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**Local Government Energy Program
Energy Audit Report**

For

***Township of Sparta
Library
16 Woodport Road
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 Library building located at 16 Woodport Road, 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 Library was built in 1970 and consists of 2 floors and a total floor area of 17,700 square feet. The main floor of the building houses the Sparta Public Library, which is open for 65 hours per week while the basement level houses the Parks and Recreation Department, which is open 70 hours per week. The building is occupied by approximately 22 employees.

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 Library building located at 16 Woodport Road, Sparta, NJ. The building is a two-story commercial building with a total floor area of 17,700 square feet. The building was built in 1970 and contains the Sparta Public Library on the main floor and the Parks and Recreation Department on the basement floor. 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 135,680 kWh or \$23,176 worth of electricity at an approximate rate of \$0.171/kWh and 4,492 therms or \$5,071 worth of natural gas at an approximate rate of \$1.129/therm. The joint energy consumption for the building, including both electricity and fossil fuel, was 912 MMBtus of energy that cost a total of \$28,247.

SWA has entered energy information about the Library building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as a Library 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 53.0 kBtu/ft²yr.

Recommendations

Implementing this report's recommendations will reduce use by approximately 0.9 kBtu/ft²yr, which would decrease the building's energy use intensity to 52.1 kBtu/ft²yr.

SWA recommends a package of measures that addresses lighting and DHW systems. The Library building was built in 1970 and all of the equipment has been maintained reasonably well. SWA recommends most lighting retrofits to reduce the amount of baseload electricity. As part of the recommendation, SWA also recommends that the electric DHW water heater is replaced with a gas electric DHW heater in order to achieve cost savings.

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 attic insulation levels
- Upgrade windows
- Increase soffit venting

Category II Recommendations: Operations and Maintenance

- Seal openings at book drop box sleeve in exterior wall

- Investigate water leaks
- 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 **3** Energy Conservation Measures (ECMs) for the Library building that is summarized in the following Table 1. The total investment cost for these ECMs with incentives is **\$3,740**. SWA estimates a first year savings of **\$1,092** with a simple payback of **3.4 years**. SWA also recommends **1** ECM with a 5-10 year payback and **1** ECM with a payback of greater than 10 years that is summarized in Tables 2 and 3, respectively.

The implementation of all the recommended ECMs would reduce the building electric usage by 8,651 kWh annually, or 6% of the building's current electric consumption. Due to the nature of recommending that an electric domestic hot water heater is converted to natural gas, there will be an increased gas usage of 124 therms annually, or a 2% increase of the building's current natural gas consumption, however this also results in an annual cost savings. SWA estimates that implementing these ECMs will reduce the carbon footprint of the Library building by **14,123 lbs of CO₂**, which is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 34 trees 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 \$0.021/kWh, which would have equated to \$2,849 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 three tables summarize the proposed Energy Conservation Measures (ECM) and their 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 27 new CFL lamps	RSMeans	1,540	0	1,540	2,468	0.5	0	0.5	81	503	5	2,291	3.1	48.7	9.7	18.9	764	4,419
2	Replace Electric DHW heater with Natural Gas DHW heater	Contractor	1,800	50	1,750	3,634	4.5	-124	0.0	0	481	10	4,065	3.6	132.3	13.2	24.4	2,357	5,140
3	Install 5 new Occupancy Sensors	RSMeans	550	100	\$450	631	0.1	0	0.1	0	108	15	1,270	4.2	182.2	12.1	22.9	\$838	1,130
	TOTALS		3,890	150	3,740	6,733	5.1	-124	0.6	81	1,092	-	7,625	3.4	-	-	-	3,958	10,689

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

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
4	Install 13 new LED exit signs	RSMMeans	2,600	260	2,340	1,261	0.3	0	0.2	26	242	10	2,040	9.7	-12.8	-1.3	0.6	(279)	2,258
	TOTALS		2,600	260	2,340	1,261	0.3	0	0.2	26	242	-	2,040	9.7	-	-	-	-279	2,258

Table 3 – End of Life Cycle ECMs (>10 year payback)

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
5	Install 4 new Pulse Start Metal Halides	RSMMeans	1,318	100	1,218	657	0.1	0	0.1	48	160	15	1,887	7.6	54.9	3.7	10.0	696	1,176
	TOTALS		1,318	100	1,218	657	0.1	0	0.1	48	160	-	1,887	7.6	-	-	-	696	1,176

1. HISTORIC ENERGY CONSUMPTION

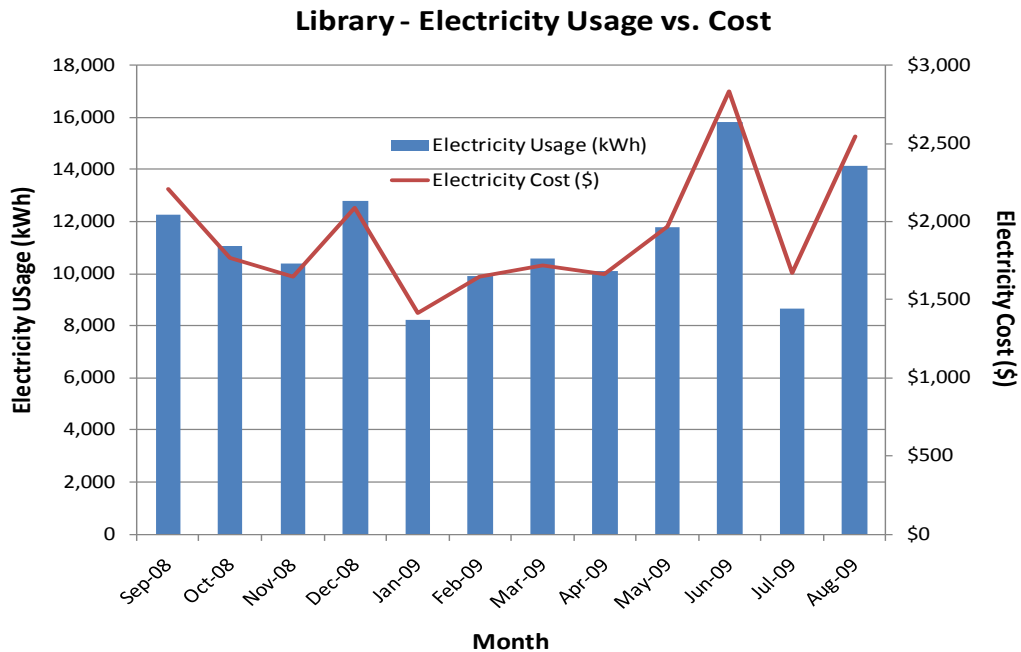
1.1. Energy usage, load profiles and cost analysis

SWA analyzed utility bills from **September 2008 through September 2009** (period of analysis) that were received from the utility companies supplying the Library building with electricity and natural gas. The Library building is currently contains one gas meter and one electric meter.

