

**CITY OF EAST ORANGE**

**RECREATION CENTER**

1 Fellowship Circle, East Orange NJ 07017

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

May 2016

Prepared by:



6 Campus Drive  
Parsippany, NJ 07054  
(973) 538-2120

**CHA PROJECT NO. 30993**

## TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY .....	1
2.0 BUILDING INFORMATION AND EXISTING CONDITIONS .....	4
3.0 UTILITIES .....	7
4.0 BENCHMARKING.....	10
5.0 ENERGY CONSERVATION MEASURES.....	11
5.1 ECM-1 Window Replacement .....	12
5.2 ECM-2 Replace the Old Boiler with a Condensing Boiler .....	12
5.3 ECM-3 Install Thermostats on FCUs and UVs .....	13
5.4 ECM-4 Install Window A/C Units Controller .....	13
5.5 ECM-5 Replace the DHW Heaters with Condensing Heaters .....	13
5.6 ECM-6 Upgrade the Plumbing Fixtures with Low Flow Fixtures .....	14
5.7 ECM-L1 Lighting Replacements with Controls (Occupancy Sensors).....	14
5.8 Additional O&M Opportunities.....	15
6.0 PROJECT INCENTIVES .....	16
6.1 Incentives Overview .....	16
6.1.1 New Jersey Smart Start Program .....	16
6.1.2 Direct Install Program .....	16
6.1.3 New Jersey Pay For Performance Program (P4P) .....	17
6.1.4 Energy Savings Improvement Plan .....	18
6.1.5 Renewable Energy Incentive Program.....	19
7.0 ALTERNATIVE ENERGY SCREENING EVALUATION .....	20
7.1 Solar .....	20
7.1.1 Photovoltaic Rooftop Solar Power Generation .....	20
7.1.2 Solar Thermal Hot Water Generation.....	21
7.2 Wind Powered Turbines .....	21
7.3 Combined Heat and Power Plant.....	22
7.4 Demand Response Curtailment .....	23
8.0 CONCLUSIONS & RECOMMENDATIONS.....	24

## **APPENDICES**

- A Utility Usage Analysis and List of Third Party Energy Suppliers
- B Equipment Inventory
- C ECM Calculations and Cost Estimates
- D Photovoltaic (PV) Solar Power Generation Analysis
- E Photos
- F EPA Benchmarking Report

## REPORT DISCLAIMER

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

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

## List of Common Energy Audit Abbreviations

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

## 1.0 EXECUTIVE SUMMARY

This report summarizes the energy audit performed by CHA for City of East Orange 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 energy conservation measures (ECMs) have also been identified in this study. This report details the results of the energy audit conducted for the building listed below:

Building Name	Address	Square Feet	Construction Date
<b>Recreation Center</b>	1 Fellowship Circle, East Orange NJ 07017	23,616	1950

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

City Hall	Electric Savings (kWh)	NG Savings (therms)	Total Savings (\$)	Payback (years)
<b>Recreation Center</b>	24,148	1,709	\$130,258	19.1

Each individual measure's annual savings are dependent on that measure alone, there are no interactive effects calculated. There are three options shown for lighting ECM savings; only one option can be chosen. The 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 further discussed in Section 6.0.

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

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

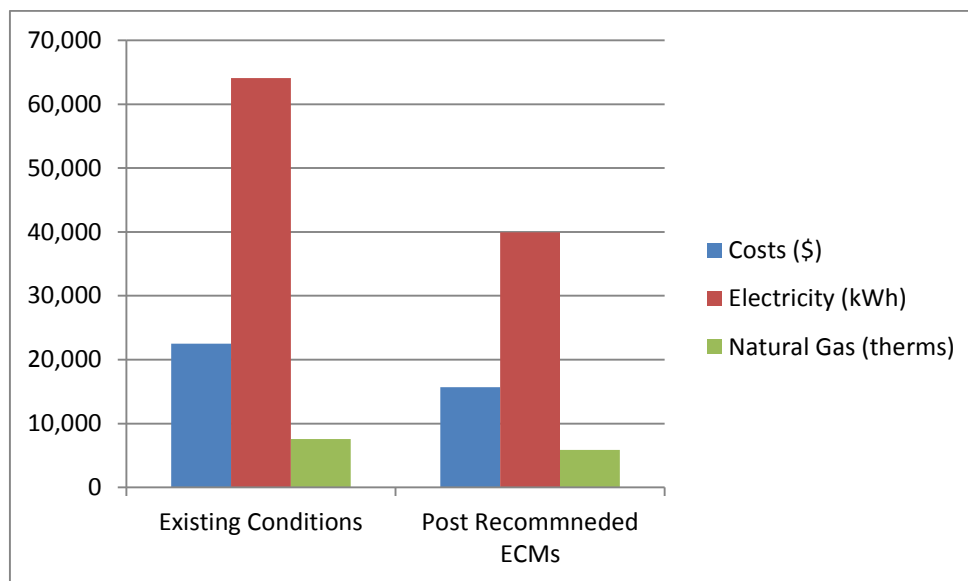
ECM #	Energy Conservation Measure	Est. Costs (\$)	Est. Savings (\$/year)	Payback w/o Incentive	Potential Incentive (\$)*	Payback w/ Incentive	Recommended
ECM-1	Replace Single Pane Windows with Double Pane Windows	51,000	628	81.2	0	81.2	N
ECM-2	Replace the Old Boiler with a Condensing Boiler	41,604	1,389	29.9	1,320	29.0	Y
ECM-3	Install Thermostats on FCUs and UHs	19,548	541	36.2	1,320	33.7	Y
ECM-4	Install Window AC Controller	1,800	171	10.5	0	10.5	Y
ECM-5	Replace the DHW Heaters with Condensing Heaters	5,657	50	112.6	150	109.7	N
ECM-6	Replace Old Plumbing Fixtures with Low Flow Plumbing Fixtures	29,758	324	92.0	0	92.0	N
ECM-L1	Lighting Replacements with Controls (Occupancy Sensors)	67,306	4,727	14.2	3,535	13.5	Y
<b>Total**</b>		<b>216,673</b>	<b>7,830</b>	<b>27.7</b>	<b>6,325</b>	<b>26.9</b>	
<b>Total(Recommended)</b>		<b>130,258</b>	<b>6,828</b>	<b>19.1</b>	<b>6,175</b>	<b>18.2</b>	

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

By implementing the recommended ECMs, the Lifetime Greenhouse gas (GHG) reduction could result in a reduction of 19 metric tons.

If the City of East Orange implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	22,506	15,678	30%
Electricity (kWh)	64,100	39,952	38%
Natural Gas (therms)	7,598	5,889	22%
Site EUI (kbtu/SF/Yr)	41.4	30.7	





## 2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

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

**Building Name:** Recreation Center

**Address:** 1 Fellowship Circle, East Orange NJ 07017

**Gross Floor Area:** 23,616

**Number of Floors:** Two floors and a basement

**Year Built:** 1950



### General

**Description of Spaces:** The building houses the recreation center. It includes gymnasium, locker rooms, conference rooms, mechanical room and restrooms.

**Description of Occupancy:** The facility has approximately 19 staff working during the office hours.

**Number of Computers:** The building has approximately 10 computers.

**Building Usage:** The regular hours are typically 50 hours per week except holidays.

**Construction Materials:** Structural steel framing with concrete masonry units (CMU) with brick façade.

**Roof:** The building has a flat roof which is covered with white rubber membranes assumed to have good insulation however, it was noted that the roof has a slight water draining issue and is possibly leaking above the gymnasium. It is suggested that City of East Orange survey the roof to ensure that the drains are functioning properly and assess the need for repairs or possible replacement.

**Windows:** The windows are single pane windows and appear to be in poor condition. An ECM associated with replacing the single pane windows with high performance double pane windows is evaluated.

**Exterior Doors:** Exterior doors are aluminum frame with single pane glass. Most of the sweeps on exterior doors are still in good condition with the exception of one front door. No ECMs associated with exterior door improvements are evaluated, however an O & M is recommended for replacing the seals on the one front entrance door.

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

**Heating:** This building has two H B Smith hot water boilers fueled with natural gas. One of the boilers is out of commission. The boiler that is in operation has a nameplate energy input of 998.3 MBH and is about 80% efficient. This boiler is in poor condition and past its useful life. The heating hot water is circulated by an inline Armstrong circulation pump to the baseboard HHW heaters, fan coil units and unit ventilators. The nameplate of the pump was illegible, but appears to be relatively small. There are five fan coil units serving the hallway areas. There is also a Nesbitt roof top unit (RTU) serving the gymnasium area, however, this RTU has been non-functional for years. Approximately 20 electric unit heaters were installed to provide supplement heat for the building due to the loss of this RTU. Each of the unit heaters has a rated capacity of 4kW.

An ECM related to the boiler replacement is evaluated.

**Cooling:** The building does not have a central cooling system. Only the office areas are cooled using window AC units and portable AC units. There are about five portable AC units and 6 window AC units: the portable AC unit has a rated cooling capacity of 0.92 ton and EER of 9.2 and the window AC unit has a rated cooling capacity of 1.25 ton and EER of 10.8.

An ECM related to installing window AC unit controls is evaluated.

**Ventilation:** The gymnasium was originally ventilated by the Nesbitt RTU, however since this unit does not function, no ventilation is currently provided. Currently, only two offices are ventilated by unit ventilators which bring a minimum amount of outdoor air to these rooms. The remainder of the building is only ventilated by operable windows. No ECMs recommended for the ventilation system.

**Exhaust:** There are three fractional horsepower exhaust fans on the roof serving the restrooms and common areas. The exhaust fans appear to be in good condition and therefore no ECMs associated with exhaust system were evaluated.

## **Controls Systems**

Currently, all of the HVAC equipment is manually controlled. It was reported that the units are left on when the building is unoccupied. The manual thermostat was set to around 75°F. An ECM related to installing programmable thermostats on the fan coil units and unit ventilators is evaluated.

## **Domestic Hot Water Systems**

Two gas fired A O Smith water heaters are located in the boiler room and provide DHW for the entire building. The heaters have a rated 75 MBH heating input and an efficiency of 80%. Each of the heaters has a rated storage capacity of 76.8 gallons. We have included an ECM that evaluates the potential savings associated with replacing the heaters with high efficiency condensing water heaters.

## **Kitchen Equipment**

The building does not have a commercial kitchen.

## **Plug Load**

This building has 10 computers and some small residential appliances (microwaves, refrigerators, etc.), which contribute to the plug load. As the plug load is a relatively small portion of the total electrical load, no ECMs are recommended, however we have included an O & M measure to replace the small appliances with Energy Star rated appliances when the old ones reach the end of their useful life span

## **Plumbing Systems**

The facility has urinals, toilets and water facets. The plumbing fixtures are old and appear to be in poor condition. Therefore an ECM associated with upgrading the plumbing fixtures with low flow plumbing fixtures is recommended.

## **Lighting Systems**

This building has 40W 4' T-12 fluorescent lighting, 32W 2' U shape T-8 fluorescent lighting, and incandescent lights. There is one wall mounted 175W metal halide outdoor light. All of the interior lights are controlled by manual switches. An ECM is included for replacing all for the lighting with LED equivalents and controlling the proposed lights using occupancy sensors.

### 3.0 UTILITIES

Natural gas, electricity are separately metered into this building. 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	PSE&G

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

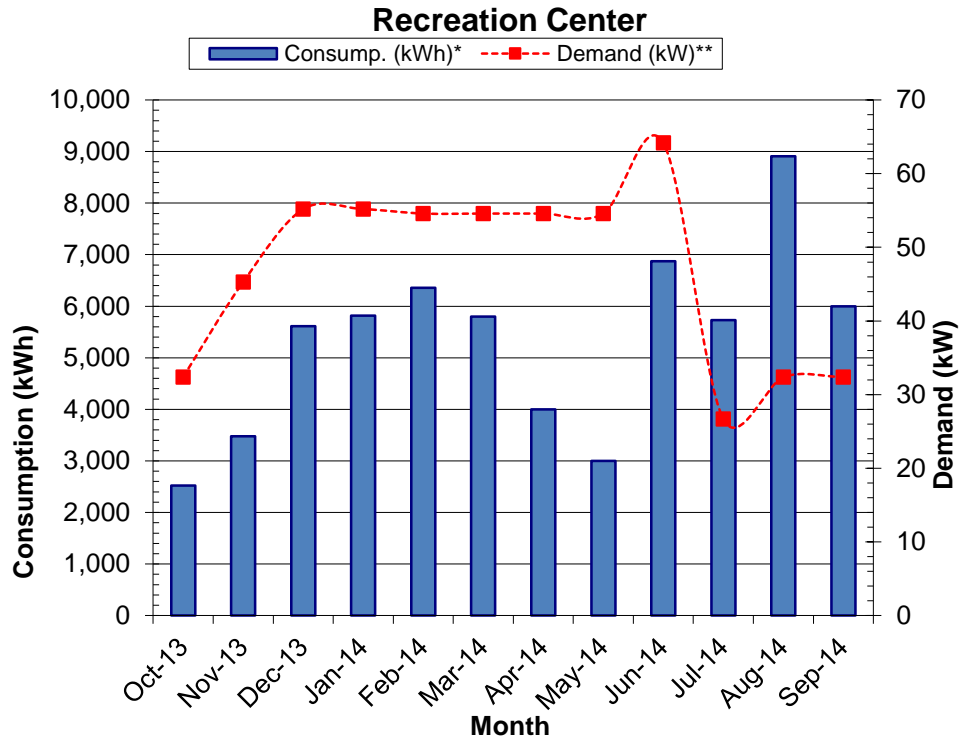
Electric		
Annual Usage	64,100	kWh/yr
Annual Cost	13,929	\$
Blended Rate	0.217	\$/kWh
Peak Demand	64.2	kW
Min. Demand	26.7	kW
Avg. Demand	46.9	kW
Natural Gas		
Annual Usage	7,598	Therms/yr
Annual Cost	8,577	\$
Rate	1.129	\$/therm
Energy Summary		
Building Area	23,616	SF
Energy Usage Intensity (EUI)	41	KBtu/SF/yr
Energy Cost Index (ECI)	0.95	\$/SF/yr
Total Annual Utility Costs	22,506	\$

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

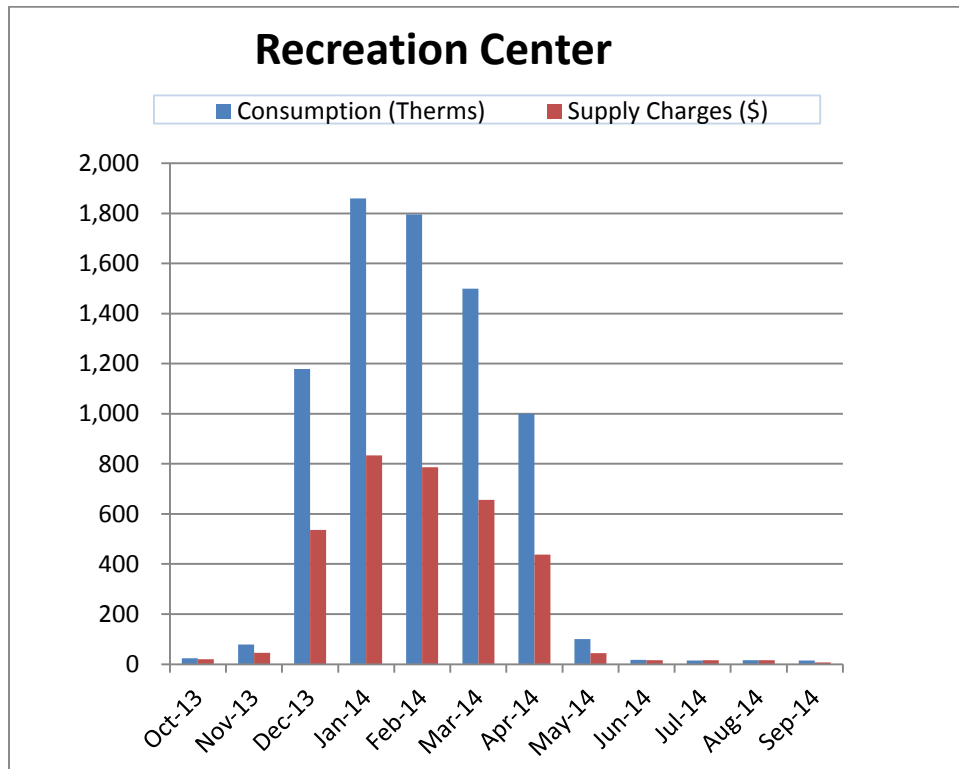
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)

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

\*Some months that do not have utility data and the missing demand usage are estimated and highlighted in the utility spreadsheet



The electric usage is high in the summer months due to the contribution of the air conditioning. The shoulder season electric usage is the lowest. The electric usage during the winter season is high again due to the usage of the electric unit heaters.



