



**Steven Winter Associates, Inc.**  
Architects and Engineers

50 Washington Street  
Norwalk, CT 06854  
[www.swinter.com](http://www.swinter.com)

Telephone  
Facsimile  
E-mail:

(203) 857-0200  
(203) 852-0741  
swinter@swinter.com

*April 7, 2010*

**Local Government Energy Program  
Energy audit report**

*For*

***Rutherford Library  
Borough of Rutherford  
Rutherford, NJ 07070***

***Project Number: LGEA13***



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## **INTRODUCTION**

On May 20th, 2009, Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment of the Rutherford Library located in Rutherford, NJ. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Rutherford Library is a relatively new building and currently houses the public library as well as classrooms and administrative library offices. The Rutherford Library building contains a full-size basement, a main level, a balcony and mechanical penthouses. The building has a total floor area of 30,000 square feet. Typical occupancy is approximately 50 persons.

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

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

## EXECUTIVE SUMMARY

This document contains the energy audit report for the Rutherford Library located at 150 Park Ave., Rutherford, NJ 07070. The Library includes a full basement, a main floor, balcony and mechanical penthouses. Based on the field visit performed by Steven Winter Associates (SWA) staff on May 20<sup>th</sup>, 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.

In the most recent full year of electric data collected (February 2008 through February 2009), the Library building consumed approximately 756,800 kWh or \$122,790 worth of electricity. Natural gas data was available from January 2008 through December 2008 but due to inconsistencies in natural gas billing, a full year of natural gas data could not be collected. In the natural gas data that was collected, the Library building consumed approximately 4,525 therms or \$6,452 worth of natural gas. The average aggregated cost of electricity was calculated to be \$0.16/kWh and the average aggregated cost of natural gas was calculated to be \$1.83/therm. With electricity and gas combined, the building consumed 3,035 MMBtus of energy at a total cost of \$129,242.

SWA benchmarked the Rutherford Library using the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The Portfolio Manager is currently not able to generate a performance rating for Library buildings. The benchmark rating is based on the facility's source energy use, level of business activity, and geographical location. The Portfolio Manager is also capable of generating a site energy use intensity number using 2008 as a baseline year.

In order to compare commercial buildings equitably, the *Portfolio Manager* ratings convey the consumption of each type of energy in a single common unit. The EPA uses source energy to represent the total amount of raw fuel required to operate the building. The site energy use intensity for the Rutherford Library building is 24 kBtu/sq.ft/year. After energy efficiency improvements are made, future utility bills can be added to the Portfolio Manager and the site energy use intensity for a different time period can be compared to the year 2008 baseline to track the changes in energy consumption associated with the energy improvements.

SWA recommends some measures that may not be cost-effective based on energy savings alone but should be considered as part of a capital investment plan or as part of a routine maintenance schedule. SWA is aware that the HVAC system that was installed in 2008 is currently having operating problems which includes leaks. SWA observed that both the equipment and control set points were reasonable for energy efficiency. SWA recommends that each component of the HVAC system undergoes functional performance testing individually as well as the system as a whole. Functional performance testing should show that the system is capable of operating at programmed set points while enduring different operating modes. SWA also recommends that the Rutherford Library consider installing occupancy sensors in small rooms that do now show constant usage. Occupancy sensors can help eliminate excess energy used by lighting in these smaller rooms during the day. Exterior door weather-stripping showed signs of deterioration and should be replaced and maintained to ensure that expensive, conditioned air is kept within the building. The Rutherford Library does not have high domestic hot water usage but can benefit from installing low flow aerators on all sinks. Low flow aerators can help reduce the heating load on the domestic hot water heater.

SWA found out that outdated lighting contributes to very high electricity consumption and recommends a major lighting retrofit in the building. The total investment cost for this ECM is **\$92,260**. SWA estimates a first year savings of **\$7,018** with a simple payback of **13.1 years**. SWA also estimates that Rutherford Library will be able to reduce their carbon footprint by **78,537 lbs of CO2 annually**.