Electricity – The Library building currently buys electricity from JCP&L at **an average rate of \$0.171/kWh** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 135,680 kWh or \$23,176 worth of electricity** in the previous year. The Library 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 40.4 kW and a monthly peak demand of 47.4 kW**.

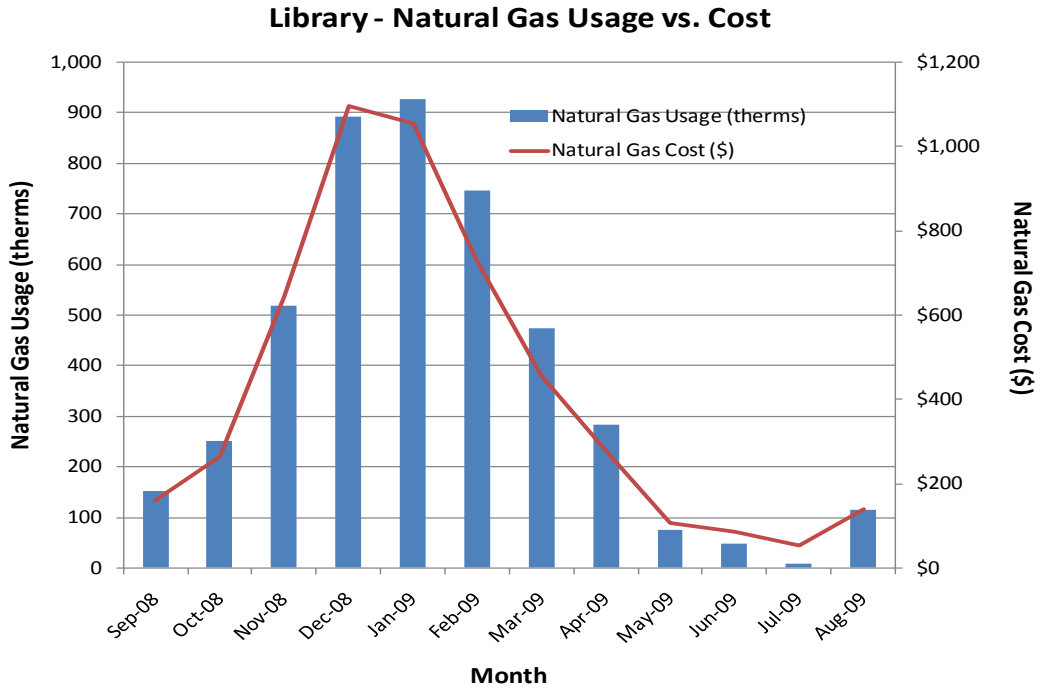
Natural gas – The Library building is currently served by one meter for natural gas. The building currently buys natural gas from Elizabethtown Gas at **an average rate of \$1.129/therm** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 4,492 therms or \$5,071 worth of natural gas** in the previous year.

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



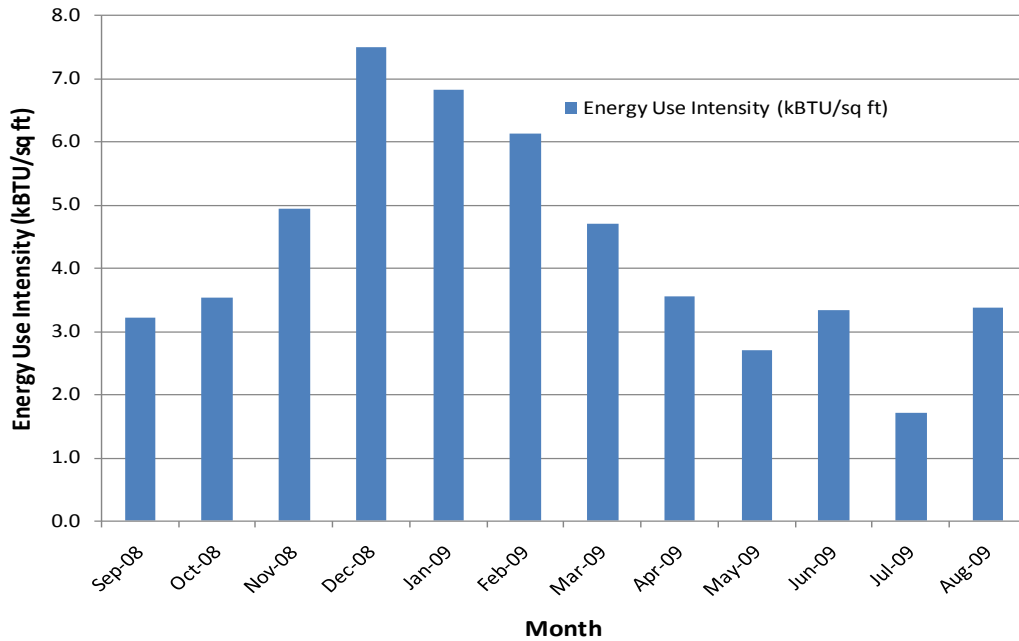
The electricity cost follows a trend line similar to that of the electricity usage as expected.

The following chart shows natural gas use versus cost for the Library building based on utility bills for the 12 month period of September 2008 to September 2009.



The following chart shows combined natural gas and electric consumption in kBtu/sq ft for the Library building based on utility bills for the 12 month period of September 2008 to September 2009.

Library - Energy Use Intensity

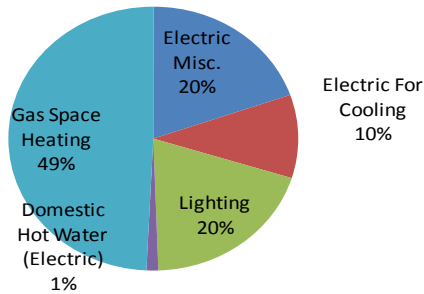


Energy Use Intensity fluctuates with the heating and cooling season as expected. Energy use peaks during January, when heat is being used the most.

