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June 28, 2010

**Local Government Energy Program
Energy Audit Report**

For

***Township of Sparta
Eagles Nest Well House
Holland Circle
Sparta, NJ 07871***

Project Number: LGEA21



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INTRODUCTION

As an approved energy consulting firm under the Local Government Energy Audit Program (LGEA), Steven Winter Associates, Inc. (SWA) was selected to perform an energy audit and assessment for the Township of Sparta buildings. For this audit, the PMK Group, an approved subcontractor under the LGEA, performed the assessment of the large mechanical and electrical systems including HVAC equipment. The audit included a review of Germany Flats – 12 Park Lake Road, Germany Flats – Storage Garage, Fire Headquarters, Library, Public Works Facility, Public Works Facility – Satellite Garage, Eagle’s Nest Well House as well as the Sparta Municipal Building. The buildings are located in Sparta, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Eagles Nest Well House building located at Holland Circle, Sparta, NJ. The current conditions and energy-related information were collected in order to analyze and suggest the implementation of building improvements and energy conservation measures.

The Eagles Nest Well House was built in 1995 and consists of 1 floor with a total floor area of 780 square feet. The building is occupied by approximately 1employee for 7 hours per week.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to Township of Sparta 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.

- Section 1 and section 2 of the report cover a description and analysis of the building existing conditions.
- Section 3 provides a detail inventory of major electrical and mechanical systems in the building.
- Sections 4 through 7 provide a description of our recommendations.
- Appendices include further details and information supporting our recommendations.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Eagles Nest Well House building located at Holland Circle, Sparta, NJ. The building is a single story well house with a total floor area of 780 square feet. The building was built in 1995 and contains the well house for the Township Water Utility. The original structure has not undergone any major renovations or additions.

Based on the field visits performed by the SWA staff on August 25th and September 3rd, 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.

Existing conditions

From September 2008 through September 2009, the period of analysis for this audit, the building consumed 210,120 kWh or \$33,624 worth of electricity at an approximate rate of \$0.160/kWh and 549 gallons or \$1,556 worth of propane at an approximate rate of \$2.106/gallon. The joint energy consumption for the building, including both electricity and fossil fuel, was 769 MMBtus of energy that cost a total of \$34,780.

SWA has entered energy information about the Eagles Nest Well House building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as a well house building and therefore was not able to receive an Energy Star performance rating. SWA encourages the Township of Sparta to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 984.0 kBtu/ft²yr.

Recommendations

Implementing this report's recommendations will reduce use by approximately 1.1 kBtu/ft²yr, which would decrease the building's energy use intensity to 983.0 kBtu/ft²yr. A majority of the electrical usage comes for the electrical pumps used by the well house and therefore will not be reduced by addressing the HVAC systems.

The Eagles Nest Well House is a very small building with limited opportunities for reducing energy use. SWA recommends one lighting measure as part of the scope of work.

Based on the assessment of the building, SWA has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- Increase insulation levels
- Increase soffit venting

Category II Recommendations: Operations and Maintenance

- Properly seal building to prevent insect nesting
- Replace missing downspout
- Maintain roofs
- Install downspout diverters

- Routine maintenance inspections of exterior walls, windows and doors
- Provide weather stripping / air sealing
- Provide water efficient fixtures and controls
- Use Energy Star labeled appliances

Category III Recommendations: Energy Conservation Measures

At this time, SWA highly recommends a total of **1** Energy Conservation Measures (ECMs) for the Eagles Nest Well House building that is summarized in the following Table 1. The total investment cost for this ECM with incentives is **\$80**. SWA estimates a first year savings of **\$52** with a simple payback of **1.5 years**.

The implementation of all the recommended ECMs would reduce the building electric usage by 250 kWh annually, or <1% of the building's current electric consumption. There are currently no ECMs recommended that would reduce the amount of propane consumption. SWA estimates that implementing this ECM will reduce the carbon footprint of the Eagles Nest Well House building by **448 lbs of CO₂**, which is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 1 tree to absorb the annual CO₂ produced. SWA also recommends that the Township of Sparta 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 \$0.010/kWh, which would have equated to \$2,101 for the past 12 months.

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, Direct Install, ARRA grants available through the NJ Office of Clean Energy, 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>

The Direct Install program offers incentives for prescriptive measures that can offset up to 80% of the installed cost. The benefits and requirements of this program can be found at:

<http://www.njcleanenergy.com/commercial-industrial/programs/direct-install>

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.

The following table summarizes the proposed Energy Conservation Measure (ECM) and its economic relevance.

