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March 18th, 2010

Local Government Energy Program
DRAFT -Energy audit report

For

Lawrence Township
Cedarville Fire Station
30 East Maple Avenue
Cedarville, NJ 08311

Project Number: LGEA47

TABLE OF CONTENTS

INTRODUCTION

On January 19th, Steven Winter Associates, Inc. (SWA) and BSG-PMK performed an energy audit and assessment of the Cedarville Fire Station Cedarville, NJ. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Cedarville Fire Station is a 15,204 sqft., single-story building that is made up of the original 6,377 sqft. fire station built in 1968 and a new 8,827 square foot five bay engine garage constructed in 2007. During the construction of the new engine garage, the original firehouse was renovated to become a new community room, with a full kitchen, men's and ladies restrooms, office space, a mechanical room and storage room. The new addition houses five engine bays, a full bathroom with shower, one storage room, and a mechanical room. The original portion of the building houses the Office of Emergency Management, a communications office and a common space. The Fire Station hours of occupation vary greatly from week to week, a best estimate was determined to be 22 hours a week on average. The building is occupied by varying numbers of the 38 volunteer firemen.

Energy data and building information collected in the field were analyzed to determine the baseline energy performance of each 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 building.

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 that additional 25% will also be paid by the program. The Board of Public Utilities (BPU's) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

This document contains the energy audit report for the Cedarville Fire Station located at 30 East Maple Avenue Cedarville, NJ 08311. The Fire Station building is a 15,204 sqft., single-story building that is made up of the original 6,377 sqft. fire station built in 1968 and a new 8,827 square foot five bay engine garage constructed in 2007.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG-PMK staff on January 19th, 2010 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, December, 2008 through November, 2009, the Cedarville Fire Station consumed a total of 65,960 kWh of electricity for a total cost of $11,338 and 7,126 therms of natural gas, for a total cost of $9,761.With electricity and natural gas combined, the building consumed 938 MMBtus of energy at a total cost of $21,099.

SWA/BSG-PMK has entered energy information about the Cedarville Fire Station in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building performance rating was not able to be determined because the building use is classified as Other-Fire Station in the Portfolio Manager system.

The Site Energy Use Intensity is 62.0 kBtu/ft^{2}yr compared to the national average of a fire station building consuming 78.0 kBtu/ft^{2}yr. The Site Energy Intensity is lower than the average because of the limited hours of operation of the Fire Station. Implementing the recommendations included in this report will reduce the building energy consumption by approximately 19.5 kBtu/ft^{2}yr. There may be energy procurement opportunities for the Cedarville Fire Station to reduce annual utility costs, which are $1,400/yr higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Cedarville Fire Station, SWA/ BSG-PMK has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- The electric unit heater in the mechanical room could be upgraded to a gas fire high efficiency unit heater.

Category II Recommendations: Operations and Maintenance

- Recommend clearing the roof drain cages at the front parapet to restore proper drainage and remove ponding water. This will extend the life of the roof system.

Category III Recommendations: Energy Conservation Measures - Upgrades with associated energy savings

At this time, SWA/BSG-PMK recommends a total of **4** Energy Conservation Measures (ECMs) for the Cedarville Fire Station that are summarized in the following table. The total investment cost for these ECMs, with estimated incentives, is **$290,310**. SWA/BSG-PMK estimates a first year savings of **$42,049** with an aggregated simple payback of **7 years**. SWA/BSG-PMK estimates that implementing the recommended ECMs will reduce the carbon footprint of the fire houses by **110,802 lbs of CO_2**.

There are various incentives that the Cedarville Fire Station could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommends that Cedarville 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.

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economic relevance:

ROI: Return on Investment (%)

Assumptions:

Discount rate:	3.2% per DOE FEMP guidelines	Electricity rate	$0.17 $/kWh
Energy price escalation rate:	0% per DOE FEMP guidelines	Gas rate	$1.37 $/therm

Avg. Annual Demand: 0.005161 Area of Building (SF) 15,204

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	$5,060	$945	$4,115	11,164	4.80	0	2.51	$0	$1,898	15	$22,332	2.17	2951%	197%	46%	$18,542	15,295
	Occupancy Sensors		$520	$140	$380	229	0.10	0	0.05	$0	$39	10	$328	9.77	-136%	-14%	0%	-$48	313
2	High-Efficiency Modulating Furnaces	Similar Projects	$36,000	$28,800	$7,200	0	0.0	1,120	7.37	$0	$1,534	18	$20,747	4.69	10%	1%	21%	$13,899	13,101
TOTAL			$41,580	$29,885	$11,695	11,393	4.90	1,120	9.92	$0	$3,471	-	$43,407	3.37	-	-	-	$32,392	28,709

Table 2 - Recommended 5-10 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
3	Upgrade Condensing Units	Similar Projects	$16,000	$12,800	$3,200	2,137	0.9	0	0.48	$0	$363	15	$4,276	8.81	2%	0%	8%	$1,138	2,928
4	50-kW Roof-Mounted PV System	Similar Projects	$324,415	$49,000	$275,415	57,784	24.9	0	12.97	$0	$38,215	30	$730,032	7.21	6%	0%	12%	$250,176	79,164
TOTAL			$340,415	$61,800	$278,615	59,921	25.77	0	13.45	$0	$38,578	-	$734,308	7.22	-	-	-	$251,313	82,092

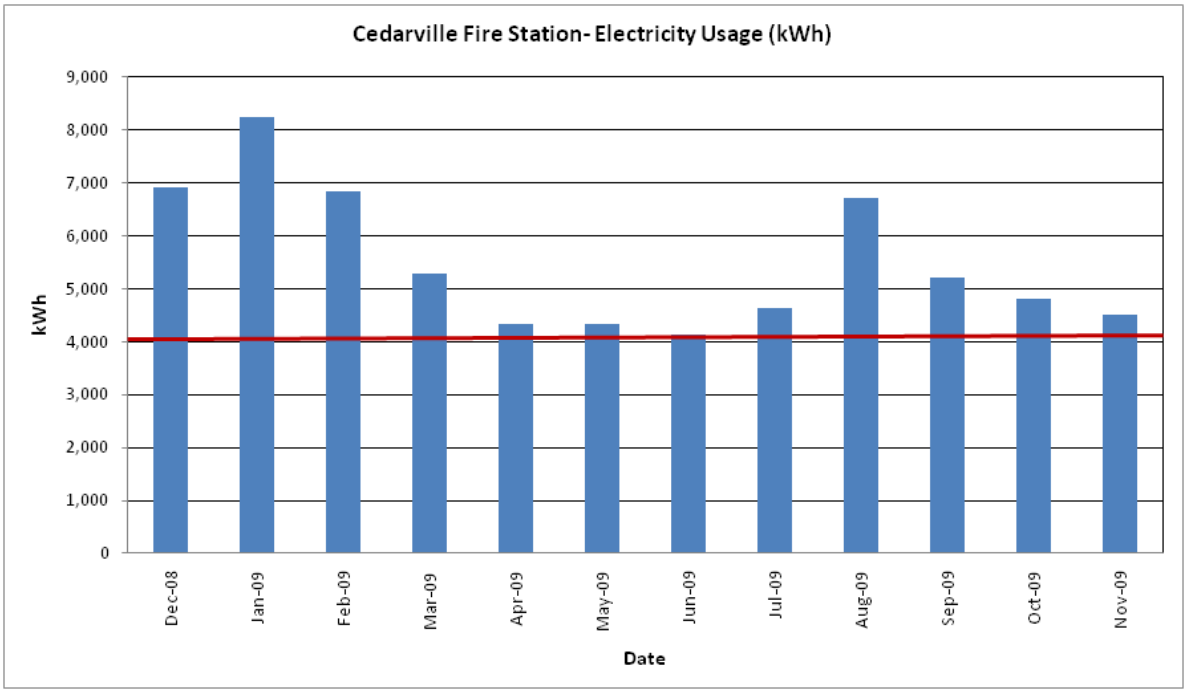
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

SWA/BSG-PMK analyzed utility bills from December, 2007 through November, 2009 that were received from the utility companies supplying the Cedarville Fire Station with electric and natural gas.