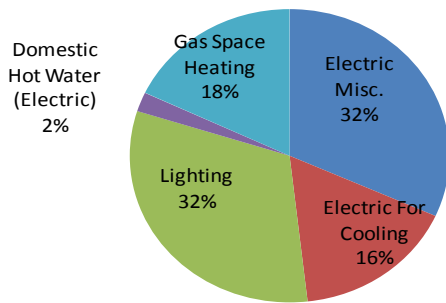
The following table and chart pies show energy use for the Library building based on utility bills for the 12 month period of September 2008 to September 2009. Note electrical cost at \$50.1/MMBtu of energy is more than 4 times the cost of natural gas at \$11.3/MMBtu. Also, miscellaneous electric use accounts for a large percentage of the building electric use due to computers, mechanical ventilation and other plug-loads not accounted for during the audit.

2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	179	20%	\$8,968	32%	50.1
Electric For Cooling	93	10%	\$4,659	16%	50.1
Lighting	179	20%	\$8,968	32%	50.1
Domestic Hot Water (Electric)	12	1%	\$601	2%	50.1
Gas Space Heating	449	49%	\$5,074	18%	11.3
Totals		100%	\$28,270	100%	
Total Electric Usage	463	51%	\$23,176	82%	50.1
Total Gas Usage	449	49%	\$5,071	18%	11.3
Totals	912	100%	\$28,247	100%	

Annual Energy Consumption (MMBTU)



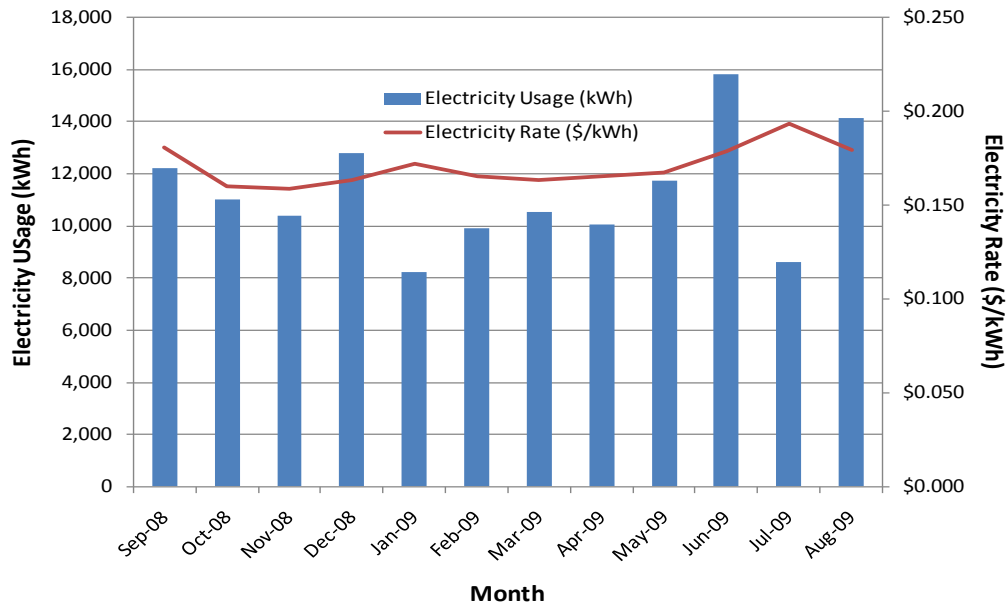
Annual Energy Consumption (\$)



1.2. Utility rate analysis

The Library 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 Library building currently pays an average rate of approximately \$0.171/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.

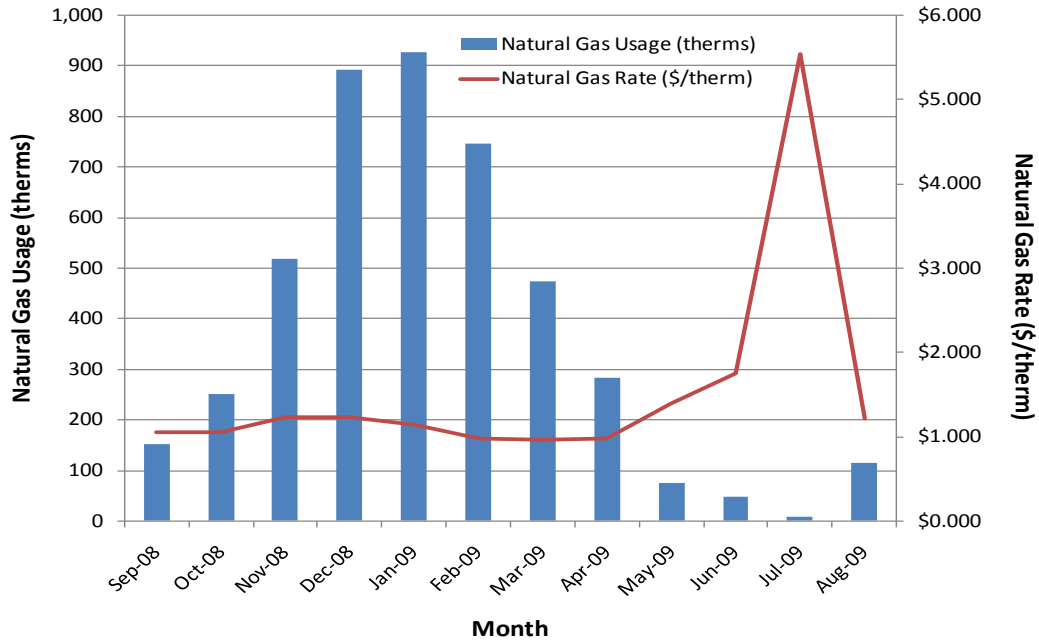
Library - Electricity Usage vs. Rate



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 Library building currently purchases natural gas from Elizabethtown Gas at a general service market rate for natural gas use (therms). The building currently pays an average rate of approximately \$1.129/therm based on the 12 months of utility bills of September 2008 to September 2009. The natural gas rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.

Library - Natural Gas Usage vs. Rate



The natural gas rate fluctuates inversely proportional to usage, as expected. Typically, the more units of natural gas that are used by the building, the cheaper natural gas becomes per unit. In summer periods, when a minimal amount of gas is used, the natural gas rate (\$/therm) increases sharply. Each month, the utility customer pays service and delivery charges to the utility company regardless of use. When minimal amounts of gas are used, the rate appears to sky rocket since service and delivery charges are the same amount as during high use months but represent a larger percentage of the total bill.

