 3 (ELE)	F43ILL/2	90	1.0	SW	2800	2,772	11	4 ft LED Tube	200732x3	45	0.5	OCC	2,100	1,040	1,733	0.5	$ 225.41	$ 3,672.45	$ 405	16.3	14.5
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Storage Rm	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Miscellaneous locked room	1	W 40 C F 2 (MAG)	F42SS	94	0.1	SW	1000	94	1	W 28 C F 2	F42SSILL	48	0.0	None	1,000	48	46	0.0	$ 8.64	$ 270.00	$ -	31.2	31.2
168	Back area	7	W 40 C F 2 (MAG)	F42SS	94	0.7	SW	1000	658	7	W 28 C F 2	F42SSILL	48	0.3	None	1,000	336	322	0.3	$ 60.50	$ 1,890.00	$ -	31.2	31.2
168	Refrigeration Room	8	W 40 C F 2 (MAG)	F42SS	94	0.8	SW	1000	752	8	W 28 C F 2	F42SSILL	48	0.4	None	1,000	384	368	0.4	$ 69.14	$ 2,160.00	$ -	31.2	31.2
168	Back Mens Rm	4	W 40 C F 2 (MAG)	F42SS	94	0.4	OCC	1000	376	4	W 28 C F 2	F42SSILL	48	0.2	None	1,000	192	184	0.2	$ 34.57	$ 1,080.00	$ -	31.2	31.2
218LED	Staff Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2400	1,080	5	4 ft LED Tube	200732x3	45	0.2	OCC	1,800	405	675	0.2	$ 90.42	$ 1,739.25	$ 195	19.2	17.1
168	Staff Room	2	W 40 C F 2 (MAG)	F42SS	94	0.2	SW	2400	451	2	W 28 C F 2	F42SSILL	48	0.1	OCC	1,800	173	278	0.1	$ 37.23	$ 668.25	$ 20	17.9	17.4
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	None	2,280	109	105	0.0	$ 14.94	$ 270.00	$ -	18.1	18.1
168	Rear Vestibule	1	W 40 C F 2 (MAG)	F42SS	94	0.1	Breaker	2280	214	1	W 28 C F 2	F42SSILL	48	0.0	None	2,280	109	105	0.0	$ 14.94	$ 270.00	$ -	18.1	18.1
168	Back area Storage	5	W 40 C F 2 (MAG)	F42SS	94	0.5	SW	1000	470	5	W 28 C F 2	F42SSILL	48	0.2	None	1,000	240	230	0.2	$ 43.21	$ 1,350.00	$ -	31.2	31.2
218LED	Ladies Room	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	OCC	1000	450	5	4 ft LED Tube	200732x3	45	0.2	None	1,000	225	225	0.2	$ 42.27	$ 1,611.00	$ 175	38.1	34.0
218LED	Ladies Locker	5	W 32 C F 3 (ELE)	F43ILL/2	90	0.5	SW	2800	1,260	5	4 ft LED Tube	200732x3	45	0.2	None	2,800	630	630	0.2	$ 85.61	$ 1,611.00	$ 175	18.8	16.8
185LED	Rear Mechanical Room	24	T 40 R F 4 (ELE)	F44SE	172	4.1	SW	1000	4,128	24	T 74 R LED	RTLED50	50	1.2	None	1,000	1,200	2,928	2.9	$ 550.11	$ 5,670.00	$ 1,200	10.3	8.1
261LED	Exterior Lights	8	PAR 38 SP	H100/1	100	0.8	Breaker	4368	3,494	8	EVO35/10	EVO35/10	39	0.3	PHC	3,500	1,092	2,402	0.5	$ 296.53	$ 3,510.00	$ 280	11.8	10.9
69	Exterior Lights	16	175 MH GROUND	MH175/1	215	3.4	Breaker	4368	15,026	16	175 MH GROUND	MH175/1	215	3.4	PHC	3,500	12,040	2,986	0.0	$ 319.49	$ -	$ -	0.0	0.0
69	Exterior Lights	4	175 MH GROUND	MH175/1	215	0.9	Breaker	4368	3,756	4	175 MH GROUND	MH175/1	215	0.9	PHC	3,500	3,010	746	0.0	$ 79.87	$ -	$ -	0.0	0.0
227LED	Exterior Lights	2	70 W MH Wall Pack	MH70/1	95	0.2	Breaker	4368	830	2	FXLED18	FXLED18/1	18	0.0	PHC	3,500	126	704	0.2	$ 87.77	$ 846.45	$ 200	9.6	7.4
227LED	Exterior Lights	3	70 W MH Wall Pack	MH70/1	95	0.3	Breaker	4368	1,245	3	FXLED18	FXLED18/1	18	0.1	PHC	3,500	189	1,056	0.2	$ 131.66	$ 1,269.68	$ 300	9.6	7.4
227LED	Exterior Lights	12	70 W MH Wall Pack	MH70/1	95	1.1	Breaker	4368	4,980	12	FXLED18	FXLED18/1	18	0.2	PHC	3,500	756	4,224	0.9	$ 526.65	$ 5,078.70	$ 1,200	9.6	7.4
145LED	Exterior Lights	22	HPS 150 POLE	HPS150/1	188	4.1	Breaker	4368	18,066	22	ALED52	ALED52	60	1.3	PHC	3,500	4,620	13,446	2.8	$ 1,666.49	$ 14,612.40	$ 3,850	8.8	6.5
S	**Total**	**557**				**181.0**			**583,145**	**557**				**155.6**			**501,492**		**25.4**	**10,788**	**101,761**	**$13,735**		
S																	**Demand Savings**			**25.4**	**$2,051**			
S																	**kWh Savings**			**81,653**	**$8,737**			
S																	**Total Savings**				**$10,788**		**9.4**	**8.2**