There are various incentives that Rutherford Library could apply for that could also help lower the cost of installing the ECMs. SWA recommends that the Borough of Rutherford applies for the NJ SmartStart program

through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project.

When pursuing incentives through the SmartStart program, SWA encourages building managers to contact the program provider to obtain more detailed information on the program guidelines and request pre-approval for all planned upgrades. At the time of this report, incentives for lighting vary but replacing T12 lighting with T8 lighting would be eligible for an incentive up to \$30 per fixture and LED exit signs would be eligible for up to \$20 per fixture.

For further information on both custom and prescriptive incentives, please visit:

<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/equipment-incentives/equi>

The New Jersey Clean Energy website also provides information on an upcoming Direct-Install program that would be applicable to this project. The Direct-Install program is aimed at commercial buildings with an average annual demand of less than 200kW. This program is designed to offset up to 80% of the cost of replacing equipment nearing the end of its useful lifecycle with high efficiency alternatives. This program could help offset the cost of replacing the entire heating system. This program has not officially been released but can be followed online at:

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

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economical relevance.

**SCOPE OF WORK – SUMMARY TABLE**

ECM Table without Incentives															
ECM #	ECM description	Installed Cost		1st year energy and cost savings						Simple Payback (SPP)	Life of Measure (LoM)	Lifetime Cost Savings (\$)	Return on Invest (ROI)	Annual Carbon Reduction (lbs of CO2)	
		Estimated Cost (\$)	Source	Electric Savings		Fuel Savings		Cost Savings (\$)							
				Consumption	Demand	Natural Gas									
1	Upgrade existing lighting	\$ 92,260	RS Means	43,863	kWh	12	kW	0	Therms	\$ 7,018	13.1	20	\$ 102,507	0.6%	78,537
<b>Total Scope of Work</b>		<b>\$ 92,260</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>12.0</b>	<b>-</b>			<b>\$ 7,018</b>	<b>13.1</b>		<b>\$ 102,507</b>		<b>78,537</b>
<b>Definitions:</b>			<b>Assumptions:</b>												
SPP: Simple Payback (years)			Discount rate = 3.2%			per DOE FEMP guidelines			Average Electric Rate = 0.16			\$/kWh			
LoM: Life of Measure (years)			Energy price escalation rate = 0%			per DOE FEMP guidelines			Average Fuel Rate = 1.83			\$/Therm			
ROI: Return on Investment (%)			Carbon Dioxide per unit Electricity = 1.7905			lbs of CO2/kWh									
			Carbon Dioxide per unit of Fuel = 11.023			lbs of CO2/unit fuel									