The natural gas usage in this building is used for heating and DHW production. The gas usage during the heating season is correlated to winter weather conditions Summer usage is for domestic hot water only and relatively low.

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	Average Rate	NJ Average Rate	
Electricity	\$/kWh	\$0.217	\$0.13	Y
Natural Gas	\$/Therm	\$1.129	\$0.96	Y

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

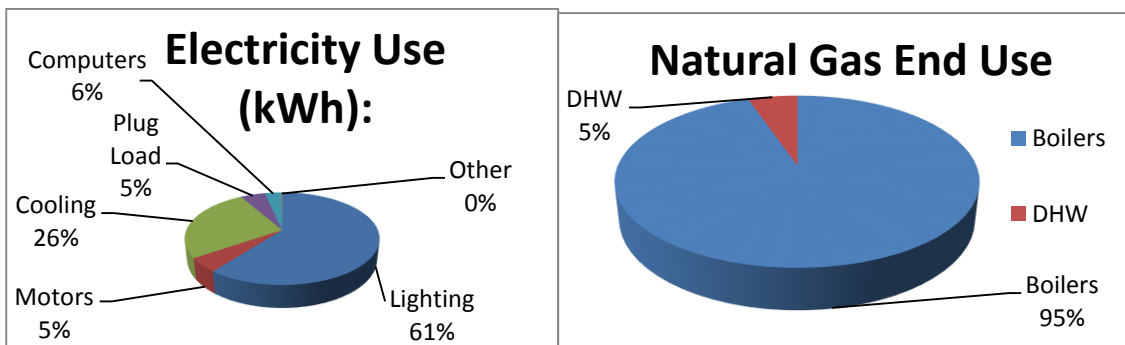
Additional information on selecting a third party energy supplier is available here:

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

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

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

### Site End-Use Utility Profile



## 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<sup>2</sup>/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100; with 100 being the most efficient. In order for a building to receive an Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase. However, the EPA does not have scores for all buildings types. The buildings that do not have energy ratings now are compared with national median EUI.

The sites EUI is the amount of heat and electricity consumed by a building as reflected in its 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 provides an equivalent measure for various types of buildings with differing energy sources. The results of the benchmarking is contained in the table below. Copies of the benchmarking report are available in Appendix F.

Site EUI kBtu/ft <sup>2</sup> /yr	Source EUI (kBtu/ft <sup>2</sup> /yr)	Energy Star Rating (1-100)
41.4	62.9	N/A

The national median site EUI is 63.8 kBtu/ft<sup>2</sup>/yr and source EUI is 96.8 kBtu/ft<sup>2</sup>/yr. The building has 35% lower source EUI than the national median source EUI. It is believed that the low occupancy of the building contributes to the lower EUI. It is expected that the EUI will be reduced by implementing the measures discussed in this report.

████████████████████  
████████████████████

## 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-cost 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 (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 Window Replacement

This measure evaluates the energy savings for replacing the single pane windows in the office section of the building with double pane windows that have better seals and insulation value. Replacement of these windows will result in a reduction of the buildings' heating and cooling loads, therefore resulting in natural gas savings.

Energy savings for this measure was calculated by estimating the reduction in the heat transfer loss and the infiltration rate through the windows. The U value of the windows will be reduced from 1.13 Btuh/SF/F to 0.50 Btuh/SF/F and the infiltration factor is reduced from 0.30 CFM/LF to 0.15CFM/LF after upgrading the windows to double glazed windows with better seals.

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

### ECM-1 Window Replacement

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
51,000	0	0	557	628	(0.8)	0	81.2

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

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

## 5.2 ECM-2 Replace the Boiler with a Condensing Boiler

This building has two H B Smith hot water boilers fueled with natural gas. One of the boilers is out of commission. The boiler that is in operation has a nameplate energy input of 998.3 MBH and is about 80% efficient. There are high efficiency condensing boilers available that have better efficiencies, therefore, it is suggested one condensing boiler be added to run as the main boiler. New modulating condensing gas boilers are available that minimally operate at 88%, and can operate as high as 96%.

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

### ECM-2 Replace the Boiler with a Condensing Boiler

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
41,604	0	0	1,230	1,389	(0.2)	1,320	29.9

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

This measure is recommended.

### 5.3 ECM-3 Install Programmable Thermostats on FCUs and UVs

The existing HHW fan coil units and unit ventilators are controlled by manual thermostats. It is suggested that digital programmable thermostats be installed to control the unit heaters and implement a night set-back temperature during unoccupied hours. Savings will result in natural gas savings from the boiler

The cost of implementing this measure includes installing the programmable thermostats, wiring and disconnecting the old thermostats, and the labor cost on doing programming on these new thermostats.

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

#### ECM-3 Install Programmable Thermostats on FCUs and UVs

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
19,548	0	0	479	541	(0.3)	1,320	36.2	33.7

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

This measure is recommended.

### 5.4 ECM-4 Install Window A/C Unit Controllers

There are 6 window A/C units which are typically left on by the occupants when they leave the room.

This ECM evaluates the installation of programmable “smart” timers that interrupt the electrical supply to the window air conditioners when the room is unoccupied. The timers are configurable to operate as a standalone timer or they can be wirelessly interconnected to provide remote temperature control using software.

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

#### ECM-4 Install Window A/C Unit Controllers

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
1,800	0	788	0	171	0.4	0	10.5	10.5

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

This measure is recommended.

### 5.5 ECM-5 Replace the DHW Heaters with Condensing Water Heaters

Two gas fired A O Smith DHW heaters are used to provide DHW for the whole building. The water heaters have a rated 75 MBH heating input and an efficiency of 80%. Each of the heaters has a rated storage capacity of 76.8 gallons. This ECM evaluates the energy savings associated with replacing the existing DHW heaters with condensing water heaters which have an efficiencies of 96%.

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

#### ECM-5 Replace the DHW Heaters with Condensing Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
5,657	0	0	44	50	(0.8)	150	112.6	109.7

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

This measure is not recommended.

### 5.6 ECM-6 Upgrade the Plumbing Fixtures with Low Flow Fixtures

This building contains older style high flow water toilets (3.5 GPF), urinals (1.5 GPF), and high flow faucets (2.0 GPM). Waterless urinals and low-flow toilets/faucets are recommended to replace the existing plumbing fixtures.

The water savings associated from replacing existing high flow fixtures with low-flow/no-flow fixtures was calculated by taking the difference of the annual water usage for the proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures. Replacing the existing fixtures in the restrooms with 1.28 Gals/flush toilets, waterless urinals, and 0.5 gpm faucets will conserve water which will result in lower annual water and sewer charges. Faucets with low-flow push valves were not considered for replacement.

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

#### ECM-6 Upgrade the Plumbing Fixtures with Low Flow Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Water	Natural Gas	Total				
\$	kGal	Therms	\$	\$	\$	Years	Years
29,758	42	100	324	(0.9)	0	92.0	92.0

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

This measure is not recommended due to long payback period.

### 5.7 ECM-L1 Lighting Replacements with Controls (Occupancy Sensors)

This building has 40W 4' T-12 fluorescent lighting, 32W 2' U shape T-8 fluorescent lighting, and incandescent lights. . There is one wall mounted 175W metal halide outdoor light. All of the interior lights are controlled by manual switches. The 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 evaluates replacing the lights with LED and installing occupancy sensors.

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

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

#### ECM-L1 Lighting Replacements 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
67,306	13	23,360	0	4,727	(0.1)	3,535	14.2	13.5

\* LED new fixtures are still qualified for prescribed incentives, however, LED retrofits must go through the custom incentive which is not calculated in LGEA study therefore, the potential incentive shown in the table is the possible prescribed incentive.

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:

- Evaluate the roof for repair/ replacement
- Purchase ENERGY STAR® appliances when needed
- Repair door seals on office doors and garage doors

## **6.0 PROJECT INCENTIVES**

### **6.1 Incentives Overview**

The following sections give detailed information on available incentive programs including New Jersey Smart Start, Direct Install, New Jersey Pay for Performance (P4P) and Energy Savings Improvement Plan (ESIP). If the facility 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.

Web URL: <http://www.njcleanenergy.com/commercial-industrial/home/home/>

#### **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. It is then installed, paid for and then the incentives are reimbursed to the owner.

#### **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 was 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 qualify for 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 200 kW. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). Additionally, the overall return on investment (ROI) must exceed 10%. If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

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

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

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

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

#### Electric

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

- Maximum incentive: \$0.11/ kWh per projected kWh saved.

#### Gas

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

Incentive cap: 25% of total project cost

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

#### Electric

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

#### Gas

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

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

The electric demand of this building does not meet the 200kW requirement for P4P program.

### **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.

#### **6.1.5 Renewable Energy Incentive Program**

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

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

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



## 7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

### 7.1 Solar

#### 7.1.1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft <sup>2</sup> )	Potential PV Array Size (kW)
6,351	89

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

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 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 \$204/SREC for January 2016 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 D and summarized as follows:

### Photovoltaic (PV) Rooftop Solar Power Generation –220 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
\$354,000	89	107,258	0	\$14,051	\$26,815	25.2	8.7	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 township should consult with a certified solar PV contractor.

#### 7.1.2 Solar Thermal Hot Water Generation

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

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

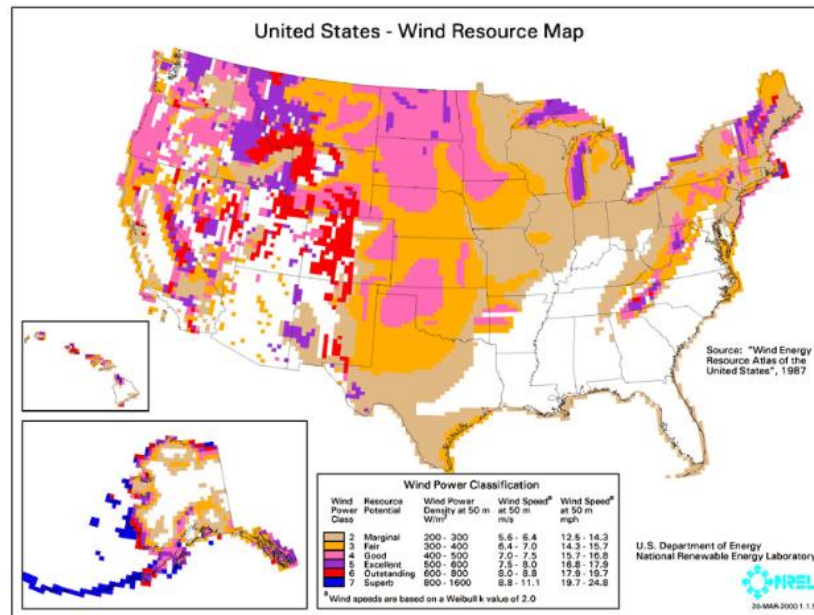
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping).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

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

#### 7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are

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



This measure is not recommended due to the location of the 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. This 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. However, a mini-size CHP could be an option for the facility to consider. The sizing and energy savings of the mini-size CHP require further study.

#### **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 the 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 November 2013 through December 2014 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
64.2	26.7	46.9	N	N

\*the demand is estimated from one month bill

This measure is not recommended due to the lack of onsite generation.

## 8.0 CONCLUSIONS & RECOMMENDATIONS

The following section summarizes the LGEA energy audit conducted by CHA for City of East Orange.

The following projects should be considered for implementation:

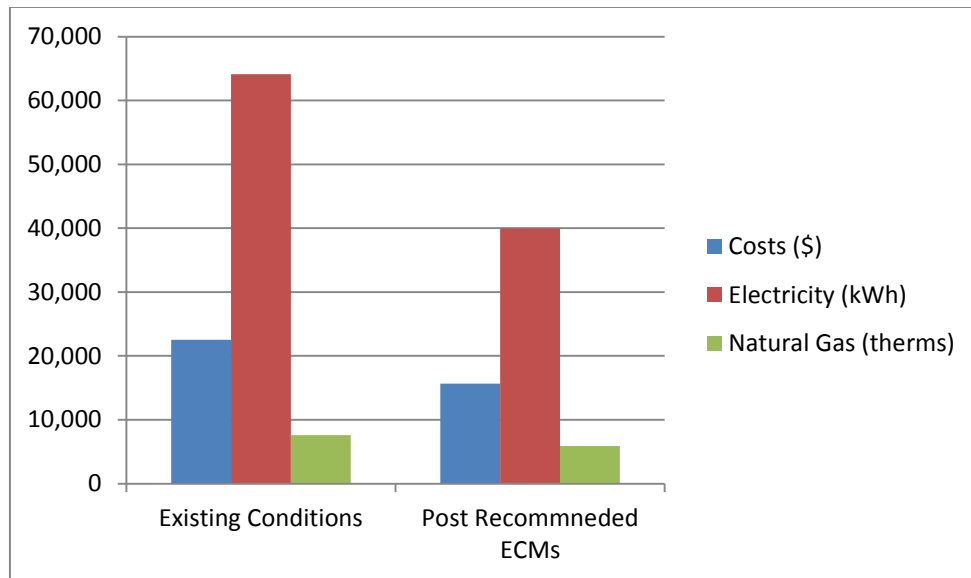
- Replace the Boiler with a Condensing Boiler
- Install Programmable Thermostats on FCUs and UVs
- Install Window AC Controllers
- Lighting Replacements with LED and add Controls (Occupancy Sensors)

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

<b>Electric Savings (kWh)</b>	<b>Natural Gas Savings (therms)</b>	<b>Total Savings (\$)</b>	<b>Payback (years)</b>
24,148	1,709	\$130,258	19.1