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	Install 4 new CFL lamps	RSMeans	80	0	80	250	0.0	0	1.1	12	52	5	237	1.5	196.0	39.2	58.5	158	448
TOTALS			80	0	80	250	0.0	0	1.1	12	52	-	237	1.5	-	-	-	158	448

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

Note: A 0.0 electrical demand reduction / month indicates that it is very low / negligible

1. HISTORIC ENERGY CONSUMPTION

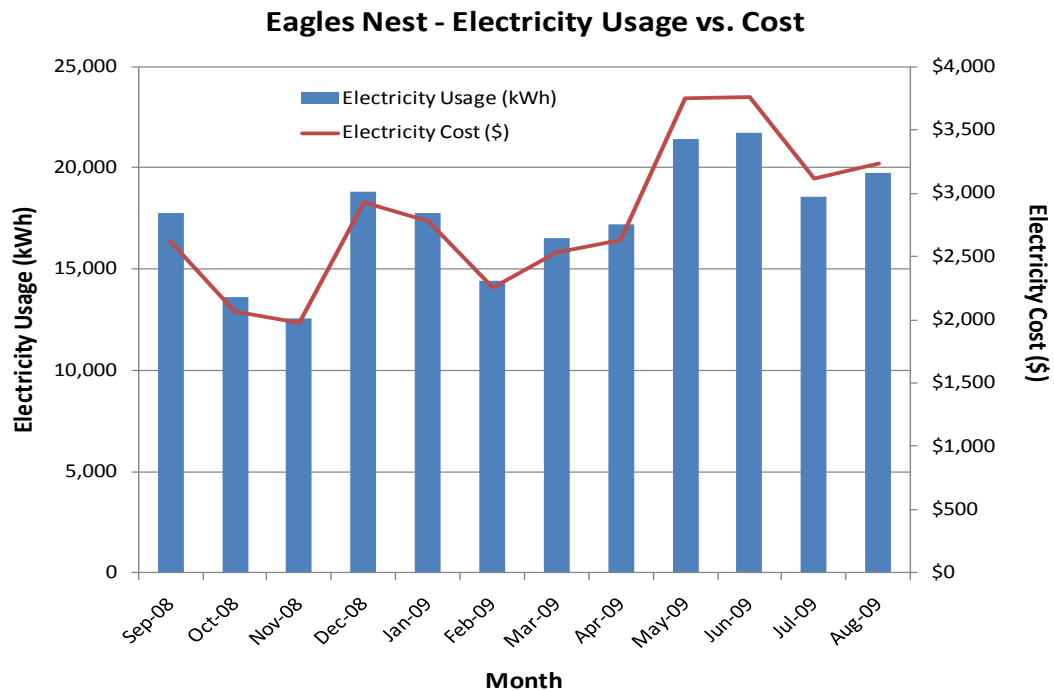
1.1. Energy usage, load profiles and cost analysis

SWA analyzed utility bills from **September 2008 through September 2009** (period of analysis) that were received from the utility companies supplying the Eagles Nest Well House building with electricity and propane. The Eagles Nest Well House building is currently contains one electric meter and has propane delivered as needed.

Electricity – The Eagles Nest Well House building currently buys electricity from JCP&L at **an average rate of \$0.160/kWh** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 210,120 kWh or \$33,624 worth of electricity** in the previous year. The Eagles Nest Well House building is charged separately for demand (kW) which has been factored into each monthly bill. Based on the same time period, the electric meter also has **an average monthly demand of 52.2kW and a monthly peak demand of 52.8 kW**.