# 1. HISTORIC ENERGY CONSUMPTION

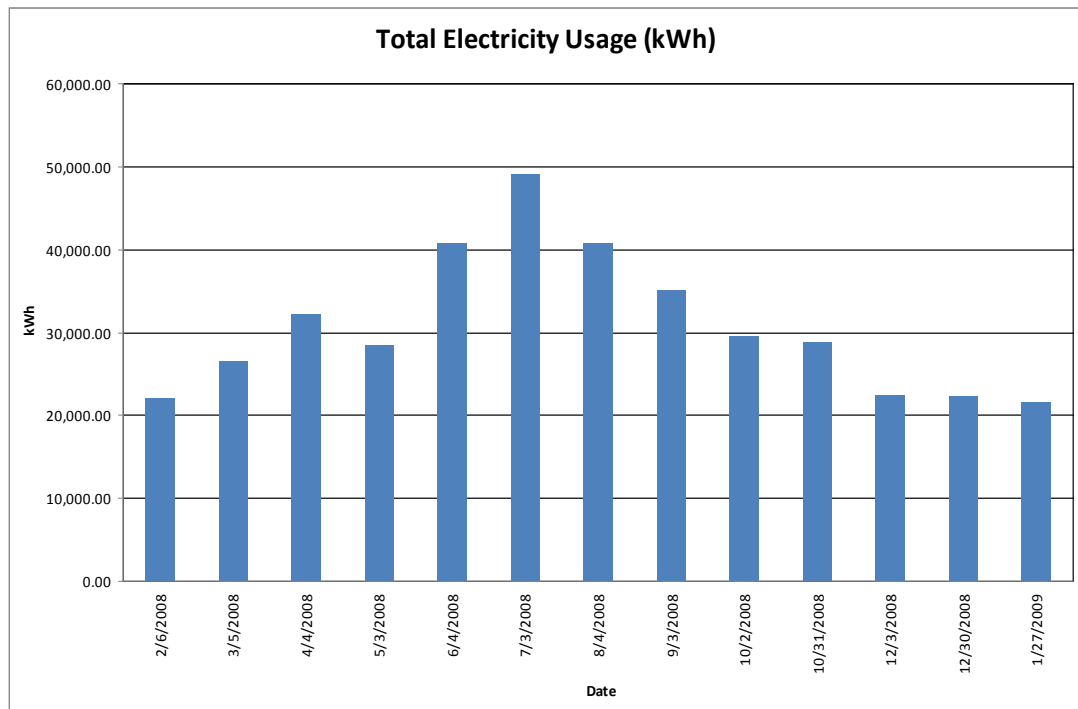
## 1.1. Energy usage and cost analysis

SWA received and analyzed utility bills for the Borough of Rutherford Library building. SWA received electric bills dated from 7/2006 through 2/2009 and natural gas bills from 01/2008 through 12/2008. There were gaps in natural gas data and a full analysis could not be completed. In order to calculate energy costs and savings, average utility rates for this project and for other comparable projects in the state of New Jersey were used. Based on eQUEST modeling and by making conservative assumptions, the building could still be analyzed and savings could still be calculated with reasonable accuracy. The context of this section explains what data is missing and assumptions that were made in order to calculate savings.

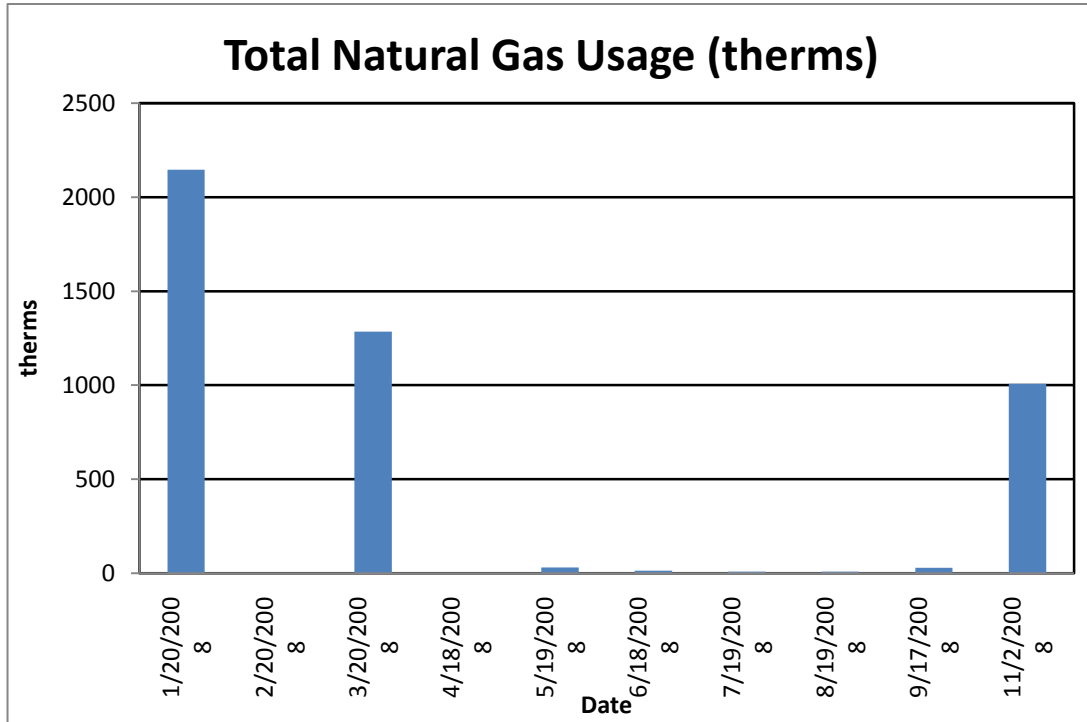
Electricity – The Rutherford Library has one electric meter for incoming electricity supply. The building purchases electricity from PSEG at **an average aggregated rate of \$0.16/kWh** based on February 2008 through February 2009 electric bills. The building purchased **approximately 756,800 kWh or \$122,790 worth of electricity from February 2008 through February 2009**. Based on the same time period, the building also has **an average monthly demand of 109.2 kW and monthly peak demand of 171.2 kW**.

