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**Local Government Energy Program
Energy Audit Report**

For

**Borough of Belmar
Union Firehouse
519 Ninth Avenue
Belmar, New Jersey 07719**

Project Number: LGE30



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INTRODUCTION

On December 11, 2009, Steven Winter Associates, Inc. (SWA) and PMK Group, Inc., a business unit of Birdsall Services Group (BSG-PMK), performed an energy audit and assessment of the Union Firehouse located in Belmar, New Jersey. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the buildings.

The Union Firehouse is a 7,394 square-foot, 2-story building built in 1889. The building contains a two bay fire engine garage, a museum area, kitchen, storage, lounge area, an exercise room, and a meeting / training room. The Fire Station is currently in service with approximately 50 employees that occupy the building at varying times. The building is consistently occupied for approximately 12 hours a week.

Energy data and building information collected in the field were analyzed to determine the baseline energy performance of the building. Using spreadsheet-based calculation methods, SWA/BSG-PMK estimated the energy and cost savings associated with the installation of each of the recommended energy conservation measures. The findings for the building are summarized in this report.

The goal of this energy audit is to provide sufficient information to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the buildings.

Launched in 2008, the LGEA Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize 75% of the cost of the audit. If the net cost of the installed measures recommended by the audit, after applying eligible NJ SmartStart Buildings incentives, exceeds the remaining cost of the audit, then the additional 25% will also be paid by the program. The Board of Public Utilities (BPU) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

This document contains the energy audit report for the Union Firehouse located at 519 Ninth Avenue, Belmar, New Jersey 07719.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG-PMK staff on December 11, 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

Current conditions

In the most recent full year of data collected, October, 2008 through September, 2009, the Union Firehouse consumed 15,535 kWh of electricity for a total cost of \$5,395. Union Firehouse had consumed 8,631 therms of natural gas for a total cost of \$14,122.

With electricity and fossil fuel combined, the building consumed 916 MMBtus of energy at a total cost of \$19,516. Using an average of \$0.15/kWh the Union Firehouse could save approximately \$3,064 on their electric bills. The Borough already purchases natural gas from a third party supplier, but the Borough could investigate prices from another third party supplier, because the current rate of \$1.64/therm is above the average rate of \$1.55/therm and the Borough could save approximately \$744 on their natural gas bills for the Union Firehouse. Appendix B contains a complete list of third party energy suppliers.

SWA/BSG-PMK has entered energy information about the Union Firehouse in the US Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. In order to compare commercial buildings equitably, the *Portfolio Manager* ratings convey the consumption of each type of energy in a single common unit. The EPA uses source energy to represent the total amount of raw fuel required to operate the building. The site energy use intensity for the buildings is 124 kBtu/sq.ft/year. After energy efficiency improvements are made, future utility bills can be added to the *Portfolio Manager* and the site energy use intensity for a different time period can be compared to the year 2009 baseline to track the changes in energy consumption associated with the energy improvements.

Buildings achieving an Energy Star rating of 75 are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification through the United States Green Building Council (USGBC). SWA/BSG-PMK encourages the Borough of Belmar to continue entering utility data in *Energy Star Portfolio Manager* in order to track whether normalized source energy use over time. The building performance rating could not be determined because this is a mixed-use facility, comprised by non-eligible space types categorized as "Other".

(Refer to Section 1.3 for Energy Star Rating)

Recommendations

Category I Recommendations: Capital Improvements

- Repair or replace roof section over former police area roof.

Category II Recommendations: Operations & Maintenance

South face façade repair- remove loose facing add control joints, and reseal finish.

- Paint all exposed wood trim.
- Prep caulk and paint all exposed wood and to repair the latch on the main garage side door to improve the weather tight seal.
- If possible, reduce the temperature setting on the electric wall mounted heater in the storage area.

Category III Recommendations: Energy Conservation Measures (ECMs)

At this time, SWA/BSG-PMK highly recommends a total of **3** Energy Conservation Measures (ECMs) for the Union Firehouse that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **\$70,983**. SWA/BSG-PMK estimates a first year savings of **\$6,362** with a simple payback of **11.2 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the buildings by **32,575 lbs of CO₂/yr**, which is equivalent to removing approximately 3 cars from the roads each year.

There are various incentives that the Borough of Belmar could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommends that the Borough apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, could also assist to cover up to 80% of the capital investment. In order to qualify, the facility being upgraded must not have had a peak demand that exceeded 200 kW in any of the preceding 12 months; the highest peak demand for the Union Firehouse in the previous year was 50.3 kW.

SCOPE OF WORK – SUMMARY TABLE

ROI: Return on Investment (%)

Assumptions:

Discount rate: 3.2% per DOE FEMP guidelines Electricity rate \$0.35 \$/kWh
 Energy price escalation rate: 0% per DOE FEMP guidelines Gas rate \$1.64 \$/therm

Avg. Annual Demand: 0.03882 Area of Building (SF) 7,394

Table 1 - Highly Recommended 0-5 Year Payback ECMs																			
ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO ₂ Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	\$1,510	\$210	\$1,300	7,048	22.80	0	3.25	\$0	\$2,467	15	\$29,028	0.53	2133%	142%	190%	\$28,150	9,656
	Occupancy Sensors		\$720	\$350	\$370	673	2.18	0	0.31	\$0	\$235	10	\$1,988	1.57	437%	44%	63%	\$1,639	922
2	Convert DHW to Natural Gas	Similar Projects	\$3,500	\$50	\$3,450	3,649	11.80	-151	-0.36	\$0	\$1,029	13	\$10,808	3.35	213%	16%	29%	\$7,497	3,231
TOTAL			\$5,730	\$610	\$5,120	11,370	36.78	-151	3.20	\$0.00	\$3,732	-	\$41,825	1.37	-	-	-	\$37,285	13,809

Table 2 - Recommended Extended-Payback ECMs																			
ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO ₂ Reduced, lbs/yr
3	Heating Upgrade & BAS	Contractor	\$67,000	\$1,138	\$65,863	0	0.00	1,604	21.69	\$0	\$2,630	25	\$44,798	25.04	-32%	-1%	0%	-\$22,747	18,765
TOTAL			\$67,000	\$1,138	\$65,863	0	0.00	1,604	21.69	\$0.00	\$2,630	-	\$44,798	25.04	-	-	-	-\$22,747	18,765