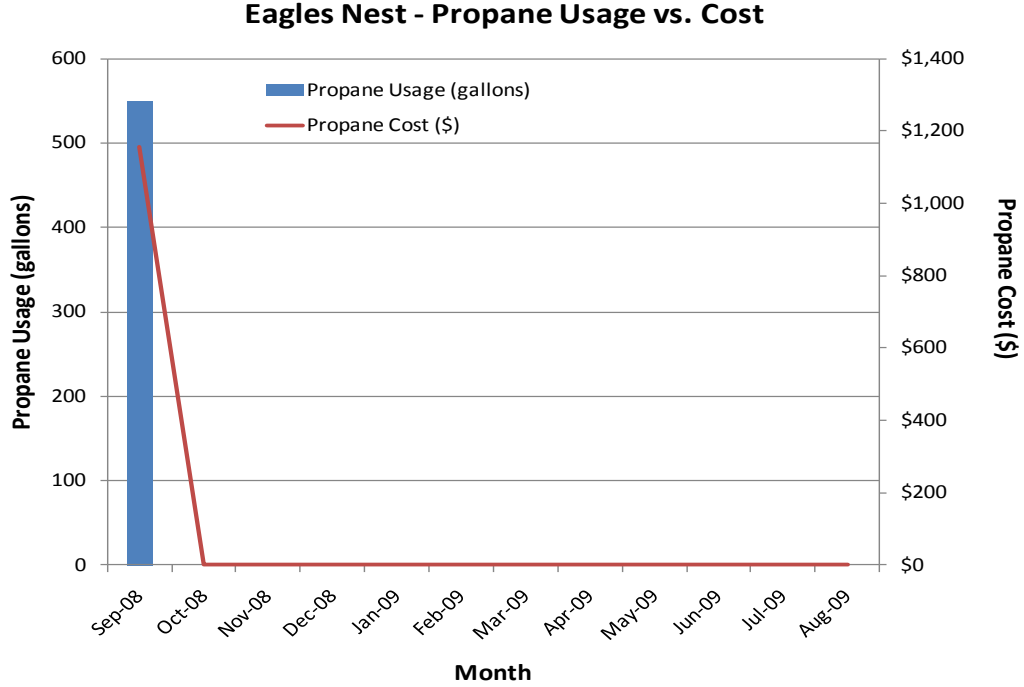
Natural gas – The Eagles Nest Well House building currently receives propane deliveries via truck when needed. The building currently buys propane from Amerigas at **an average rate of \$2.106/gallon** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 549 gallons or \$1,156 worth of propane** in the previous year.

The following chart shows electricity use versus cost for the Eagles Nest Well House building based on utility bills for the 12 month period of September 2008 to September 2009.



The electricity cost follows a trend line similar to that of the electricity usage as expected.

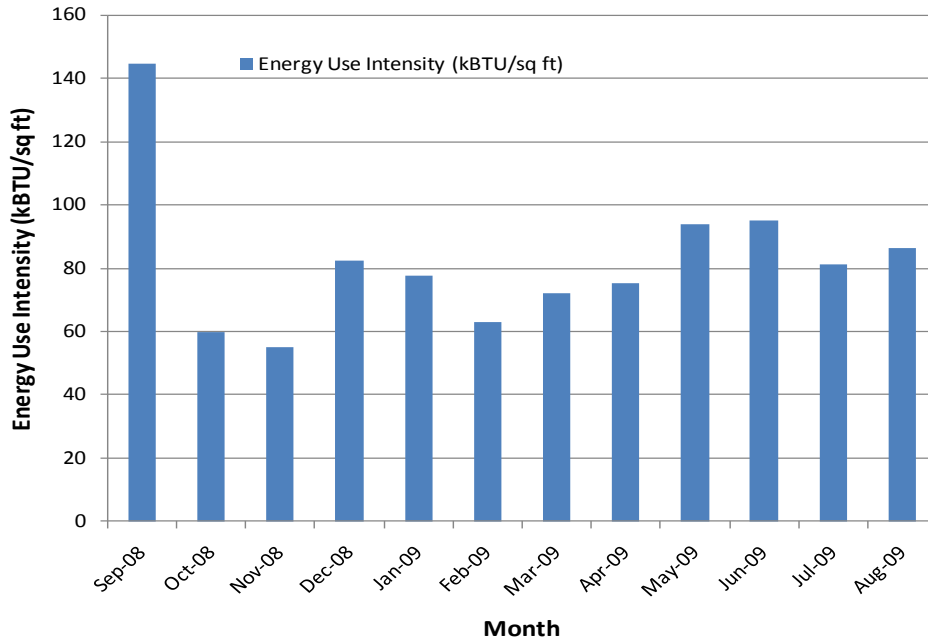
The following chart shows propane use versus cost for the Eagles Nest Well House building based on utility bills for the 12 month period of September 2008 to September 2009.



The above graph shows propane usage based on delivery. Since the Eagles Nest Well House only receives one delivery per year, the graph will not accurately portray energy usage. Unlike Natural Gas, Propane is delivered via truck when needed. The Eagles Nest Well House contains one 2000 gallon propane tank that is partially filled based on necessity. Currently, the propane tank is filled to around 550 gallons once per year.

The following chart shows combined propane and electric consumption in kBtu/sq ft for the Eagles Nest Well House building based on utility bills for the 12 month period of September 2008 to September 2009.

Eagles Nest - Energy Use Intensity

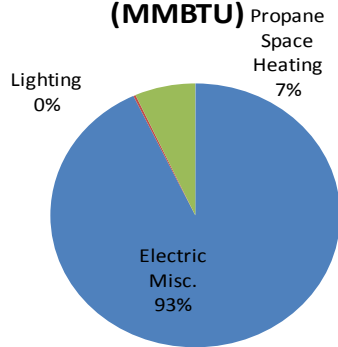


Energy Use Intensity fluctuates with the heating and cooling season as expected. September shows an unusually large peak due to the fact that propane is delivered on an irregular basis and all propane use is therefore attributed to that single annual delivery.