Natural Gas – The Rutherford Library has one gas meter for incoming natural gas from PSE&G. The building purchases natural gas from PSEG at **an average aggregated rate of \$1.83/therm** based on January 2008 through December 2008. The building purchased **approximately 4,525 therms or \$6,452 worth of natural gas from January 2008 through December 2008**. The natural gas analysis is based on less than one year’s worth of data. The analysis is based on 334 days worth of data.

The following chart shows electricity usage for the Library based on utility bills for the 2008- 2009 billing period.



The following chart shows natural gas usage for the Library based on utility bills on the January 2008 through December 2008 billing period. Due to inconsistencies in the billing data, the chart does not clearly represent monthly usage.



### 1.2. Utility rate

Rutherford Library currently buys electricity from PSEG at the GHSGHC2 and GSGHLPLS service rate. These rates charge the Borough of Rutherford different electric rates based on the time of day divided up into on-peak and off-peak rates. The rates are appropriate and competitive with similar buildings in New Jersey. Rutherford Library uses PSEG electric account #01 21 020 139 28 and PSEG natural gas account #2102013928 at the service address of 150 Park Ave Rutherford, NJ. Electricity for the building was billed at an average rate of **\$0.16/kWh**. Natural Gas for the building was billed at an average rate of **\$1.83/therm**.

### 1.3. Energy benchmarking

The Rutherford Library Building information and utility data were entered into the U.S. Environmental Protection Agency’s (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. Currently, performance scores cannot be generated for libraries. SWA recommends that the Rutherford Library maintain the Portfolio Manager account at the link below. As the account is maintained, SWA can share the Rutherford Library building and allow future data to be added and tracked using the benchmarking tool.

[http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)



## STATEMENT OF ENERGY PERFORMANCE

### Borough of Rutherford - Public Library

Building ID: 1800765  
 For 12-month Period Ending: December 31, 2008<sup>1</sup>  
 Date SEP becomes ineligible: N/A

Date SEP Generated: September 18, 2009

<b>Facility</b> Borough of Rutherford - Public Library 150 Park Avenue Rutherford, NJ 07070	<b>Facility Owner</b> N/A	<b>Primary Contact for this Facility</b> N/A
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Year Built: 2009  
 Gross Floor Area (ft<sup>2</sup>): 30,000

Energy Performance Rating<sup>2</sup> (1-100) N/A

#### Site Energy Use Summary<sup>3</sup>

Electricity - Grid Purchase (kBtu)	267,321
Natural Gas (kBtu) <sup>4</sup>	454,991
Total Energy (kBtu)	722,312

#### Energy Intensity<sup>5</sup>

Site (kBtu/ft <sup>2</sup> /yr)	24
Source (kBtu/ft <sup>2</sup> /yr)	46

#### Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO <sub>2</sub> e/year)	65
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#### Electric Distribution Utility

PSE&G - Public Service Elec & Gas Co

#### National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-81%
Building Type	Library

Stamp of Certifying Professional

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

#### Meets Industry Standards<sup>6</sup> 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 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 (20221), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

## **2. FACILITY AND SYSTEMS DESCRIPTION**

### **2.1. Building Characteristics**

Rutherford Library was built approximately 22 years ago. The building is two stories with a full-sized basement. The building has a total floor area of 30,000 square feet.