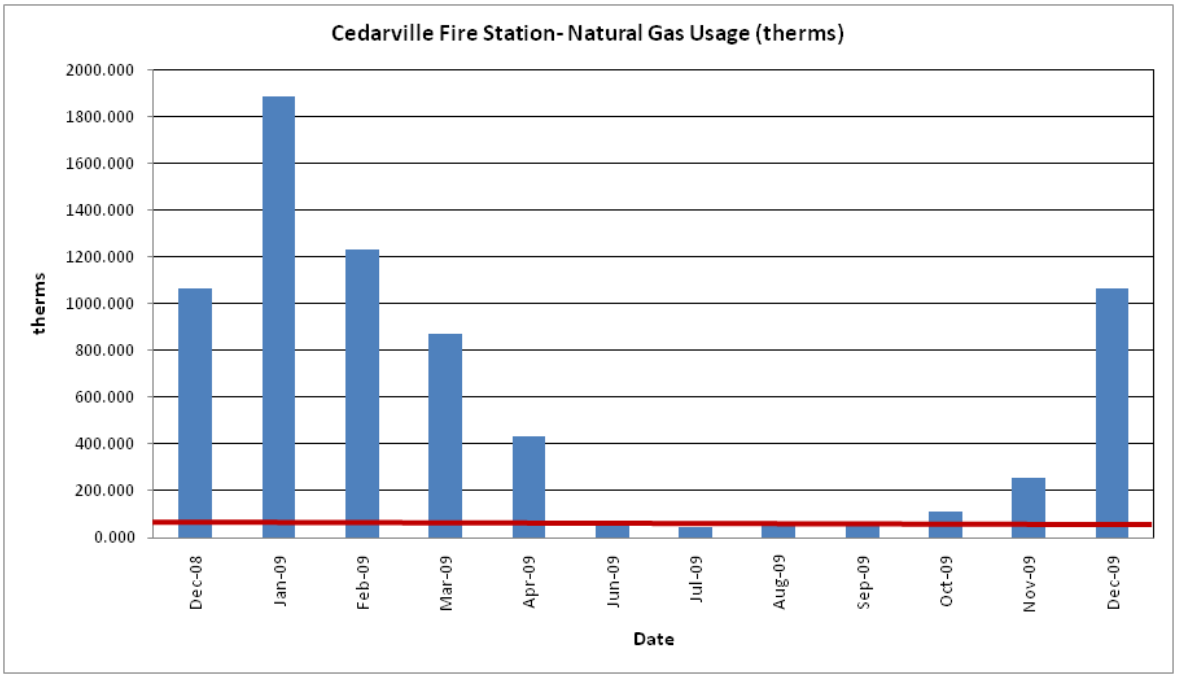
Electricity – The Cedarville Fire Station is currently served by one electric meter. The Cedarville Fire Station currently receives electricity from Atlantic City Electric at **an average rate of $0.172/kWh** based on 12 months of utility bills from December 2008 to November 2009. The Cedarville Fire Station building purchased **approximately 65,960 kWh or $11,338 worth of electricity** in the previous year with an average monthly demand of 28.4 kW.

The following charts show electricity usage for The Cedarville Fire Station based on utility bills from December 2008 through November 2009. The red line indicates the estimated baseload in kWh.



Natural Gas – The Cedarville Fire Station is currently served by one meter for natural gas. The Cedarville Fire Station currently receives natural gas from South Jersey Gas at **an average aggregated rate of $1.370/therm** based on 12 months of utility bills for December 2008 to November 2009. The Cedarville purchased **approximately 7,126 therms or $9,761 worth of natural gas** in the previous year.

The following charts show the natural gas usage for the Cedarville Fire Station based on utility bills from December 2008 through November 2009. The natural gas usage mimics the change in seasons. The red line indicates the baseload level for heating domestic hot water and the cooking needs. The natural gas usage above the red line shows the amount of natural gas used for heating.



1.2. Utility Rate

The Cedarville Fire Station currently purchases electricity via two meters from Atlantic City Electric at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Cedarville Fire Station currently pays an average rate of approximately $0.172/kWh based on the most recent 12 months of utility bills from December 2008 through November 2009.

Cedarville Fire Station currently purchases natural gas supply from South Jersey Gas at a general service market rate for natural gas in (therms). There are two gas meter that provides natural gas service to the Cedarville Fire Station building. The average aggregated rate (supply and transport) for the meter is approximately $1.370/therm based on 12 months of utility bills for December 2008 to November 2009.

1.3. Energy Benchmarking

SWA/BSG-PMK has entered energy information about The Cedarville Fire Station in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The username is *lawrencetownship* and the password is *lawrence*. The building performance rating was not able to be determined because the building use is classified as Other-Fire Station in the Portfolio Manager system.

The Site Energy Use Intensity is 62.0 kBtu/sqft/yr compared to the national average of Fire Station/Police Station consuming 78.0 kBtu/sqft/ yr. Implementing this report's recommended Energy Conservations Measures (ECMs) will reduce use by approximately 23.4 kBtu/sqft/yr.

SWA/BSG-PMK has created the Portfolio Manager site information for Cedarville Fire Station. This information can be accessed at: https://www.energystar.gov/istar/pmpam/, with the following:

Username: *lawrencetownship* **Password:** *lawrence*

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Cedarville Fire Department/ OEM

Building ID: 2245755
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: March 18, 2010

Facility
Cedarville Fire Department/ OEM
30 Maple Ave
Cedarville, NJ 08311

Facility Owner
Lawrence Township of Cumberland County
357 Main St
Cedarville, NJ 08311

Primary Contact for this Facility
Ruth Dawson
357 Main St
Cedarville, NJ 08311

Year Built: 1968
Gross Floor Area (ft²): 15,204

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	225,262
Natural Gas (kBtu)[4]	712,588
Total Energy (kBtu)	937,850

Energy Intensity[5]	
Site (kBtu/ft²/yr)	62
Source (kBtu/ft²/yr)	99

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	72

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison	
National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-37%
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.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**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.

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Cedarville Fire Station is a 15,204 sqft., single-story building that is made up of the original 6,377 sqft. fire station built in 1968 and a new 8,827 square foot five bay engine garage constructed in 2007. During the construction of the new engine garage, the original firehouse was renovated to become a new community room, with a full kitchen, men's and ladies restrooms, office space, a mechanical room and storage room. The new addition houses five engine bays, a full bathroom with shower, one storage room, and a mechanical room.

2.2. Building Occupancy Profiles

The Fire Station hours of occupation vary greatly from week to week, a best estimate was determined to be 22 hours a week on average. The building is occupied by varying numbers of the 38 volunteer firemen.

2.3. Building Envelope

2.3.1.Exterior Walls

The exterior walls of the south face of the original fire house building are constructed of 8" split face concrete masonry unit block with wood furring, R-19 bat insulation and painted drywall. The front façade of the new engine bays are a matching 8" split face insulated block with painted interior. The remaining exterior walls of the original building are concrete block with wood studs, R-19 insulation, and corrugate metal panels for exterior finish with interior finishes of painted drywall. The remaining walls of the new building are insulated concrete masonry units to full height with exterior vertical standing seam metal panels. The interior is painted block. The south or front face of the building has a perimeter metal standing seam soffit. Exterior and interior finishes of the envelope were found to be in good condition and without cracks or water damage.

2.3.2.Roof

The building has three distinct roofing sections; the original fire house office area section has a wood truss construction low pitched roof with built up asphalt sheets with a silver coat finish. The roof is in good condition with some ponding water at the base of the front parapet. The parapet is capped with aluminum flashing that was found in good condition. The new bay garage roof is a standing seam metal roof framed with steel framing. The roof has six skylight openings for improved light. The roof is new and in good condition with no visible leaks or problems. The third roof section is the lower roof over the new garage restroom and storage area that houses the Trane Voyager unit and two exhaust fans. This roof is a flat built up rubber membrane roof with mechanically adhered insulation board.