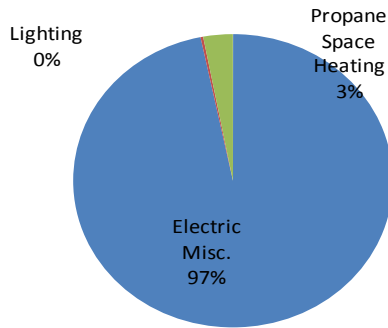
The following table and chart pies show energy use for the Eagles Nest Well House building based on utility bills for the 12 month period of September 2008 to September 2009. Note electrical cost at \$46.9/MMBtu of energy is more than 2 times the cost of propane at \$22.2/MMBtu. Also, miscellaneous electric use accounts for a large percentage of the building electric use due to the high usage of electricity used by the pump motors.

2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	715	93%	\$33,534	97%	46.9
Lighting	2	0%	\$94	0%	46.9
Propane Space Heating	52	7%	\$1,154	3%	22.2
Totals		100%	\$34,782	100%	
Total Electric Usage	717	93%	\$33,624	97%	46.9
Total Propane Usage	52	7%	\$1,156	3%	22.2
Totals	769	100%	\$34,780	100%	

Annual Energy Consumption (MMBTU)



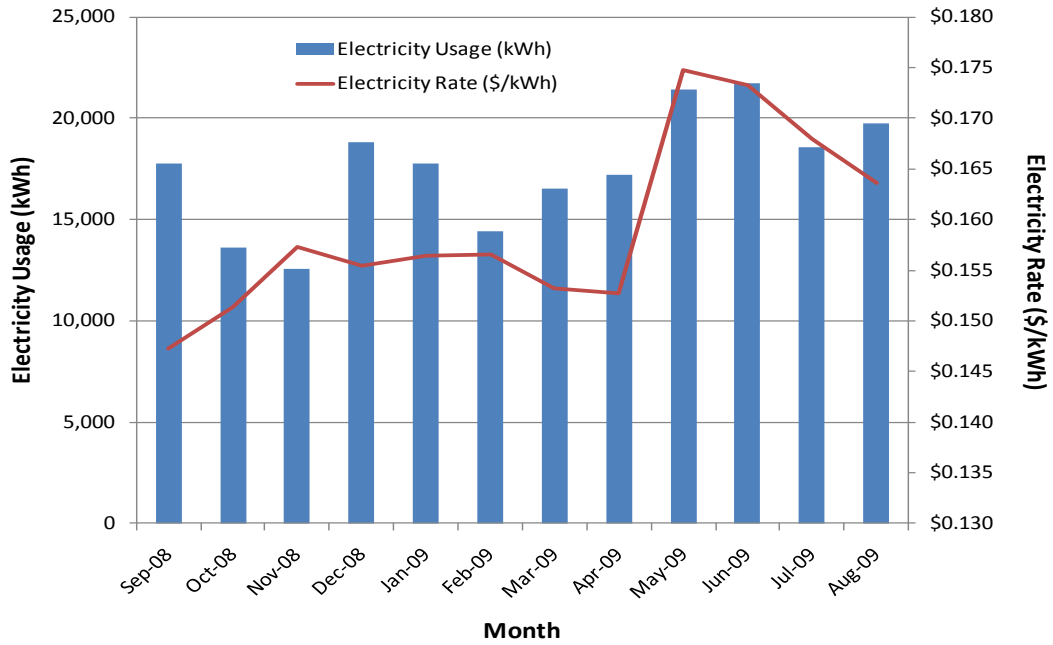
Annual Energy Consumption (\$)



1.2. Utility rate analysis

The Eagles Nest Well House building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) including a separate (kW) demand charge that is factored into each monthly bill. The Eagles Nest Well House building currently pays an average rate of approximately \$0.160/kWh based on the 12 months of utility bills of September 2008 to September 2009. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. The electric rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.