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

	<b>Existing Conditions</b>	<b>Post Recommended ECMs</b>	<b>Percent Savings</b>
Costs (\$)	22,506	15,678	30%
Electricity (kWh)	64,100	39,952	38%
Natural Gas (therms)	7,598	5,889	22%
Site EUI (kbtu/SF/Yr)	41.4	30.7	



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

## **APPENDIX A**

### **Utility Usage Analysis and Alternate Utility Suppliers**

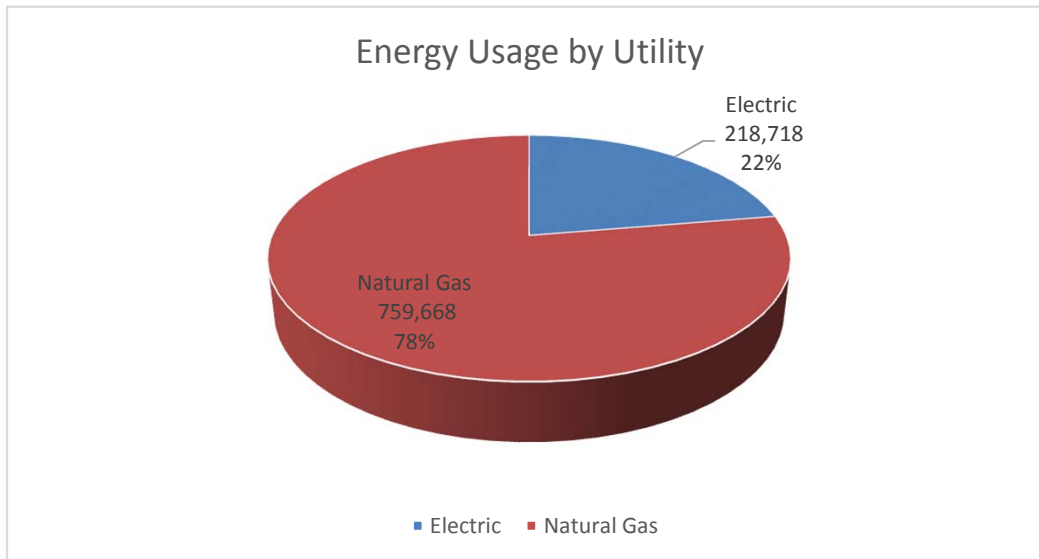
# East Orange NJBPU LGEA Recreation Center

## Annual Utilities 12-month Summary

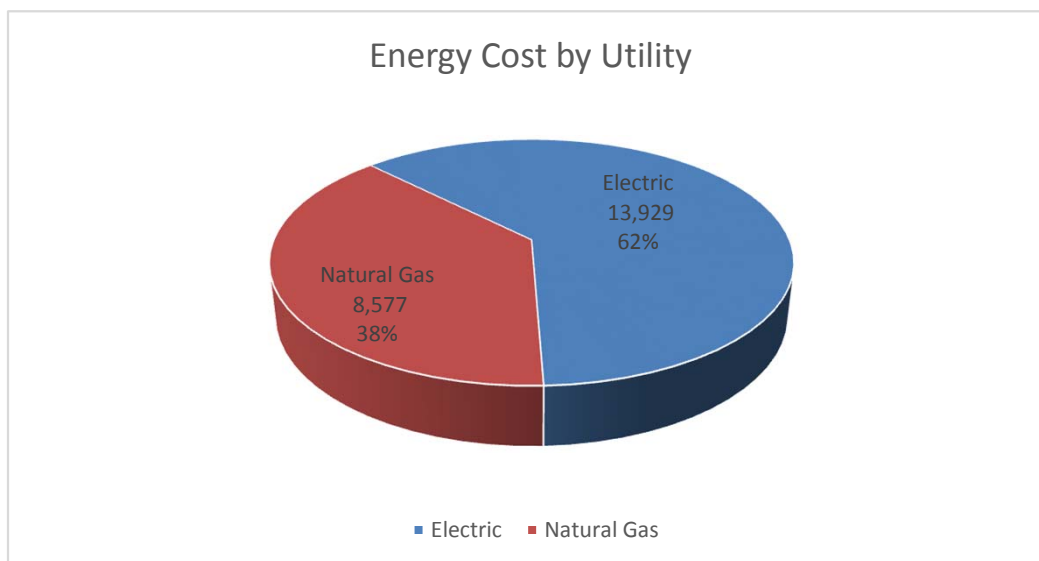
Electric		
Annual Usage	64,100	kWh/yr
Annual Cost	13,929	\$
Blended Rate	0.217	\$/kWh
Peak Demand	64.2	kW
Min. Demand	26.7	kW
Avg. Demand	46.9	kW
Natural Gas		
Annual Usage	7,598	Therms/yr
Annual Cost	8,577	\$
Rate	1.129	\$/therm
Energy Summary		
Building Area	23,616	SF
Energy Usage Intensity (EUI)	41	KBtu/SF/yr
Energy Cost Index (ECI)	0.95	\$/SF/yr
Total Annual Utility Costs	22,506	\$



Utility	KBtu	%
Electric	218,718	22%
Natural Gas	759,668	78%
	978,386	100%



Utility	\$	%
Electric	13,929	62%
Natural Gas	8,577	38%
	22,506	100%



East Orange NJBPU LGEA  
Recreation Center

Electric Service

Account No.: 7003203618  
Meter No.: 61680858

Delivery: PSE&G  
Rate GLP

Month			Provider Charges			Usage (kWh) vs. Demand (kW) Charges		Unit Costs				
	Consump. (kWh)*	Demand (kW)**	Delivery (\$)*	Supplier (\$)	Total (\$)	Consumption (\$)	Demand (\$)	Delivery (\$/kWh)	Supplier (\$/kWh)	Consumption Rate (\$/kWh)	Demand (\$/kW)	Blended Rate (\$/kWh)
October-13	2,520	32	229	530.74	759.55	500.35	259.20	0.091	0.211	0.199	8.000	0.301
November-13	3,480	45	317	588.11	905.09	542.69	362.40	0.091	0.169	0.156	8.000	0.260
December-13	5,610	55	432	728.53	1,160.58	718.98	441.60	0.077	0.130	0.128	8.000	0.207
January-14	5,820	55	436	744	1,180.37	738.77	441.60	0.075	0.128	0.127	8.000	0.203
February-14	6,360	55	444	793	1,236.54	799.74	436.80	0.070	0.125	0.126	8.000	0.194
March-14	5,800	55	405	723	1,127.66	690.86	436.80	0.070	0.125	0.119	8.000	0.194
April-14	4,000	55	279	499	777.70	340.90	436.80	0.070	0.125	0.085	8.000	0.194
May-14	3,000	55	209	374	583.27	146.47	436.80	0.070	0.125	0.049	8.000	0.194
June-14	6,870	64	1,050	859	1,908.97	1395.37	513.60	0.153	0.125	0.203	8.000	0.278
July-14	5,730	27	544	798	1,341.85	1128.25	213.60	0.095	0.139	0.197	8.000	0.234
August-14	8,910	32	738	1,043	1,781.19	1521.99	259.20	0.083	0.117	0.171	8.000	0.200
September-14	6,000	32	419	748	1,166.55	907.35	259.20	0.070	0.125	0.151	8.000	0.194
<b>Total (All)</b>	<b>64,100</b>	<b>64.20</b>	<b>\$4,474.00</b>	<b>\$8,426.79</b>	<b>\$13,929.32</b>	<b>\$9,431.72</b>	<b>\$4,497.60</b>	<b>\$0.07</b>	<b>\$0.13</b>	<b>\$0.15</b>	<b>\$8.00</b>	<b>\$0.22</b>
Notes	1	2	3	4	5			6	7			8

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 - note, includes 8.875% tax

5.) Total charges (Delivery + Supplier)

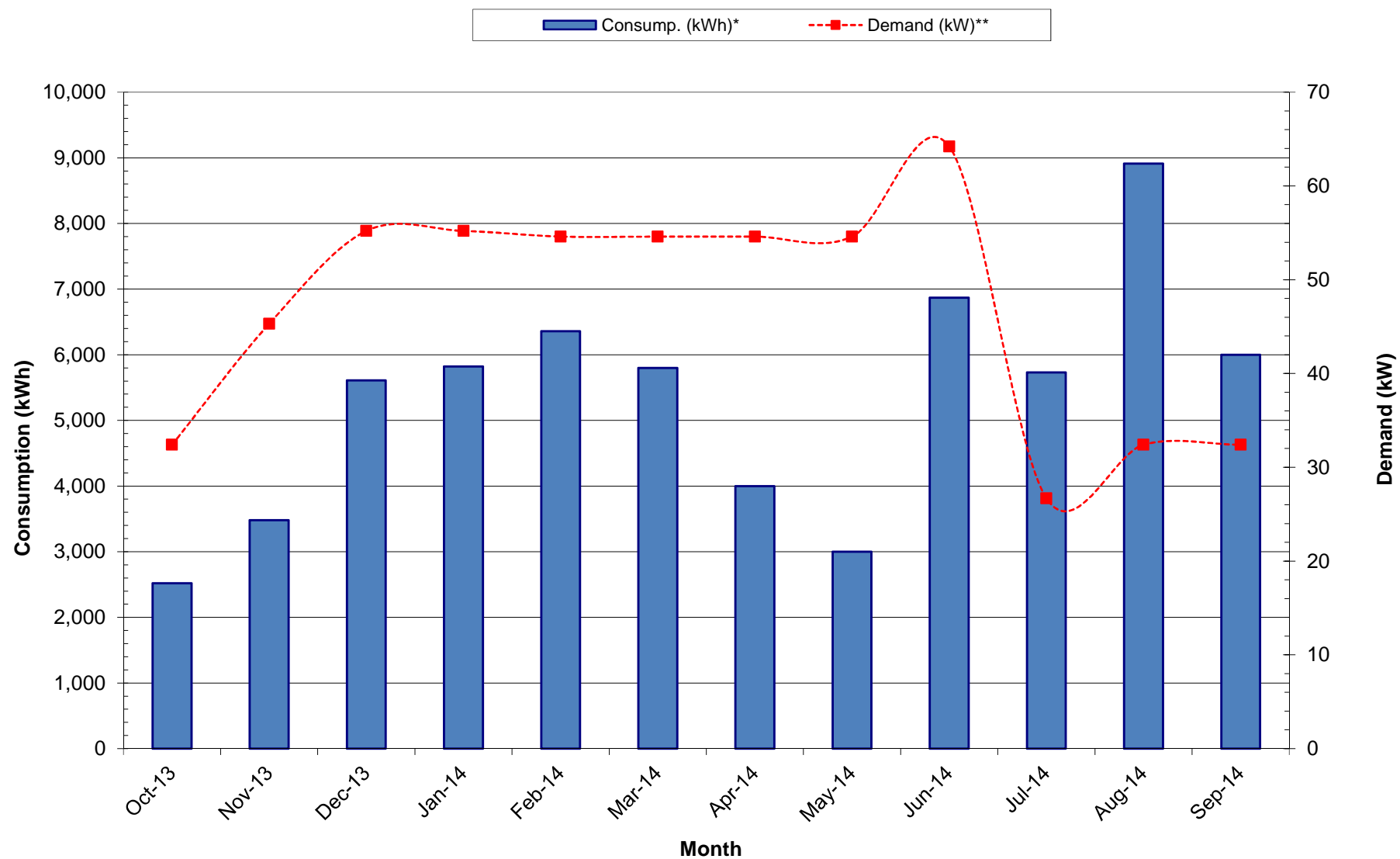
6.) Delivery Charges (\$) / Consumption (kWh)

7.) Supplier Charges (\$) / Consumption (kWh)

8.) Total Charges (\$) / Consumption (kWh)

\* Based on combined numbers provided by client

\*\* Addition of two accounts provided by client

**Recreation Center**

**East Orange NJBPU LGEA  
Recreation Center**

**Natural Gas Service**

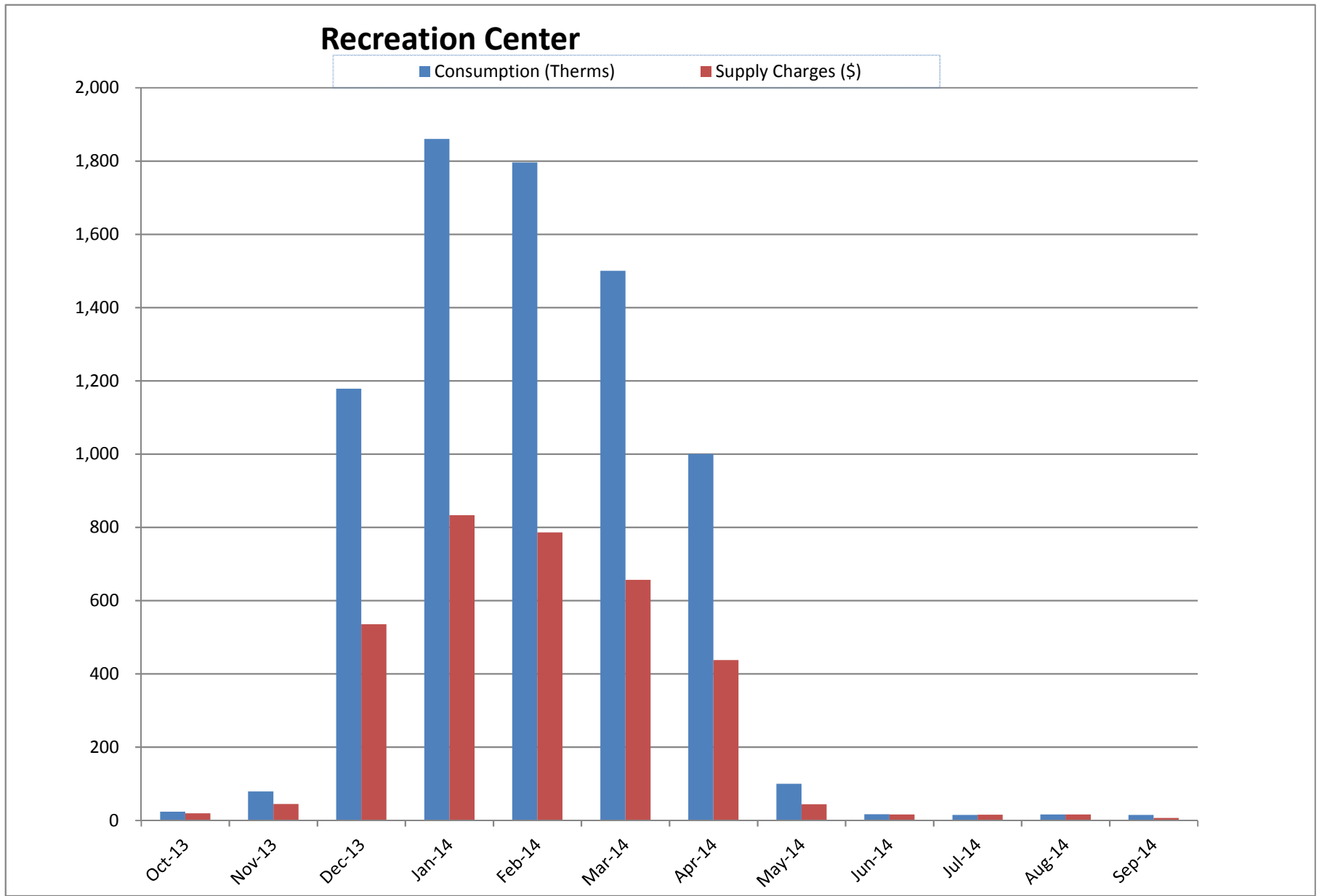
**Account No.: 7003203618**

**Meter No: 3228983**

**Delivery: PSE&G**

**Rate GSG**

<b>Month</b>	<b>Consumption (Therms)</b>	<b>Delivery Charges (\$)</b>	<b>Supply Charges (\$)</b>	<b>Total Charges (\$)</b>	<b>Rate (\$/Therm)</b>
October-13	23.36	19.20	15.88	35.08	1.50
November-13	79.09	44.79	53.78	98.57	1.25
December-13	1,178.17	535.50	801.15	1,336.65	1.13
January-14	1,859.88	833.10	1264.72	2,097.82	1.13
February-14	1,795.96	785.83	1221.25	2,007.08	1.12
March-14	1,500.00	656.33	1020.00	1,676.33	1.12
April-14	1,000.00	437.55	680.00	1,117.55	1.12
May-14	100.00	43.76	68.00	111.76	1.12
June-14	16.86	16.23	11.46	27.69	1.64
July-14	14.48	15.54	9.85	25.39	1.75
August-14	15.71	15.99	10.02	26.01	1.66
September-14	15.00	6.56	10.20	16.76	1.12
<b>Total (12 Months)</b>	<b>7,598</b>	<b>\$ 3,410.38</b>	<b>\$ 5,166.31</b>	<b>\$ 8,576.70</b>	<b>\$ 1.13</b>