APPENDIX D

New Jersey Board of Public Utilities Incentives

i. **Smart Start**

ii. **Direct Install**

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

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

I. SMART START

NJ SmartStart Buildings

Program Overview

With New Jersey SmartStart Buildings ...

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

Special Notice

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

Visit the Sandy web page for details and important links.

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

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

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

Getting Started

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

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

Support for Custom Energy-Efficiency Measures

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

Incentives for Qualifying Equipment and Projects

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

Find out more about equipment incentives

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

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COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

Home » Commercial & Industrial » Programs » NJ SmartStart Buildings

Equipment Incentives

Special Notice

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

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

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

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

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

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

Electric Chillers

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

Gas Cooling

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

PAST PROGRAMS

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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 Measur
Gas furnaces ($300-$400 per unit)
Gas infrared heaters - indoor only ($300 - $500 per unit)
Boiler economizing controls ($1,200 - $2,700 per unit)

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

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

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

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

Prescriptive Lighting

New Linear Fluorescent

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

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

Lighting Controls

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

Refrigeration

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

Food Service Equipment

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

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

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

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

Other Equipment Incentives*

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

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

II. DIRECT INSTALL

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

PARTICIPATION STEPS

PARTICIPATING CONTRACTORS

SUSTAINABLE JERSEY

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

Direct Install

NEW JERSEY'S CLEAN ENERGY PROGRAM
DIRECT Install

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

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

ELIGIBILITY

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

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

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

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

III. PAY FOR PERFORMANCE (P4P)

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

EXISTING BUILDINGS

PARTICIPATION STEPS

APPLICATIONS AND FORMS

APPROVED PARTNERS

NEW CONSTRUCTION

FAQS

BECOME A PARTNER

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

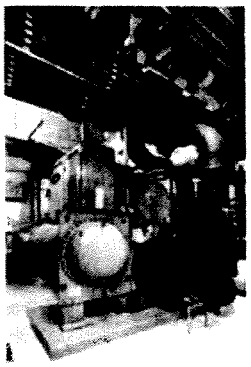
ENERGY BENCHMARKING

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

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



Eligibility

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

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

ENERGY STAR Portfolio Manager

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

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

Incentives

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

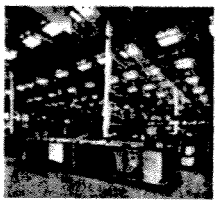
TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

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

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



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

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

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

Steps to Participation

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

Home | Residential | Commercial & Industrial | Renewable Energy
About Us | Press Room | Library | FAQs | Calendar | Newsletters | Contact Us | Site

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

BPU New Jersey Board of Public Utilities

PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2014 – June 30, 2015

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

Instructions

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

Additional Comments:

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

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

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

Visit our website: NJCleanEnergy.com/P4P

*Incentives/Requirements subject to change.