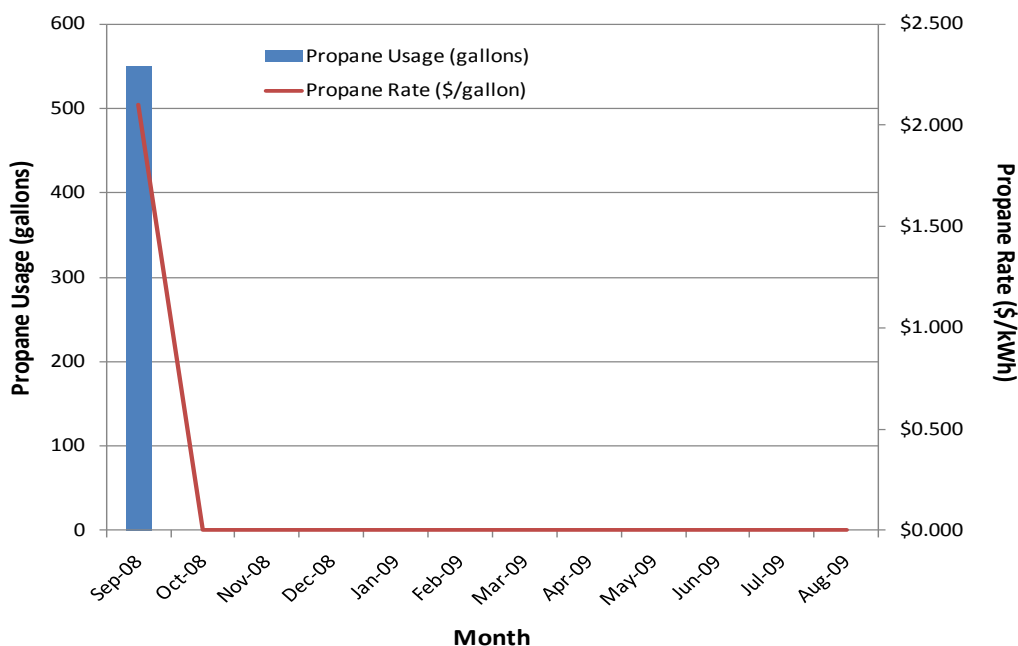
Eagles Nest - Electricity Usage vs. Rate



The electricity rate fluctuates inversely proportional to usage, as expected. Typically, the more units of electricity that are used by the building, the cheaper electricity becomes per unit. Some rate fluctuations may be due to estimated utility readings as opposed to actual readings.

The Eagles Nest Well House building currently purchases propane from Amerigas at a general service market rate for propane use (gallons). The building currently pays an average rate of approximately \$2.106/therm based on the 12 months of utility bills of September 2008 to September 2009. The propane rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.

Eagles Nest - Propane Usage vs. Rate



The Eagles Nest Well House only receives one delivery of propane per year, based on previous utility bills. Since there is only one delivery per year, the propane usage graph will only show one point.

Some of the minor 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

SWA has entered energy information about the Eagles Nest Well house building in the U.S. Environmental Protection Agency’s (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as Well House building. The building was not able to receive an Energy Star performance rating since the building is classified as a Well House building, which is currently ineligible for a performance score through the Benchmarking tool. SWA encourages the Township of Sparta to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 984.0 kBtu/ft²yr.

Implementing this report’s highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 1.1 kBtu/ft²yr.

Per the LGEA program requirements, SWA has assisted the Township of Sparta to create an *Energy Star Portfolio Manager* account and has shared the Eagles Nest Well House building facility information to allow future data to be added and tracked using the benchmarking tool. SWA is sharing this Portfolio Manager Site information with TRC Energy Services. As per requirements, the account information is provided below:

Username: SpartaTownship
 Password: SPARTA2009

Also, below is a performance rating that is generated based on historical energy consumption from the Portfolio Manager Benchmarking tool.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE Township of Sparta - Eagles Nest Well House

Building ID: 1857579
For 12-month Period Ending: September 30, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 25, 2010

Facility Township of Sparta - Eagles Nest Well House Holland Circle Sparta, NJ 07871	Facility Owner N/A	Primary Contact for this Facility N/A
Year Built: 1995 Gross Floor Area (ft²): 780		
Energy Performance Rating² (1-100): N/A		
Site Energy Use Summary³		
Electricity - Grid Purchase (kBtu)	716,929	<div style="border: 1px solid black; width: 100%; height: 100%; margin-bottom: 5px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: small;">Stamp of Certifying Professional</div> <div style="border: 1px solid black; padding: 5px; text-align: center; font-size: x-small;">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.</div>
Liquid Propane (kBtu)	50,333	
Natural Gas - (kBtu) ⁴	0	
Total Energy (kBtu)	767,262	
Energy Intensity⁵		
Site (kBtu/ft ² /yr)	984	
Source (kBtu/ft ² /yr)	3135	
Emissions (based on site energy use)		
Greenhouse Gas Emissions (MtCO ₂ e/year)	112	
Electric Distribution Utility		
FirstEnergy - Jersey Central Power & Lt Co		
National Average Comparison		
National Average Site EUI	104	
National Average Source EUI	213	
% Difference from National Average Source EUI	1372%	
Building Type	Other	
Meets Industry Standards⁶ for Indoor Environmental Conditions:		Certifying Professional
Ventilation for Acceptable Indoor Air Quality	N/A	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.