**PSE&G ELECTRIC SERVICE TERRITORY**

**Last Updated: 7/21/15**

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

<b>Supplier</b>	<b>Telephone &amp; Web Site</b>	<b>*Customer Class</b>
<b>Abest Power &amp; Gas of NJ, LLC</b> 202 Smith Street Perth Amboy, NJ 08861	(888)987-6937  <a href="http://www.AbestPower.com">www.AbestPower.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>AEP Energy, Inc. f/k/a BlueStar Energy Services</b> 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782  <a href="http://www.aepenergy.com">www.aepenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
Agera Energy, LLC 115 route 46, Building F Parsippany, NJ 07054	(844) 692-4372  <a href="http://www.ageraenergy.com">www.ageraenergy.com</a>	R/C/I
<b>Alpha Gas and Electric, LLC</b> 641 5 <sup>th</sup> Street Lakewood, NJ 08701	(855) 553-6374  <a href="http://www.alphagasandelectric.com">www.alphagasandelectric.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Ambit Northeast, LLC d/b/a Ambit Energy</b> 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284  <a href="http://www.ambitenergy.com">www.ambitenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>American Power &amp; Gas of NJ, LLC - 10000 Lincoln Drive East – Suite 201</b> Marlton, NJ 08053	(800) 205-7491  <a href="http://www.GoAPG.com">www.GoAPG.com</a>	<b>R/C/I</b>
<b>American Powernet Management, LP</b> 437 North Grove St. Berlin, NJ 08009	(877) 977-2636  <a href="http://www.americanpowernet.com">www.americanpowernet.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Amerigreen Energy, Inc.</b> 333 Sylvan Avenue, Suite 305 Englewood Cliffs, NJ 07632	888-559-4567  <a href="http://www.amerigreen.com">www.amerigreen.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>AP Gas &amp; Electric, (NJ) LLC</b> 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895  <a href="http://www.apgellc.com">www.apgellc.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Astral Energy LLC</b> 16 Tyson Place Bergenfield, NJ 07621	(888)850-1872  <a href="http://www.AstralEnergyLLC.com">www.AstralEnergyLLC.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

<b>Barclays Capital Services, Inc.</b> 70 Hudson Street Jersey City, NJ 07302-4585	(800) 526-7000  <a href="http://www.barclays.com">www.barclays.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>BBPC, LLC d/b/a Great Eastern Energy</b> 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121  <a href="http://www.greateasternenergy.com">www.greateasternenergy.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>Berkshire Energy Partners, LLC</b> 9 Berkshire Road Landenberg, PA 19350 Attn: Dana A. LeSage, P.E.	(610) 255-5070  <a href="http://www.berkshireenergypartners.com">www.berkshireenergypartners.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Blue Pilot Energy, LLC</b> 197 State Rte. 18 South Ste. 3000 East Brunswick, NJ 08816	(800) 451-6356  <a href="http://www.bluepilotenergy.com">www.bluepilotenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Brick Standard, LLC</b> 235 Hudson Street Suite 1 Hoboken, NJ 07030	(201)706-8101  <a href="http://www.standardalternative.com">www.standardalternative.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>CCES LLC dba Clean Currents Energy Services</b> 566 Terhune Street Teaneck, NJ 07666	(877) 933-2453  <a href="http://www.cleancurrents.com">www.cleancurrents.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Champion Energy Services, LLC</b> 1200 Route 22 Bridgewater, NJ 08807	(888) 653-0093  <a href="http://www.championenergyservices.com">www.championenergyservices.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Choice Energy, LLC</b> 4257 US Highway 9, Suite 6C Freehold, NJ 07728	(888) 565-4490  <a href="http://www.4choiceenergy.com">www.4choiceenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Clearview Electric, Inc.</b> 1744 Lexington Avenue Pennsauken, NJ 08110	(888) CLR-VIEW (800) 746- 4702 <a href="http://www.clearviewenergy.com">www.clearviewenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Commerce Energy, Inc.</b> 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674  <a href="http://www.commerceenergy.com">www.commerceenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Community Energy Inc.</b> 51 Sandbrook Headquarters Road Stockton, NJ 08559	(866)946-3123  <a href="http://www.communityenergyinc.com">www.communityenergyinc.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

<b>ConEdison Solutions</b> Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955  <a href="http://www.conedsolutions.com">www.conedsolutions.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>ConocoPhillips Company</b> 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 646-4427  <a href="http://www.conocophillips.com">www.conocophillips.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Constellation New Energy, Inc.</b> 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827  <a href="http://www.constellation.com">www.constellation.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Constellation Energy</b> 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995  <a href="http://www.constellation.com">www.constellation.com</a>	<b>R</b>  <b>ACTIVE</b>
<b>Constellation Energy Services, Inc.</b> <b>116 Village Boulevard</b> <b>Suite 200</b> <b>Princeton, NJ 08540</b>	1 (800) 536-0151  <a href="http://www.integrityenergy.com">www.integrityenergy.com</a>	<b>R/C/I</b>
<b>Corporate Services Support Corp.</b> <b>665 Howard Avenue</b> <b>Somerset, NJ 08873</b>	1(800) 761-4000  <a href="http://www.morganstanley.com">www.morganstanley.com</a>	<b>C</b>
<b>Credit Suisse, (USA) Inc.</b> 700 College Road East Princeton, NJ 08450	(800) 325-2000  <a href="http://www.creditsuisse.com">www.creditsuisse.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>Direct Energy Business, LLC</b> 1 Hess Plaza Woodbridge	(888) 925-9115  <a href="http://www.business.directenergy.com/">http://www.business.directenergy.com/</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Direct Energy Business Marketing, LLC (fka Hess Energy Marketing)</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872  <a href="http://www.business.directenergy.com/">http://www.business.directenergy.com/</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC)</b> One Hess Plaza Woodbridge, NJ 07095	(888) 925-9115  <a href="http://www.business.directenergy.com/small-business">http://www.business.directenergy.com/small-business</a>	<b>C/I</b>  <b>ACTIVE</b>



<b>Direct Energy Services, LLC</b> <b>1 Hess Plaza</b> <b>Woodbridge, NJ 07095</b>	1 (866) 348-4193  <a href="http://www.directenergy.com">www.directenergy.com</a>	<b>C/I</b>  <b>INACTIVE</b>
<b>Discount Energy Group, LLC</b> 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331  <a href="http://www.discountenergygroup.com">www.discountenergygroup.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>DTE Energy Supply, Inc.</b> One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450  <a href="http://www.dtesupply.com">www.dtesupply.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>EDF Energy Services, LLC</b> 1 Meadowlands Plaza Suite 200, Office No. 246 East Rutherford, NJ 07073	1 (877) 432-4530  <a href="http://www.edfenergyservices.com">www.edfenergyservices.com</a>	<b>C/I</b>
<b>Energy.me Midwest LLC</b> 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270  <a href="http://www.energy.me">www.energy.me</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Energy Plus Holdings LLC</b> 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193  <a href="http://www.energypluscompany.com">www.energypluscompany.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>EnerPenn d/b/a YEP Energy</b> 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736  <a href="http://www.yepenergyNJ.com">www.yepenergyNJ.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Ethical Electric Benefit Co. d/b/a Ethical Electric/d/b/a Clean Energy Option</b> 100 Overlook Center, 2 <sup>nd</sup> Fl. Princeton, NJ 08540	(888) 444-9452  <a href="http://www.ethicalelectric.com">www.ethicalelectric.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Energy Service Providers, Inc., d/b/a New Jersey Gas &amp; Electric</b> 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290  <a href="http://www.njgande.com">www.njgande.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Everyday Energy, LLC</b> <b>One International Blvd., Suite 400</b> <b>Mahwah, NJ 07495-0400</b>	844-684-5506  <a href="http://www.energyrewards.comcast.com">www.energyrewards.comcast.com</a>	<b>R/I</b>

<b>FirstEnergy Solutions</b> 150 West State Street Trenton, NJ 08608	(888) 254-63590-  <a href="http://www.fes.com">www.fes.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>First Point Power, LLC</b> 90 Washington Valley Road Bedminster, NJ 07921	(888) 875-1711  <a href="http://www.firstpointpower.com">www.firstpointpower.com</a>	<b>R/C/I</b>
<b>Frontier Utilities Northeast, LLC</b> 199 New Road, Suite 61-187 Linwood, NJ 08221	(877) 437-6930  <a href="http://www.frontierutilities.com">www.frontierutilities.com</a>	<b>R/C/I</b>
<b>Gateway Energy Services Corporation</b> <b>1 Hess Plaza</b> <b>Woodbridge, NJ 07095</b>	(800) 805-8586  <a href="http://www.gesc.com">www.gesc.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>GDF SUEZ Energy Resources NA, Inc.</b> 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374  <a href="http://www.gdfsuezenergyresources.com">www.gdfsuezenergyresources.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>GDF Suez Retail Energy Solutions LLC d/b/a THINK ENERGY</b> 333 Thornall St. Sixth Floor Edison, NJ 08819	1-866-252-0078  <a href="http://www.mythinkenergy.com">www.mythinkenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Glacial Energy of New Jersey, Inc.</b> 21 Pine Street, Suite 237 Rockaway, NJ 07866	(888) 452-2425  <a href="http://www.glacialenergy.com">www.glacialenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Global Energy Marketing LLC</b> 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778  <a href="http://www.globalp.com">www.globalp.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Greenlight Energy, Inc.</b> <b>2608 25<sup>th</sup> Road</b> <b>Astoria, NY 11102</b>	(888) 453-4427  <a href="http://www.greenlightenergy.us">www.greenlightenergy.us</a>	<b>R</b>
<b>Green Mountain Energy Company</b> 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818  <a href="http://www.greenmountain.com/commercial-home">www.greenmountain.com/commercial-home</a>	<b>C/I</b>  <b>ACTIVE</b>

<b>Harborside Energy LLC</b> 101 Hudson Street Suite 2100 Jersey City, NJ 07302	(877) 940-3835  <a href="http://www.harborsideenergynj.com">www.harborsideenergynj.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Hess Corporation</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872  <a href="http://www.hess.com">www.hess.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>HIKO Energy, LLC</b> 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908  <a href="http://www.hikoenergy.com">www.hikoenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
Holcim (US) Inc. 595 Morgan Boulevard Camden, NJ 08104	(800) 831-9507 ext. 4354  <a href="http://www.holcim.us">www.holcim.us</a>	<b>I</b>
<b>Hudson Energy Services, LLC</b> 7 Cedar Street Ramsey, New Jersey 07466	(877) Hudson 9  <a href="http://www.hudsonenergyservices.com">www.hudsonenergyservices.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>IDT Energy, Inc.</b> 550 Broad Street Newark, NJ 07102	(877) 887-6866  <a href="http://www.idtenergy.com">www.idtenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Independence Energy Group, LLC</b> 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708  <a href="http://www.chooseindependence.com">www.chooseindependence.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Inspire Energy Holdings LLC</b> 923 Haddonfield Road 3rd Fl. Building B2 Cherry Hill, NJ 08002	(866) 403-2620  <a href="http://www.inspireenergy.com">www.inspireenergy.com</a>	<b>R/C/I</b>
<b>Integrus Energy Services, Inc.</b> 33 Wood Ave, South, Suite 610 Iselin, NJ 08830	(800) 536-0151  <a href="http://www.integrusenergy.com">www.integrusenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Jsynergy, LLC</b> 445 Central Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020  <a href="http://Jsynergylc.com">Jsynergylc.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Kuehne Chemical Company, Inc.</b> 86 North Hackensack Avenue South Kearney, NJ 07032	(973) 589-0700  <a href="mailto:kuehnechemical@comcast.net">kuehnechemical@comcast.net</a>	<b>I</b>

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

<b>Nordic Energy Services, LLC</b> 50 Tice Boulevard, Suite 340 Woodcliff Lake, NJ 07677	(877) 808-1027  <a href="http://www.nordiceenergy.us.com">www.nordiceenergy.us.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>North American Power and Gas, LLC</b> 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086  <a href="http://www.napower.com">www.napower.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>North Eastern States, Inc. d/b/a Entrust Energy</b> 90 Washington Valley Road Bedminster, NJ 07921	(888) 521-5861  <a href="http://www.entrustenergy.com">www.entrustenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Oasis Power, LLC d/b/a Oasis Energy</b> 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046  <a href="http://www.oasisenergy.com">www.oasisenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Palmco Power NJ, LLC</b> One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862  <a href="http://www.PalmcoEnergy.com">www.PalmcoEnergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Park Power, LLC</b> 1200 South Church St. Suite 23 Mount Laurel, NJ 08054	(856) 778-0079  <a href="http://www.parkpower.com">www.parkpower.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Plymouth Rock Energy, LLC</b> 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937)  <a href="http://www.plymouthenergy.com">www.plymouthenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Power Management Co., LLC b/b/a PMC Lightsavers</b> Limited Liability Company 1600 Moseley Road Victor, NY 14564	(585) 249-1360  <a href="http://www.powermanagementco.com">www.powermanagementco.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>PPL Energy Plus, LLC</b> Shrewsbury Executive Offices 788 Shrewsbury Ave., Suite 2178 Tinton Falls, NJ 07724	(800) 281-2000  <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a>	<b>C</b>  <b>/I</b>  <b>ACTIVE</b>
<b>Progressive Energy Consulting, LLC</b> PO Box 4582 Wayne, New Jersey 07474	(917) 837-7400  <a href="mailto:Progressivenrg@optionline.net">Progressivenrg@optionline.net</a>	<b>R/C/I</b>  <b>ACTIVE</b>