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 Library building in the U.S. Environmental Protection Agency’s (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as Library building. The building was not able to receive an Energy Star performance rating since the building is classified as a Library 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 53.0 kBtu/ft²yr.

Implementing this report’s highly recommended Energy Conservation Measures (ECMs) will reduce use by approximately 0.6 kBtu/ft²yr, with an additional 0.2 kBtu/ft²yr from the recommended ECMs, and an additional 0.1 kBtu/ft²yr from the recommended End of Life cycle ECMs.

Per the LGEA program requirements, SWA has assisted the Township of Sparta to create an *Energy Star Portfolio Manager* account and has shared the Library building facility information to allow future data to be added and tracked using the benchmarking tool. SWA has shared 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 - Library

Building ID: 1857388
For 12-month Period Ending: August 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 24, 2010

Facility Township of Sparta - Library 16 Woodport road Sparta, NJ 07871	Facility Owner N/A	Primary Contact for this Facility N/A
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Year Built: 1970
Gross Floor Area (ft²): 17,700

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	488,994
Natural Gas (kBtu) ⁴	448,732
Total Energy (kBtu)	937,726

Energy Intensity⁵

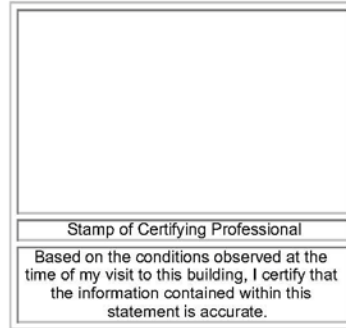
Site (kBtu/ft ² /yr)	53
Source (kBtu/ft ² /yr)	119

Emissions (based on site energy use)
 Greenhouse Gas Emissions (MtCO₂e/year) 98

Electric Distribution Utility
 FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-52%
Building Type	Library



Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional
 N/A

Notes:

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

The government estimates the average time needed to fill out this form is 5 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.

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Library building was built in 1970. The two-story building consists of a total area of 17,700 square feet. The main floor of the building houses the Sparta Public Library, while the basement level houses the Parks and Recreation Department.

2.2. Building occupancy profiles

The Library building is occupied by 22 employees. The Library main floor is occupied by 65 hours per week while the Parks and Recreation Department is occupied for 70 hours per week. Peak occupancy for the building is approximately 85 persons.

2.3. Building envelope

2.3.1. Exterior Walls

The exterior envelope consists of a brick veneer façade with cut stone accents and a wood box cornice wrapping the two sides of the Library. The basement walls are poured concrete stem walls with some signs of water damage in ceiling tiles around the perimeter, possibly from damaged down spouts.

Exterior wall insulation levels could not be verified but no related complaints were voiced during the inspection. With the exception of only a few areas where SWA would recommend re-pointing the brick veneer and fixing aged window sill caulking, the envelope was found to be in good condition.

The book drop box sleeve in the exterior wall, next to the main entry doors was found not to be sealed. SWA recommends sealing both openings inside and outside with weather stripping to ensure no conditioned air to escape unhindered through this large opening.



Water damage visible on ceiling tiles in basement perimeter



Slightly aged sill caulk and brick veneer Unsealed book drop box sleeve

Overall, exterior and interior wall finishes of the envelope were found to be in age-appropriate, good condition with the exception of some minor damage to exterior walls, missing caulking and slight

water damage. 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. Other than minor water damage, no major signs of unusual water, air leakage or other energy compromising damage.

2.3.2. Roof

The wood framed original slate roof was recently replaced with a TPO type rubber slate that shows no visual signs of leakage. Attic insulation levels could not be verified but in some areas fiberglass batt insulation was visible through ceiling tiles. SWA recommends a minimum of R-30 attic insulation. All gypsum board ceiling penetrations should be sealed and covered as required by code.

Soffit and ridge vents were identified and SWA recommends verifying that unobstructed air flow between the two is provided. The amount of soffit vents was found to be insufficient and SWA recommends adding additional vent. This helps to prolong the life of the installed synthetic slate roof and minimize potential leakage which can compromise insulation performance and structural components. It also significantly lowers the attic temperature during summer months which reduces the overall building's cooling load.

Gutters and downspouts were inspected and found to be in good condition with the exception of missing or disconnected down spout deflectors and diverters. SWA recommends that all downspout diverters slope away from exterior walls to minimize potential water and moisture problems around the perimeter foundation.



Insufficient amount of soffit vents



Downspout deflectors and diverter missing, causing water penetration between basement wall and insulation

In an effort to get the maximum life expectancy out of the roofing material installed, SWA recommends following the installer's or manufacturer's recommended maintenance and inspection schedule.

2.3.3.Base

The building's base is 4" concrete slab below grade with a perimeter footing and concrete block stem walls. There were not any reported problems with water penetration or moisture.

2.3.4.Windows

The building contains double hung and fixed windows. Most of them were found to be newer wood frame type double glazed with low-e coating and simulated dividers. The original remaining single pane wood windows are in poor condition however they would not be cost effective to replace at this time. If major renovations are undertaken in the future, SWA recommends replacing them with double glazed low-e windows.

Extensive insect nesting was noticed around some windows and the eaves. SWA recommends inspecting all caulking around windows and doors for openings that could attract insects of various kinds with the potential of sub-surface damage to structure and insulation. SWA recommends exterior and interior inspections of all windows as part of the building's routine maintenance schedule to ensure air and water tight performance year round.



Excessive insect nesting



Original single pane windows with cracked panel

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 wood main doors and metal composite side doors were observed to be in fair condition except for some missing or worn weather-stripping. SWA recommends that the exterior doors of the building be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals. Tight seals around doors will help ensure the building to be is kept continuously insulated.



Worn and missing weather stripping around doors.

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

At this location there were six Lennox G26 Series natural gas furnaces. Each is equipped with a DX cooling coil fed from remote condensers (See 2.4.2 Cooling). Every area is controlled by a Night Set back programmable thermostat and it is not recommended that they be replaced.

Unit	Series	DX Coil Model #	Heating Capacity	Heating Efficiency
GF/AC-1	Lennox G26	C26-65FCEAP-2	65,000 BTUH	92%
GF/AC-2	Lennox G26	C26-31FC-1	31,000 BTUH	90%
GF/AC-3	Lennox G26	C26-51/65NFC-1	51,000 BTUH	92%
GF/AC-4	Lennox G26	C26-65FCEAP-2	65,000 BTUH	92%
GF/AC-5	Lennox G26	C26-65FCEAP-2	65,000 BTUH	92%
GF/AC-6	Lennox G26	C26-65FCEAP-2	65,000 BTUH	92%



Sample of heating furnaces

2.4.2. Cooling

At this location there are eight residential-grade condensers located on the side of the building. The Lennox condensers feed the Lennox DX Cooling coils located above each furnace. (See 2.4.1 Heating) listed above. Supplemental cooling is provided by individual Mr. Slim wall mounted Split systems. All of the units have a SEER value of 11.4 or higher and were found to be in good condition, and it is not recommended that they be replaced.