Category II Repair and Maintenance: Recommend clearing the roof drain cages at the front parapet to restore proper drainage and remove ponding water. This will extend the life of the roof system.

2.3.3. Base

The base of the existing building consists of reinforced concrete footings, and a 4" poured concrete slab on grade. The engine bay flooring is 6" reinforced concrete on gravel and vapor barrier. There are no signs of water damage or improper drainage.

2.3.4. Windows

There are 20 double pane thermally broken aluminum clad windows that were installed throughout the building during the 2007 renovation. The windows are in good condition.

2.3.5. Exterior doors

The engine bays have front and rear full height thermo pane aluminum framed roll up doors. There are seven entry doors to this facility; there are two storefront sections to this building. One is the front main entryway and the other is the rear main entrance. Both are double medium style aluminum store front doors. The remaining entry doors are hollow metal with visual panels. All doors and hardware were in good condition.

2.3.6. Building air tightness

The building's air tightness is in good condition. The new fire engine bays were found to comfortable with little to no leakage at the roll up doors and operable louvers. The original fire house building was found tight as well largely due to the new windows and doors.

2.4. HVAC systems

2.4.1. Heating

The renovated portion of the original fire station is heated by a gas-fired heating coil located in a new Trane rooftop Voyager unit. The 68 Deg F daytime temperature set point is maintained year round by a wall mounted programmable thermostat located on the Community Room interior wall. The original offices located in the remaining portion of the original fire house are heated by three attic-mounted furnaces that are controlled by individual zone thermostats. The new five bay addition is heated by six gas fired ceiling mounted unit heaters located in the four corners of the building, that are also controlled by individual programmable wall mounted thermostats. The fire house bathroom has one ceiling mounted electric radiant panel. The mechanical and storage rooms in the new addition each have electric unit heaters with programmable thermostats. The electric radiant heating panel in the bathroom and electric unit heater in the storage room are used infrequently, therefore it is not recommended that they be switched to gas fire units. The electric unit heater in the mechanical room could be upgraded to a gas fire high efficiency unit heater. All systems were found to be in good condition and found to be in good working order.

Category I Recommendation- Capital Improvements: The electric unit heater in the mechanical room could be upgraded to a gas fire high efficiency unit heater.

2.4.2. Cooling

The renovated portion of the original fire station is cooled by the newly installed Trane Voyager packaged roof top unit. Similarly the cooling set point is maintained by a wall mounted programmable thermostat located on the Community Room interior wall. The Voyager unit was found to be in good operating condition. The balance of the original building is cooled by two split DX systems with coils located in the ceiling mounted furnaces. The engine bays are not conditioned.

Condenser for the split AC system

2.4.3. Ventilation

The building has five exhaust fans. EF-1 provides exhaust for the men's and ladies rooms located off the community room in the newly renovated old firehouse. EF-2 provides exhaust ventilation for the new fire house restroom off the new engine bay addition. The fans operate on an occupied / unoccupied time clock. EF-5 is a shower exhaust fan located in the fire house restroom that is operated by a wall switch. EF-4 is utilized for removal of fire engine exhaust. The exhaust fan and associated outside air louver is activated by a Carbon monoxide sensor. The garage area is ventilated via EF-3, a 9,800 CFM exhaust fan that is interlocked with two outdoor intake louvers sized for a total of the full 9,800 CFM. All fans are roof mounted and found to be in good working order.

2.4.4. Domestic Hot Water

The building's domestic hot water is supplied by a gas fired high efficiency 100 gallon AO smith.

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. Our initial findings indicate that performing a detailed lighting upgrade per the recommendations in Appendix A will result in an annual energy and cost 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

Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov. The building is currently equipped with energy vending miser devices for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending

machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

The building has a full kitchen including; (2) stoves, (1) convection oven, (2) Refrigerators, (1) microwave, (1) coffee machine, (1) dishwasher. The building has total of 12 computers, one copy machine.

2.5.3.Elevators

This is a single story structure that does not have an elevator.

3. Building Systems Equipment List

Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimtaed. Remaining Useful Life %
Heating	(2) gas-fired unit heaters, 250/200 MBH input/output, 3,100 CFM	Garage	Trane, M# GPND025CAF1	Natural Gas	Garage	2001	46%
Heating	(4) gas-fired unit heaters, 200/160 MBH input/output, 2,640 CFM	Garage	Trane, M# GPND020CAF1	Natural Gas	Garage	2001	46%
Heating	(2) 150 MBH forced-air furnaces	Ceiling of original building	Not accessible	Natural Gas	Original building	-	0%
Heating	150 MBH forced-air furnace	Banquet hall	Not accessible	Natural Gas	Banquet hall	-	0%
Heating	Electric baseboards	Electrical room	No nameplate	Electricity	Electrical room	-	50%
Heating	Electric unit heater, 2.25 kW, 7,677 BTUH, 300 CFM	Mechanical room	QMark	Electricity	Mechanical room		50%
Heating	Electric unit heater, 2.25 kW, 7,677 BTUH, 300 CFM	Storage room	QMark	Electricity	Storage room		50%
Heating/ Cooling	15-ton rooftop unit w/ 350/284 MBH input/output heating	Roof	Trane Voyager, M# YCH180B3H0HB, S# 81400231D	Natural Gas/ Electricity	Entire building (excl. garage)	2008	87%
Cooling	4-ton condensing unit	Outside	Lennox, M# HS29-511-2P, S# 5896D 51131	Electricity	Furnace-mounted cooling coil	1996	7%
Cooling	4-ton condensing unit	Outside	Lennox, M# HS18-511-5P	Electricity	Furnace-mounted cooling coil	1984	0%
DHW	100 gallon, 150 MBH water heater	Mechanical room	AO Smith, M# BTM-150-570	Natural Gas	Entire building	2006	69%

Appliance	Convection oven	Kitchen	Blodgett, M# EF-111, S# 0380G7962101	Electricity	Kitchen		50%
Appliance	Refrigerator	Kitchen	Frigidaire, M# FRU17B2JW18, S# WA93500840	Electricity	Kitchen		50%
Appliance	Refrigerator	Kitchen	GE, M# GTS18ABSARWW, S# FM740074	Electricity	Kitchen		50%
Appliance	Stove	Kitchen	Frigidaire	Natural Gas	Kitchen		50%
Appliance	Stove	Kitchen	Southbend	Natural Gas	Kitchen		50%
Appliance	Microwave	Kitchen	Ewave, M# KOT-152UW, S# 20313920	Electricity	Kitchen	2002	50%
Appliance	Coffee maker	Kitchen	Black & Decker	Electricity	Kitchen		50%
Appliance	Dishwasher	Kitchen	Maytag, M# MDB6000AWA, S# 18752400WB	Electricity	Kitchen		50%
Ventilation	Exhaust fan, 1/12 HP, 1,300 RPM, 450 CFM	Roof	Greenheck, type G, size G-095-G	Electricity	Restrooms		50%
Ventilation	Exhaust fan, 1/20 HP, 1,550 RPM, 200 CFM	Roof	Greenheck, type G, size G-065-G	Electricity	Restrooms/ shower		50%
Ventilation	Exhaust fan, 1 1/2 HP, 1,725 RPM, 9,800 CFM	Roof	Greenheck, type GB, size GB-330-20	Electricity	Fire house		50%
Ventilation	Exhaust fan, 1/4 HP, 1,725 RPM, 800 CFM	Roof	Greenheck, type GB, size GB-101-4	Electricity	Fire house		50%
Ventilation	Exhaust fan, 70 CFM	Ceiling	QMark, size B560	Electricity	Fire house/ shower		50%
Ventilation	(2) intake louvers, 4,900 CFM	Fire House 112	Greenheck, M# EDD-401	Electricity	Fire House 112		50%
Ventilation	Intake louver, 800 CFM	Fire House 112	Greenheck, M# ESJ-401	Electricity	Fire House 112		50%

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 Improvement Measures

- The electric unit heater in the mechanical room could be upgraded to a gas fire high efficiency unit heater.