<b>Prospect Resources, Inc.</b> 208 W. State Street Trenton, NJ 08608-1002	(847) 673-1959 <a href="http://www.prospectresources.com">www.prospectresources.com</a>	<b>C</b> <b>ACTIVE</b>
<b>Public Power &amp; Utility of New Jersey, LLC</b> One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415 <a href="http://www.ppandu.com">www.ppandu.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Reliant Energy</b> 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 <a href="http://www.reliant.com">www.reliant.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>ResCom Energy LLC</b> 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 <a href="http://rescom-energy.com">http://rescom-energy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Residents Energy, LLC</b> 550 Broad Street Newark, NJ 07102	(888) 828-7374 <a href="http://www.residentsenergy.com">www.residentsenergy.com</a>	<b>R/C</b>
<b>Respond Power LLC</b> 1001 East Lawn Drive Teaneck, NJ 07666	(888) 625-6760 <a href="http://www.majorenergy.com">www.majorenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Save on Energy, LLC</b> 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877)-658-3183 <a href="http://www.saveonenergy.com">www.saveonenergy.com</a>	<b>R/C</b>
<b>SFE Energy</b> One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 <a href="http://www.sfeenergy.com">www.sfeenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>S.J. Energy Partners, Inc.</b> 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666 <a href="http://www.sjnaturalgas.com">www.sjnaturalgas.com</a>	<b>C</b> <b>ACTIVE</b>
<b>SmartEnergy Holdings, LLC</b> 100 Overlook Center 2nd Floor Princeton, NJ NJ 08540 United States of America	(800) 443-4440 <a href="http://www.smartenergy.com">www.smartenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>South Jersey Energy Company</b> 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Spark Energy Gas, LP/ Spark Energy</b>	(713)600-2600	<b>R/C/I</b>

2105 City West Blvd. Suite 100 Houston, TX 77042	<a href="http://www.sparkenergy.com">www.sparkenergy.com</a>	<b>ACTIVE</b>
<b>Sperian Energy Corp.</b> 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082  <a href="http://www.sperianenergy.com">www.sperianenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Sprague Energy Corp.</b> 12 Ridge Road Chatham Township, NJ 07928	855-466-2842  <a href="http://www.spragueenergy.com">www.spragueenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Starion Energy PA Inc.</b> 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040  <a href="http://www.starionenergy.com">www.starionenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Stream Energy New Jersey, LLC</b> 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150  <a href="http://www.streamenergy.net">www.streamenergy.net</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Summit Energy Services, Inc.</b> 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT  <a href="http://www.summitenergy.com">www.summitenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Talen Energy Marketing, LLC</b> <b>788 Shrewsbury Avenue,</b> <b>Suite 2178 Tinton Falls, NJ</b> <b>07724</b>	(888) 289-7693  <a href="http://www.pplenergyplus.com/*">www.pplenergyplus.com/*</a>	<b>R/C</b>
<b>Texas Retail Energy LLC</b> Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663 Attn: Chris Hendrix	(866) 532-0761  Texasretailenergy.com	<b>C/I</b>  <b>ACTIVE</b>
<b>TransCanada Power Marketing Ltd.</b> 190 Middlesex Essex Turnpike, Suite 200 Iselin, NJ 08830	(877) MEGAWAT  <a href="http://www.transcanada.com/powermarketing">www.transcanada.com/powermarketing</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>TriEagle Energy, LP</b> 90 Washington Valley Rd Bedminster, NJ 07921	(877) 933-2453  <a href="http://www.trieagleenergy.com">www.trieagleenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

<b>UGI Energy Services, Inc. dba UGI Energy Link</b> 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 427-8545  <a href="http://www.ugienergylink.com">www.ugienergylink.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Verde Energy USA, Inc.</b> 2001 Route 46 Waterview Plaza Suite 301 Parsippany, NJ 07054	(800) 388-3862  <a href="http://www.lowcostpower.com">www.lowcostpower.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Viridian Energy</b> 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508  <a href="http://www.viridian.com">www.viridian.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>XOOM Energy New Jersey, LLC</b> 744 Broad Street. 16 <sup>th</sup> Floor Newark, NJ 07102	(888) 997-8979  <a href="http://www.xoomenergy.com">www.xoomenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Your Energy Holdings, LLC</b> One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493  <a href="http://www.thisisyourenergy.com">www.thisisyourenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

[Back to the main supplier page](#)



**PSE&G GAS SERVICE TERRITORY**  
**Last Updated 7/21/15**

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

<b>Supplier</b>	<b>Telephone &amp; Web Site</b>	<b>*Customer Class</b>
<b>Agera Energy, LLC</b> <b>115 route 46, Building F</b> <b>Parsippany, NJ 07054</b>	(844) 692-4372  <a href="http://www.ageraenergy.com">www.ageraenergy.com</a>	<b>R/C/I</b>
<b>Ambit Northeast, LLC d/b/a</b> <b>Ambit Energy</b> 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284  <a href="http://www.ambitenergy.com">www.ambitenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>American Power &amp; Gas of</b> <b>NJ, LLC</b> 10000 Lincoln Drive East – Suite 201 Marlton, NJ 08053	(800) 2057491  <a href="http://www.GoAPG.com">www.GoAPG.com</a>	<b>R/C/I</b>
<b>Amerigreen Energy, Inc.</b> 333 Sylvan Avenue Suite 305 Englewood Cliffs, NJ 07632	(888)559-4567  <a href="http://www.amerigreen.com">www.amerigreen.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Astral Energy LLC</b> 16 Tyson Place Bergenfield, NJ 07621	888-850-1872  <a href="http://www.AstralEnergyLLC.com">www.AstralEnergyLLC.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>BBPC, LLC Great Eastern</b> <b>Energy</b> 116 Village Blvd. Suite 200 Princeton, NJ 08540	888-651-4121  <a href="http://www.greateasternenergy.com">www.greateasternenergy.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>Choice Energy, LLC</b> <b>4257 US Highway 9, Suite 6C</b> <b>Freehold, NJ 07728</b>	(888) 565-4490  <a href="http://www.4choiceenergy.com">www.4choiceenergy.com</a>	<b>R/C/I</b>
<b>Clearview Electric Inc.</b> <b>d/b/a Clearview Gas</b> 1744 Lexington Ave. Pennsauken, NJ 08110	800-746-4720  <a href="http://www.clearviewenergy.com">www.clearviewenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>

<b>Colonial Energy, Inc.</b> 83 Harding Road Wyckoff, NJ 07481	845-429-3229  <a href="http://www.colonialgroupinc.com">www.colonialgroupinc.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Commerce Energy, Inc.</b> 7 Cedar Terrace Ramsey, NJ 07746	888 817-8572  <a href="http://www.commerceenergy.com">www.commerceenergy.com</a>	<b>R</b>  <b>ACTIVE</b>
<b>Compass Energy Services, Inc.</b> 33 Wood Avenue South, 610 Iselin, NJ 08830	866-867-8328  <a href="http://www.compassenergy.net">www.compassenergy.net</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Compass Energy Gas Services, LLC</b> 33 Wood Avenue South Suite 610 Iselin, NJ 08830	866-867-8328  <a href="http://www.compassenergy.net">www.compassenergy.net</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>ConocoPhillips Company</b> 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-646-4427  <a href="http://www.conocophillips.com">www.conocophillips.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Consolidated Edison Energy, Inc.</b> <b>d/b/a Con Edison Solutions</b> 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-686-1383 x2130  <a href="http://www.conedenergy.com">www.conedenergy.com</a>	
<b>Consolidated Edison Solutions, Inc.</b> Cherry Tree Corporate Center 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-665-0955  <a href="http://www.conedsolutions.com">www.conedsolutions.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Constellation NewEnergy-Gas Division, LLC</b> 116 Village Boulevard, Suite 200 Princeton, NJ 08540	800-785-4373  <a href="http://www.constellation.com">www.constellation.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Constellation Energy Gas Choice, Inc.</b> 116 Village Blvd., Suite 200 Princeton, NJ 08540	800-785-4373  <a href="http://www.constellation.com">www.constellation.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Constellation Energy Services Natural Gas, LLC</b> <b>116 Village Boulevard</b>	1 (800) 536-0151	<b>C/I</b>

<b>Suite 200 Princeton, NJ 08540</b>	<a href="http://www.integrysenergy.com">www.integrysenergy.com</a>	
<b>Direct Energy Business, LLC</b> 1 Hess Plaza Woodbridge, NJ 07095	888-925-9115 <a href="http://www.business.directenergy.com/">http://www.business.directenergy.com/</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Direct Energy Business Marketing, LLC (fka Hess Energy Marketing)</b> One Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 <a href="http://www.business.directenergy.com/">http://www.business.directenergy.com/</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC)</b> One Hess Plaza Woodbridge, NJ 07095	(888) 925-9115 <a href="http://www.business.directenergy.com/small-business">http://www.business.directenergy.com/small-business</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Direct Energy Services, LLC</b> <b>1 Hess Plaza</b> <b>Woodbridge, NJ 07095</b>	1 (866) 348-4193 <a href="http://www.directenergy.com">www.directenergy.com</a>	<b>C/I</b> <b>INACTIVE</b>
<b>Dominion Retail, Inc. d/b/a Dominion Energy Solutions</b> <b>395 Route #70 West, Suite 125 Lakewood, NJ 08701</b>	(866)237-4765 <a href="http://www.dominionenergy.com">www.dominionenergy.com</a>	<b>R/C</b>
<b>Everyday Energy, LLC</b> <b>One International Blvd., Suite 400</b> <b>Mahwah, NJ 07495-0400</b>	844-684-5506 <a href="http://www.energyrewards.comcast.com">www.energyrewards.comcast.com</a>	<b>R/I</b>
<b>Frontier Utilities Northeast, LLC</b> 199 New Road, Suite 61-187 Linwood, NJ 08221	(877) 437-6930 <a href="http://www.frontierutilities.com">www.frontierutilities.com</a>	<b>R/C/I</b>
<b>Glacial Energy of New Jersey, Inc.</b> 21 Pine Street, Suite 237 Rockaway, NJ 07866	888-452-2425 <a href="http://www.glacialenergy.com">www.glacialenergy.com</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Gateway Energy Services Corporation</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 805-8586 <a href="http://www.gesc.com">www.gesc.com</a>	<b>R/C</b> <b>ACTIVE</b>

<b>Global Energy Marketing, LLC</b> 129 Wentz Avenue Springfield, NJ 07081	800-542-0778 <a href="http://www.globalp.com">www.globalp.com</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Great Eastern Energy</b> 116 Village Blvd., Suite 200 Princeton, NJ 08540	888-651-4121 <a href="http://www.greateastern.com">www.greateastern.com</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Greenlight Energy</b> 2608 25 <sup>th</sup> Road Astoria, NY 11102	(888) 453-4427 <a href="http://www.greenlightenergy.us">www.greenlightenergy.us</a>	<b>R</b> <b>ACTIVE</b>
<b>Harborside Energy LLC</b> 101 Hudson Street, Suite 2100 Jersey City, NJ 07302	877-940-3835 <a href="http://www.harborsideenergynj.com">www.harborsideenergynj.com</a>	<b>R/C</b> <b>ACTIVE</b>
<b>Hess Energy, Inc.</b> One Hess Plaza Woodbridge, NJ 07095	800-437-7872 <a href="http://www.hess.com">www.hess.com</a>	<b>C/I</b> <b>ACTIVE</b>
<b>HIKO Energy, LLC</b> 655 Suffern Road Teaneck, NJ 07666	888 264-4908 <a href="http://www.hikoenergy.com">www.hikoenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Hudson Energy Services, LLC</b> 7 Cedar Street Ramsey, NJ 07466	877- Hudson 9 <a href="http://www.hudsonenergyservices.com">www.hudsonenergyservices.com</a>	<b>C</b> <b>ACTIVE</b>
<b>IDT Energy, Inc.</b> 550 Broad Street Newark, NJ 07102	877-887-6866 <a href="http://www.idtenergy.com">www.idtenergy.com</a>	<b>R/C</b> <b>ACTIVE</b>
<b>Infinite Energy dba Intelligent Energy</b> 1200 Route 22 East Suite 2000 Bridgewater, NJ 08807-2943	(800) 927-9794 <a href="http://www.InfiniteEnergy.com">www.InfiniteEnergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Integrlys Energy Services-Natural Gas, LLC</b> 101 Eisenhower Parkway Suite 300 Roseland, NJ 07068	(800) 536-0151 <a href="http://www.integrlysenergy.com">www.integrlysenergy.com</a>	<b>C/I</b> <b>ACTIVE</b>
<b>Jsynergy LLC</b> 445 Cental Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020 <a href="http://www.Jsnergylc.com">www.Jsnergylc.com</a>	<b>R/C/I</b> <b>ACTIVE</b>
<b>Major Energy Services, LLC</b> 1001 East Lawn Drive Teaneck NJ 07666	888-625-6760 <a href="http://www.majorenergy.com">www.majorenergy.com</a>	<b>R/C/I</b> <b>ACTIVE</b>

<b>Marathon Power LLC</b> 302 Main Street Paterson, NJ 07505	888-779-7255  <a href="http://www.mecny.com">www.mecny.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Metromedia Energy, Inc.</b> 6 Industrial Way Eatontown, NJ 07724	1-877-750-7046  <a href="http://www.metromediaenergy.com">www.metromediaenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Metro Energy Group, LLC</b> 14 Washington Place Hackensack, NJ 07601	888-53-Metro  <a href="http://www.metroenergy.com">www.metroenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>MPower Energy NJ LLC</b> One University Plaza, Suite 507 Hackensack, NJ 07601	877-286-7693  <a href="http://www.mpowerenergy.com">www.mpowerenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>NATGASCO (Supreme Energy, Inc.)</b> 532 Freeman Street Orange, NJ 07050	800-840-4427  <a href="http://www.supremeenergyinc.com">www.supremeenergyinc.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>New Energy Services LLC</b> 101 Neptune Avenue Deal, New Jersey 07723	800-660-3643  <a href="http://www.newenergyservicesllc.com">www.newenergyservicesllc.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>New Jersey Gas &amp; Electric</b> 10 North Park Place Suite 420 Morristown, NJ 07960	866-568-0290  <a href="http://www.njgande.com">www.njgande.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Noble Americas Energy Solutions</b> The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772  <a href="http://www.noblesolutions.com">www.noblesolutions.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>North American Power &amp; Gas, LLC d/b/a North American Power</b> 197 Route 18 South Ste. 300 New Brunswick, NJ 08816	888- 313-8086  <a href="http://www.napower.com">www.napower.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>North Eastern States, Inc. d/b/a Entrust Energy</b> 90 Washington Valley Road Bedminster, NJ 07921	(888) 521-5861  <a href="http://www.entrustenergy.com">www.entrustenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Oasis Power, LLC d/b/a Oasis Energy</b> 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046  <a href="http://www.oasisenergy.com">www.oasisenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>