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

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 Charge 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 mastered-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 IMPLICITY. 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)

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND FUEL CELLS

LOCAL GOVERNMENT ENERGY AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

Energy Savings Improvement Program

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

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

Local Government
School Districts (K-12)

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

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

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

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

FIRST STEP – ENERGY AUDIT

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

ENERGY REDUCTION PLANS

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

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

ESIP PROGRAM

Final version 42413

BPU RULES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX E

Photovoltaic Analysis
Solar Domestic Hot Water Analysis
Combined Heat and Power Generation

Essex County Department of Parks
Richard J. Codey Arena

Cost of Electricity	$0.151	/kWh
Electricity Usage	3,764,565	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$480,000	**120.0**	**158,911**	**0**	**$23,919**	**0**	**$23,919**	**$0**	**$27,015**	**20.1**	**9.4**

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

Area Output*
2,406 m2
25,897 ft2

Perimeter Output*
207 m
681 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
16,226 ft2

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

8 watt/ft2
129,808 DC watts
120 kW Enter into PV Watts

PV Watts Inputs***

Array Tilt Angle	20	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	180	Enter into PV Watts (default)
Zip Code	07052	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output
158,911 annual kWh calculated in PV Watts program

% Offset Calc

Usage	3,764,565	(from utilities)
PV Generation	158,911	(generated using PV Watts)
% offset	4%	

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

PVWatts * * * * *

AC Energy & Cost Savings

* * * * *

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Saving Text from a Browser

Station Identification

Cell ID:	0268370
State:	New Jersey
Latitude:	40.9 ° N
Longitude:	74.2 ° W

PV System Specifications

DC Rating:	120.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	99.6 kW
Array Type:	Fixed Tilt
Array Tilt:	40.9 °
Array Azimuth:	180.0 °

Energy Specifications

Cost of Electricity:	15.1 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.18	10200	1540.20
2	3.90	11220	1694.22
3	5.05	15376	2321.78
4	5.16	14658	2213.36
5	5.47	15747	2377.80
6	5.70	15444	2332.04
7	5.36	14690	2218.19
8	5.32	14697	2219.25
9	5.16	14167	2139.22
10	4.60	13557	2047.11
11	3.32	9715	1466.96
12	3.00	9439	1425.29
Year	4.60	158911	23995.56

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

(Output Results as Text - Temporarily Unavailable)

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster

Disclaimer and copyright notice.

RReDC home page (*http://rredc.nrel.gov*)

MANUFACTURER'S REPRESENTATIVE

ROBCO SPECIALTIES, INC.

P.0. BOX 6387

ALBANY, NY 12206

Phone 518-463-6607 Fax 518-463-4687

Budget

Date 1/15/2015

Expiration 4/30/2015

Manufacturer Kingspan

Robco Representative Anthony Abbate

Engineering Firm CHA

Architecture Firm

Job Site Richard J Codey Arena

Purchasing Company

Company Rep

Phone

Fax

Product Number	Quantity	Description	Price Each	Total Net
KSK0161	15	HP-450, 30 Tube Manifold	$ 402.00	$ 6,030.00
KST0054	45	(10) HP-450 Evacuated Tubes	$ 605.00	$ 27,225.00
KSK0027	5	Manifold Piping Connection Kit	$ 62.00	$ 310.00
C0599	15	Flat Roof Manifold A-Frame	$ 295.00	$ 4,425.00
KSK0172	10	HP-450 Manifold Interconnection Kit	$ 28.00	$ 280.00
C0560	6	5 Gallon Glycol	$ 86.00	$ 516.00
KSP0520	5	Balance Valve, Flow Meter	$ 125.00	$ 625.00
KEK0074	1	Pyronometer	$ 80.00	$ 80.00
KSP0461	2	Sensor Well 1/2" NPT	$ 41.00	$ 82.00
KEK0017	1	Lightning Protection Box	$ 14.00	$ 14.00
KEK0073	1	Outdoor Temperature Sensor	$ 46.00	$ 46.00
KSP0616	1	Air Vent Valve	$ 36.00	$ 36.00
KSP0621	1	Automatic Air Vent	$ 42.00	$ 42.00
KSP0499	1	Pump and Control Skid w/ Heat Exchangers	$16,450.00	$ 16,450.00
KSP0510	1	Electric 3 Way Control Valve, 1.5" NPT	$ 1,300.00	$ 1,300.00
KSP0408	1	25 Gallon Expansion Tank	$ 900.00	$ 900.00
L600ATRS	1	750 Gallon Aquaplex Lining Free Storage Tanks, 25 Year Warranty	$21,000.00	$ 21,000.00