Category II Recommendations: Operations and Maintenance

- Recommend clearing the roof drain cages at the front parapet to restore proper drainage and remove ponding water. This will extend the life of the roof system.

Category III Recommendations: Energy Conservation Measures:

Summary Table

ECM #	Description
1	Lighting Upgrades
2	High-Efficiency Modulating Furnaces
3	Upgrade Condensing Units
4	Photovoltaic Roof Mounted Installation-50 kw

ECM #1: Lighting Upgrade & Occupancy Sensors

Description:

Lighting at the Fire House primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts, and T8 lamps with electronic ballasts. SWA/BSG-PMK recommends retrofitting the T12 fluorescent lamps and magnetic ballasts with T8's and electronic ballasts. The existing T8's do not need to be upgraded. Also in the building are incandescent lamps, which should be replaced with longer lasting, more efficient compact fluorescent lamps. Some fixtures have already been upgraded to compact fluorescents. In addition, occupancy sensors should be installed to control the lighting in the storage room and the electrical room. 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	$5,060.00	$520.00	$5,580.00
Rebate	$945.00	$140.00	$1,085.00
Net Cost	$4,115.00	$380.00	**$4,495.00**
Savings (kWh)	11,164	229	**11,393**
Savings ($)	$1,897.86	$38.90	**$1,936.75**
Payback	2.2	9.8	**2.3**

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	$5,060	$945	$4,115	11,164	4.80	0	2.51	$0	$1,898	15	$22,332	2.17	2951%	197%	46%	$18,542	15,295
	Occupancy Sensors		$520	$140	$380	229	0.10	0	0.05	$0	$39	10	$328	9.77	-136%	-14%	0%	-$48	313

Assumptions:

The electric cost used in this ECM was $0.172/kWh, which was the facilities' average rate for the 12-month period from December, 2008 through November, 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 $1,085.

ECM#2: High-Efficiency Modulating Furnaces

Description:

The original Fire House is heated by three 150-MBH (approximate), gas-fired furnaces. They have passed the end of their 18-year useful life and should be replaced. Higher-efficiency modulating furnaces are now available, which are up to 95% efficient. The current units were 80% efficient at the time of their purchase, but due to their age and condition, were estimated to decrease by 10%, to 70%.

Installation cost:

Estimated installed cost: $12,000 for each furnace, $36,000 total
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, $	CO2 Reduced, lbs/yr
2	High-Efficiency Modulating Furnaces	Similar Projects	$36,000	$28,800	$7,200	0	0.0	1,120	7.37	$0.00	$1,534	18	$20,747	4.69	10%	1%	21%	$13,899	13,101

Assumptions:

The savings for this ECM were calculated using the heating degree-day method to find the furnace's current annual energy consumption. The cost per therm of natural gas that was used, taken from twelve months of the Fire House's energy bills, was $1.37. Also taken from the energy bills was the number of heating degree-days for one year, 5,168. Due to the fact that the Fire Station does not operate constantly, it was estimated that the facility operates 1/3 of the work week, 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:

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

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

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

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

Rebates/financial incentives:

This ECM is calculated based on a projected eligibility for New Jersey's Direct Install Rebate, which pays up to 80% of the total installation cost for the furnaces, or $28,800 for this measure.

ECM#3: Upgrade Condensing Units

Description:
Cooling is provided to the original section of the Fire Station by two 4-ton Lennox condensing units. The units feed furnace-mounted cooling coils; the furnaces themselves were recommended for replacement in ECM #2. The condensing units have passed their 15-year useful life, and should be replaced. Units are now available with Seasonal Energy Efficiency Ratios (SEERs) as high as 21. The SEER for the current unit could not be found, but 4-ton condensing units manufactured in the mid-1990's would have SEERs around 12; due to the age and condition of the unit, the SEER was assumed to be 80% of the original value, or 10.

Installation cost:
Estimated installed cost: $8,000 each, $16,000 total
Source of 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/sqft, 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	Upgrade Condensing Units	Similar Projects	$16,000	$12,800	$3,200	2,137	0.9	0	0.48	$0.00	$363	15	$4,276	8.81	2%	0%	8%	$1,138	2,928

Assumptions:
Using the facility's electricity bills from December, 2008 through November, 2009, it was determined that the cost of electricity is currently $0.172/kWh. This ECM was calculated using 65°F as a change-over temperature from heating to cooling. The American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) estimates on average per year, 1,104 cooling degree-days for a region that only exceeds a dry-bulb temperature of 92°F for 0.4% of the year. The Fire Station does not operate constantly, therefore only 1/3 of the 1,104 cooling degree days were used for these calculations. The desired indoor temperature during the cooling season was assumed to be 74°F. The following equation, the degree-day equation for cooling systems, was used to calculate the electric consumptions of the current and proposed air-conditioners:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24\ \frac{\text{hours}}{\text{day}}}{1{,}000\times\text{SEER}\times\left(\text{Temp.}_{0.4\%}-\text{Temp.}_{\text{indoor}}\right)}=\text{Electric Consumption (in kWh)}$$

Rebates/financial incentives:
This ECM is calculated based on a projected eligibility for New Jersey's Direct Install Rebate, which pays up to 80% of the total installation cost, or $12,800 for this measure.

ECM #4: 50-kW Roof-Mounted PV System

Description:

Currently, the Fire House does not use any renewable energy systems. Renewable energy systems, such as photovoltaic panels, can be mounted on the roof of the facility and can offset a significant portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc. being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA/BSG-PMK present below the economics of installing a 50-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 217 commercial multi-crystalline 230 watt panels would generate 57,784 kWh of electricity per year, or 87% of the Fire House's annual electric consumption.

Installation cost:

Estimated installed cost: $349,370; SREC revenue included in "Total 1st Year Savings"
Source of cost estimate: Similar projects

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
4	50-kW Roof-Mounted PV System	Similar Projects	$349,370	$49,000	$300,370	57,784	24.9	0	12.97	$0.00	$38,215	30	$730,032	7.86	5%	0%	12%	$448,661	79,164

Assumptions:
Cost of installation was estimated, using data from similar projects, at approximately $7,000 per kW. Annual energy savings were calculated via "PV Watts", an online tool on the website of the National Renewable Energy Laboratory.

Rebates/financial incentives:

This ECM is eligible for New Jersey's Solar Renewable Energy Certificates (SREC). SRECs are marketable certificates issued to the owner of a PV system for each 1,000 kWh (1MWh) of electricity generated. SRECs are sold or traded separately from the power generated; the income from the sale of the SREC can be used to offset the cost of the system by applying the revenue to a loan payment or debt service. The value of the SREC is market driven, and is controlled by the amount of the Solar Alternative Compliance Payment (SACP) which is set by the NJBPU. The SREC market is derived from New Jersey's Renewable Portfolio Standard (RPS), which requires that all licensed energy suppliers in the state invest in energy generated from renewable sources, with specific requirements for solar power. If a supplier does not invest by purchasing SRECs, the supplier must pay the SACP for a percentage of the total annual power produced. Since SRECs typically trade just below the SACP, there is an incentive for the supplier to buy SRECs. The SREC Program provides a market for SRECs to be created and verified on the owner's behalf. The New Jersey Clean Energy program facilitates the sale of SRECs to New Jersey electric suppliers. PV system owners in New Jersey with a grid-connected PV system are eligible to participate in New Jersey's SREC Program.

The NJBPU has stated its intention to continue to operate a program of rebates and SRECs, On September 12, 2007, the NJBPU approved an SREC only pilot incentive program. The program set the SACP at an initial value of $711, decreasing annually for an eight (8) year period. SRECs would be generated for fifteen (15) years (referred to as the Qualification Life), and have a two (2) year trading life. The NJBPU believes that to achieve an internal rate of return of twelve (12) percent, the target SREC price would be $611, reducing by three (3) percent per year for the same eight (8) year period that the SACP is set.

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing Systems

There are currently no existing renewable energy systems.

5.2. Solar Photovoltaic

As a result of our study, the roof of the Cedarville Fire Station building has been identified as conducive for the application of a Photovoltaic (PV) system.