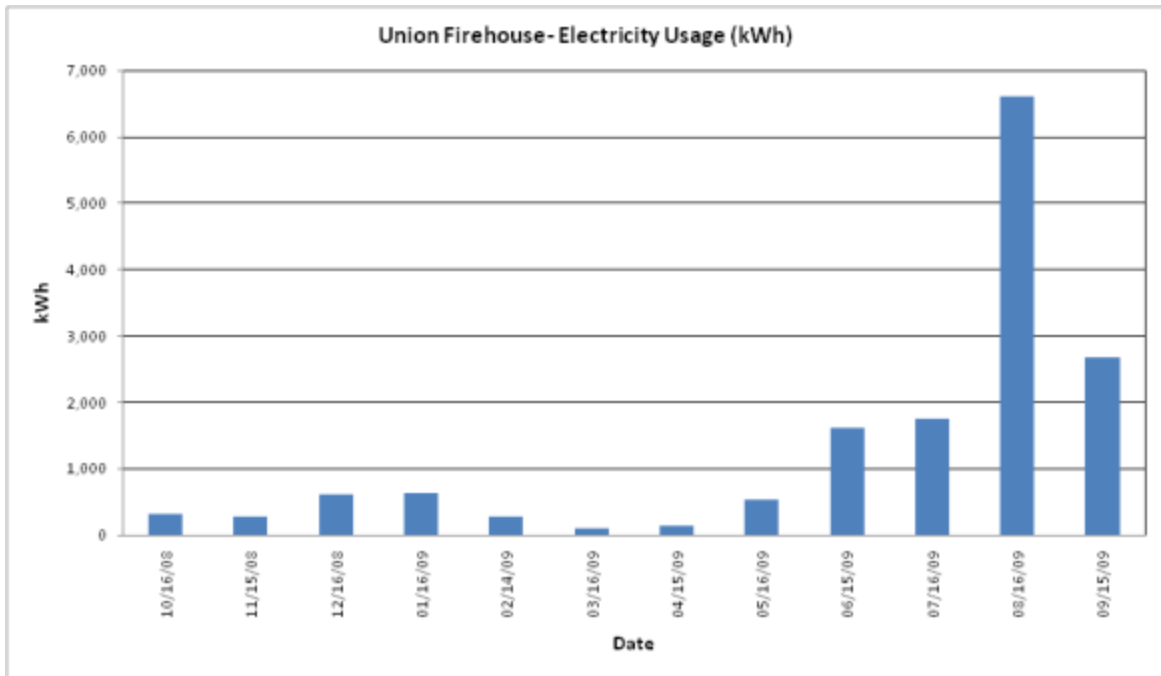
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

SWA/BSG-PMK analyzed utility bills from October, 2008 through September, 2009 that were received from the utility companies supplying the Union Firehouse building with electric and natural gas.

Electricity - The Union Firehouse is currently served by one electric meter. The Union Firehouse currently receives electricity from Jersey Central Power & Light at **an average rate of \$0.35/kWh** based on 12 months of utility bills from October 2008 to September 2009. The Union Firehouse building consumed **approximately 15,535 kWh or \$5,395 worth of electricity** in the previous year. The account history provided by Jersey Central Power & Light shows an average rate of \$0.35/kWh, which is extremely high compared to like buildings. SWA/BSG-PMK recommends the Borough of Belmar contact JCP&L and verify that the meter readings and charges are accurate and not estimates.

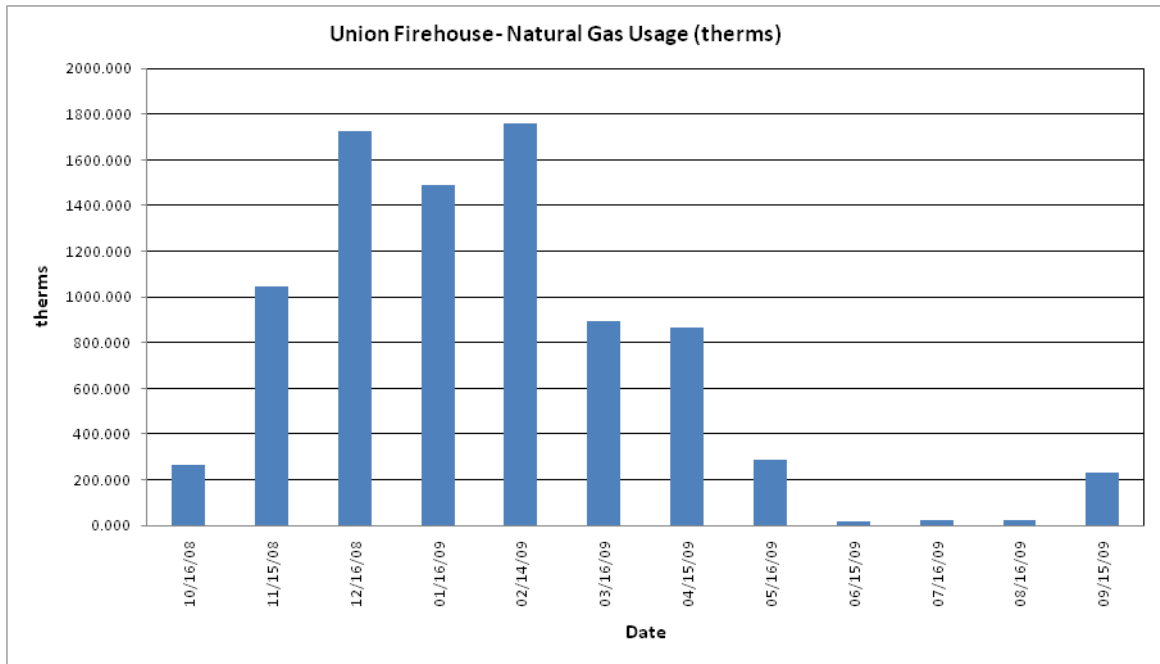
The following chart shows electricity usage for the building based on utility bills from October, 2008 through September, 2009:



The increased electricity usage in August, shown on the graph, is caused by the use of the air conditioning.

Natural Gas - The Union Firehouse is currently served by one meter for natural gas. The Union Firehouse receives its natural gas from New Jersey Natural Gas at **an average aggregated rate of \$1.64/therm** based on 12 months of utility bills for October 2008 to September 2009. The Union Firehouse consumed **approximately 8,631 therms or \$14,122 worth of natural gas** in the previous year.

The following chart shows natural gas usage for the building based on utility bills from October, 2008 through September, 2009:



1.2. Utility Rate

The Union Firehouse building currently receives electricity from Jersey Central Power & Light at an average rate of \$0.35/kWh based on 12 months of utility bills from October, 2008 through September, 2009.

The Union Firehouse building currently receives natural gas supply from New Jersey Natural Gas at an average aggregated rate of \$1.64/therm based on 12 months of utility bills from October, 2008 through September, 2009.

Some of the unusual utility fluctuations that showed up for a couple of months on the utility bills may be due to adjustments between estimated and actual meter readings.

1.3. Energy Benchmarking

The building information and utility data were entered into the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. SWA/BSG-PMK recommends that the Borough maintain the Portfolio Manager account at the link below. As the account is maintained, SWA/BSG-PMK can share with the Borough and allow future data to be added and tracked using the benchmarking tool.

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Username: belmarboro
Password: belmarboro

Buildings achieving an Energy Star rating of 75 are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification through the United States Green Building Council (USGBC). SWA/BSG-PMK encourages the Borough to continue entering utility data in Energy Star Portfolio Manager in order to track whether normalized source energy use over time.

The Site Energy Use Intensity is 124 kBtu/ft²yr compared to the national average of 78 kBtu/ft²yr for commercial buildings classified by the Energy Star Portfolio Manager as “Other-Fire Station/Police Station”. Implementing this report’s recommendations will reduce use by approximately 24.9 kBtu/ft²yr, which when implemented would lower the buildings energy consumption.



STATEMENT OF ENERGY PERFORMANCE

Union Firehouse

Building ID: 2019793
 For 12-month Period Ending: September 30, 2009¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: January 26, 2010

Facility
 Union Firehouse
 519 9th Ave
 Belmar, NJ 07719

Facility Owner
 Borough of Belmar
 601 Main St.
 Belmar, NJ 07719

Primary Contact for this Facility
 Robbin Kirk
 601 Main St
 Belmar, NJ 07719

Year Built: 1889
 Gross Floor Area (ft²): 7,394

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	53,005
Natural Gas (kBtu) ⁴	863,067
Total Energy (kBtu)	916,072

Energy Intensity⁵

Site (kBtu/ft ² /yr)	124
Source (kBtu/ft ² /yr)	146

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	54
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Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-7%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional
Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards⁶ for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Certifying Professional
 N/A

Notes:

1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 8 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Union Firehouse is a 7,394 square-foot, 2-story building built in 1889 including an original police, jail cells, and sally port area. The main firehouse contains a two bay fire engine garage, a museum area, kitchen, storage, lounge area, an exercise room, and a meeting / training room.