Unit	Manufacturer/Model	Tons	SEER	Refrig.
CU-1	Lennox # HS26-060-24	5	11.4	R-22
CU-2	Lennox # HS26-030-2P	2.5	11.4	R-22
CU-3	Lennox # HS26-048-34	4	11.4	R-22
CU-4	Lennox # HS26-060-24	5	11.4	R-22
CU-5	Lennox # HS26-060-24	5	11.4	R-22
CU-6	Lennox # HS26-060-24	5	11.4	R-22
CU-7	Mitsubishi Mr. Slim # PU24EK	2	12	R-22
CU-8	Mitsubishi Mr. Slim # PU24EK	2	12	R-22



Condensers located outside along the exterior wall of the building

2.4.3. Ventilation

Ventilation for this building is provided by exhaust fans, ceiling vents, and manually operated windows. The exhaust fan' motors were in fair condition and could be replaced with more efficient models on an as fail basis.

2.4.4. Domestic Hot Water

Water is heated by an electric-powered Bradford White water heater, located adjacent to the furnaces in the mechanical room. The model # is MI5056DS13, the volume is 50 gallons, and its heating capacity is 4.5 kW (15,368.31 BTUH). It is in good condition, however replacing with a natural gas unit will be cost-effective by using a cheaper source of fuel.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – The Library building contains efficient T8 fluorescent fixtures with electronic ballasts for general lighting. Areas such as the Lobby, Bathrooms and Entrance areas contain incandescent lights that should be upgraded to CFLs. SWA identified 5 areas that could benefit from the installation of occupancy sensors. The areas identified were mainly bathrooms and other smaller rooms located in the building that is used sporadically throughout the day. See Appendix A for complete existing and proposed lighting schedule.

Exit Lights – The exit signs were observed to be inefficient fluorescent fixtures. SWA recommends replacing 13 fluorescent exit signs with newer LED technology. LED exit signs are always recommended since they use such little power and operate 24 hours a day, 365 days a year. See attached existing and proposed lighting schedule in Appendix A.

Exterior Lighting - The exterior lighting surveyed revealed that there were 4 exterior fixtures that contained probe-start metal halide fixtures. SWA recommends upgrading these probe-start metal halide fixtures with new pulse-start metal halide fixtures.

2.5.2.Appliances

SWA performed a basic survey of appliances installed at the Library building. 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 of similar size to the existing units, use as little as 315 kWh/year. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large energy as well as cost savings. Look for the Energy Star label when replacing appliances and equipment including; window air conditioners, 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>

2.5.3.Elevators

The Library building is a two story building and contains a single hydraulic elevator. This elevator is not original to the building and was installed approximately 10 years ago as part of a renovation. There is no recommendation for improvement at this time.

2.5.4.Process and others electrical systems

There are no other electrical systems present within the building.

3. EQUIPMENT LIST

Inventory

Building System	Description	Physical Location	Model #	Fuel	Space Served	Estimated Remaining Useful Life %
Heating/Cooling	6 furnaces with DX cooling coils (90-92% efficient, capacity and tonnage not listed)	Mechanical Room	Lennox G26	Natural Gas/ Electric	All Areas	50%
	Four 5-ton condensing unit (R-22 refrigerant, 11.4 SEER)	Mechanical Room	Lennox # HS26-060-24	Electric	All Areas	33%
	2.5-ton condensing unit (R-22 refrigerant, 11.4 SEER)	Mechanical Room	Lennox # HS26-030-2P	Electric	All Areas	33%
	4-ton condensing unit (R-22 refrigerant, 11.4 SEER)	Mechanical Room	Lennox # HS26-048-34	Electric	All Areas	33%
	Two 2-ton split-system air conditioners (R-22 refrigerant, 12 SEER)	Mechanical Room	Mitsubishi Mr. Slim # PU24EK	Electric	All Areas	33%
Domestic Hot Water	50-gallon, 4.5 kW (15,368 BTUH) water heater	Mechanical Room	Bradford White # MI5056DS13	Electric	All Areas	33%
Controls	6 main non-programmable thermostats	Various	-	Electric	6 different zones	50%
Lighting	See Details - Appendix A	-	-	Electric	All	Varies

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 attic insulation levels – SWA recommends that insulation with a minimal insulation value of R-30 is added and maintained in the plenum above the ceiling.
- Upgrade windows – SWA recommends that all single-pane windows are replaced with newer double-paned windows with low-e glazing. New windows should also include frames that have a thermal break.
- 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

- Seal openings at book drop box sleeve in exterior wall – SWA recommends sealing both inside and outside openings with weather-stripping to ensure no conditioned air to escape through large opening around book drop box sleeve.
- Investigate water leaks – There were several water damage spots noted on ceiling tiles. SWA was unable to identify the major source of these leaks. SWA recommends investigating these leaks when they are first noticed and perform corrective maintenance. Preventative maintenance such as air-sealing and bi-annual inspections can help prevent future leaks.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
- Install downspout diverters – SWA observed that the building was properly fitted with gutters and downspouts; however the downspouts allow the water to pool directly next to the exterior wall of the building. SWA recommends installing downspout diverters in order to divert water away from the building in order to prevent damage to the exterior walls.
- 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.

- Provide water efficient fixtures and controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators (0.5 gpm on bathroom sinks) and low-flow shower heads (1.2 gpm) to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.
- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install 27 new CFL lamps
2	Replace Electric DHW heater with Natural Gas DHW heater
3	Install 5 new Occupancy Sensors
	Description of Recommended 5-10 Year Payback ECMs
4	Install 13 new LED exit signs
	Description of Recommended End of Life Cycle ECMs (>10 year payback)
5	Install 4 new Pulse Start Metal Halides

ECM#1: Install 27 new CFL lamps

Description:

The Library building contains 27 incandescent bulbs located in rooms such as the Lobby, Entrance areas and Bathrooms. 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: \$162
 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 27 new CFL lamps	RSMeans	162	0	162	2,468	0.5	0	0.5	81	503	5	2,291	0.3	1314.0	262.8	310.2	2,142	4,419

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 Office of Clean Energy – SmartStart, Direct Install programs

ECM#2: Replace Electric DHW heater with Natural Gas DHW heater

Description:

Currently, the Library building contains one electric DHW heater with a heating capacity of 4.5 kW and a storage capacity of 50 gallons. SWA recommends replacing this electric DHW heater with an equivalent sized, gas-fired unit. By replacing this heater with a gas-fired unit, the Library will see cost savings by switching to a less expensive fuel.