Based on the goal of generating as much of the building's electric load as possible utilizing renewable energy while meeting the limitations of usable space available, a PV system with a design capacity of 50 kW was selected. The total annual generating capacity of the system is 57,784 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).

This proposed PV system would include 217 flat, crystalline PV modules installed on the roof. The system is based on commonly used 230 Watt PV modules, and one (1) inverter for conversion to AC power.

The proposed system would generate approximately 87 percent of the electric power consumed annually by the Fire Station building. It is noted this system would supplement the utility power supply since PV electricity production is based on weather and the system size is limited to 87 percent. The estimated cost of construction would be approximately $349,370 for this system. There would be an applicable upfront incentive through the Renewable Energy Incentive Program; this rebate could be up to $49,000. The approximate annual savings would be $38,215, which would make the approximate payback 8 years

If the Client is interested in moving forward, a structural analysis of the roofs must be performed to confirm they will support the addition of PV modules.

5.3. Solar Thermal Collectors

Solar thermal collectors are not recommended due to the low amount of domestic hot water use throughout the building.

5.4. Combined Heat and Power

Combined Heat Power 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.

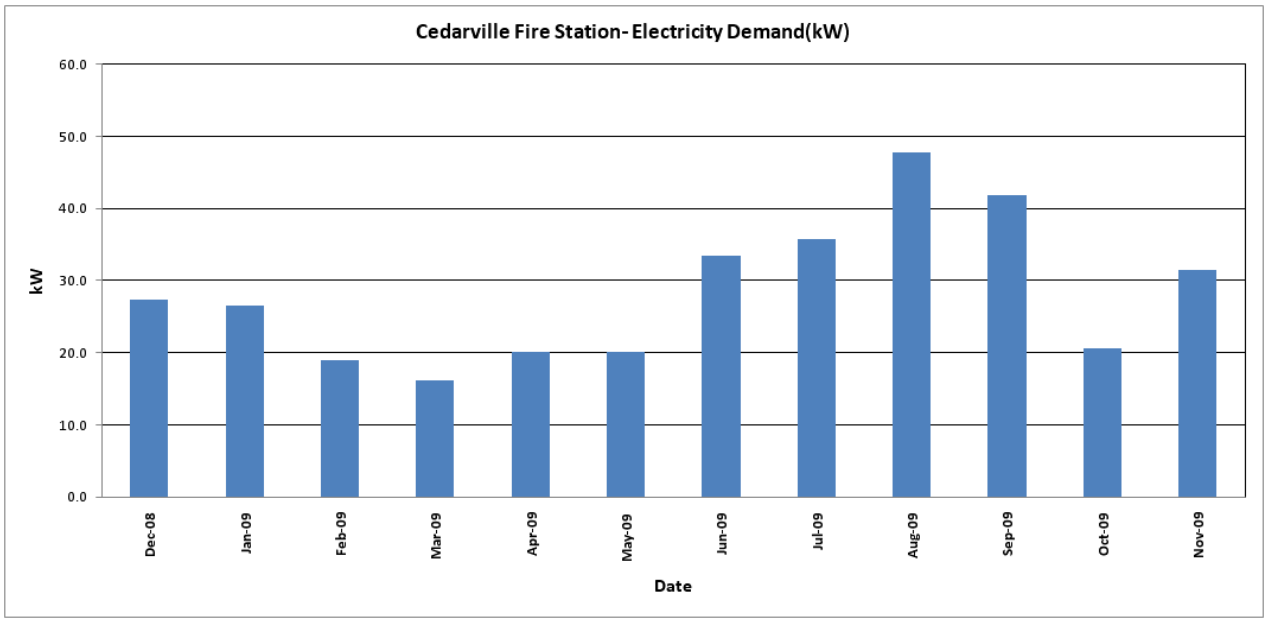
5.6. Wind

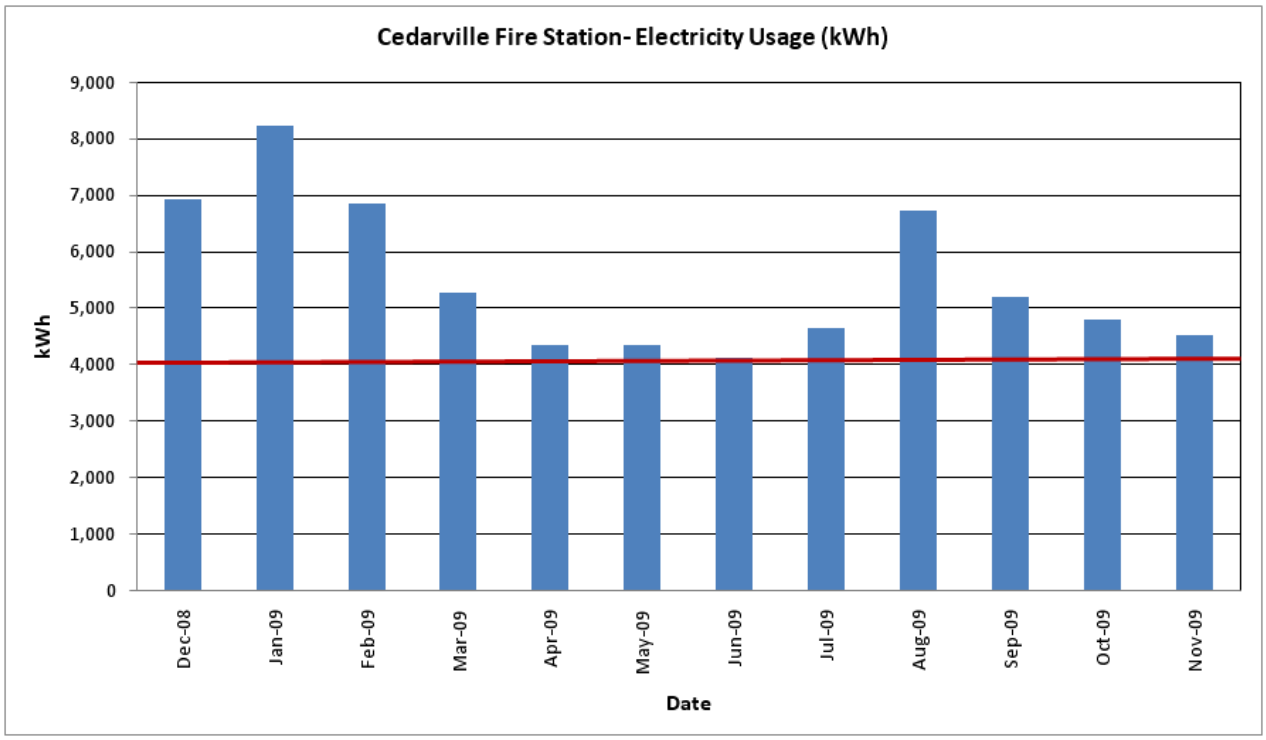
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