2.2. Building Occupancy Profiles

The peak occupancy for the Fire Station is approximately 50 employees over varying times. The building is occupied for approximately 12 hours a week.

2.3. Building Envelope

2.3.1. Exterior Walls

The exterior walls are full brick construction interior and exterior. The walls are approximately 12" thickness including the face brick. The façade on the east side of the building has been skim coated with cement and a painted finish. The painting on the remaining building was found to be in good condition.

Category II Repair and Maintenance: South face façade repair- remove loose facing add control joints, and reseal finish.



South facing exterior wall

2.3.2. Roof

The second floor roof above the firehouse bays is built up asphalt with an applied protective coating that is in good condition. The perimeter terracotta coping stones were found to be in good condition with some minor need of caulking between stones.

The flat roof over the older police portion of the building is also a built up roof with a fiberglass based top layer that is showing signs of deterioration from exposure.

Category II Repair and Maintenance: Repair or replace roof section over former police area roof.



Roof photo indicating wear and exposed fiberglass.

2.3.3. Base

The building's base is made up of original footings with brick foundation walls. All materials were found to be in good condition.

2.3.4. Windows

The building has been retrofitted with double-pane vinyl-clad windows within the existing wood framing. The wood window frames are in need of prepping and painting.

Category II Repair and Maintenance: Recommend painting all exposed wood trim.



Wood trim windows

2.3.5.Exterior Doors

There are two all wood roll up doors on the engine bays, they are in good condition with the exception of needing to be prepped and painted. The roll up door on the old Sally Port area is in good condition. The main entry door to the station was replaced with an insulated unit when the building windows were replaced. The museum entrance and the side entry door are both original wooden doors. The latch on the garage by door needs adjustment to provide a weather tight seal.



Main engine bay roll up door.

Category II Repair and Maintenance: It is recommended to prep caulk and paint all exposed wood and to repair the latch on the main garage side door to improve the weather tight seal.

2.3.6.Building Air Tightness

The building's recently installed windows have greatly reduced the infiltration in the building. The roll up doors are tight fitting, and the entry doors are tight with the exception of the main garage side entry noted above.

2.4. HVAC Systems

2.4.1.Heating

The heating system is made up of one gas fired 526,000 Btuh Weil McLain Steam boiler. The building is set up with three zones all controlled by isolation valves driven by space thermostats. The three zones are first floor, second floor, and the old police headquarters. The storage area is heated by a 3 kW wall mounted heater, and the original Sally Port area is heated by a 50,000 Btu ceiling hung Bryant unit heater with local thermostat.

Category II Recommendation-Repair & Maintenance: If possible, reduce the temperature setting on the electric wall mounted heater in the storage area.

Category III Recommendation - ECM #3: Replace existing steam boiler with high efficient unit including condensate pump, and replace the unit heater in the Sally Port area. Also install a building automation system in order to set the temperature back on the 2nd floor when it is not in use.

2.4.2. Cooling

The building is cooled by one 4 ton York Split split system. The condenser is located on the lower east roof with an air handler located above the kitchen. The unit serves the main garage, and break area. There is also a Kenmore 13,200 Btu through the wall air conditioner located in the exercise room.

2.4.3. Ventilation

Natural ventilation is provided by open windows, and a Dayton kitchen exhaust hood fan. Truck engine exhaust is alleviated by a Plymo Exhaust ventilation system.

2.4.4. Domestic Hot Water

Hot water is provided by a 40 Gallon electric A.O. Smith heater.

Category III Recommendations – ECM #2: Replace the current electric water heater to a gas-fired unit.

2.5. Electrical Systems

2.5.1. Lighting

A complete inventory of all interior, exterior, and exit sign light fixtures were examined and documented in Appendix A of this report including an estimated total lighting power consumption. There are incandescent lamps and T12 florescent lamps that can be upgraded to more efficient lamps. Our initial findings indicate that performing a detailed lighting upgrade per the recommendations in Appendix A will result in an annual savings.

Category III Recommendation - ECM #1: Recommend upgrading all T-12 lighting fixtures with magnetic ballasts to T-8 fixtures with electronic ballasts, as well as various other lighting upgrades outlined in Appendix A. Also recommend installing lighting sensors to certain areas where lights typically remain lit when unoccupied for long periods of time.

2.5.2. Appliances and Process

The Fire House has a complete kitchen, and serving area with all natural gas equipment. The kitchen is equipped with a Garland six (6) burner stove and oven, a Frymaster fryer, griddle, an exhaust hood, a Sears refrigerator, two Manitowic ice machines, a beverage air cooler, and a Kenmore dishwasher.

The fire house also utilizes one Dayton 60 gallon Air Compressor for process.

2.5.3. Elevators

The building is a two story structure with no elevators.

2.5.4. Other Electrical Systems

There are no other major electrical systems in the building

3. EQUIPMENT LIST

FIRE HOUSE							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimateed. Remaining Useful Life %
Cooling	Kenmore 13,200 Btu 8.5 EER A/C Unit	Weight Room	M# 580 75135700, S# 804TAQP00700	Electric	weight room	-	80%
Cooling	York Air Handler	Kitchen / Serving Area Attic	-	Electric	Kitchen / Serving Area and Main Garage	-	-
	4 Ton York Condenser- 208/230V 28.8 Amps	Lower East roof	M# AC048X122G, S# W0H5730228	Electric		1999	27%
Heating	Weil-Mclain Steam Boiler 650,000 Btuh input / 526,000 Btuh output	Boiler Room	M# LCB-6	Natural Gas	3 zones: 1st floor, 2nd floor, 1st Floor old Jail and sally port	1987	8%
	B & G Condensate Pumps- (2) 18 Gal. 20 PSI 115 v			Electric		-	-
	Marathon pump 1/3 Hp 3450 Rpm- 208/230 2.8 Amps		DqK 56C 34 D 2110F YQD 56C 34D1006E			2007	85%
Heating	Electrolux Electric wall heater- 3000 Watt	Storage Area		Electric	Storage Area	-	-
Heating	Bryant Unit Heater- 50,000 Btuh input/40,000 Btuh output.	Old Sally Port	M# 50 337, S# 18N 62022	Natural Gas	Old Sally Port	-	0%
Domestic Hot Water	AO Smith 40-gallon, 4.5- kW water heater	Storage Area	M# EES 40 917, S# MM99- 0059226-S43	Electric	Entire Building	1999	15%

Ventilation	Power Ventilation Exhaust Fan 208/220 V 1/4 Hp	Lower East roof	M# 4HX92A	Electric	Kitchen Exaustfan	-	-
Ventilation	Dayton Exhaust Fan	Lower East roof	M# 4YC686	Electric	Storage area hood	-	-
Appliances	Fry Master Fryer 100,000 Btuh	Kitchen	M# GF 14 SD	Natural Gas	Kitchen	-	-
Appliances	Griddle	Kitchen	-	Natural Gas	Kitchen	-	-
Appliances	Garland - 6 Burner Stove and Oven	Kitchen	-	Natural Gas	Kitchen	-	-
Appliances	Sears refrigerator 115V 4.75 Amp	Kitchen	M# 2537884291	Electric	Kitchen	1998	37%
Appliances	Manitowic Ice Inc. Ice Machine	Storage Area	M# S- 570	Electric	General use	-	-
Appliances	Beverage Air Cooler- 115V 6.3 Amp	Kitchen / Serving Area	M# DW 64	Electric	Kitchen / Serving Area	-	-
Appliances	Manotowoc Equip Ice Machine- 115 V 9.8 Amps	Kitchen / Serving Area	M# BYO 154A	Electric	Kitchen / Serving Area	-	-
Appliances	Kenmore Dishwasher- 120 V 9 amps	Kitchen / Serving Area	M# 665 17679400	Electric	Kitchen / Serving Area	-	-
Equipment	Dayton Air Compressor 60 Gallon 240 V 15 Amp	Storage Area	M# 4B236	Electric	Garage	-	-
Equipment	Plymo Exhaust Ventilation- Baldor 3 Hp motor 115 / 220 V @ 29/14.5 Amps 3450 Rpm	Lower East roof	M# V13606T	Electric	Main Bays	-	-