Installation cost:

Estimated installed cost: \$1,750

Source of cost estimate: Contractor (Struble Mechanical Services, Fairfield, NJ)

Economics:

ECM #	ECM description	Source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
2	Replace Electric DHW heater with Natural Gas DHW heater	Contractor	1,800	50	1,750	3,634	4.5	-124	0.0	0	481	10	4,065	3.6	132.3	13.2	24.4	2,357	5,140

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes that heating capacity will not change. The unit will no longer use 3,634 kWh, instead it will use a natural gas equivalent of 124 therms. Cost savings will occur by switching from electricity at \$50.1/MMBTU to natural gas at \$11.3/MMBTU.

Rebates / financial incentives:

NJ Clean Energy – Natural Gas Water Heating – Gas water heaters ≤50 gallons (\$50 per unit)

Maximum incentive of \$50

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

ECM#3: Install 5 new occupancy sensors

Description:

Based on field observations, there are 5 areas within the Library building that would benefit from the installation of occupancy sensors. SWA recommends that these 5 areas are upgraded to occupancy sensors in order to reduce the amount of runtime based on occupancy schedules. See Appendix A for complete lighting schedule and analysis.

Installation cost:

Estimated installed cost: \$450
 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
3	Install 5 new Occupancy Sensors	RSMeans	550	100	450	631	0.1	0	0.1	0	108	15	1,270	4.2	182.2	12.1	22.9	838	1,130

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes amount of reduced hours based on field observations.

Rebates / financial incentives:

NJ Clean Energy Prescriptive Lighting Controls – Wall-mounted occupancy sensors (\$20 per control)
 Maximum incentive amount is \$100.

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

ECM#4: Install 13 new LED exit signs

Description:

The Library building contains 13 fluorescent exit signs. SWA recommends replacing these fluorescent exit signs with newer LED technology. Exit signs present a good opportunity for energy savings since they are operated 24 hours per day, 7 days per week. See Appendix A for existing and proposed lighting schedule.

Installation cost:

Estimated installed cost: \$2,340
 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
4	Install 13 new LED exit signs	RSMeans	2,600	260	2,340	1,261	0.3	0	0.2	26	242	10	2,040	9.7	-12.8	-1.3	0.6	(279)	2,258

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:

*NJ Clean Energy Prescriptive Lighting – LED Exit signs (\$10/\$20 per fixture)
 Maximum incentive amount is \$260.*

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

ECM#5: *Install 4 new Pulse Start Metal Halide fixtures*

Description:

The Library building currently contains 4 exterior probe start metal halide fixtures that are older and consume an unnecessary amount of power. SWA recommends upgrading each probe-start metal halide to pulse-start metal halides. A complete lighting schedule has been attached in Appendix A of this report.

Installation cost:

Estimated installed cost: \$1,118

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
5	Install 4 new Pulse Start Metal Halides	RSMeans	1,318	100	1,218	657	0.1	0	0.1	48	160	15	1,887	7.6	54.9	3.7	10.0	696	1,176

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:

*NJ Clean Energy Prescriptive Lighting – Metal halide w/pulse start (\$25 per fixture)
Maximum incentive amount is \$100.*

Options for funding ECM:

NJ Office of 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

Solar Photovoltaic panels are not recommended due to the minimal amount of available unobstructed South/South-West exposure.

5.4. Solar Thermal Collectors

Solar thermal collectors are not recommended for this project because they would require modification to the existing domestic hot water system and/or heat distribution system, which would not be cost-effective.

5.5. Combined Heat and Power

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

5.6. Geothermal

Geothermal is not applicable for this building because it would require significant modifications to the existing HVAC system, which would not be cost effective.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

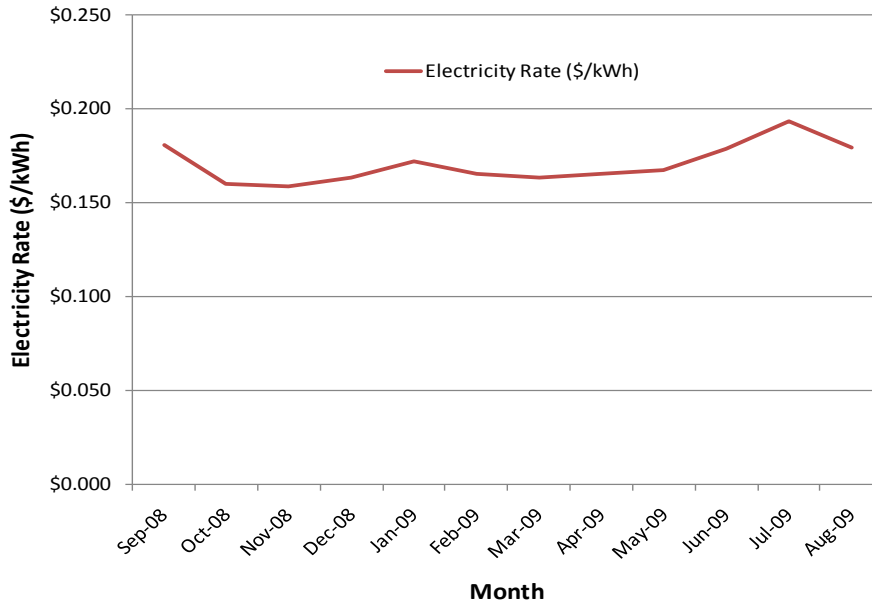
6.1. Energy Purchasing

The Library building receives natural gas via one incoming meter. Elizabethtown Gas supplies gas 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 18% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 45% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and escalating energy costs in 2008.