Net Total $ 79,361.00

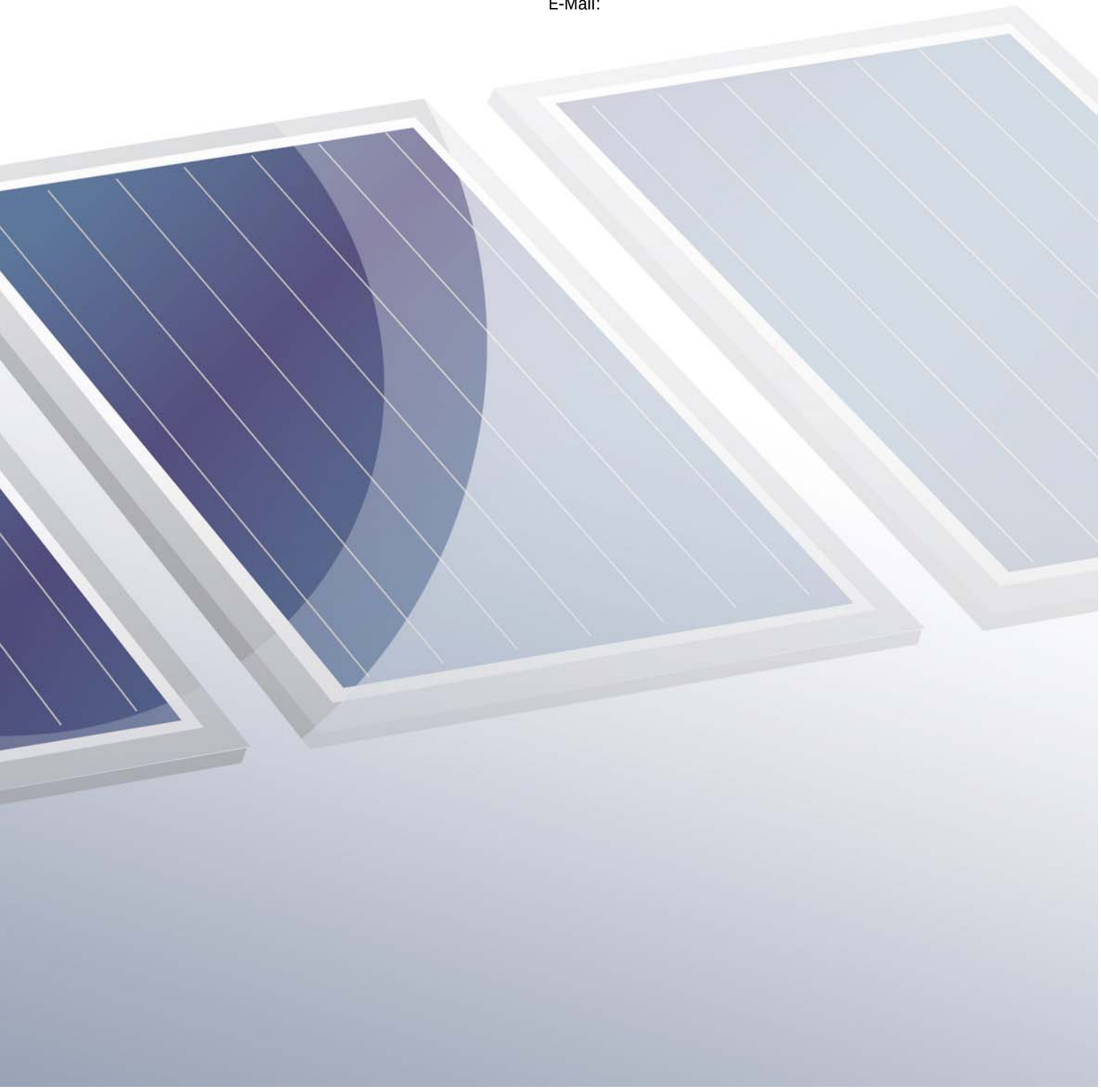
Payment Terms	net 30
Shipping Terms	Pre Pay and Add, FOB Factory