Note: The remaining useful life of a system (in %) is the relationship between the system manufactured and / or installed date and the standard life expectancy of similar equipment based on ASHRAE (2003), ASHRAE Handbook: HVAC Applications, Chapter 36.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of this building, SWA/BSG-PMK have separated the investment opportunities into three categories of recommendations:

1. Capital Improvements – Upgrades not directly associated with energy savings
2. Operations and Maintenance – Low Cost/No Cost Measures
3. Energy Conservation Measures – Higher cost upgrades with associated energy savings

Category I Recommendations: Capital Improvements

Repair or replace roof section over former police area roof.

Category II Recommendations: Operations & Maintenance

South face façade repair- remove loose facing add control joints, and reseal finish.

Paint all exposed wood trim.

Prep caulk and paint all exposed wood and to repair the latch on the main garage side door to improve the weather tight seal.

If possible, reduce the temperature setting on the electric wall mounted heater in the storage area.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM #	Description
1	Lighting Upgrades & Occupancy Sensors
2	Convert DHW to Natural Gas
3	Heating Upgrade & BAS

ECM #1: Lighting Upgrades & Occupancy Sensors

Description:

Lighting at the Union Firehouse primarily consists of incandescent lamps. SWA/BSG-PMK recommends replacing the incandescent lamps with longer lasting, more efficient compact fluorescent lamps. The fixtures with T12 fluorescent lamps and magnetic ballast should be retrofitted with T8 lamps and electronic ballasts. Lighting replacements have short paybacks because of the low cost of the project combined with the high daily use of the lights.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

Summary	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$1,510.00	\$720.00	\$2,230.00
Rebate	\$210.00	\$350.00	\$560.00
Net Cost	\$1,300.00	\$370.00	\$1,670.00
Savings	\$2,466.92	\$235.46	\$2,535.31
Payback	0.5	1.6	0.7

Source of cost estimate: Empirical Data

Economics (without incentives):

ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	\$1,510	\$210	\$1,300	7,048	22.80	0	3.25	\$0	\$2,467	15	\$29,028	0.53	14220%	948%	190%	\$28,150	9,656
	Occupancy Sensors		\$720	\$350	\$370	673	2.18	0	0.31	\$0	\$235	10	\$1,988	1.57	4374%	437%	63%	\$1,639	922

Assumptions:

The electric cost used in this ECM was \$0.35/kWh, which was the facilities’ average rate for the 12-month period ranging from October, 2008 through September, 2009. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix A.

Rebates/financial incentives:

The New Jersey SmartStart offers rebates for upgrading lighting fixtures and installing lighting controls. The total rebate this ECM qualifies for is \$560.

ECM #2: Convert Electric Water Heater to Natural Gas

Description:

Domestic hot water is provided by a 40 gallon electric water heater. A natural gas unit would be more cost-efficient. The cost the Fire Department currently pays for electricity, \$0.35/kWh, is equivalent to \$10.26 per therm. The cost of natural gas the Fire Department pays, by comparison, is \$1.64 per therm. The cost stated below includes the cost of 50 feet of piping.

Installation cost:

Estimated installed cost: Installation: \$3,500; rebates/incentives: \$50; total: \$3,450

Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO ₂ Reduced, lbs/yr
2	Convert DHW to Natural Gas	Similar Projects	\$3,500	\$50	\$3,450	3,649	11.80	-151	-0.36	\$0	\$1,029	13	\$10,808	3.35	1641%	126%	29%	\$7,497	3,231

Assumptions:

Using the facility's electricity bills from October, 2008 through September, 2009, it was determined that the cost of electricity is currently \$0.35/kWh. Natural gas costs during this same time period were \$1.64/therm.

To calculate the savings from switching from electricity to gas, a spreadsheet created by Rheem was used. The temperature rise of the heated water was set at 77°F on the spreadsheet, and the energy factor (a unit that specifies the efficiency of water heaters) is specified as 0.94 for new electric units and 0.62 for gas units. Weight of water was set at 8.33 pounds/gal. Using this data, the BTUs of output heat used for heating the water were calculated by the following equation:

$$BTU_{\text{output}} = \text{Vol.} \times \text{Wt.}_{\text{Water}} \times \Delta \text{Temp.}$$

This value would be the same for the current and proposed units. The actual BTUs purchased by each unit are calculated using this value and the energy factors:

$$BTUs_{input} = \frac{BTUs_{output}}{\text{Energy Factor}}$$

The annual costs for heating the water can now be calculated using this data:

Current

Volume of Water Heated	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	\$/kWh	Daily Cost to Heat Water	Annual Cost to Heat Water
40	8.33	77	25,656	0.75	34,118	\$0.35	\$3.50	\$1,277.03

Proposed

Volume of Water Heated	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	\$/therm	Daily Cost to Heat Water	Annual Cost to Heat Water
40	8.33	77	25,656	0.62	41,381	\$1.64	\$0.68	\$247.71

Rebates/financial incentives:

This ECM qualifies for a New Jersey SmartStart rebate of \$50.

ECM#3: Heating Upgrade & BAS

Description:

The Fire Department building is heated by a 650 MBH natural gas, steam boiler, and the Old Sally Port section is heated by a 50 MBH gas-fired unit heater. Both units are at or near the end of their useful lives, and should be replaced. Due to the fact that this is a steam boiler and not a hot water boiler, there are no high-efficiency replacements available, and the cost of upgrading to a hot water system would be too high to recommend. Steam boilers are available with efficiencies up to 84%; the current unit is rated at 80% efficiency. The current unit heater is also 80% efficient.

Additionally, the building's temperature controls do not have a zoned occupied/unoccupied arrangement. Do to the irregular occupancy of this building a simplified building automation system (BAS) would provide the ability to monitor and control the building temperature from remote locations. The temperature would be adjusted automatically when the facility is not in use, and save energy by not causing excess heating to be used when the building is unoccupied.