The government estimates the average time needed to fill out this form is 6 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 Eagles Nest Well House was built in 1995 and contains a total floor area of 780 square feet in one story. The building serves as a pump station for the Township Water Utility.

2.2. Building occupancy profiles

The Eagles Nest Well House building is occupied by 1 employee for approximately 7 hours per week.

2.3. Building envelope

2.3.1. Exterior Walls

The exterior walls consist of 8” CMU blocks with brick veneer finish. The building is not insulated.

This building’s exterior envelope wall material was found to be in overall good condition. Under eaves and around some windows insect nesting was observed which should be cleaned up to prevent possible future infestation.

Wall penetrations were found to be sealed with inappropriate materials and methods. SWA recommends using manufacturer’s recommended sealants and caulks.



Insect nesting around eaves and windows in addition to inappropriate wall penetration sealer were found

Overall, exterior and interior wall finishes of the envelope were found to be in age-appropriate, good condition with the exception of some minor insect nesting and improper ceiling to exterior walls. SWA recommends that Sparta perform bi-annual inspections to maintain building weather-stripping and sealing as well as perform preventative maintenance to the exterior surfaces.

2.3.2. Roof

The low pitch standing seam metal roof shows no visual signs of leakage. Attic insulation levels could not be verified and are believed to be non-existent.

Soffit and ridge vents were identified and SWA recommends verifying that unobstructed air flow between the two is provided. This helps to prolong the life of the installed metal roof and minimizes attic summer temperatures through passive ventilation.

Gutters and downspouts were inspected and found to be in good condition except of one downspout was missing and needs to be installed and properly attached to the building.



Missing downspout

2.3.3.Base

The building's base is a 4" concrete slab-on grade with a perimeter footing. There were no visual signs of water or moisture problems.

2.3.4.Windows

The double hung type double glazed vinyl windows showed no visual signs of water/ moisture leakage or air infiltration and were found to be in overall good condition.

As a best practice, SWA recommends that all windows be inspected at least once a year. Any gaps, cracks, or damage to weather-stripping or caulking should be repaired or replaced, as needed, to minimize energy loss around those openings. Building staff should also verify that windows open and close properly and repair, as needed.

2.3.5.Exterior doors

The metal exterior doors were in good condition. SWA recommends inspecting weather- stripping twice a year, replacing worn or missing areas.

2.3.6.Building air tightness

In addition to the above mentioned recommendations, SWA suggests air sealing, caulking and/or insulating around all plumbing, electrical, HVAC and structural envelope penetrations. This should include bottom and top plates, recessed light fixtures, electrical boxes, chimney walls and window or sleeve air conditioner units. The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

2.4.1. Heating

Heating is provided by two 25 MBH, 80% efficient Reznor gas-fired unit heaters, set for 60°F. The units consume propane fuel. They were found to be in good operating condition.



Reznor unit heater

2.4.2. Cooling

Not applicable, the Eagles Nest Well House does not contain cooling.

2.4.3. Ventilation

In addition to the exterior doors, ventilation is provided by a wall-mounted ventilation fan in the chemical pump room.

2.4.4. Domestic Hot Water

Not applicable, the Eagles Nest Well House does not contain a domestic hot water system.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – The Eagles Nest Well House building contains efficient T8 fluorescent fixtures with electronic ballasts for general lighting. See Appendix A for a complete existing lighting schedule.

Exit Lights – There are no exit lights installed in Eagles Nest Well House.

Exterior Lighting - The exterior lighting surveyed revealed that there were 4 fixtures used for exterior lighting that each contained one 85W incandescent lamp. See Appendix A for a complete existing and proposed lighting schedule.

2.5.2. Appliances

Not applicable, the Eagles Nest Well House does not contain any appliances.

2.5.3.Elevators

The Eagles Nest Well House is a one story building and therefore does not contain an elevator.

2.5.4.Process and others electrical systems

The Eagles Nest Well House processes have been relocated to the Germany Flats pump station. There are only two pumps remaining at this facility. Those two pumps have two motors which are both rated at ¼ HP and 1,725 RPM, and operate the chemical feed system. The pumps and motors have been installed in the recent past and are in good operating condition.