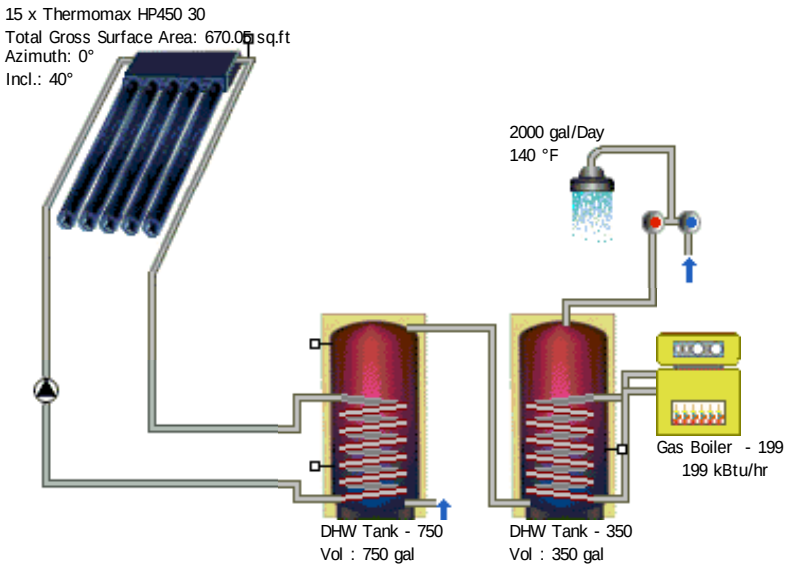
Project Report: KS3756 Richard J. Codey, 560 Northfield Avenue

Planning Office

Technical Specification
Finbarr McCarthy

Tel:
Fax:
E-Mail:





Results of Annual Simulation

Installed Collector Power:	148.68 kBtu/hr	
Installed Gross Solar Surface Area:	670.05 sq.ft	
Collector Surface Area Irradiation (Active Surface):	264.13 MMBTU	511.24 kBtu/sq.ft
Energy Produced by Collectors:	176.64 MMBTU	341.90 kBtu/sq.ft
Energy Produced by Collector Loop:	170.68 MMBTU	330.35 kBtu/sq.ft
DHW Heating Energy Requirement:	512.88 MMBTU	
DHW Heating Energy Supply:	469.46 MMBTU	
Solar Contribution to DHW:	170.71 MMBTU	
Energy from Auxiliary Heating:	304.37 MMBTU	

Natural Gas (H) Savings:	**7,363.8 m³**
Natural Gas (H) Savings:	**2,627.77 therm**
CO2 Emissions Avoided:	**34,330.09 lbs**
DHW Solar Fraction:	**35.9 %**
Fractional Energy Saving (EN 12976):	**41.9 %**
System Efficiency:	**64.6 %**

Basic Data

Climate File

Location:	NEWARK INTERNATIONAL ARPT
Climate Data Record:	"NEWARK INTERNATIONAL ARPT"
Total Annual Global Radiation:	4.85 MMBTU
Latitude:	40.7 °
Longitude:	74.17 °

Domestic Hot Water

Average Daily Consumption:	2000 gal
Desired Temperature:	140 °F
Load Profile:	Sports Facility
Cold Water Temperature:	February:47.5 °F / August:63.1 °F
Circulation:	No

System Components

Collector Loop

Manufacturer:	Kingspan Renewables Ltd. (Thermomax)
Type:	Thermomax HP450 30
Number:	15.00
Total Gross Surface Area:	670.05 sq.ft
Total Active Solar Surface Area:	516.67 sq.ft
Tilt Angle:	40 °
Azimuth:	0 °