Installation cost:

Estimated installed cost: Boiler, \$50,000; unit heater, \$2,000; BAS, \$15,000; total, \$67,000
 Source of cost estimate: Contractor

Economics:

ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1 st Yr Savings	kW Demand Reduction/Mo	Therms, 1 st Yr Savings	kBtu/sq ft, 1 st Yr Savings	Est. Operating Cost, 1 st Yr Savings, \$	Total 1 st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO2 Reduced, lbs/yr
3	Heating Upgrade & BAS	Contractor	\$67,000	\$1,138	\$65,863	0	0.00	1,604	21.69	\$0	\$2,630	25	\$44,798	25.04	-32%	-1%	0%	-\$22,747	18,765

Assumptions:

The savings for this ECM were calculated using the heating degree-day method to find the boiler and unit heater's current annual energy consumption. The cost per therm of natural gas that was used, taken from twelve months of the Fire Department's energy bills, was \$1.64. Also taken from the energy bills was the number of heating degree-days for one year, 5,168. The Fire Department is only consistently operating for 12 hours per week, but the heating system would operate at all hours the building might be occupied; therefore, it was estimated that the facility operates 1/3 of the work week, or 8 hours per day, and therefore only 1/3 of the heating degree days were used for these calculations. The 99.6%

heating dry bulb temperature is 10°F, which was provided by ASHRAE, and the desired indoor temperature was estimated to be 68°F. The savings were calculated using the following equations:

$$\frac{\text{Capacity} \times \text{Degree-Days} \times 24}{\text{Efficiency}_{\text{current}} \times (\text{Temp}_{\text{indoor}} - \text{Temp}_{.99.6\%})} \times \frac{1 \text{ therm}}{100,000.4 \text{ BTU}} \times \frac{(\text{Weekly Operating Hours})}{24 \times 7} = \text{Current Gas Input (therms)}$$

$$\text{Gas Output (therms)} = \text{Current Gas Input} \times \text{Efficiency}_{\text{current}}$$

$$\text{Proposed Gas Input (therms)} = \frac{\text{Gas Output}}{\text{Efficiency}_{\text{proposed}}}$$

$$\text{Savings (therms)} = \text{Current Gas Input} - \text{Proposed Gas Input}$$

An additional 5% of the natural gas consumption was saved on the boiler's gas consumption with the addition of the BAS. A BAS typically saves 10-15%, but in this case, only the 2nd floor, or half of the building, requires setback, as it is not occupied very often throughout the day.

Rebates/financial incentives:

This ECM is eligible for New Jersey's SmartStart Rebate, which pays \$1.75 per MBH for gas-fired boilers of this size, or \$1,138 for this measure.

BSG-PMK/SWA has reviewed several funding options for the purposes of subsidizing the costs for installing the energy conservation measures noted within this report.

Although funding options are constantly changing and updating this project may benefit from enrolling in a number of alternative programs such as the; The NJ SmartStart program with Technical Assistance, alternate funding by applying for financing and competitive grants through the United States Department of Energy as well as local utility incentive programs in an effort to offset a portion of the cost of ECM implementation.

The Smart Start program offers reimbursement incentives for various equipment purchases, and lighting incentives. The benefits and requirements of this program can be found at:

<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings>

Financial assistance is also available through the United States Department of Energy in the form of; Grants, Cooperative Research and development agreements, small business innovation research, and Loan Guarantee Programs. Further information for these programs is available at:

http://www1.eere.energy.gov/financing/types_assistance.html

Local Utility incentives such as a Direct Install Program, offer incentives that can provide up to 80% subsidy of the cost to install particular ECM's. As each utility company has different guidelines and incentives it is important to contact your local utility authority for eligibility in these programs.

Additional funding may also be found through the following funding methods:

- Energy Savings Improvement Program (ESIP) – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements.
- Municipal Bonds – Municipal bonds are a bond issued by a city or other local government, or their agencies. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.
- Power Purchase Agreement – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as “power purchase agreements.” These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system.

BSG-PMK/SWA recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are currently no existing renewable energy systems.

5.2. Solar Photovoltaic

Photovoltaic (PV) technology would not be cost beneficial to this project since there is such a high cost of installation and small area of viable space available.

5.3. Solar Thermal Collectors

Solar thermal collectors are not cost effective for this project and are not recommended due to the low amount of domestic hot water use throughout the building.

5.4. Combined Heat and Power

CHP is not applicable to this project because of the HVAC system type and limited domestic hot water usage.

5.5. Geothermal

Geothermal is not applicable to this project because it would require modifications to the existing heat distribution system, which would not be cost effective.

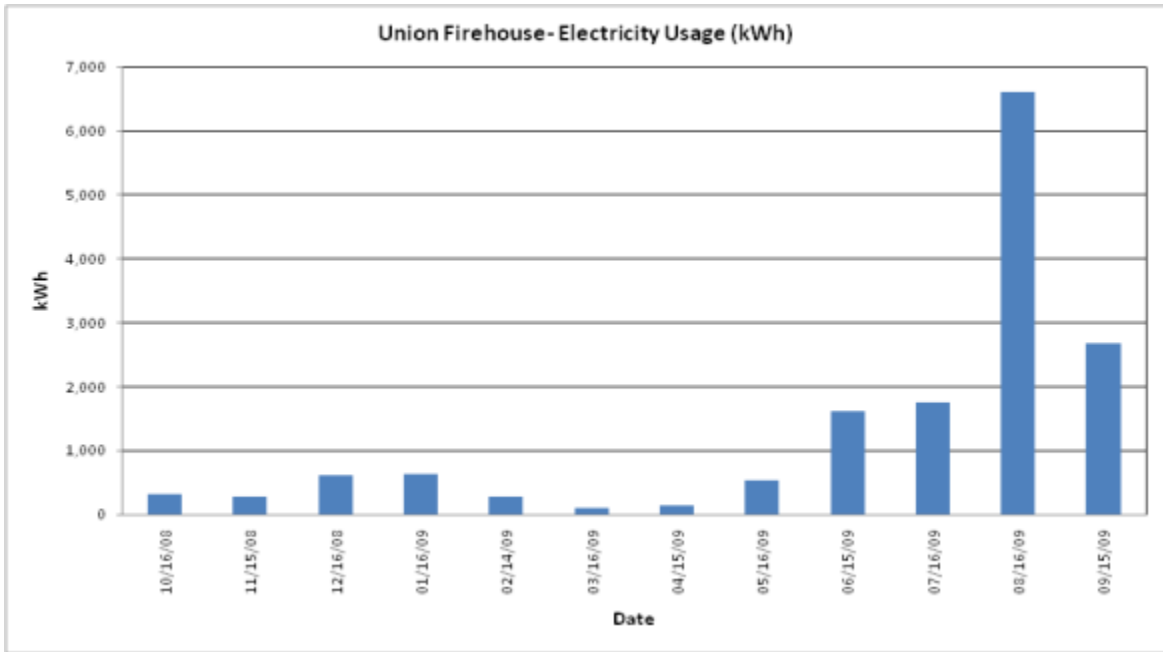
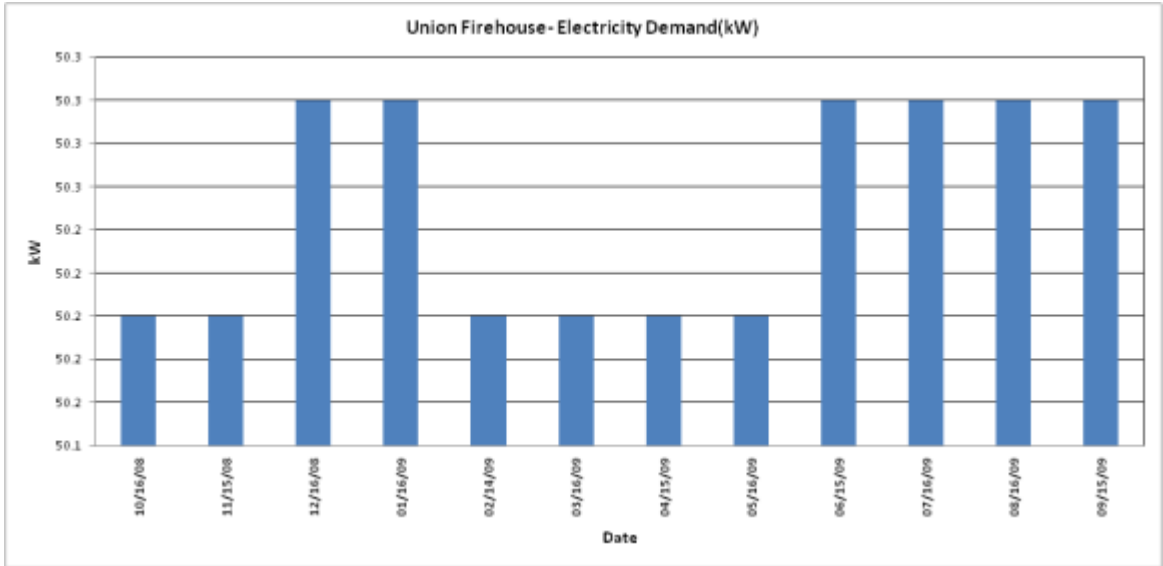
5.6. Wind