Two (2) chemical feed pumps

3. EQUIPMENT LIST

Inventory

Building System	Description	Physical Location	Model #	Fuel	Space Served	Estimated Remaining Useful Life %
Heating/Cooling	Unit heater, set to 60°F, Installed 1995	Interior Ceiling	Reznor	Propane	Entire building	65%
Pumps/Motors	Two (2) pump motors, 1/4 HP, 1,725 RPM	Pump room	N/A	Electric	Chemical feed system	80%

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Municipal building, SWA has separated the investment opportunities into three recommended categories:

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

- Increase insulation levels – SWA recommends that insulation levels are increase at the roof as well as exterior walls to help thermally insulate the building. Insulating the wells can help prevent frost from penetrating the building exterior as well as reduce heating costs associated with the Well House.
- Increase soffit venting – SWA observed that the amount of soffit vents was found to be insufficient. SWA recommends using additional venting in order to prolong life of the installed synthetic slate roof and minimize potential leakage. Roof ventilation should be installed according to local building codes.

Category II Recommendations: Operations and Maintenance

- Properly seal building to prevent insect nesting – SWA recommends caulking and installing proper sealing to prevent insect nesting in small openings and penetrations of the exterior shell.
- Replace missing downspout – SWA recommends replacing a missing downspout that was observed to be missing during the audit. The downspout is important to keep water away from the building exterior and preventing any moisture damage.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
- Routine maintenance inspections of exterior walls, windows and doors – SWA observed several areas around windows and doors that were missing caulking and created openings allowing insects to build nests where there were surface transitions. SWA recommends routine maintenance inspections to prevent insect nesting and look for minor maintenance issues that have the potential of creating larger problems in the future.
- Provide weather stripping / air sealing – SWA observed that all windows and doors had proper weather-stripping and air sealing due to their age. As a best practice, SWA recommends that each window and door is inspected twice per year for deficiencies. Any time that a seal has been compromised, building maintenance staff should repair and replace the seal immediately to ensure that thermal barriers are not breached.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install 4 new CFL lamps

ECM#1: *Install 4 new CFL lamps*

Description:

The Eagles Nest Well House building contains 4 incandescent bulbs used for exterior lighting. Replacing incandescent bulbs with CFLs allows each fixture to use 2/3 less energy with the same light output. See Appendix A for existing and proposed lighting schedule.

Installation cost:

Estimated installed cost: \$80

Source of cost estimate: *RS Means; Published and established costs*

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
1	Install 4 new CFL lamps	RSMeans	80	0	80	250	0.0	0	1.1	12	52	5	237	1.5	196.0	39.2	58.5	158	448

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:

There are currently no incentives for this measure at this time.

Options for funding ECM:

NJ Clean Energy – SmartStart, Direct Install programs

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are not currently any existing renewable energy systems.

5.2. Wind

A Wind system is not applicable for this building because the area does not have winds of sufficient velocity to justify installing a wind turbine system.

5.3. Solar Photovoltaic

This site has already been analyzed for the use of Photovoltaic panels and the proposed system has already gone out to bid.

5.4. Solar Thermal Collectors

Solar thermal collectors are not recommended for this project since it does not contain a domestic hot water system.

5.5. Combined Heat and Power

CHP is not applicable for this building based on its size.

5.6. Geothermal

CHP is not applicable for this building based on its size.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

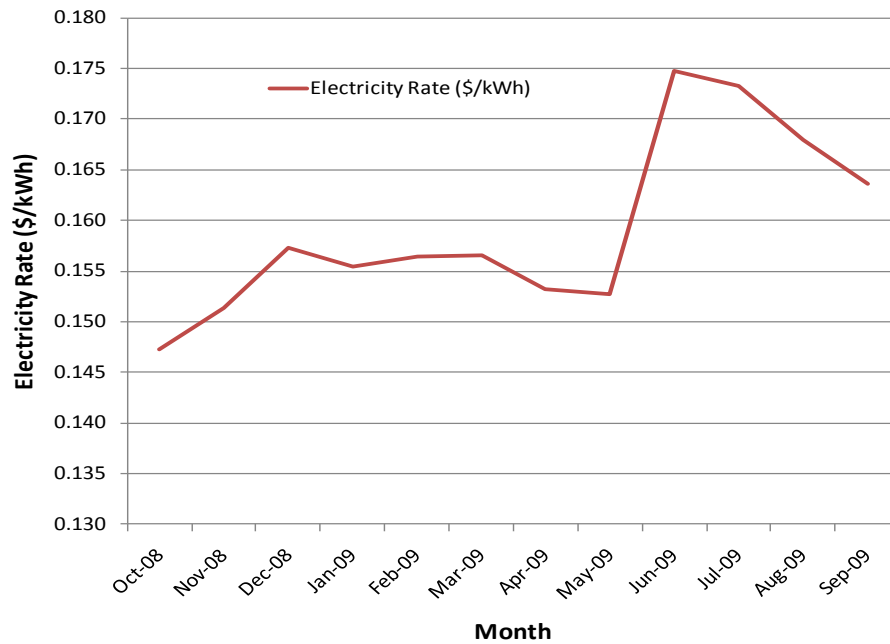
6.1. Energy Purchasing

The Eagles Nest Well House building receives propane via truck deliveries to a 2000 gallon storage tank. Amerigas supplies propane to the building. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased via one incoming meter from JCP&L without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations of 16% over the most recent 12 month period. Propane bill analysis did not show fluctuations since there is only one delivery per year.