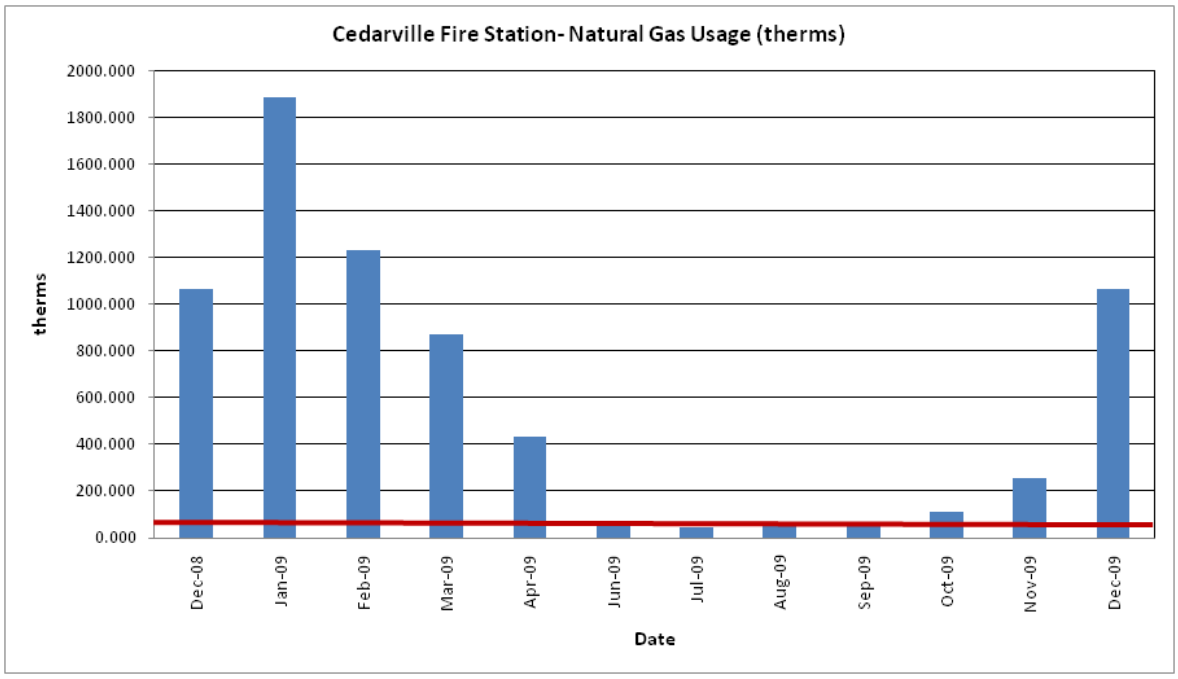
6.1. Load Profile

The average electrical peak demand for the previous year was 28.4 kW and the maximum peak demand was 47.8 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.





The electrical demand peaks in summer because of the added electric load for cooling the building. The electrical consumption has two peaks, one in winter one in summer. This is because of electric unit heaters being used in winter and the added load for cooling in summer. . The red line indicates the baseload of electricity.



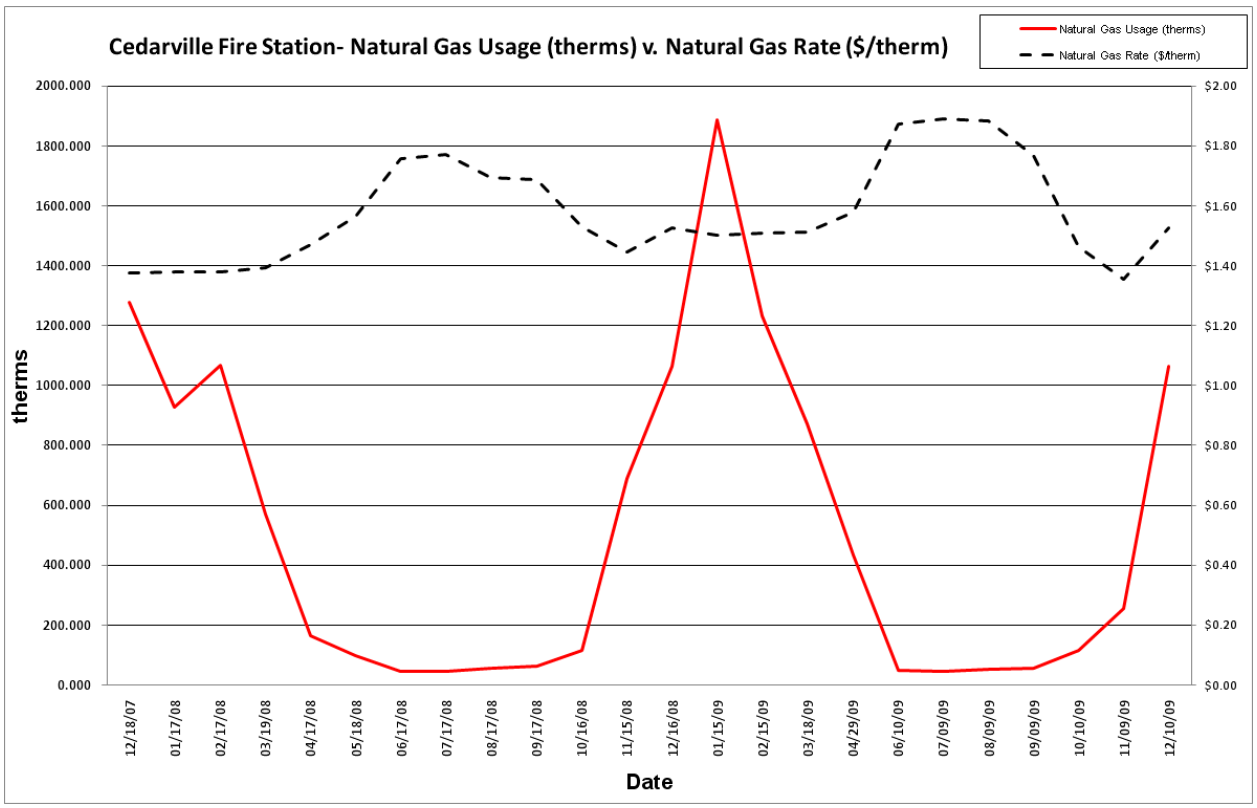
The natural gas usage shows that the most natural gas is consumed in the winter months, meaning the primary use of natural gas in this building is for heating. The red line indicates the baseload level for heating domestic hot water and the cooking needs. The natural gas usage above the red line shows the amount of natural gas used for heating.

6.2. Tariff Analysis

Currently, natural gas is provided via two gas meters with South Jersey Gas serving as transmission and supply provider. The general service rate for natural gas charges a market-rate price based on use and the Cedarville Fire Station billing data does not breakdown demand costs for all periods. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the natural gas prices increase during the cooling months when natural gas is used less often.

The Cedarville Fire Station is direct-metered (via two meters) and currently purchases electricity from Atlantic City Electric at a general service rate. The general service rate for electric charges are market-rate based on use and the Fire Station's billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by the HVAC condensing units and air handlers.

The following charts compare the utility consumption and utility rates for the natural gas and electricity over the previous two year period.