<b>Palmco Energy NJ, LLC</b> One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862  <a href="http://www.PalmcoEnergy.com">www.PalmcoEnergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Plymouth Rock Energy, LLC</b> 338 Maitland Avenue Teaneck, NJ 07666	855-32-POWER (76937)  <a href="http://www.plymouthenergy.com">www.plymouthenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>PPL EnergyPlus, LLC</b> <b>Shrewsbury Executive</b> <b>Offices</b> 788 Shrewsbury Avenue Suite 2200 Tinton Falls, NJ 07724	(732) 741-0505  <a href="http://www.pplenenergyplus.com">www.pplenenergyplus.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Public Power &amp; Utility of</b> <b>New Jersey, LLC</b> One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415  <a href="http://www.ppandu.com">www.ppandu.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Residents Energy, LLC</b> 550 Broad Street Newark, NJ 07102	(888) 828-7374  <a href="http://www.residentsenergy.com">www.residentsenergy.com</a>	<b>R/C</b>
<b>Respond Power LLC</b> 1001 East Lawn Drive Teaneck, NJ 07666	(877) 973-7763  <a href="http://www.respondpower.com">www.respondpower.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Save on Energy, LLC</b> 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877) 658-3183  <a href="http://www.saveonenergy.com">www.saveonenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>SFE Energy</b> One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344  <a href="http://www.sfeenergy.com">www.sfeenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>S.J. Energy Partners, Inc.</b> 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666  <a href="http://www.sjnaturalgas.com">www.sjnaturalgas.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>Star Energy Partners, LLC</b> <b>CEO Corporate Center</b> <b>1812 Front Street</b> <b>Scotch Plains, NJ 07076</b>	(855) 427-7827  <a href="http://www.starenergypartners.com">www.starenergypartners.com</a>	<b>R/C/I</b>
<b>South Jersey Energy</b> <b>Company</b> 1 South Jersey Plaza, Route 54	800-266-6020  <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

Folsom, NJ 08037		
<b>SouthStar Energy d/b/a New Jersey Energy</b> 1085 Morris Avenue, Suite 155 Union, NJ 07083	(866) 477-8823  <a href="http://www.newjerseyenergy.com">www.newjerseyenergy.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Spark Energy Gas, LP/ Spark Energy</b> 2105 City West Blvd. Suite 100 Houston, TX 77042	(713)600-2600  <a href="http://www.sparkenergy.com">www.sparkenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Sperian Energy Corp.</b> Bridgewater Center 1200 Route 22 East Bridgewater, NJ 08807	888-682-8082  <a href="http://www.sperianenergy.com">www.sperianenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Sprague Energy Corp.</b> 12 Ridge Road Chatham Township, NJ 07928	855-466-2842  <a href="http://www.spragueenergy.com">www.spragueenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Stuyvesant Energy LLC</b> 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-640-6457  <a href="http://www.stuyfuel.com">www.stuyfuel.com</a>	<b>C</b>  <b>ACTIVE</b>
<b>Stream Energy New Jersey, LLC</b> 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150  <a href="http://www.streamenergy.net">www.streamenergy.net</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Summit Energy Services, Inc.</b> 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT  <a href="http://www.summitenergy.com">www.summitenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Systrum Energy</b> 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786  <a href="http://www.systrumenergy.com">www.systrumenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Talen Energy Marketing, LLC</b> <b>788 Shrewsbury Avenue,</b> <b>Suite 2178</b> <b>Tinton Falls, NJ 07724</b>	(888) 289-7693  <a href="http://www.pplenergyplus.com/*">www.pplenergyplus.com/*</a>	<b>R/C</b>
<b>Tiger Natural Gas, Inc. dba Tiger, Inc.</b> 234 20th Avenue Brick, NJ 008724	888-875-6122  <a href="http://www.tignaturalgas.com">www.tignaturalgas.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

<b>UGI Energy Services, Inc. dba UGI Energy Link</b> 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-427-8545  <a href="http://www.ugienergylink.com">www.ugienergylink.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>UGI Energy Services, Inc. d/b/a GASMAR</b> 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995  <a href="http://www.ugienergylink.com">www.ugienergylink.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>Verde Energy USA, Inc.</b> 2001 Route 46 Waterview Plaza, Suite 301 Parsippany, NJ 07054	800-388-3862  <a href="http://www.lowcostpower.com">www.lowcostpower.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Viridian Energy PA LLC</b> 2001 Route 46, Waterview Plaza Suite 230 Parsippany, NJ 07054	866-663-2508  <a href="http://www.viridian.com">www.viridian.com</a>	<b>R/C</b>  <b>ACTIVE</b>
<b>Vista Energy Marketing, L.P.</b> 197 State Route 18 South, Suite 3000 South Wing East Brunswick, NJ 08816	888-508-4782  <a href="http://www.vistaenergymarketing.com">www.vistaenergymarketing.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Woodruff Energy</b> 73 Water Street PO Box 777 Bridgeton, NJ 08302	800-557-1121  <a href="http://www.woodruffenergy.com">www.woodruffenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Woodruff Energy US LLC</b> 73 Water Street P.O. Box 777 Bridgeton, NJ 08302	800-457-1121  <a href="http://www.woodruffenergy.com">www.woodruffenergy.com</a>	<b>C/I</b>  <b>ACTIVE</b>
<b>XOOM Energy New Jersey, LLC</b> 744 Broad Street. 16th Floor Newark, NJ 07102	888-997-8979  <a href="http://www.xoomenergy.com">www.xoomenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>
<b>Your Energy Holdings, LLC</b> One International Boulevard Suite 400 Mahwah, NJ 07495-0400	855-732-2493  <a href="http://www.thisisyourenergy.com">www.thisisyourenergy.com</a>	<b>R/C/I</b>  <b>ACTIVE</b>

[Back to main supplier information page](#)



## **APPENDIX B**

### **Equipment Inventory**

CHA Project # 30993  
City of East Orange  
Recreation Center

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type/ Utility	Capacity/Size /Efficiency	Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.	Current year	Years Old	ASHRAE life expectancy
DHW Heater	2	A O Smith	FSG 75 230	FSG-75-JOONO1000	DHW Heater	75MBH Input and 76.8gallon storage	80% Efficiency	Mechanical Room	the whole building	1994	-2		2016	22	20
Boiler	1	H B Smith	11	N/A	HHW Boiler	998.3MBH heating input	~80%	Mechanical Room	the whole building	1950	-46		2016	66	20
Boiler	1	H B Smith	11	N/A	HHW Boiler	998.3MBH heating input	~80%	Mechanical Room	Failed and Does not work anymore	1950	-46		2016	66	20
HHW Pump Motor	1	Armstrong	N/A	N/A	pump	2HP	89.5% Eff.	Mechanical Room	the whole building	1950	-46	name plate faded	2016	66	20
RTU	1	Nesbitt	N/A	N/A	RTU	N/A	81.1% heating eff.	Mechanical Room	Failed and Does not work anymore	1950	-46		2016	66	20
Unit heater	20	Dimplex	N/A	N/A	unit heater	4kW	N/A	Hallways offices	Hallways and offices	1990	-6		2016	26	20
Portable AC	5	LG	LP1111WXR	4469334	portable AC	0.92 ton cooling capacity	EER of 9.2	Offices	Offices	1994	-2		2016	22	20
Window AC	6	LG	LW1511ER	N/A	Window AC	1.25 ton cooling capacity	EER of 10.8	Offices	Offices	1994	-2		2016	22	20

Cost of Electricity:

\$0.150	\$/kWh
\$8.00	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	Usage Describe Usage Type using Operating Hours	No. of Fixtures No. of fixtures before the retrofit	Standard Fixture Code Lighting Fixture Code	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control Pre-inst. control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/space) * (Annual Hours)	Retrofit control device	
41LED	Basement Office	Offices	4	1B 40 R F 2 (MAG)	F42LL	68	0.27	SW	1920	522	C-OCC	
41LED	Storage	Storage Areas	2	1B 40 R F 2 (MAG)	F42LL	68	0.14	SW	480	65	C-OCC	
41LED	Hallway	Hallways	16	1B 40 R F 2 (MAG)	F42LL	68	1.09	SW	5760	6,267	NONE	
185LED	Office	Offices	4	T 40 R F 4 (ELE)	F44SE	140	0.56	SW	1920	1,075	C-OCC	
32LED	Locker	Locker	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	960	346	NONE	
41LED	Locker	Locker	2	1B 40 R F 2 (MAG)	F42LL	68	0.14	SW	960	131	NONE	
71LED	Locker	Locker	2	I 60	I 60/1	60	0.12	SW	960	115	NONE	
185LED	Office	Offices	12	T 40 R F 4 (ELE)	F44SE	140	1.68	SW	1920	3,226	C-OCC	
185LED	Lab	Lab	10	T 40 R F 4 (ELE)	F44SE	140	1.40	SW	1200	1,680	NONE	
185LED	Building Main.	Offices	9	T 40 R F 4 (ELE)	F44SE	140	1.26	SW	1920	2,419	C-OCC	
185LED	Conf	Conference	12	T 40 R F 4 (ELE)	F44SE	140	1.68	SW	960	1,613	C-OCC	
185LED	Office	Offices	4	T 40 R F 4 (ELE)	F44SE	140	0.56	SW	1920	1,075	C-OCC	
185LED	Storage	Storage Areas	8	T 40 R F 4 (ELE)	F44SE	140	1.12	SW	480	538	C-OCC	
185LED	Program Office	Offices	3	T 40 R F 4 (ELE)	F44SE	140	0.42	SW	1920	806	C-OCC	
185LED	Storage	Storage Areas	2	T 40 R F 4 (ELE)	F44SE	140	0.28	SW	480	134	C-OCC	
185LED	Program Office	Offices	2	T 40 R F 4 (ELE)	F44SE	140	0.28	SW	1920	538	C-OCC	
185LED	Program Office	Offices	6	T 40 R F 4 (ELE)	F44SE	140	0.84	SW	1920	1,613	C-OCC	
185LED	Program Office	Offices	2	T 40 R F 4 (ELE)	F44SE	140	0.28	SW	1920	538	C-OCC	
185LED	Program Office	Offices	2	T 40 R F 4 (ELE)	F44SE	140	0.28	SW	1920	538	C-OCC	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
185LED	Storage	Storage Areas	2	T 40 R F 4 (ELE)	F44SE	140	0.28	SW	480	134	C-OCC	
185LED	Office	Offices	3	T 40 R F 4 (ELE)	F44SE	140	0.42	SW	1920	806	C-OCC	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
5LED	Women	Restroom	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.18	SW	960	173	C-OCC	
71LED	Stair	Hallways	1	I 60	I 60/1	60	0.06	SW	5760	346	NONE	
5LED	Stair	Hallways	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.18	SW	5760	1,037	NONE	
5LED	Men	Restroom	4	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.24	SW	960	230	C-OCC	
41LED	Gym	Gymnasium	54	1B 40 R F 2 (MAG)	F42LL	68	3.67	SW	480	1,763	NONE	
71LED	Storage	Storage Areas	6	I 60	I 60/1	60	0.36	SW	480	173	C-OCC	
41LED	Stage	Gymnasium	11	1B 40 R F 2 (MAG)	F42LL	68	0.75	SW	480	359	NONE	
185LED	Hallway	Hallways	4	T 40 R F 4 (ELE)	F44SE	140	0.56	SW	5760	3,226	NONE	
185LED	Pantry	Offices	3	T 40 R F 4 (ELE)	F44SE	140	0.42	SW	1920	806	C-OCC	
5LED	Pantry	Offices	1	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.06	SW	1920	115	C-OCC	
5LED	Hallway	Hallways	4	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.24	SW	5760	1,382	NONE	
5LED	Fun Room	Offices	12	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.72	SW	1920	1,382	C-OCC	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
5LED	Weight	Gymnasium	12	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.72	SW	480	346	NONE	
71LED	Restroom	Restroom	1	I 60	I 60/1	60	0.06	SW	960	58	C-OCC	
71LED	Stair	Hallways	1	I 60	I 60/1	60	0.06	SW	5760	346	NONE	
64LED	Outdoor	Outdoor Lighting	1	175 MH	MH175/1	215	0.22	SW	2880	619	NONE	
									960			
	Total		239				22.25			36,827		

## **APPENDIX C**

### **ECM Calculations**

Page 2, ECM-L3

City of East Orange  
CHA Project Number: 30993

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$	0.217	\$/kWh blended			Electric	Natural Gas	Fuel Oil
\$	0.150	\$/kWh supply	64,100		\$ 13,929	\$ 8,577	
\$	8.00	\$/kW	64.2				
\$	1.13	\$/Therm	7,598				
\$	5.00	\$/kgals					
		\$/Gal					

water

Recommend?  Y or N	Recreation Center																							
		Item	Savings					Cost	Simple Payback	Life Expectancy	GHG Reduction (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR		
			kW	kWh	therms	No. 2 Oil gal	Water kgal								\$	kW	kWh	therms	kgal/yr				\$	
N	ECM-1	Replace Single Pane Windows with Double Pane Windows	0.0	0	557	0	0	628	\$ 51,000	81.2	15	3.0	\$ -	N	81.2	0.0	0	8,348	0	\$ 9,425	(0.8)	(\$43,499)	-16.2%	
Y	ECM-2	Replace the Old Boiler with a Condensing Boiler	0.0	0	1,230	0	0	1,389	\$ 41,604	29.9	25	6.6	\$ 1,320	N	29.0	0.0	0	30,761	0	\$ 34,729	(0.2)	(\$16,094)	-1.1%	
Y	ECM-3	Install Thermostats on FCUs and UVs	0.0	0	479	0	0	541	\$ 19,548	36.2	25	2.6	\$ 1,320	N	33.7	0.0	0	11,970	0	\$ 13,515	(0.3)	(\$8,815)	-2.2%	
Y	ECM-4	Install Window AC Controller	0.0	788	0	0	0	171	\$ 1,800	10.5	15	0.3	\$ -	N	10.5	0.0	11,820	0	0	\$ 2,565	0.4	\$241	4.8%	
N	ECM-5	Replace the DHW Heaters with Condensing Heaters	0.0	0	44	0	0	50	\$ 5,657	112.6	20	0.2	\$ 150	N	109.7	0.0	0	890	0	\$ 1,004	(0.8)	(\$4,760)	-12.6%	
N	ECM-6	Replace Old Plumbing Fixtures with Low Flow Plumbing Fixtures	0.0	0	100	0	42	324	\$ 29,758	92.0	10	0.5	\$ -	N	92.0	0.0	0	998	422	\$ 3,236	(0.9)	(\$26,997)	-28.0%	
Y	ECM-L1	Lighting Replacements with Controls (Occupancy Sensors)	12.7	23,360	0	0	0	4,727	67,306	14.2	10	9.8	\$ 3,535	N	13.5	127.4	233,600	0	0	\$ 62,922	(0.1)	(\$23,448)	-5.1%	
Total			12.7	24,148	2,410	0	42	\$ 7,830	\$ 216,673	27.7	17.1	23	\$ 6,325		26.9	127	245,420	52,967	422	\$ 127,396	(0.4)	(123,372)	-4.7%	
Recommended Measures (highlighted green above)			12.7	24,148	1,709	0	0	\$ 6,828	\$ 130,258	19.1	18.8	19	\$ 6,175		0	18.2	127	245,420	42,731	-	\$ 113,730	(0.1)	(48,116)	-0.1%
% of Existing			20%	38%	22%	0	0																	