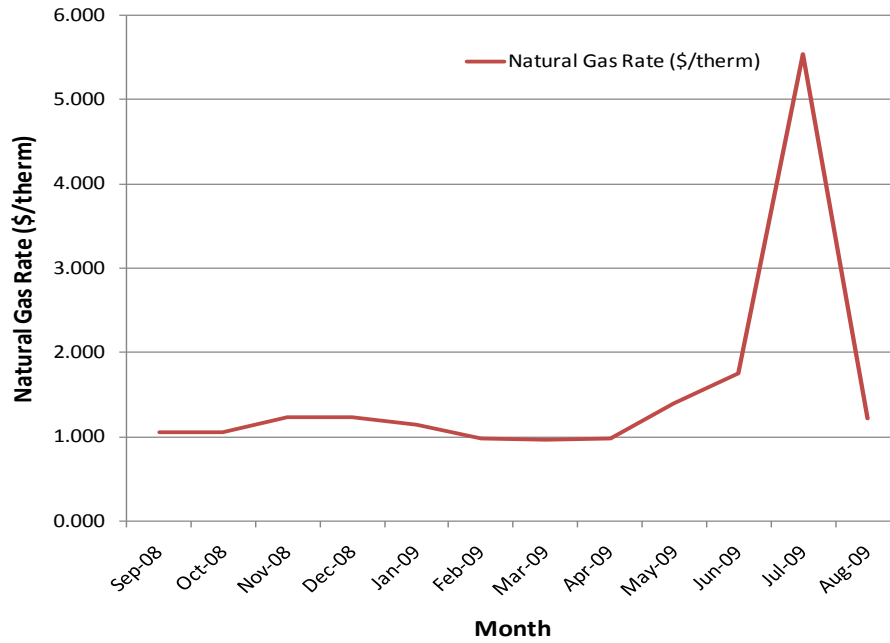
Currently, New Jersey commercial buildings of similar type pay \$0.150/kWh for electricity and \$1.55/therm for natural gas. Currently, the electricity rate for the Library building is \$.171/kWh, which means there is a potential cost savings of \$2,849 per year. The current natural gas rate for the Library building is \$1.17/therm which is better than the average natural gas cost. A 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 Library 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.