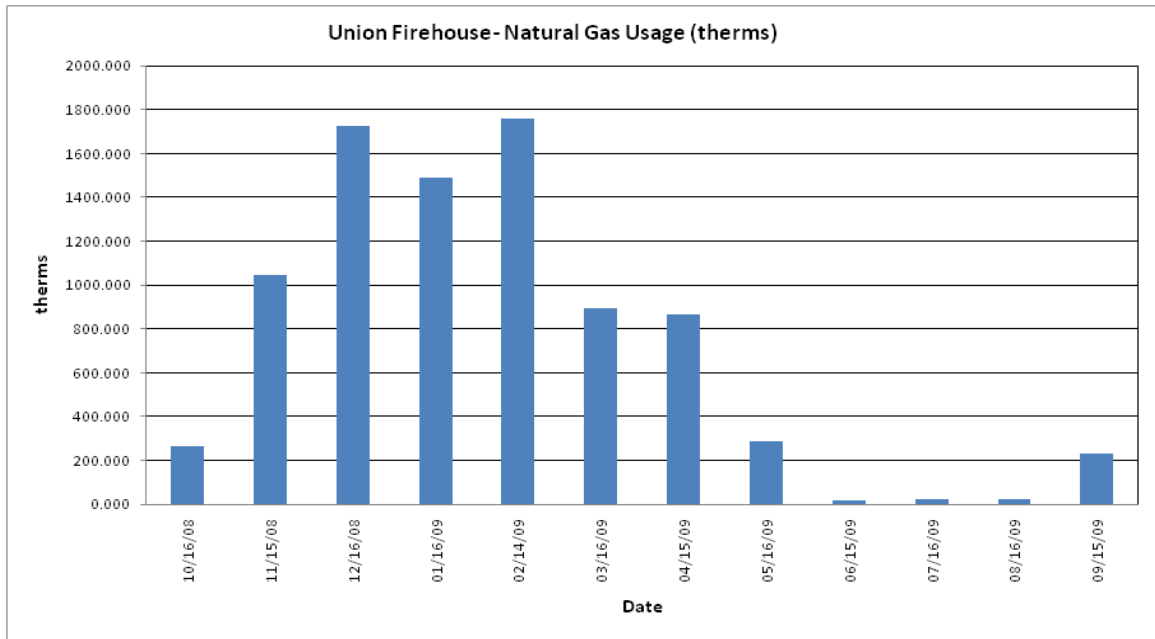
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

The average electrical peak demand for the Union Firehouse during previous year was 50.3 kW and the maximum peak demand was 50.3 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the other two charts show electric and gas usage (in kWh), respectively.