City:		Newark, NJ					
Occupied Hours/Week		60					
		Building	Auditorium	Gymnasium	Library	Classrooms	
		Operating	Occupied	Occupied	Occupied	Occupied	
Temp	Enthalpy h (Btu/lb)	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5							
97.5	35.4	6	2	0	0	0	0
92.5	37.4	31	11	0	0	0	0
87.5	35.0	131	47	0	0	0	0
82.5	33.0	500	179	0	0	0	0
77.5	31.5	620	221	0	0	0	0
72.5	29.9	664	237	0	0	0	0
67.5	27.2	854	305	0	0	0	0
62.5	24.0	927	331	0	0	0	0
57.5	20.3	600	214	0	0	0	0
52.5	18.2	730	261	0	0	0	0
47.5	16.0	491	175	0	0	0	0
42.5	14.5	656	234	0	0	0	0
37.5	12.5	1,023	365	0	0	0	0
32.5	10.5	734	262	0	0	0	0
27.5	8.7	334	119	0	0	0	0
22.5	7.0	252	90	0	0	0	0
17.5	5.4	125	45	0	0	0	0
12.5	3.7	47	17	0	0	0	0
7.5	2.1	34	12	0	0	0	0
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	78%
Cooling Eff (kW/ton)	1.2

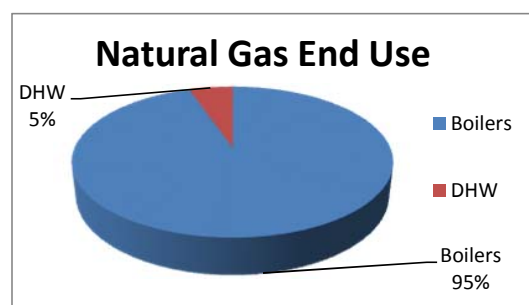
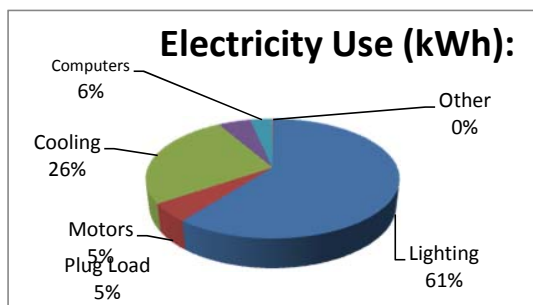
Heating	
Hours	9,454 Hrs
Weighted Avg	2 F
Avg	25 F

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

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
64,100	Total	Based on utility analysis
37,000	Lighting	From Lighting Calculations
3,000	Motors	Estimated
16,000	Cooling	Calculated from Cooling Capacity
3,000	Plug Load	Estimated
2,000	Computers	Estimated
100	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
7,598	Total	Based on utility analysis
7,198	Boilers	
400	DHW	Based on utility analysis

58%  
5%  
25%  
5%  
3%  
0%

95%  
5%



City of East Orange  
CHA Project Number: 30993  
Recreation Center

Note: pricing is for energy calculations only -do not use for procurement

ECM-1 Replace Single Pane Windows with Double Pane Windows

Existing: The windows in this building are still single pane windows which needs to be upgraded to reduce heating lo  
Proposed: Replace single pane windows with double pane window

Linear Feet of Windows	300.0 LF	Cooling System Efficiency	0 kW/ton	Heating System Efficiency	78%
Area of Windows	360.0 SF	Ex Occupied Cing Temp.	74 °F	Heating On Temp.	60 °F
Existing Infiltration Factor	0.30 cfm/LF	Ex Unoccupied Cing Temp.	80 °F	Ex Occupied Htg Temp.	70 °F
Proposed Infiltration Factor	0.15 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	65 °F
Existing U Value	1.13 Btuh/SF°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.217 \$/kWh
Proposed U Value	0.50 Btuh/SF°F			Natural Gas	\$ 1.13 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Enthalpy	Air	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
						Occupied	Unoccupied	Occupied	Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy Therms	Proposed Heating Energy Therms
						Panel Infiltration & Heat Load BTUH	Panel Infiltration & Heat Load BTUH	Panel Infiltration & Heat Load BTUH	Panel Infiltration & Heat Load BTUH	I	J	K	L
102.5	50.1		0	0	0	-20,747	-18,306	-9,707	-8,627	0	0	0	0
97.5	42.5		6	2	4	-15,635	-13,194	-7,268	-6,188	0	0	0	0
92.5	39.5		45	16	29	-12,386	-9,945	-5,760	-4,680	0	0	0	0
87.5	36.6		146	52	94	-9,177	-6,737	-4,273	-3,193	0	0	0	0
82.5	34.0		298	106	192	-6,090	-3,650	-2,846	-1,766	0	0	0	0
77.5	31.6		476	170	306	-3,084	0	-1,460	0	0	0	0	0
72.5	29.2		662	237	426	0	0	0	0	0	0	0	0
67.5	27.0		740	264	476	0	0	0	0	0	0	0	0
62.5	24.5		765	273	492	0	0	0	0	0	0	0	0
57.5	21.4		733	262	471	6,300	3,780	2,858	1,715	0	0	44	20
52.5	18.7		668	239	430	8,820	6,300	4,001	2,858	0	0	62	28
47.5	16.2		659	235	424	11,340	8,820	5,144	4,001	0	0	82	37
42.5	14.4		685	245	441	13,860	11,340	6,287	5,144	0	0	108	49
37.5	12.6		739	264	475	16,380	13,860	7,430	6,287	0	0	140	63
32.5	10.7		717	256	461	18,900	16,380	8,573	7,430	0	0	159	72
27.5	8.6		543	194	349	21,420	18,900	9,716	8,573	0	0	138	63
22.5	6.8		318	114	205	23,940	21,420	10,859	9,716	0	0	91	41
17.5	5.5		245	88	158	26,460	23,940	12,002	10,859	0	0	78	35
12.5	4.1		156	56	100	28,980	26,460	13,145	12,002	0	0	55	25
7.5	2.6		92	33	59	31,500	28,980	14,288	13,145	0	0	35	16
2.5	1.0		36	13	23	34,020	31,500	15,431	14,288	0	0	15	7
-2.5	0.0		19	7	12	36,540	34,020	16,574	15,431	0	0	9	4
-7.5	-1.5		8	3	5	39,060	36,540	17,717	16,574	0	0	4	2
TOTALS			8,760	3,129	5,631					0	0	1,019	462

Existing Panel Infiltration	90 cfm	Savings	557 Therms	\$ 628
Existing Panel Heat Transfer	407 Btuh/°F		0 kWh	\$ -
Proposed Panel Infiltration	45 cfm			\$ 628
Proposed Panel Heat Transfer	180 Btuh/°F			

Panel ID	Location	Quantity	Width (ft)	Height (ft)	Linear Feet (LF)	Area (SF)	Infiltration Rate (CFM/LF)	U Value (Btuh/SF°F)	Infiltration (CFM)	Heat Transfer (Btuh/°F)
1	whole building	15	4	6	300.0	360.0	0.3	1.13	90.0	406.8
Total		15	4	6	300	360	0.30	1.13	90.0	406.8

\*the number of the windows suitable for replacement is estimated based on facility staff and field observation. The final counts should be conducted by the window contractor for the actual replacement amount



Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

**ECM-1 Replace Single Pane Windows with Double Pane Windows - Cost**

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Window Replacement	360	sqft	\$ 65	\$ 40	\$ -	\$ 23,400	\$ 14,400	\$ -	\$ 37,800	Vendor Est per SF

Cost estimated are for Energy Savings only- do not use for procurement

\$ 37,800	Subtotal
\$ 13,230	35% Contingency
<b>\$ 51,000</b>	<b>Total</b>

City of East Orange  
CHA Project Number: 30993  
Recreation Center

**ECM-2 Replace the Old Boiler with a Condensing Boiler**

Description: This ECM evaluates replacing the existing boiler with a high efficiency condensing boiler.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 1.13	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	767,843	btu/hr	Estimated Boiler Load % and Capacity
Heating Combustion Efficiency	78%		Estimated averaged Efficiency
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	57	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	767,843	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	1,230	therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 1,389		

Savings calculation formulas are taken from NJ Protocols document for Occupancy Controlled Thermostats

## Algorithms

### *Gas Savings (Therms)*

$$= \frac{OF \times ((CAPY_{Bi} \times EFF_Q) - (CAPY_{Qi} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

### Definition of Variables

OF = Oversize factor of standard boiler or furnace (OF=0.8)

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

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

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

24 = Hours/Day

ΔT = design temperature difference

HC<sub>fuel</sub> = Conversion from Btu to therms of gas or gallons of oil or propane (100,000 btu/therm; 138,700 btu/gal of #2 oil; 92,000 btu/gal of propane)

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

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

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

### Furnaces and Boilers

Component	Type	Value	Source
$AFUE_q$	Variable		Application
$AFUE_b$	Fixed	Furnaces: 78% Boilers: 80% Infrared: 78%	EPACT Standard for furnaces and boilers
$CAPY_{in}$	Variable		Application
$\Delta T$	Variable	See Table Below	1
$HDD_{mod}$	Fixed	See Table Below	1

Sources:

1. KEMA, *Smartstart Program Protocol Review*. 2009.
2. [http://www.spaceray.com/1\\_space-ray\\_faqs.php](http://www.spaceray.com/1_space-ray_faqs.php)

### Adjusted Heating Degree Days by Building Type

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

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

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

City of East Orange

CHA Project Number: 30993

Recreation Center

**ECM-2 Replace the Old Boiler with a Condensing Boiler-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.		
BMK1000 NG Condensing Boiler	1	EA	\$ 20,000	\$ 4,600		\$ 20,540	\$ 5,732	\$ -	\$ 26,272	Vendor Estimate
Flue Installation	1	LS	\$ 500.0	\$ 500.0		\$ 514	\$ 623	\$ -	\$ 1,137	Estimated
controls	1	EA	\$ 500.0	\$ 500.0		\$ 514	\$ 623	\$ -	\$ 1,137	Estimated
Miscellaneous Electrical	1	LS	\$ 500.0	\$ 500.0		\$ 514	\$ 623	\$ -	\$ 1,137	Estimated
Miscellaneous HW Piping	1	LS	\$ 500.0	\$ 500.0		\$ 514	\$ 623	\$ -	\$ 1,137	Estimated
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 30,818	Subtotal
\$ 10,786	35% Contingency
<b>\$ 41,604</b>	<b>Total</b>

City of East Orange  
CHA Project Number: 30993  
Recreation Center

ECM-3 Install Thermostats on FCUs and UVs

Description: This ECM evaluates installing thermostat control valves on the fan coil units and unit heaters to have more accurate control on the room temperature (temeprature setback at night) and reduce energy usage

Day Setback			Nighttime Setback			
EXISTING CONDITIONS			EXISTING CONDITIONS			
Heating			Heating			
Heating Season Facility Temp	78	F	Th	Heating Season Facility Temp	78	F
Weekly Occupied Hours	60	hrs	H	Weekly Occupied Hours	60	hrs
Heating Season Setback Temp	72	F	Sh	Heating Season Setback Temp	68	F
Heating Season % Savings per	1%		Ph	Heating Season % Savings per	3%	
Annual Boiler Capacity	719,800	Mbtu/yr		Annual Boiler Capacity	719,800	Mbtu/yr
Connected Heating Load	298,610	Btu/hr	Caph	Connected Heating Load Capacity	298,610	Btu/hr
Equivalent Full Load Heating	900	hrs	EFLHh	Equivalent Full Load Heating Hours	500	hrs
Heating Equipment Efficiency	78%		AFUEh	Heating Equipment Efficiency	78%	
S A V I N G S			S A V I N G S			
Natural Gas Savings	127	Therms <sup>3</sup>		Natural Gas Savings	352	Therms <sup>3</sup>
Cooling Electricity Savings	0	kWh		Cooling Electricity Savings	0	kWh

\$0.22 \$/kWh Blended \$1.13 \$/Therm	COMBINED SAVINGS	
	Natural Gas Savings	479 Therms
	Cooling Electricity Savings	0 kWh
	Total Cost Savings	\$ 541
	Estimated Total Project Cost	\$ 19,548
	Simple Payback	36.2 Yrs

Savings calculation formulas are taken from NJ Protocols document for Occupancy Controlled Thermostats

### Algorithms

Cooling Energy Savings (kWh) =  $((T_c * (H+5) + S_c * (168 - (H+5))) / 168) * T_c * (P_c * Cap_{hp} * 12 * EFLH_c / EER_{hp})$

Heating Energy Savings (kWh) =  $((T_h * (H+5) + S_h * (168 - (H+5))) / 168) - T_h * (P_h * Cap_{hp} * 12 * EFLH_h / EER_{hp})$

Heating Energy Savings (Therms) =  $(T_h - (T_h * (H+5) + S_h * (168 - (H+5))) / 168) * (P_h * Cap_{hp} * EFLH_h / AFUE_h / 100,000)$

### Definition of Variables

$T_h$  = Heating Season Facility Temp. (°F)

$T_c$  = Cooling Season Facility Temp. (°F)

$S_h$  = Heating Season Setback Temp. (°F)

$S_c$  = Cooling Season Setup Temp. (°F)

$H$  = Weekly Occupied Hours

$Cap_{hp}$  = Connected load capacity of heat pump/AC (Tons) – Provided on Application.

$Cap_h$  = Connected heating load capacity (Btu/hr) – Provided on Application.

$EFLH_c$  = Equivalent full load cooling hours

$EFLH_h$  = Equivalent full load heating hours

$P_h$  = Heating season percent savings per degree setback

$P_c$  = Cooling season percent savings per degree setup

$AFUE_h$  = Heating equipment efficiency – Provided on Application.