### **2.2. Building occupancy profiles**

During the site visit, there were approximately 15 employees observed in the building at once. The Library building is operated various hours each day, seven days a week for a total of 61 hours per week.

### **2.3. Building envelope**

#### **2.3.1. Exterior walls**

The exterior walls of the Library building consist of a 4" face brick with 2"x4" wood framing spaced 16" on center on the interior side. It is assumed there is 6" of fiberglass batt insulation situated in between each of the wooden studs. While insulation could be added to the exterior walls of the main building, it would not be aesthetic and it would have a significant impact on building operations. If any portion of the building is renovated or improved as part of a capital improvement plan, SWA recommends increased insulation is added to any walls during construction.

#### **2.3.2. Roof**

The Library building contains a flat roof with light gray built up roofing. The roof surface appeared to be in fair condition and it would not be cost effective to upgrade at this point in time. The roof contains approximately 3-4 inches of rigid insulation which forms a slope in the roof for drainage. If the roof is improved as part of a capital improvement plan, SWA recommends increasing the amount of rigid insulation located on the roof and airseal any leaky attic space to keep more conditioned air inside of the actual conditioned spaces and allow the least amount of expensive, conditioned air to escape.

#### **2.3.3. Base**

The building contains a full-sized below grade basement. The floor of the basement is made of 6" concrete. There were no reported problems with water penetration or moisture.

#### **2.3.4. Windows**

All of the windows in the building are metal-framed, operable windows. These windows contain double-pane glass with no low-e coating. The windows appeared to be in good condition and did not allow for excessive air or moisture penetration around the frame. There are no cost-effective measures for the windows at this point in time. At this time, replacing the windows would not be cost-effective but SWA recommends that windows are replaced with newer windows with a high insulating value if any capital improvements or construction are planned for the building in the future.

#### **2.3.5. Exterior doors**

The entrance ways for the Library Building consists of double-pane glass doors set in a metal frame. The frames of these doors are poor insulators and allow expensive, conditioned air to leak out of the

building. Some of the doors were observed to be having deteriorated weather-stripping so that they did not seal well to the frames. SWA recommends weather-stripping around all of the doors of the building in order to prevent conditioned air from leaking outside of the building. Weather-stripping should be checked at least once a year and replaced as soon as signs of deterioration show.

### **2.3.6. Building air tightness**

The Rutherford Library was relatively tight with the exception of the exterior doors and some small penetrations inside of the building. Windows and Entranceways such as the front and back vestibule of the Library Building should be maintained so that a tight seal is always formed to keep conditioned air from leaking outside of the building.

## **2.4. HVAC systems**

### **2.4.1. Heating**

The Rutherford Library Building contains two P-K Thermific Gas-fired heating boilers. These boilers are modulating, non-condensing units. Each boiler has an input rating of 1,000,000 Btuh with a nameplate thermal efficiency of 85%. The Library also contains three modular Trane air-handling units with VSD controls that provide, via a ducted system, conditioned air to the open main floor of the building. The majority of the system consists of VAV boxes and hot water baseboard. The basement contains 3 fan-coil units. SWA did not recognize any potential for upgrades at this point in time due to the age of the system. The boilers are controlled by a Heat-Timer Multi-Mod Platinum control. The entire heating, ventilation and air-conditioning system at the Rutherford Library was installed in 2008. The boilers, the chiller, pumps, controls, etc. have all been installed and still have some problems that are being worked out. Currently all of the controls appear to be set properly for energy efficiency concerns. SWA was informed that the building is currently experiencing operating problems with the equipment as it is currently installed. Some of the equipment appears to be leaking and dripping onto light fixtures in the main lobby area and causing failure in some of the lighting ballasts. Building staff informed SWA that there are issues being resolved currently with the mechanical contractor and some work is still required to have the system operate properly.