Cedarville Fire Station- Natural Gas Usage (therms) v. Natural Gas Rate ($/therm)
Natural Gas Usage (therms)
Natural Gas Rate ($/therm)
therms
2000.000
1800.000
1600.000
1400.000
1200.000
1000.000
800.000
600.000
400.000
200.000
0.000
$2.00
$1.80
$1.60
$1.40
$1.20
$1.00
$0.80
$0.60
$0.40
$0.20
$0.00
12/18/07
01/17/08
02/17/08
03/19/08
04/17/08
05/18/08
06/17/08
07/17/08
08/17/08
09/17/08
10/16/08
11/15/08
12/16/08
01/15/09
02/15/09
03/18/09
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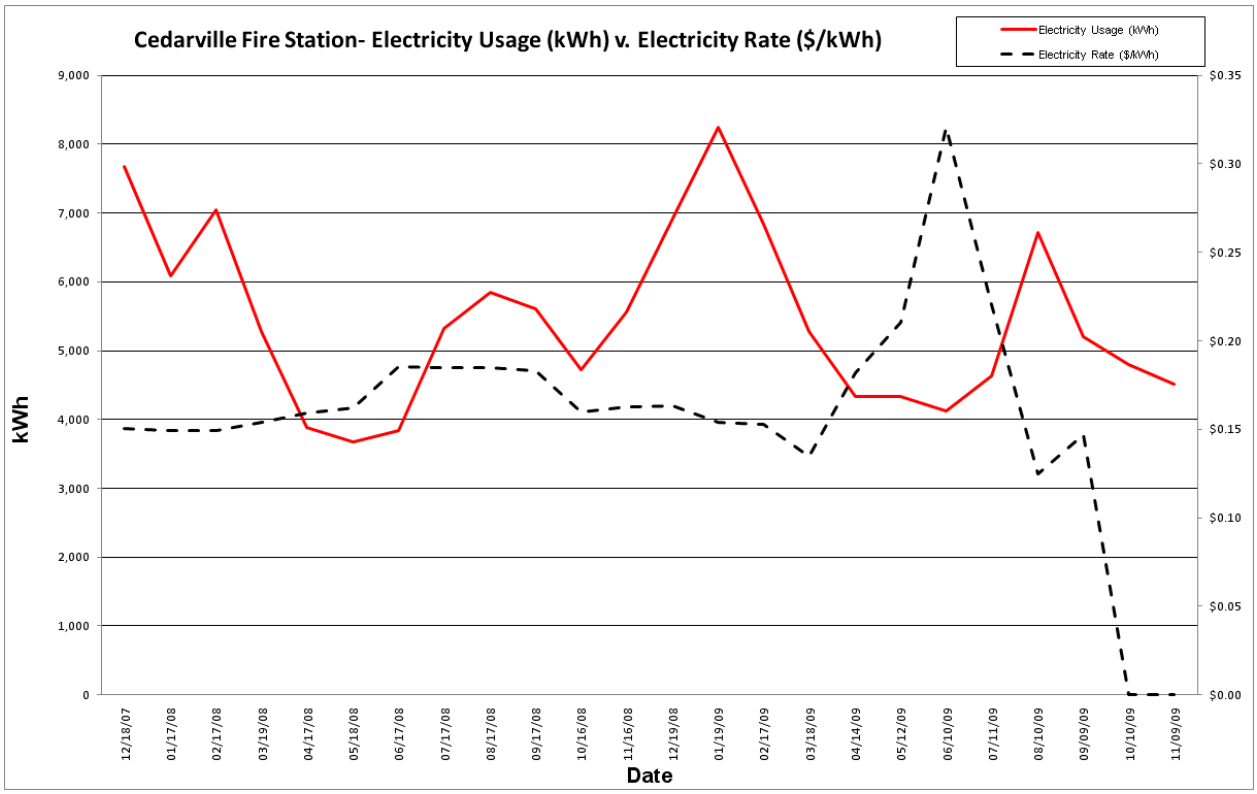
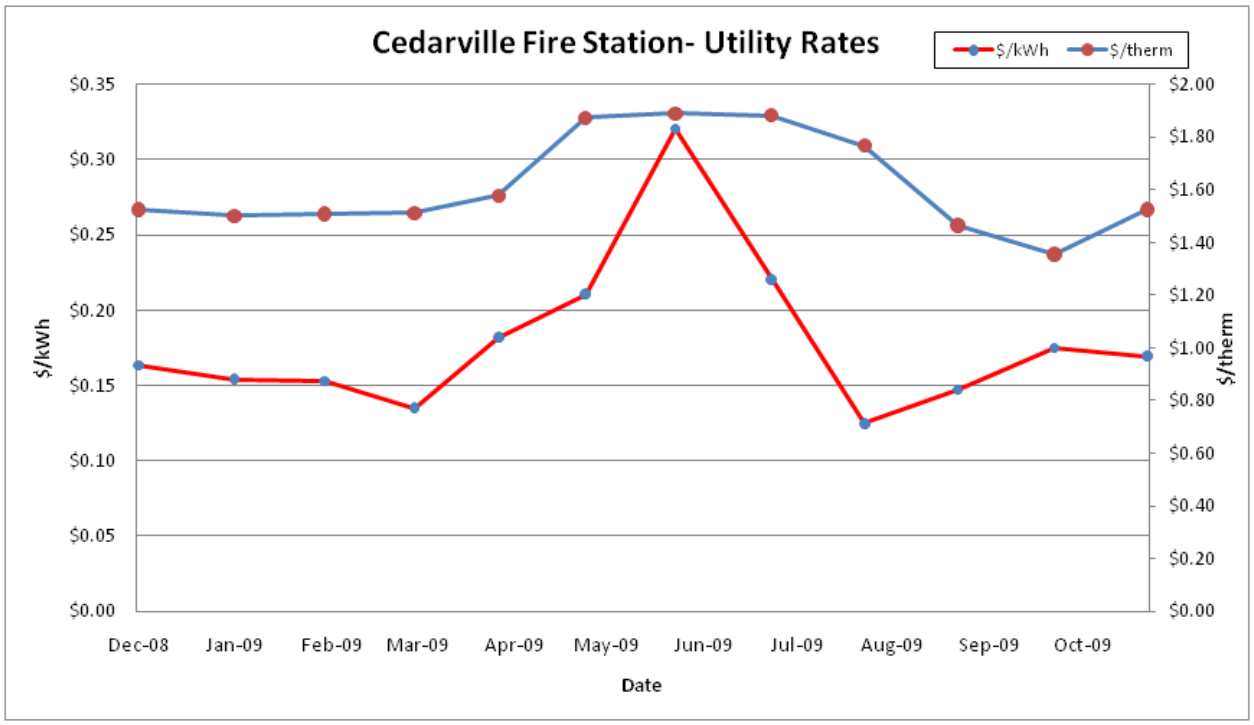
09/09/09
10/10/09
11/09/09
12/10/09
Date


Cedarville Fire Station- Electricity Usage (kWh) v. Electricity Rate ($/kWh)
Electricity Usage (kWh)
Electricity Rate ($/kWh)
kWh
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
$0.35
$0.30
$0.25
$0.20
$0.15
$0.10
$0.05
$0.00
12/18/07
01/17/08
02/17/08
03/19/08
04/17/08
05/18/08
06/17/08
07/17/08
08/17/08
09/17/08
10/16/08
11/16/08
12/19/08
01/19/09
02/17/09
03/18/09
04/14/09
05/12/09
06/10/09
07/11/09
08/10/09
09/09/09
10/10/09
11/09/09
Date

6.3. Energy Procurement Strategies

Billing analysis shows that the rate paid is lower than estimated state averages over the course of the year for the Cedarville Fire Station natural gas account. Changing to a third party suppliers could reduce the cost associated with energy procurement. 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. Appendix B contains a complete list of third party energy suppliers.

SWA/BSG-PMK recommends that Lawrence Township contacts third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, it may be possible to save up to $ 0.022/kWh, which would have equated to approximately $1,400 for the past 12 months.



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

Lawrence Township
OEM/Fire House
ADDRESS

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Upgrade Code	Upgrade Description	Existing Fixture	Existing Watts	Proposed Fixture	Proposed Watts	Lighting Total # of Upgrades	Lighting Cost per Upgrade ($)	Lighting SmartStart Rebate per Upgrade
1	LED Exit Sign	LED	2	No Upgrades	2	10	$0.00	$0.00
2	(4) 34W T12 Lamps, Magnetic Ballast / Retrofit with (4) 28W T8 Lamps, Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC LO	99	40	$90.00	$15.00
3	(2) 40W T12 U-Tube Lamps, Magnetic Ballast / Retrofit with (2) 32W T8 U-TubeLamps, Electronic Ballast	2L22" STD/STD	94	2L22"	62	22	$50.00	$15.00
4	120 W Incadescent / Replace with 44W Compact Fluorescent	120W INCANDESCENT	120	44W CF/SI	44	26	$10.00	$0.00
5	(4) 32W T8 Lamps, Electronic Ballast / No Upgrade	4L4' T8/ELEC	110	No Upgrade	110	16	$0.00	$0.00
6	26W Compact Fluorescent / No Upgrade	26W CF/SI	28	No Upgrade	28	4	$0.00	$0.00
7	(2) 8' T12 Lamps, Magnetic Ballast / Retrofit with (2) 8' T8 Lamps, Electronic Ballast	2L8' EE/STD	138	2L8' T8/ELEC	118	1	$50.00	$15.00
8	(3) 32W T8 Lamps, Electronic Ballast / No Upgrade	3L4' T8/ELEC	89	No Upgrade	89	80	$0.00	$0.00
9	65 W Incadescent / Replace with 26W Compact Fluorescent	65W INCANDESCENT	65	26W CF/HW	28	5	$10.00	$0.00
10	150W Metal Halide WallPack / No Upgrade	150W MH/BALLAST	195	No Upgrade	195	15	$0.00	$0.00
11	200W Metal Halide Contour Parking Lights / No Upgrade	200W MH/BALLAST HI	220	No Upgrade	220	7	$0.00	$0.00
12						0	$0.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$5,060.00	$520.00	$5,580.00
Rebate	$945.00	$140.00	$1,085.00
Net Cost	$4,115.00	$380.00	**$4,495.00**
Savings (kWh)	11,164	229	**11,393**
Savings ($)	$1,897.86	$38.90	**$1,936.75**
Payback	2.2	9.8	**2.3**