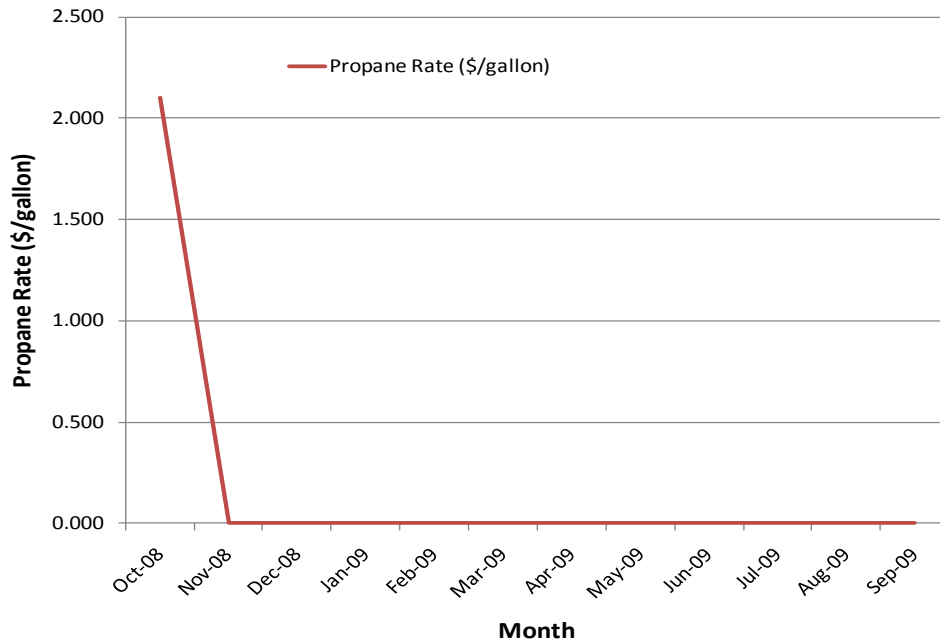
Currently, New Jersey commercial buildings of similar type pay \$0.150/kWh for electricity and \$1.30/gallon for propane. Currently, the electricity rate for the Eagles Nest Well House building is \$.160/kWh, which means there is a potential cost savings of \$2,101 per year however a majority of the Well House usage occurs during Peak times and is therefore charged a significant demand charge which influences the utility rate. The current propane rate for the Eagles Nest Well House building is \$2.106/gallon which is more than the average propane cost, however this number is high since the building only receives a minimal amount of propane once per year. Large cost savings potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates.

SWA recommends that the Township of Sparta further explore opportunities of purchasing electricity from third party energy suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Eagles Nest Well House building. Appendix B contains a complete list of third party energy suppliers for the Township of Sparta service area. The Township of Sparta may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and natural gas use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country and in New Jersey.

Eagles Nest - Annual Electricity Rate



Eagles Nest - Annual Propane Rate



6.2. Energy Procurement strategies

Also, the Eagles Nest Well House building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option.

7. METHOD OF ANALYSIS

7.1. Assumptions and tools

Energy modeling tool: Established / standard industry assumptions, DOE e-Quest
Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)
RS Means 2009 (Building Construction Cost Data)
RS Means 2009 (Mechanical Cost Data)
Published and established specialized equipment material and labor costs
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.

Appendix A: Lighting Study

Location			Existing Fixture Information											Retrofit Information											Annual Savings					
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
252	GF	Main area	Parabolic	E	4T8	11	2	32	S	0.5	261	0	704	92	N/A	Parabolic	4T8	None	S	11	2	32	0.5	261	0	704	92	0	0	0
253	Ext	Exterior	Exterior	None	Inc	4	1	85	S	3	365	0	340	372	CFL	Exterior	CFL	None	S	4	1	28	3	365	0	112	123	250	0	250
Totals:						15	3	117	0				1,044	464						15	3	60				816	215	250	0	250

Appendix B: Third Party Energy Suppliers (ESCOs)
<http://www.state.nj.us/bpu/commercial/shopping.html>

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Integrays Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integraysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com