### **2.4.2. Cooling**

The Rutherford Library Building contains a Trane 100 ton centrifugal, air-cooled chiller that uses R22 refrigerant. The Trane chiller also has two compressors for step operation to improve the part load efficiency. The Trane air-cooled condenser is located on the roof with 4 cells. The chilled water loop feeds VAV boxes as well as the fan coil units in the basement to provide cool air throughout the building. According to building staff, there are still some issues with calibrating the cooling system for use with the building. The chilled water system is still undergoing debugging to correct problems such as not properly interconnecting fire alarm and smoke detectors to shut down the air-handling units' fan systems during alarm conditions. The entire cooling system is controlled by a programmable Honeywell DDC control system which is operable and controllable with remote computer. The Honeywell controls alternate between the two chilled water pumps every 3.5 days. The chiller is set to shut off at outdoor temperatures of 65F. The entire system was installed in 2008.

### **2.4.3. Ventilation**

The Library Building uses air-handling units to introduce fresh air into the building. Rooftop exhaust fans exhaust stale air and help induce fresh air into the building.

#### **2.4.4. Domestic Hot Water**

The Library Building contains one Rheem natural gas domestic hot water heater. This atmospheric water heater has an input of 34,000 Btuh with a storage capacity of 40 gallons. The water heater was installed with the new HVAC system and is not cost-effective to upgrade at this point.

It is not cost-effective to replace the existing water heating equipment with higher efficiency equipment. However, higher efficiency water heating equipment will save energy and should be strongly considered upon replacement of the equipment. Energy saving appliances bearing the ENERGY STAR label should be selected to ensure efficiency performance. Incentives may be available to offset any added costs for the installed equipment.

More efficient water-consuming fixtures and appliances save both energy and money through reduced energy consumption for water heating, as well decreased water and sewer bills. SWA recommends that the aerators in all sinks are retrofitted with low-flow aerators that constrict the volume of water allowed to flow out of the faucets during the time it takes to wash hands, wash dishes, etc. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce hot water consumption. In addition, routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy.

### **2.5. Electrical systems**

#### **2.5.1. Lighting**

*Interior Lighting* – Most of the lighting within the Library Building consisted of older, inefficient T12 lighting with magnetic ballasts as well as CFL bulbs. There are approximately 449 fixtures throughout the building that contain T12 fluorescent bulbs with magnetic ballasts that should be replaced with T8 fluorescent bulbs with electronic ballasts. There were only 4 incandescent lights found in the building. CFL bulbs save money since they require less power to operate and they also have a better light quality. The building also contains 15 fluorescent exit signs that should be upgraded with LED exit signs. LED exit signs are always cost-effective 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.

#### **2.5.2. Appliances and process**

Appliances, such as refrigerators, copiers and computers that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315kwh/yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large 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**

There are no elevators at the Rutherford Library building.

#### **2.5.4. Other electrical systems**

There are currently no other electrical systems in the building.



### 3. EQUIPMENT LIST

Building System	Description	Make/ Model	Fuel	Space served	Estimated Remaining useful life %
Heating	Two (2) P-K Thermific, non-condensing modulating boilers. Each 1,000 kBtuh input, 85% thermal efficiency. With Leeson 1/2 HP blower motors.	P-K Thermific, Model #NM-1000	Natural Gas	All areas	96%
Heating	Two (2) Bell & Gossett HW pumps, each 3HP, no VFD drive	Bell & Gossett, Model #R332	Electric	All areas	90%
Heating	Two (2) Bell & Gossett HW circulator pumps, each 3/4 HP, no VFD drive	Bell & Gossett #DVH 4 8T17D1738-P	Electric	All areas	90%
Controls	Heat-Timer, Multi-Mod Platinum control	Heat- Timer, Model Multi-Mod Platinum	Electric	All areas	95%
Controls	Honeywell Control	Honeyweel, Model PP1	Electric	All areas	95%
Cooling	Three (3) Trane Climate Changer, M series, VAV, with CHW and HW coils, VSD control	Trane #MCCB017UA 0D0UB	Electric	All areas	90%
Cooling	Trane Series R, 100 ton rotary liquid electric chiller	Trane, Model # RTUA 100 YH01R3DO VFR	Electric	All areas	96%
Cooling	Air cooled 4-cell condenser	AYH 01R300VFR	Electric	All areas	96%
Cooling	Two (2) CHW pumps with Baldor motors, each 7.5HP, no VSD control. NEMA efficiency of 91.7%.	Baldor, Cat# EM3311T-8	Electric	All areas	90%
Domestic Hot Water	Rheem Rheemglas Imperial DHW heater, atmospheric, natural gas-fired. Unit has input of 34,000 Btuh and 40 gallon capacity.	Rheem, Model #21X40-7	Natural Gas	All areas	96%
Lighting	Please see Appendix A	-	-	-	-