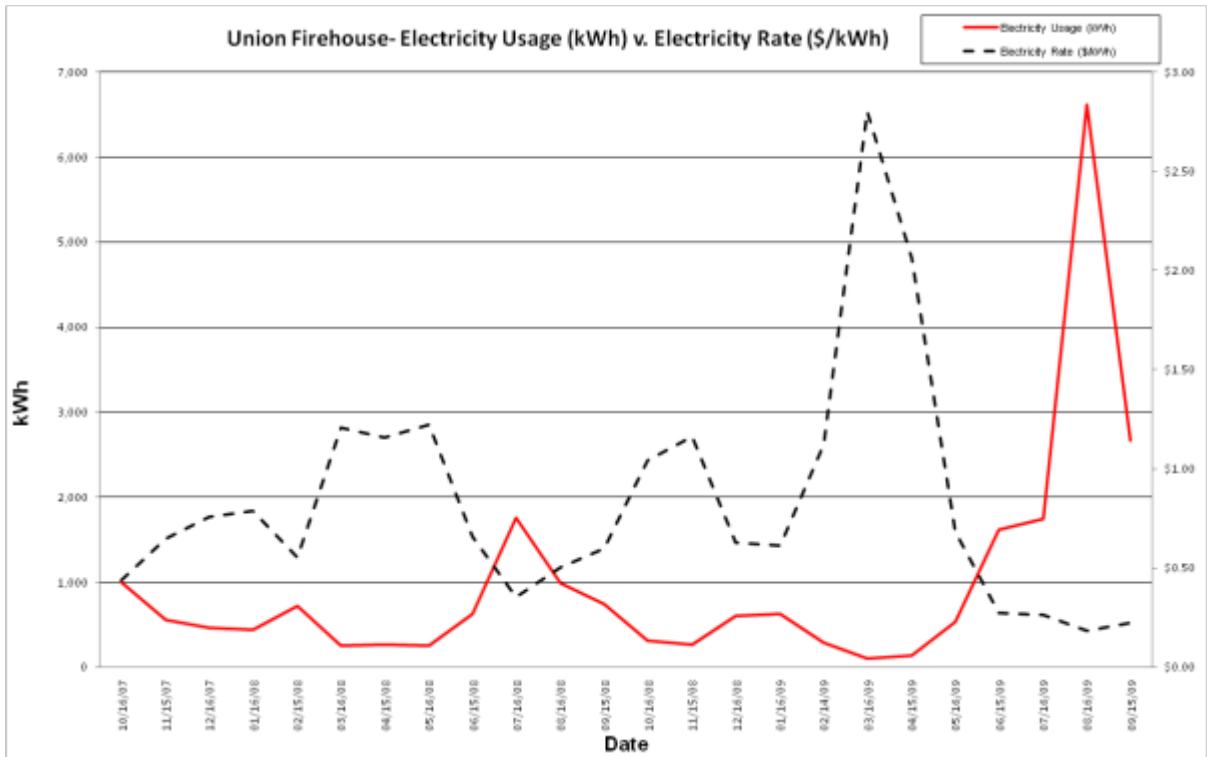




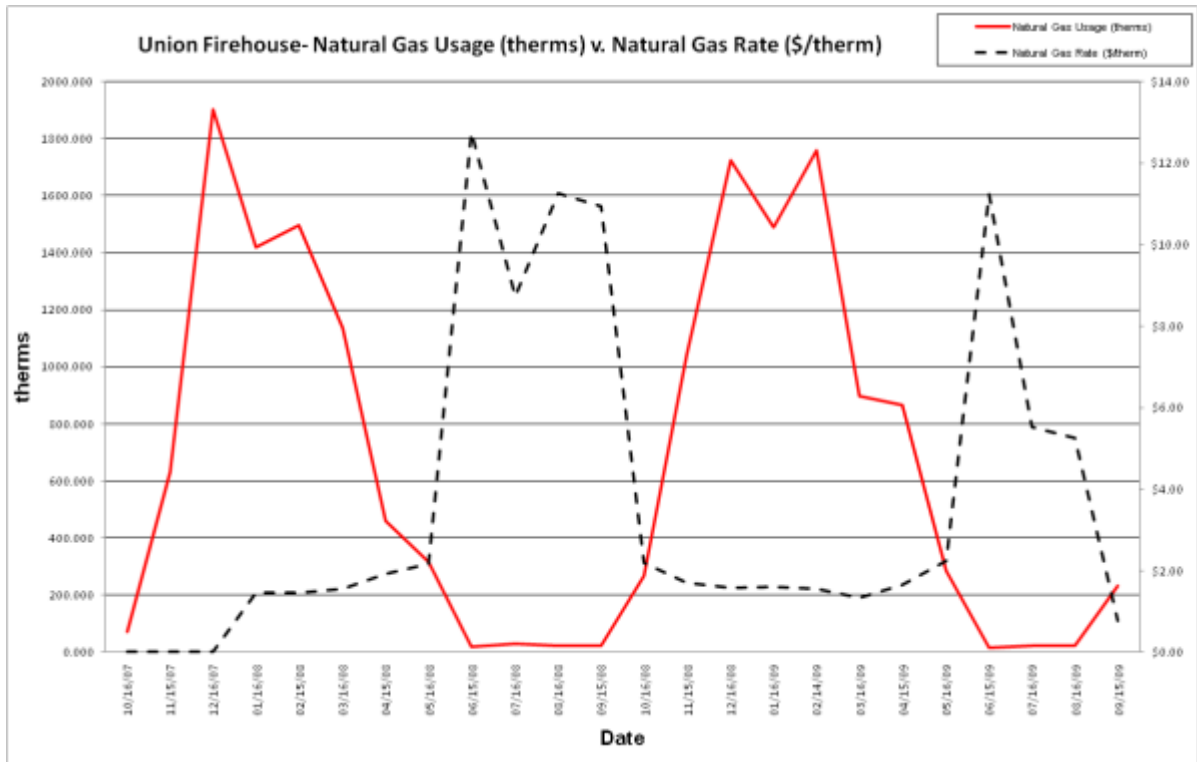
6.2. Energy Procurement strategies

Billing analysis shows price fluctuations of over 20% over the course of the year for the building electrical and natural gas accounts. Customers that have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier. Contact the NJ Energy Choice Program for further information on Energy Services Companies (ESCOs) that can act as third party energy suppliers. Purchasing electricity from an ESCO can reduce electric rate fluctuation and ultimately reduce the annual cost of energy for the Borough.

Using an average of \$0.15/kWh the Union Firehouse could save approximately \$3,064 on their electric bills. The Borough already purchases natural gas from a third party supplier, but the Borough could investigate prices from another third party supplier, because the current rate of \$1.64/therm is well above the average rate of \$1.55/therm and the Borough could save approximately \$744 on their natural gas bills for the Union Firehouse. Appendix B contains a complete list of third party energy suppliers.



Electricity prices reflect electricity usage



Natural gas prices fluctuate as expected with usage

7. METHOD OF ANALYSIS

7.1. Assumptions and methods

Energy modeling method: Spreadsheet-based calculation methods

Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)

RS Means 2009 (Building Construction Cost Data)

RS Means 2009 (Mechanical Cost Data)

Note: Cost estimates also based on utility bill analysis and prior experience with similar projects.

7.2. Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.

LIGHTING ANALYSIS

Borough of Belmar
Union Firehouse
519 Ninth Ave, Belmar, NJ



Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade (\$)	SmartStart Rebate per Upgrade
1	100W Incandescent Lamp / Replace with 30W Compact Fluorescent	100W INCANDESCENT	100	30W CF/SI	29	12	\$15.00	\$0.00
2	60W Incandescent Lamp / Replace with 23W Compact Fluorescent	60W INCANDESCENT	60	23W CF/SI	24	31	\$10.00	\$0.00
3	250W High Pressure Sodium Lamps / No Upgrade	250W HPS/BALLAST	295	No Upgrade	295	2	\$0.00	\$0.00
4	150W Incandescent Lamp / Replace with W Compact Fluorescent	150W INCANDESCENT	150	44W CF/SI	44	1	\$20.00	\$0.00
5	(2) 8' T8 Lamps, Electronic Ballasts / No Upgrade	2L8' T8/ELEC	118	2L8' T8/ELEC	118	10	\$0.00	\$0.00
6	(2) 34W T12 Lamps, Magnetic Ballast / Retrofit with (2) 28W T8 Lamps, Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC LO	55	10	\$60.00	\$15.00
7	(2) 32W T8 Lamps, Electronic Ballast / No Upgrade	2L4' T8/ELEC	61	2L4' T8/ELEC	61	3	\$0.00	\$0.00
8	(4) 32W T8 Lamps, Electronic Ballast / No Upgrade	4L4' T8/ELEC	110	4L4' T8/ELEC	110	3	\$0.00	\$0.00
9	(2) 32W T8 U-Tube Lamps, Electronic Ballast / No Upgrade	2L22"	62	2L22"	62	2	\$0.00	\$0.00
10	(2) 34W T12 U-Tube Lamps, Magnetic Ballast / Retrofit with (2) 28W T8 U-Tube Lamps, Electronic Ballast	2L22" STD/STD	94	2L22" LO	55	1	\$60.00	\$15.00
11	75W Halogen / No Upgrade	75W HALOGEN	75	75W HALOGEN	75	1	\$0.00	\$0.00
12	75W Incandescent / Replace with 27W Compact Fluorescent	75W INCANDESCENT	75	27W CF/SI	27	4	\$10.00	\$0.00
13	(4) 34W T12 Lamps, Magnetic Ballast / Retrofit with (4) 28W T8 Lamps, Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	3	\$100.00	\$15.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$1,510.00	\$720.00	\$2,230.00
Rebate	\$210.00	\$360.00	\$560.00
Net Cost	\$1,300.00	\$370.00	\$1,670.00
Savings	\$2,466.92	\$236.46	\$2,535.31
Payback	0.5	1.6	0.7

Variables:

\$0.35	Avg. Electric Rate (\$/kWh)
	Avg. Demand Rate (\$/kW)
2000	Operating Hours/Year
8	Operating Hours/Work Day

Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings (>Avg)

Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/Work Day	Hrs/Year	Existing				Proposed				Lighting				Occupancy Sensors (ONLY)				Lighting & Occupancy Sensors								
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Controls Type	Qty.	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	SmartStart Rebate Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)	
Totals:																													
					7366					4661	2.705	7048	\$1,510.00	\$2,466.92	0.6					673	\$720.00	\$236.46	3.1	\$210.00	\$360.00	7244	\$1,670.00	\$2,535.31	0.7
1	1	Exterior Side Door	11	2860	100W INCANDESCENT	1	100		30W CF/SI	1	29	0.071	203	\$15.00	\$71.07	0.2			0	0	\$0.00		\$0	\$0	203	\$15.00	\$71.07	0.2	
2	2	Sign	11	2860	60W INCANDESCENT	1	60		23W CF/SI	1	24	0.036	103	\$10.00	\$36.04	0.3			0	0	\$0.00		\$0	\$0	103	\$10.00	\$36.04	0.3	
3	3	Spots over Bays	11	2860	250W HPS/BALLAST	2	590		No Upgrade	2	590	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
4	2	ABU Door	11	2860	60W INCANDESCENT	1	60		23W CF/SI	1	24	0.036	103	\$10.00	\$36.04	0.3			0	0	\$0.00		\$0	\$0	103	\$10.00	\$36.04	0.3	
5	4	Bailer Room	9	2340	150W INCANDESCENT	1	150		44W CF/SI	1	44	0.106	248	\$20.00	\$86.81	0.2	OSW	1	88	200	\$30.71	6.5	\$0	\$0	274	\$220.00	\$96.02	2.3	
6	5	Truck Bay	11	2860	2L8' T8/ELEC	5	590		2L8' T8/ELEC	5	590	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
7	6	Captain's Office	9	2340	2L4' EE/STD	1	80		2L4' T8/ELEC LO	1	55	0.025	59	\$60.00	\$20.48	2.9			0	0	\$0.00		\$15	\$0	59	\$45.00	\$20.48	2.2	
8	11	Drying Tower	11	2860	75W HALOGEN	1	75		75W HALOGEN	1	75	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
9	1	Kitchen	9	2340	100W INCANDESCENT	4	400		30W CF/SI	4	116	0.284	665	\$60.00	\$232.60	0.3	OSR	1	234	260	\$81.90	3.2	\$0	\$140	732	\$180.00	\$256.36	0.7	
10	1	Store Hood	11	2860	100W INCANDESCENT	1	100		30W CF/SI	1	29	0.071	203	\$15.00	\$71.07	0.2			0	0	\$0.00		\$0	\$0	203	\$15.00	\$71.07	0.2	
11	5	Storage	1	260	2L8' T8/ELEC	2	236		2L8' T8/ELEC	2	236	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
12	2	Bar Area	11	2860	60W INCANDESCENT	12	720		23W CF/SI	12	268	0.432	1236	\$120.00	\$432.43	0.3			0	0	\$0.00		\$0	\$0	1236	\$120.00	\$432.43	0.3	
13	7	Repair Closet	1	260	2L4' T8/ELEC	2	122		2L4' T8/ELEC	2	122	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
14	2	Restroom	2	520	60W INCANDESCENT	1	60		23W CF/SI	1	24	0.036	19	\$10.00	\$6.55	1.5			0	0	\$0.00		\$0	\$0	19	\$10.00	\$6.55	1.5	
15	6	Old Jail Cell Corridor	11	2860	2L4' EE/STD	3	240		2L4' T8/ELEC LO	3	165	0.075	215	\$180.00	\$75.08	2.4			0	0	\$0.00		\$45	\$0	215	\$135.00	\$75.08	1.8	
16	6	Old Cells	11	2860	2L4' EE/STD	3	240		2L4' T8/ELEC LO	3	165	0.075	215	\$180.00	\$75.08	2.4			0	0	\$0.00		\$45	\$0	215	\$135.00	\$75.08	1.8	
17	5	Sally Port	11	2860	2L8' T8/ELEC	3	354		2L8' T8/ELEC	3	354	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		
18	7	Entry Foyer	11	2860	2L4' T8/ELEC	1	61		2L4' T8/ELEC	1	61	0	0	\$0.00	\$0.00				0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00		

Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Existing				Proposed				kW Reduction	Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	Energy Savings, kWh		Cost (\$)	Savings (\$)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)	
																													Lighting
19	9		11	2860	2L22"	1	62		2L22"	1	62	0	0	\$0.00	\$0.00					0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	
20	6	Landing Room	11	2860	2L4' EE/STD	1	80		2L4' T8/ELEC LO	1	55	0.025	72	\$60.00	\$25.03	2.4				0	0	\$0.00		\$15	\$0	72	\$45.00	\$25.03	1.8
21	8	Corridor	11	2860	4L4' T8/ELEC	1	110		4L4' T8/ELEC	1	110	0	0	\$0.00	\$0.00					0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	
22	1	Office	9	2340	100W INCANDESC	6	600		30W CF/SI	6	174	0.426	997	\$90.00	\$348.89	0.3	OSR	1	351	260	\$122.85	2.1	\$0	\$210	1,099	\$140.00	\$384.52	0.4	
23	9	Corridor	11	2860	2L22"	1	62		2L22"	1	62	0	0	\$0.00	\$0.00					0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	
24	6	Storage	11	2860	2L4' EE/STD	1	80		2L4' T8/ELEC LO	1	55	0.025	72	\$60.00	\$25.03	2.4				0	0	\$0.00		\$15	\$0	72	\$45.00	\$25.03	1.8
25	12	Firearms Room	11	2860	75W INCANDESC	4	300		27W CF/SI	4	108	0.192	549	\$40.00	\$192.19	0.2				0	0	\$0.00		\$0	\$0	549	\$40.00	\$192.19	0.2
26	13	Weight Room	11	2860	4L4' EE/STD	3	480		4L4' T8/ELEC	3	330	0.15	429	\$300.00	\$150.15	2.0				0	0	\$0.00		\$45	\$0	429	\$255.00	\$150.15	1.7
27	10	Restroom	1	260	2L22" STD/STD	1	94		2L22" LO	1	55	0.039	10	\$60.00	\$3.55	16.9				0	0	\$0.00		\$15	\$0	10	\$45.00	\$3.55	12.7
28	2	Meeting Room	11	2860	60W INCANDESC	16	960		23W CF/SI	16	384	0.576	1647	\$160.00	\$576.58	0.3				0	0	\$0.00		\$0	\$0	1,647	\$160.00	\$576.58	0.3
29	6	Closet	1	260	2L4' EE/STD	1	80		2L4' T8/ELEC LO	1	55	0.025	7	\$60.00	\$2.28	26.4				0	0	\$0.00		\$15	\$0	7	\$45.00	\$2.28	19.8
30	8	Old Police Headquarters	11	2860	4L4' T8/ELEC	2	220		4L4' T8/ELEC	2	220	0	0	\$0.00	\$0.00					0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	

Appendix B: Third Party Energy Suppliers (ESCOs)

JCP&L SERVICE TERRITORY

Last Updated: 12/09/09

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

Supplier	Telephone & Web Site	*Customer Class
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	C ACTIVE
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	C/I ACTIVE
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	C/I ACTIVE
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	C/I ACTIVE
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com	C/I ACTIVE
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	C/I ACTIVE
Integrays Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integraysenergy.com	C/I ACTIVE
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE

Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	C/I ACTIVE
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	C/I ACTIVE
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	C/I ACTIVE
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	C/I ACTIVE
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com	C/I ACTIVE
South Jersey Energy Company One South Jersey Plaza Route 54 Folsom, NJ 08037	(800) 800-756-3749 www.southjerseyenergy.com	C/I ACTIVE
Suez Energy Resources NA, Inc. 333 Thornall Street 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com	C/I ACTIVE
UGI Energy Services, Inc. 704 East Main Street Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	C/I ACTIVE

**NJ NATURAL GAS CO. SERVICE TERRITORY Last
Updated: 12/09/09**

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

Supplier	Telephone & Web Site	*Customer Class
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	800-6-BUYGAS (6-289427) www.cooperativenet.com	C/I ACTIVE
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-547-2722 www.directenergy.com	R/C/I INACTIVE
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	R/C/I ACTIVE
UGI Energy Services, Inc. d/b/a/ GASMAR 704 East Main Street, Suite 1 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	C/I ACTIVE
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	C/I ACTIVE
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-724-1880 www.intelligentenergy.org	R/C/I ACTIVE
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	877-750-7046 www.metromediaenergy.com	C/I ACTIVE
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	800-375-1277 www.mxenergy.com	R/C/I ACTIVE
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	C ACTIVE
NJ Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	866-568-0290 www.NewJerseyGasElectric.com	R/C ACTIVE

Palmco Energy NJ, LLC One Greentree Centre 10000 Lincoln Drive East Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	C/I ACTIVE
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	800-363-7499 www.pepco-services.com	C/I ACTIVE
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	C/I ACTIVE
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	800-756-3749 www.sjindustries.com/sje.htm	R/C/I ACTIVE
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	800-225-1560 www.spragueenergy.com	C/I ACTIVE
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	R/C/I ACTIVE

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