Variables:

$0.17	Avg. Electric Rate ($/kWh)
	Avg. Demand Rate ($/kW)
2080	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 Fixture	Existing Qty.	Existing Watts	Existing Foot Candles	Proposed Fixture	Proposed Qty.	Proposed Watts	kW Reduction	Lighting Energy Savings, kWh	Lighting Cost ($)	Lighting Savings ($)	Lighting Payback (yrs)	Controls Type	Controls Qty.	Occupancy Sensors (ONLY) Energy Savings, kWh	Occupancy Sensors (ONLY) Cost ($)	Occupancy Sensors (ONLY) Savings ($)	Occupancy Sensors (ONLY) Payback (yrs)	SmartStart Rebate Lighting	SmartStart Rebate Sensors	Lighting & Occupancy Sensors Energy Savings, kWh	Lighting & Occupancy Sensors Post-Rebate Cost ($)	Lighting & Occupancy Sensors Savings ($)	Lighting & Occupancy Sensors Payback (yrs)
		Totals:					25528				20203	5.325	11164	$5,060.00	$1,897.86	2.7			229	$520.00	$38.90	13.4	$945.00	$140.00	11393	$4,495.00	$1,936.75	2.3
1	1	Exit	24	8760	LED	10	20		No Upgrades	10	20	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
2	2	OEM Lobby	8	2080	4L4' EE/STD	1	160		4L4' T8/ELEC LO	1	99	0.061	127	$90.00	$21.57	4.2			0	$0.00	$0.00		$15.00	$0.00	127	$75.00	$21.57	3.5
3	2	Lounge Area	8	2080	4L4' EE/STD	17	2720		4L4' T8/ELEC LO	17	1683	1.037	2157	$1,530.00	$366.68	4.2			0	$0.00	$0.00		$255.00	$0.00	2157	$1,275.00	$366.68	3.5
4	3	Lounge Area	8	2080	2L22" STD/STD	2	188		2L22"	2	124	0.064	133	$100.00	$22.63	4.4			0	$0.00	$0.00		$30.00	$0.00	133	$70.00	$22.63	3.1
5	2	Kitchen	8	2080	4L4' EE/STD	6	960		4L4' T8/ELEC LO	6	594	0.366	761	$540.00	$129.42	4.2			0	$0.00	$0.00		$90.00	$0.00	761	$450.00	$129.42	3.5
6	2	Meeting Room	8	2080	4L4' EE/STD	6	960		4L4' T8/ELEC LO	6	594	0.366	761	$540.00	$129.42	4.2			0	$0.00	$0.00		$90.00	$0.00	761	$450.00	$129.42	3.5
7	2	Radio Room	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC LO	2	198	0.122	254	$180.00	$43.14	4.2			0	$0.00	$0.00		$30.00	$0.00	254	$150.00	$43.14	3.5
8	2	Office	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC LO	2	198	0.122	254	$180.00	$43.14	4.2			0	$0.00	$0.00		$30.00	$0.00	254	$150.00	$43.14	3.5
9	2	Office	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC LO	2	198	0.122	254	$180.00	$43.14	4.2			0	$0.00	$0.00		$30.00	$0.00	254	$150.00	$43.14	3.5
10	3	Mens Room	8	2080	2L22" STD/STD	1	94		2L22"	1	62	0.032	67	$50.00	$11.32	4.4			0	$0.00	$0.00		$15.00	$0.00	67	$35.00	$11.32	3.1
11	3	Womens Room	8	2080	2L22" STD/STD	1	94		2L22"	1	62	0.032	67	$50.00	$11.32	4.4			0	$0.00	$0.00		$15.00	$0.00	67	$35.00	$11.32	3.1
12	3	Banquet Room	8	2080	2L22" STD/STD	18	1692		2L22"	18	1116	0.576	1198	$900.00	$203.67	4.4			0	$0.00	$0.00		$270.00	$0.00	1198	$630.00	$203.67	3.1
13	4	Banquet Room	8	2080	120W INCANDES	26	3120		44W CF/SI	26	1144	1.976	4110	$260.00	$698.71	0.4			0	$0.00	$0.00		$0.00	$0.00	4110	$260.00	$698.71	0.4
14	5	Kitchen	8	2080	4L4' T8/ELEC	6	660		No Upgrade	6	660	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
15	6	Kitchen	8	2080	26W CF/SI	2	56		No Upgrade	2	56	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
16	7	Electrical Room	8	2080	2L8' EE/STD	1	138		2L8' T8/ELEC	1	118	0.02	42	$50.00	$7.07	7.1			0	$0.00	$0.00		$15.00	$0.00	42	$35.00	$7.07	4.9
17	2	Restroom	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC LO	2	198	0.122	254	$180.00	$43.14	4.2			0	$0.00	$0.00		$30.00	$0.00	254	$150.00	$43.14	3.5
18	2	Store Room	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC LO	2	198	0.122	254	$180.00	$43.14	4.2			0	$0.00	$0.00		$30.00	$0.00	254	$150.00	$43.14	3.5
19	8	Fire Emergency Bay	8	2080	3L4' T8/ELEC	80	7120		No Upgrade	80	7120	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
20	5	Storage	8	2080	4L4' T8/ELEC	2	220		No Upgrade	2	220	0	0	$0.00	$0.00		OSR	1	114	$260.00	$19.45	13.4	$0.00	$70.00	114	$190.00	$19.45	9.8
21	5	Electrical Room	8	2080	4L4' T8/ELEC	2	220		No Upgrade	2	220	0	0	$0.00	$0.00		OSR	1	114	$260.00	$19.45	13.4	$0.00	$70.00	114	$190.00	$19.45	9.8
22	5	Hallway	8	2080	4L4' T8/ELEC	1	110		No Upgrade	1	110	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
23	5	Mens Room	8	2080	4L4' T8/ELEC	2	220		No Upgrade	2	220	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
24	6	Store Room	8	2080	26W CF/SI	2	56		No Upgrade	2	56	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
25	5	Hallway	8	2080	4L4' T8/ELEC	2	220		No Upgrade	2	220	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
26	5	Wing	8	2080	4L4' T8/ELEC	1	110		No Upgrade	1	110	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
27	9	Exterior	7	2555	65W INCANDES	5	325		26W CF/HW	5	140	0.185	473	$50.00	$80.35	0.6			0	$0.00	$0.00		$0.00	$0.00	473	$50.00	$80.35	0.6
28	10	Exterior	7	2555	150W MH/BALLA	15	2925		No Upgrade	15	2925	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
29	11	Exterior	7	2555	200W MH/BALLA	7	1540		No Upgrade	7	1540	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	

Appendix B: Third Party Energy Suppliers (ESCOs)

CONECTIV POWER DELIVERY SERVICE TERRITORY
Last Updated: 12/09/09

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

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Commerce Energy, Inc. 4400 Route 9 South Suite100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	C ACTIVE
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.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
Liberty Power Delaware, LLC Park 80 West, Plaza II, Suite	(866) 769-3799	C/I

200Saddle Brook, NJ 07663	www.libertypowercorp.com	**ACTIVE**
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200Saddle 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 fl. Woodbridge, NJ 07095	(877) 273-6772 (800) 2- SEMPRA www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com	**C/I** **ACTIVE**
Strategic Energy, LLC 55 Madison Avenue Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.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**

SOUTH JERSEY GAS 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 GASMARK** 704 East Main Street, Suite 1 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.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 088327	800-375-1277 www.mxenergy.com	**R/C** **ACTIVE**
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	**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	**C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800- 557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**