DHW Standby Tank

Manufacturer:	T*SOL Database
Type:	DHW Tank - 350
Volume:	350 gal

Solar Preheating Tank

Manufacturer:	T*SOL Database
Type:	DHW Tank - 750
Volume:	750 gal

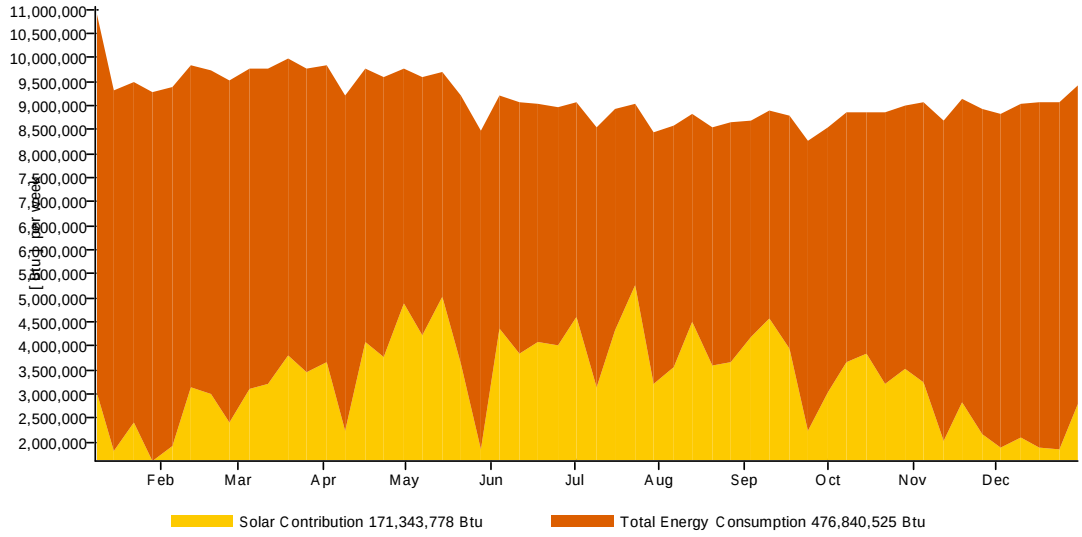
Auxiliary Heating

Manufacturer:	T*SOL Database
Type:	Gas Boiler - 199
Nominal Output:	199 kBtu/hr

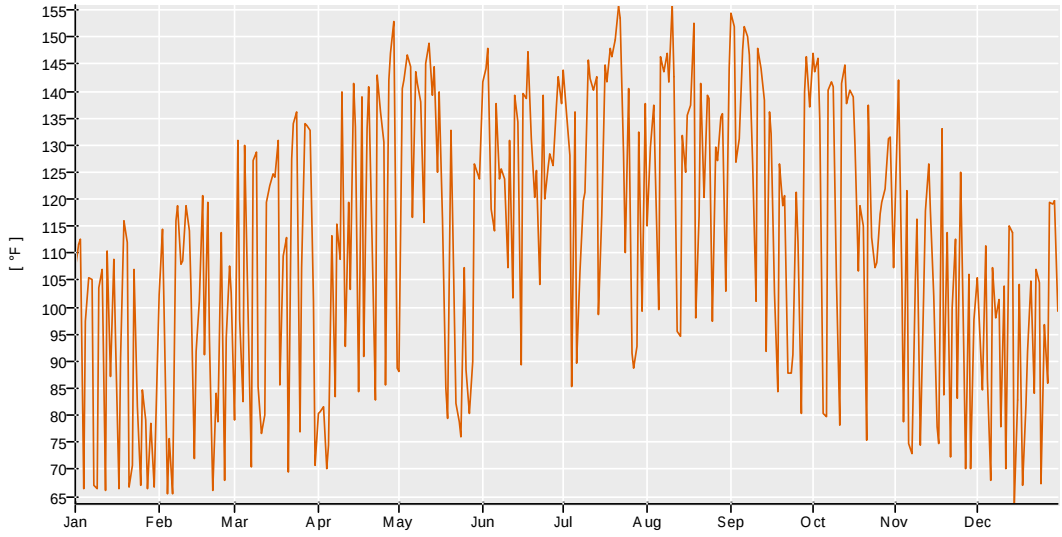
Legend

Original T*SOL Database
With Test Report
Solar Keymark

Solar Energy Consumption as Percentage of Total Consumption

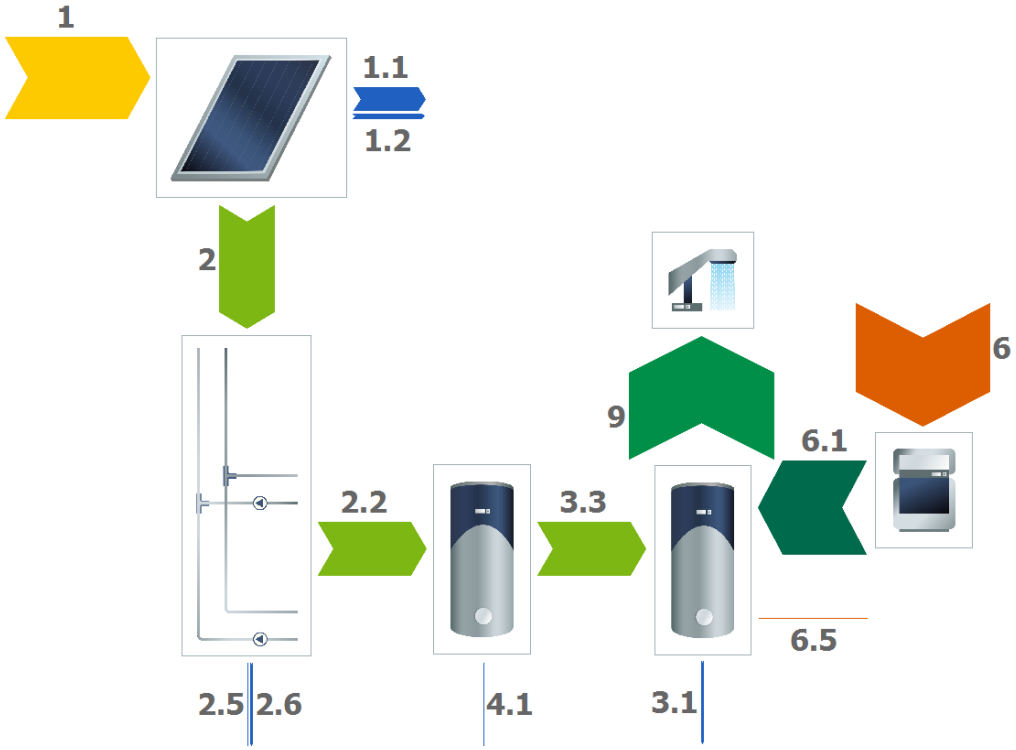


Daily Maximum Collector Temperature



These calculations were carried out by T*SOL Expert 4.5 - the Simulation Programme for Solar Thermal Heating Systems. The results are determined by a mathematical model calculation with variable time steps of up to 6 minutes. Actual yields can deviate from these values due to fluctuations in climate, consumption and other factors.The system schematic diagram above does not represent and cannot replace a full technical drawing of the solar system.

Energy Balance Schematic



Legend

1	Collector Surface Area Irradiation (Active Surface)	2,651 therm
1.1	Optical Collector Losses	741 therm
1.2	Thermal Collector Losses	13,684 kBtu
2	Energy from Collector Array	1,773 therm
2.2	Solar Energy to Preheating Tank	1,713 therm
2.5	Internal Piping Losses	1,162 kBtu
2.6	External Piping Losses	4,828 kBtu
3.1	Tank Losses	5,638 kBtu
3.3	Preheating Tank to Tank	1,713 therm
4.1	Tank Losses (S)	-36 kBtu
6	Final Energy	4,392 therm
6.1	Supplementary Energy to Tank	3,055 therm
6.5	Heating Element	0 kBtu
9	DHW Energy from Tank	4,712 therm

Glossary

1 Collector Surface Area Irradiation (Active Surface)
Energy Irradiated onto Tilted Collector Area (Active Solar Surface)