Library - Annual Electricity Rate



Library - Annual Natural Gas Rate



6.2. Energy Procurement strategies

Also, the Library 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)
200	1	Childrens Section	Parabolic	E	4T8	31	2	32	S	12	261	6	1,990	6,796	N/A	Parabolic	4T8	None	S	31	2	32	12	261	6	1,990	6,796	0	0	0
201	1	Childrens Section	Screw-in	None	CFL	4	1	13	S	12	261	0	52	163	N/A	Screw-in	CFL	None	S	4	1	13	12	261	0	52	163	0	0	0
202	1	New Books	Parabolic	E	4T8	35	1	32	S	12	261	3	1,123	3,837	N/A	Parabolic	4T8	None	S	35	1	32	12	261	3	1,123	3,837	0	0	0
203	1	New Books	Screw-in	None	CFL	22	2	13	S	12	261	0	572	1,792	N/A	Screw-in	CFL	None	S	22	2	13	12	261	0	572	1,792	0	0	0
204	1	New Books	Screw-in	None	CFL	3	1	13	S	12	261	0	39	122	N/A	Screw-in	CFL	None	S	3	1	13	12	261	0	39	122	0	0	0
205	1	New Books	Exit sign	None	Fl. Exit	1	1	16	N	24	365	2	18	158	LEDex	Exit sign	LED Exit	None	N	1	1	5	24	365	1	6	53	105	0	105
206	1	Reading Area	Screw-in	None	CFL	10	1	13	S	12	261	0	130	407	N/A	Screw-in	CFL	None	S	10	1	13	12	261	0	130	407	0	0	0
207	1	Reading Area	Screw-in	None	CFL	10	2	13	S	12	261	0	260	814	N/A	Screw-in	CFL	None	S	10	2	13	12	261	0	260	814	0	0	0
208	1	Reading Area	Screw-in	None	Hal	4	1	75	S	12	261	8	308	1,040	CFL	Screw-in	CFL	None	S	4	1	25	12	261	0	100	313	727	0	727
209	1	Reading Area	Screw-in	None	Inc	8	1	15	S	12	261	0	120	376	CFL	Screw-in	CFL	None	S	8	1	5	12	261	0	40	125	251	0	251
210	1	Stacks	Parabolic	E	4T8	68	1	32	S	12	261	3	2,179	7,454	N/A	Parabolic	4T8	None	S	68	1	32	12	261	3	2,179	7,454	0	0	0
211	1	Stacks	Parabolic	E	4T8	10	2	32	S	24	261	6	646	4,385	N/A	Parabolic	4T8	None	S	10	2	32	24	261	6	646	4,385	0	0	0
212	1	Stacks	Screw-in	None	CFL	4	1	13	S	14	261	0	52	190	N/A	Screw-in	CFL	None	S	4	1	13	14	261	0	52	190	0	0	0
213	1	Stacks	Screw-in	None	CFL	10	2	13	S	12	261	0	260	814	N/A	Screw-in	CFL	None	S	10	2	13	12	261	0	260	814	0	0	0
214	1	Office	Parabolic	E	4T8	6	2	32	S	12	261	6	390	1,315	N/A	Parabolic	4T8	None	S	6	2	32	12	261	6	390	1,315	0	0	0
215	1	Office	Parabolic	E	4T8	6	2	32	S	12	261	6	390	1,315	N/A	Parabolic	4T8	None	S	6	2	32	12	261	6	390	1,315	0	0	0
216	1	Office	Screw-in	None	CFL	2	1	13	S	12	261	0	26	81	N/A	Screw-in	CFL	None	S	2	1	13	12	261	0	26	81	0	0	0
217	1	Quiet Room	Parabolic	E	4T8	3	2	32	S	8	261	6	198	438	N/A	Parabolic	4T8	None	S	3	2	32	8	261	6	198	438	0	0	0
218	1	Quiet Room	Screw-in	None	CFL	1	1	13	S	8	261	0	13	27	N/A	Screw-in	CFL	None	S	1	1	13	8	261	0	13	27	0	0	0
219	1	Bathroom Men	2'U-shape	E	T8 U	2	2	32	S	12	261	3	131	420	C	2'U-shape	T8 U	None	OS	2	2	32	9	261	3	131	315	0	105	105
220	1	Bathroom Women	2'U-shape	E	T8 U	2	2	32	S	12	261	3	131	420	C	2'U-shape	T8 U	None	OS	2	2	32	9	261	3	131	315	0	105	105
221	1	Front desk	2'U-shape	E	T8 U	7	2	32	S	12	261	3	451	1,469	N/A	2'U-shape	T8 U	None	S	7	2	32	12	261	3	451	1,469	0	0	0
222	1	Front desk	Screw-in	None	CFL	6	2	13	S	12	261	0	156	489	N/A	Screw-in	CFL	None	S	6	2	13	12	261	0	156	489	0	0	0
223	1	Lobby	Screw-in	None	Hal	4	1	135	S	12	261	14	554	1,867	CFL	Screw-in	CFL	None	S	4	1	45	12	261	0	180	564	1,303	0	1,303
224	1	Lobby	Screw-in	None	Hal	3	3	5	S	12	261	2	47	160	CFL	Screw-in	CFL	None	S	3	3	2	12	261	0	18	56	85	0	103
225	B	Multy Purp Rm	Parabolic	E	2T8	18	2	16	S	8	261	3	579	1,315	N/A	Parabolic	2T8	None	S	18	2	16	8	261	3	579	1,315	0	0	0
226	B	Multy Purp. Rm	Exit sign	None	Fl. Exit	4	1	16	N	24	365	2	66	631	LEDex	Exit sign	LED Exit	None	N	4	1	5	24	365	2	22	245	385	0	385
227	B	Staircase	Parabolic	E	4T8	1	2	32	S	24	261	6	70	438	C	Parabolic	4T8	None	OS	1	2	32	18	261	6	70	329	0	110	110
228	B	Multy Purp Rm	Parabolic	E	2T8	8	3	16	S	8	261	4	388	869	N/A	Parabolic	2T8	None	S	8	3	16	8	261	4	388	869	0	0	0
229	B	Multy Purp Rm	Exit sign	None	Fl. Exit	2	1	16	N	24	365	2	34	315	LEDex	Exit sign	LED Exit	None	N	2	1	5	24	365	2	12	123	193	0	193
230	B	Storage Rm 1	Screw-in	None	Inc	1	1	60	S	1	261	0	60	16	CFL	Screw-in	CFL	None	S	1	1	20	1	261	0	20	5	10	0	10
231	B	Storage Rm 2	Parabolic	M	8T12	5	2	68	S	1	261	16	696	198	T8	parabolic	8T8	E	S	5	2	68	1	261	16	696	198	0	0	0
232	B	Storage Rm 2	Parabolic	E	4T8	1	4	32	S	2	261	13	141	74	N/A	Parabolic	4T8	None	S	1	4	32	2	261	13	141	74	0	0	0
233	B	Mechanical Rm	Screw-in	None	Inc	4	1	60	S	2	261	0	240	125	CFL	Screw-in	CFL	None	S	4	1	20	2	261	0	80	42	84	0	84
234	B	Office Area	Parabolic	E	4T8	10	4	32	S	12	261	13	1,293	4,416	N/A	Parabolic	4T8	None	S	10	4	32	12	261	13	1,293	4,416	0	0	0
235	B	Office Area	Exit sign	None	Fl. Exit	2	1	16	N	24	365	2	34	315	LEDex	Exit sign	LED Exit	None	N	2	1	5	24	365	2	12	123	193	0	193
236	B	Hallway	2'U-shape	E	T8 U	4	2	32	S	12	261	3	259	839	N/A	2'U-shape	T8 U	None	S	4	2	32	12	261	3	259	839	0	0	0
237	B	Hallway	Exit sign	None	Fl. Exit	2	1	16	N	24	365	0	32	280	LEDex	Exit sign	LED Exit	None	N	2	1	5	24	365	0	10	88	193	0	193
238	B	Elevator Rm	Screw-in	None	Inc	1	1	100	S	2	261	0	100	52	CFL	Screw-in	CFL	None	S	1	1	35	2	261	0	35	18	34	0	34
239	B	Elevator Rm	Screw-in	None	Inc	1	1	200	S	2	261	0	200	104	CFL	Screw-in	CFL	None	S	1	1	65	2	261	0	65	34	70	0	70
240	B	Kitchen	Parabolic	E	4T8	8	2	32	S	2	261	6	518	292	N/A	Parabolic	4T8	None	S	8	2	32	2	261	6	518	292	0	0	0
241	B	Janitor's Closet	2'U-shape	E	T8 U	1	2	32	S	1	261	3	67	17	N/A	2'U-shape	T8 U	None	S	1	2	32	1	261	3	67	17	0	0	0
242	B	Bathroom Men	Circline	E	2T8	4	2	32	S	12	261	3	259	839	C	Circline	2T8	None	OS	4	2	32	9	261	3	259	630	0	210	210
243	B	Bathroom Men	Screw-in	None	CFL	5	1	13	S	12	261	0	65	204	C	Screw-in	CFL	None	OS	5	1	13	9	261	0	65	153	0	51	51
244	B	Bathroom Women	Screw-in	None	CFL	5	1	13	S	12	261	0	65	204	C	Screw-in	CFL	None	OS	5	1	13	9	261	0	65	153	0	51	51
245	B	Hallway	Recessed	E	2T8	6	2	16	S	12	261	3	195	658	N/A	Recessed	2T8	None	S	6	2	16	12	261	3	195	658	0	0	0
246	B	Hallway	Exit sign	None	Fl. Exit	2	1	16	N	24	365	2	34	315	LEDex	Exit sign	LED Exit	None	N	2	1	5	24	365	2	12	123	193	0	193
247	B	Rec. DEP Office	Parabolic	E	4T8	4	4	32	S	9	261	13	525	1,325	N/A	Parabolic	4T8	None	S	4	4	32	9	261	13	525	1,325	0	0	0
248	B	Rec. DEP Office	Parabolic	E	4T8	2	3	32	S	9	261	10	202	498	N/A	Parabolic	4T8	None	S	2	3	32	9	261	10	202	498	0	0	0
249	Ext	Entrance	Screw-in	E	MH	4	1	70	PC	9	365	25	305	1,248	PSMH	HID	MH	None	PC	4	1	25	9	365	25	125	657	591	0	591
250	Ext	All Entrances - Sconces	Screw-in	None	CFL	4	1	18	PC	9	365	0	72	237	N/A	Screw-in	CFL	None	PC	4	1	18	9	365	0	72	237	0	0	0
251	Ext	Left side of building	Screw-in	None	Inc	1	1	85	PC	9	365	0	85	279	CFL	Screw-in	CFL	None	PC	1	1	30	9	365	0	30	99	181	0	181
Totals:						372	87	1,799	0				16,820	52,455							372	87	1,200			15,350	47,208	4,597	631	5,246

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

Third Party Gas Suppliers for Elizabethtown Gas Co. Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateastern.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street 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
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com