$EER_{hp}$  = Heat pump/AC equipment efficiency – Provided on Application

### Occupancy Controlled Thermostats

Component	Type	Value	Source
$T_h$	Variable		Application
$T_c$	Variable		Application
$S_h$	Fixed	$T_h - 5^\circ$	
$S_c$	Fixed	$T_c + 5^\circ$	
$H$	Variable		Application; Default of 56 hrs/week
$Cap_{hp}$	Variable		Application
$Cap_h$	Variable		Application
$EFLH_c$	Fixed	381	1
$EFLH_h$	Fixed	900	PSE&G
$P_h$	Fixed	3%	2
$P_c$	Fixed	6%	2
$AFUE_h$	Variable		Application
$EER_{hp}$	Variable		Application

### Sources:

1. JCP&L metered data from 1995-1999
2. ENERGY STAR Products website

City of East Orange  
CHA Project Number: 30993  
Recreation Center

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

ECM-3 Install Thermostats on FCUs and UVs - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Boiler Controller	1	ea	\$ 5,000	\$ 7,500		\$ 5,135	\$ 9,345	\$ -	\$ 14,480	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 14,480	Subtotal
\$ 5,068	35% Contingency
\$ 19,548	Total



EQUIPMENT	AREA/EQUIPMENT SERVED	COOLING CAPACITY (btu/h)		
Window AC	Office	72,000	12,000	6 units
Total btu/h of all window A/C Units:		72,000	btu/h	6 unitss

ECM-4 Install Window AC Controller

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

ASSUMPTIONS		Comments
Electric Cost	\$0.217 / kWh	
Average run hours per Week	60 Hours	
Space Balance Point	55 F	
Space Temperature Setpoint	72 deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	72,000 Btu / Hr	Total BTU/hr of DX cooling equipment to be replaced.
Average EER	11.0	
Existing Annual Electric Usage	2,214 kWh	

Item	Value	Units	Comments
Proposed Annual Electric Usage	1,426	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS	
Annual Electrical Usage Savings	788 kWh
Annual Cost Savings	\$171
Total Project Cost	\$1,800
Simple Payback	11 years

OAT - DB Bin Temp F	Annual Hours	Existing Hours of Operation	Proposed % of time of operation	Proposed hrs of Operation
102.5	0	0	100%	0
97.5	6	5	100%	5
92.5	31	24	100%	24
87.5	131	90	87%	78
82.5	500	289	73%	212
77.5	620	294	60%	176
72.5	664	245	47%	114
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	730	0	0%	0
47.5	491	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	34	0	0%	0
2.5	1	0	0%	0
-2.5	5,027	0	0%	0
-7.5	0	0	0%	0
Total	13,787	947	64%	610

City of East Orange  
CHA Project Number: 30993  
Recreation Center

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4 Install Window AC Controller - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						0	\$ -	\$ -	\$ -	
Window AC Controller	6	EA	\$ 100	\$ 100	\$ -	616.2	\$ 748	\$ -	\$ 1,364	Estimated
						\$ -	\$ -	\$ -	\$ -	

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

\$ 1,364	Subtotal
\$ 477	35% Contingency
\$ 1,800	Total

**City of East Orange**  
**CHA Project Number: 30993**  
**Recreation Center**

**ECM-5 Replace the DHW Heaters with Condensing Heaters**

Description: This ECM evaluates the energy savings associated with replacing the existing DHW heater with a condensing heater

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	33	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	40,000	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	32,000	MBTU/yr	
Existing Tank Size	77	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	Per building personnel
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		( 2.5% of stored capacity per hour, per U.S. Department of Energy )
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,155	MBTU/yr	
New Tank Size	77	Gallons	Based on Takagi Flash T-H1 instantaneous, condensing DHW Heater
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		( 2.5% of stored capacity per hour, per U.S. Department of Energy )
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,151	MBTU/yr	
Total Annual Hot Water Demand	31,996	MBTU/yr	
Proposed Avg. Hot water heater efficiency	90%		Estimated
Proposed Fuel Use	356	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$1.13	\$/Therm	
Existing Operating Cost of DHW	\$452	\$/yr	
Proposed Operating Cost of DHW	\$401	\$/yr	

**Savings Summary:**

Utility	Energy Savings	Cost Savings
Therms/yr	44	\$50

City of East Orange  
CHA Project Number: 30993  
Recreation Center

ECM-5 Replace the DHW Heaters with Condensing Heaters - 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.		
Condensing Heater	2	EA	\$ 1,250	\$ 250		\$ 2,568	\$ 623	\$ -	\$ 3,191	From Internet Price/ Estimated Cost*
Miscellaneous Electrical/Controls	1	LS				\$ -	\$ -	\$ -	\$ 1,000	Estimated

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

\$ 4,191	Subtotal
\$ 1,467	35% Contingency
\$ 5,657	Total

**City of East Orange**  
**CHA Project Number: 30993**  
**Recreation Center**

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$5.00	\$ / kGal
Urinals in Building to be replaced	3	
Average Flushes / Urinal (per Day)	5	
Average Gallons / Flush	1.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	3	
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	8.21	kGal / year
Proposed Urinal Water Use	0.68	kGal / year
Water Savings	7.53	kGal / year
Cost Savings	\$38	/ year

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

City of East Orange  
CHA Project Number: 30993  
Recreation Center

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

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$5.00	\$ / kGal
Toilets in Building	3	
Average Flushes / Toilet (per Day)	3	
Average Gallons / Flush	3.5	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	3	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	11.50	kGal / year
Proposed Toilet Water Use	4.20	kGal / year
Water Savings	7.29	kGal / year
Cost Savings	\$36	/ year

**City of East Orange**  
**CHA Project Number: 30993**  
**Recreation Center**

**ECM: Replace faucets and shower with low flow**

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

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$5.00	\$ / kGal
Faucets in Building	6	
Average Uses / Faucet (per day)	1	# Uses
Average Time of Use	500.0	seconds
Average Flowrate	2.0	gpm

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	6	
Proposed Flowrate	0.5	gpm

HEATING SAVINGS		
Fuel Cost	\$ 1.13	/kWh
Number of Faucets	6	
Hours per Day of Usage	0.1	hrs
Days per Year of Facility Usage	365	days
Average Flowrate	2.0	gpm
Proposed Flowrate	0.5	gpm
Heat Content of Water	8.33	Btu/gal/F
Temperature Difference (Intake and Output)	35	F
Water Heating Equipment Efficiency	80%	
Conversion Factor	100,000	Btu/Therm
SAVINGS		
Current Faucet Water Use	36.50	kGal / year
Proposed Faucet Water Use	9.13	kGal / year
Water Savings	27.38	kGal / year
Heating Savings	100	Therms
Cost Savings	\$250	/ year

Savings calculation formulas are taken from NJ Protocols document for Faucet

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

City of East Orange  
CHA Project Number: 30993  
Recreation Center

**#REF!**

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Low-Flow Urinal	3	EA	\$ 1,200	\$ 1,000	\$ -	\$ 3,697	\$ 3,738	\$ -	\$ 7,435	Vendor Estimate
Low-Flow Toilet	3	EA	\$ 1,400	\$ 1,000	\$ -	\$ 4,313	\$ 3,738	\$ -	\$ 8,051	Vendor Estimate
Low-Flow Faucet	6	EA	\$ 700	\$ 300	\$ -	\$ 4,313	\$ 2,243	\$ -	\$ 6,556	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 22,043	Subtotal
\$ 7,715	35% Contingency
<b>\$ 29,758</b>	<b>Total</b>



**City of East Orange**  
**CHA Project Number: 30993**  
**Recreation Center**

**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 200 kW and minimum area of building is 50,000 ft to be most cost-effective for commercial and industrial buildings. However, multifamily buildings with peak demand over 100kW are still eligible. Market manager has the discretion to approve applications that fall below 200kW minimum.

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
- up to 70% of lighting savings may be considered but performance target will increase by 1% for each percent over 50%
- Scope should include two or more unique measures
- 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)	23,616
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

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

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$13,929	\$8,577
Existing Usage (from utility)	64,100	7,598
Proposed Savings	24,148	1,709
Existing Total MMBtus	1,016	
Proposed Savings MMBtus	262	
% Energy Reduction	25.8%	
Proposed Annual Savings	\$6,828	

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

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$5,000
Incentive #2	\$2,656	\$2,137	\$4,793
Incentive #3	\$2,656	\$2,137	\$4,793
Total All Incentives	\$5,313	\$4,273	\$14,586

Total Project Cost	\$130,258
--------------------	-----------

		Allowable Incentive
% Incentives #1 of Utility Cost*	22.2%	\$5,000
% Incentives #2 of Project Cost**	3.7%	\$4,793
% Incentives #3 of Project Cost**	3.7%	\$4,793
Total Eligible Incentives***		\$14,586
Project Cost w/ Incentives		\$115,672

Project Payback (years)	
w/o Incentives	w/ Incentives
19.1	16.9

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

\*\* Maximum allowable amount of Incentive #2 is 50% of total project cost.

\*\*\* Maximum allowable amount of Incentive #3 is 50% of total project cost.

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

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

## **APPENDIX D**

### **Photovoltaic Analysis**



Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at <http://sam.nrel.gov>) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

Disclaimer: The PVWatts® Model ("Model") is provided by the National Renewable Energy Laboratory ("NREL"), which is operated by the Alliance for Sustainable Energy, LLC ("Alliance") for the U.S. Department Of Energy ("DOE") and may be used for any purpose whatsoever.

The names DOE/NREL/ALLIANCE shall not be used in any representation, advertising, publicity or other manner whatsoever to endorse or promote any entity that adopts or uses the Model. DOE/NREL/ALLIANCE shall not provide

any support, consulting, training or assistance of any kind with regard to the use of the Model or any updates, revisions or new versions of the Model.

YOU AGREE TO INDEMNIFY DOE/NREL/ALLIANCE, AND ITS AFFILIATES, OFFICERS, AGENTS, AND EMPLOYEES AGAINST ANY CLAIM OR DEMAND, INCLUDING REASONABLE ATTORNEYS' FEES, RELATED TO YOUR USE, RELIANCE, OR ADOPTION OF THE MODEL FOR ANY PURPOSE WHATSOEVER. THE MODEL IS PROVIDED BY DOE/NREL/ALLIANCE "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. IN NO EVENT SHALL DOE/NREL/ALLIANCE BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO CLAIMS ASSOCIATED WITH THE LOSS OF DATA OR PROFITS, WHICH MAY RESULT FROM ANY ACTION IN CONTRACT, NEGLIGENCE OR OTHER TORTIOUS CLAIM THAT ARISES OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE MODEL.

The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

## RESULTS

# 107,258 kWh per Year \*

System output may range from 103,172 to 112,353kWh per year near this location.

Month	Solar Radiation ( kWh / m <sup>2</sup> / day )	AC Energy ( kWh )	Energy Value ( \$ )
January	2.39	5,674	738
February	3.17	6,735	876
March	4.07	9,391	1,221
April	4.83	10,442	1,357
May	5.70	12,345	1,605
June	5.94	12,130	1,577
July	5.77	12,039	1,565
August	5.38	11,151	1,450
September	4.65	9,585	1,246
October	3.61	7,918	1,029
November	2.35	5,174	673
December	2.01	4,676	608
<b>Annual</b>	<b>4.16</b>	<b>107,260</b>	<b>\$ 13,945</b>

### Location and Station Identification

Requested Location	1 Grove Pl East Orange, NJ 07017
Weather Data Source	(TMY2) NEWARK, NJ 3.1 mi
Latitude	40.7° N
Longitude	74.17° W

### PV System Specifications *(Commercial)*

DC System Size	88.5 kW
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	10°
Array Azimuth	182°
System Losses	14%
Inverter Efficiency	96%
DC to AC Size Ratio	1.1

### Initial Economic Comparison

Average Cost of Electricity Purchased from Utility	0.13 \$/kWh
Initial Cost	2.60 \$/Wdc
Cost of Electricity Generated by System	0.14 \$/kWh

These values can be compared to get an idea of the cost-effectiveness of this system. However, system costs, system financing options (including 3rd party ownership) and complex utility rates can significantly change the relative value of the PV system.

# Photovoltaic (PV) Solar Power Generation - Screening Assessment

## City of East Orange Fire Station - Recreation HQ

Cost of Electricity	\$0.131	/kWh
Electricity Usage	339,360	kWh/yr
System Unit Cost	\$4,000	/kW

## Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary	Annual Utility Savings				Estimated	Total		New Jersey	Payback	Payback
Cost					Maintenance	Savings	Federal Tax	Renewable	(without	(with
					Savings		Credit	** SREC	incentive)	incentive)
\$	kW	kWh	therms	\$	\$	\$	\$	\$	Years	Years
\$354,000	88.5	107,258	0	\$14,051	0	\$14,051	\$0	\$26,815	25.2	8.7

\*\* Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= \$250 /1000kwh

### Area Output\*

590 m<sup>2</sup>  
6,351 ft<sup>2</sup>

### Perimeter Output\*

m  
0 ft

### Available Roof Space for PV:

(Area Output - 10 ft x Perimeter) x 85%  
5,998 ft<sup>2</sup>

### Approximate System Size:

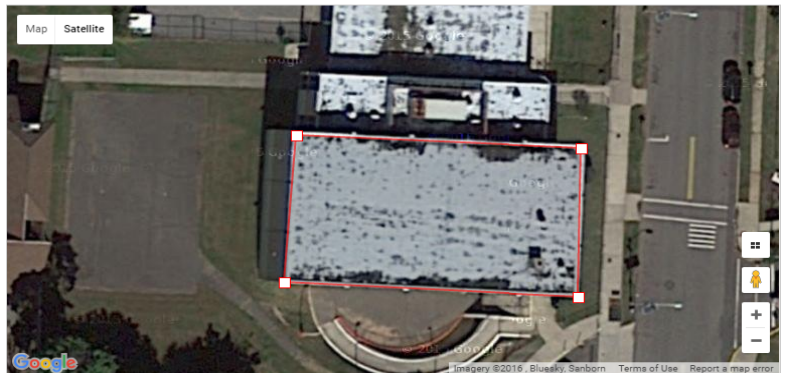
Is the roof flat? (Yes/No) Yes

8 watt/ft<sup>2</sup>  
50,806 DC watts  
89 kW From PV Watts

### PV Watts Inputs\*\*\*

Enter into PV Watts (always 20 if flat, if  
Array Tilt Angle 10 pitched - enter estimated roof angle)  
Array Azimuth 182 Enter into PV Watts (default)  
Zip Code 07019 Enter into PV Watts  
DC/AC Derate Factor 0.83 Enter into PV Watts

System Capacity: 88.5 kWdc (590 m<sup>2</sup>)



### PV Watts Output

107,258 annual kWh calculated in PV Watts program

### % Offset Calc

Usage 339,360 (from utilities)  
PV Generation 107,258 (generated using PV Watts )  
% offset 32%

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

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

\*\*\* [http://gisatnrel.nrel.gov/PVWatts\\_Viewer/index.html](http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html)

## **APPENDIX E**

### **Photos**



*Existing windows*



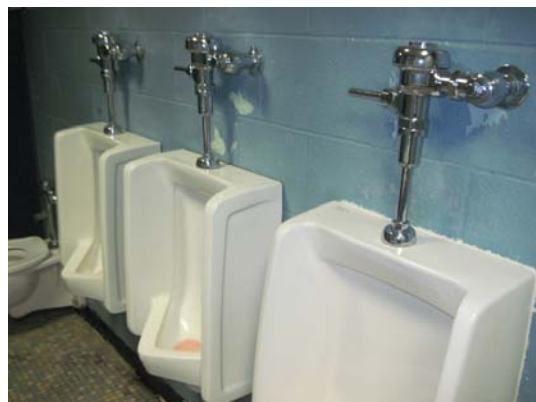
*Existing unit heaters*



*Existing DHW Heater*



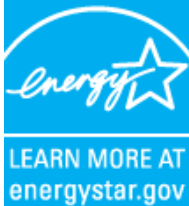
*Existing Boiler*



*Existing plumbing fixtures*

## **APPENDIX F**

### **EPA Benchmarking Report**



# ENERGY STAR® Statement of Energy Performance

# N/A

## Recreation Center

**Primary Property Type:** Fitness Center/Health Club/Gym  
**Gross Floor Area (ft²):** 23,616  
**Built:** 1950

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

**For Year Ending:** September 30, 2014  
**Date Generated:** April 20, 2016

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**

Recreation Center  
1 Fellowship Circle  
East Orange, New Jersey 07017

**Property Owner**

\_\_\_\_\_  
,  
(\_\_\_\_)\_\_\_\_-\_\_\_\_

**Primary Contact**

\_\_\_\_\_  
,  
(\_\_\_\_)\_\_\_\_-\_\_\_\_  
\_\_\_\_\_

**Property ID:** 4940271

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

**Site EUI**

41.4 kBtu/ft²

**Annual Energy by Fuel**

Natural Gas (kBtu)	759,851 (78%)
Electric - Grid (kBtu)	218,709 (22%)

**National Median Comparison**

National Median Site EUI (kBtu/ft²)	63.8
National Median Source EUI (kBtu/ft²)	96.8
% Diff from National Median Source EUI	-35%

**Source EUI**

62.9 kBtu/ft²

**Annual Emissions**

Greenhouse Gas Emissions (Metric Tons CO2e/year)	70
--	----

### 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)