1.1 Optical Collector Losses
Reflection and Other Losses

1.2 Thermal Collector Losses
Heat Conduction and Other Losses

2 Energy from Collector Array
Energy Output at Collector Array Outlet (i.e. Before the Piping)

2.2 Solar Energy to Preheating Tank
Collector Array Energy Minus Piping Losses

2.5 Internal Piping Losses
Internal Piping Losses

2.6 External Piping Losses
External Piping Losses

3.1 Tank Losses
Heat Losses via Surface Area

3.3 Preheating Tank to Tank
Heat from Preheating Tank to Tank

4.1 Tank Losses (S)
Heat Losses via Surface Area

6 Final Energy
Final Energy Current into System. This can flow in as natural gas, oil or electricity (not including solar energy) taking efficiency levels into account

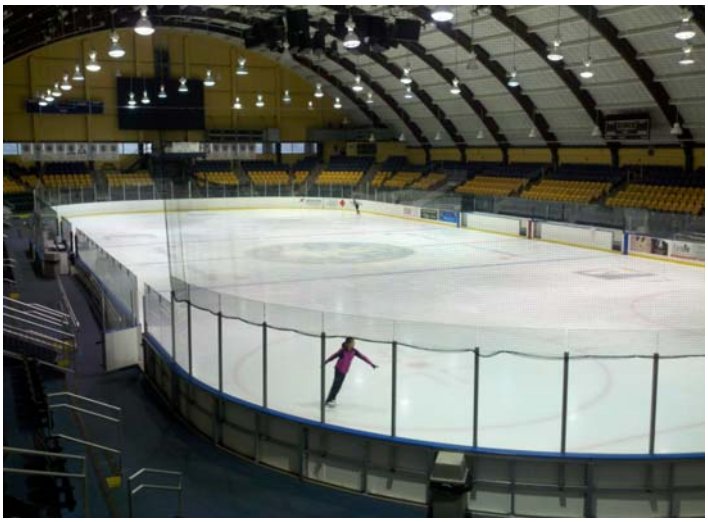
6.1 Supplementary Energy to Tank
Supplementary Energy (e.g. Boiler) to Tank

6.5 Heating Element
Energy from Heating Element

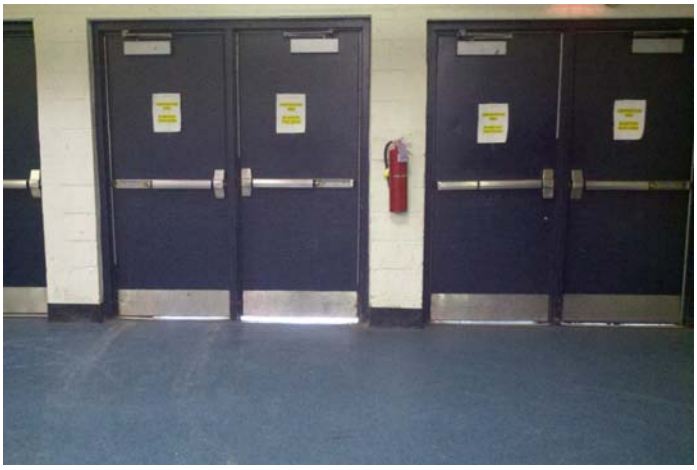
9 DHW Energy from Tank
Heat for DHW Appliances from Tank (Exluding Circulation)

APPENDIX F

Photos



1: Rink #1 Richard J. Codey Arena



2: Exit doors in need of sweeps & seals

3: Roof mounted exhaust fans

4: Munters dehumidification unit

5: Rooftop unit RTU

APPENDIX G

EPA Benchmarking Report

ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Richard J. Codey Arena

Primary Property Function: Ice/Curling Rink
Gross Floor Area (ft²): 104,695
Built: 1958

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

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Richard J. Codey Arena 560 Northfield Avenue West Orange, New Jersey 07052	_____ , (____)____-_____	____ _____ , (____)____-_____ _____

Property ID: 4199015

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
238.4 kBtu/ft²

Source EUI
506.7 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)	45.6
National Median Source EUI (kBtu/ft²)	96.8
% Diff from National Median Source EUI	423%

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)