**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 this building, SWA has separated the investment opportunities into two categories of recommendations:

**General Recommendations: Operations and Maintenance**

- Functional performance testing – The new HVAC system is currently undergoing issues with operation and has had several leaks that have not been corrected yet. SWA observed that equipment and set points were reasonable from an energy standpoint but there are still some issues that need to be debugged. SWA recommends that the each component of the HVAC system undergoes functional performance testing individually as well as the system as a whole. Functional performance testing will show that the system is capable of operating at programmed set points while enduring different operating modes. Functional performance testing allows the system to be stressed under different conditions to show that it has been installed correctly and each piece of the system is capable of handling the different operating modes.
- Occupancy sensors – SWA recommends that the Library install occupancy sensors in small rooms such as mechanical rooms, bathrooms and closets. Occupancy sensors can help reduce excess energy use in small rooms that do not see constant use. Occupancy sensors also prevent energy from being wasted when lights are accidentally left on overnight.
- Weather Stripping/Air Sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frame. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Water Efficient Fixtures & Controls - Adding controlled on/off timers on all lavatory faucets is a cost-effect way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures 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-consuming fixtures and appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water and sewer bills.

**Specified Recommendations: Energy Conservation Measures**

**Summary table**

ECM#	Description
1	Lighting Upgrade; See appendix A for entire lighting retrofit schedule.

## ECM#1: Upgrade lighting

### Description:

The Rutherford Library Building consists of mostly outdated T12 fluorescent lighting with magnetic ballasts. SWA recommends that each T12 fixture is replaced with a T8 fixture with electronic ballasts. Typically, T8 fluorescent lights with electronic ballasts have an electrical savings of 30% over T12 fixtures with magnetic ballasts. T8 fluorescent fixtures also have a better quality light output and can save on maintenance costs over T12 fixtures. Any remaining incandescent light bulbs should be replaced with newer-type CFL bulbs. The Library Building should also replace all fluorescent exit signs with newer LED fixtures. Exit signs are one good opportunity for energy efficiency since they are required to operate 24 hours per day. See Appendix A for complete existing and proposed lighting schedules.

### Installation cost:

Estimated installed cost: \$92,260

Source of cost estimate: RS Means

### Economics:

1st year energy and cost savings						Simple Payback (SPP)	Life of Meas. (LoM)	Lifetime Cost Savings	Return on Invest (ROI)	
Electricity Savings			Fuel Savings		Cost Savings					
Consumption	Demand		Natural Gas							
43,863	kWh	12	kW	0	Therms	\$7,018	13.1	20	\$102,507	0.6%

**Assumptions:** SWA calculated the savings for this measure using information collected during the field visit and analysis of historical utility consumption information.

### Rebates/financial incentives:

*NJ Clean Energy – Prescriptive Lighting Incentive, Incentive based on installing T5 or T8 lamps with electronic ballasts in existing facilities (\$10-\$30 per fixture, depending on quantity of lamps). Maximum incentive amount is \$13,470.*

*NJ Clean Energy – Prescriptive Lighting Incentive, Incentive based on installing LED Exit signs (\$10/\$20 per fixture). Maximum incentive amount is \$300.*

### Options for funding ECM:

*This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*

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

## **5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES**

### **5.1. Existing systems**

*There are currently no existing renewable energy systems.*

### **5.2. Solar Photovoltaic**

*Solar photovoltaic panels are not recommended due to the limited roof area.*

### **5.3. Solar Thermal Collectors**

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

### **5.4. Combined Heat and Power**

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

### **5.5. Geothermal**

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

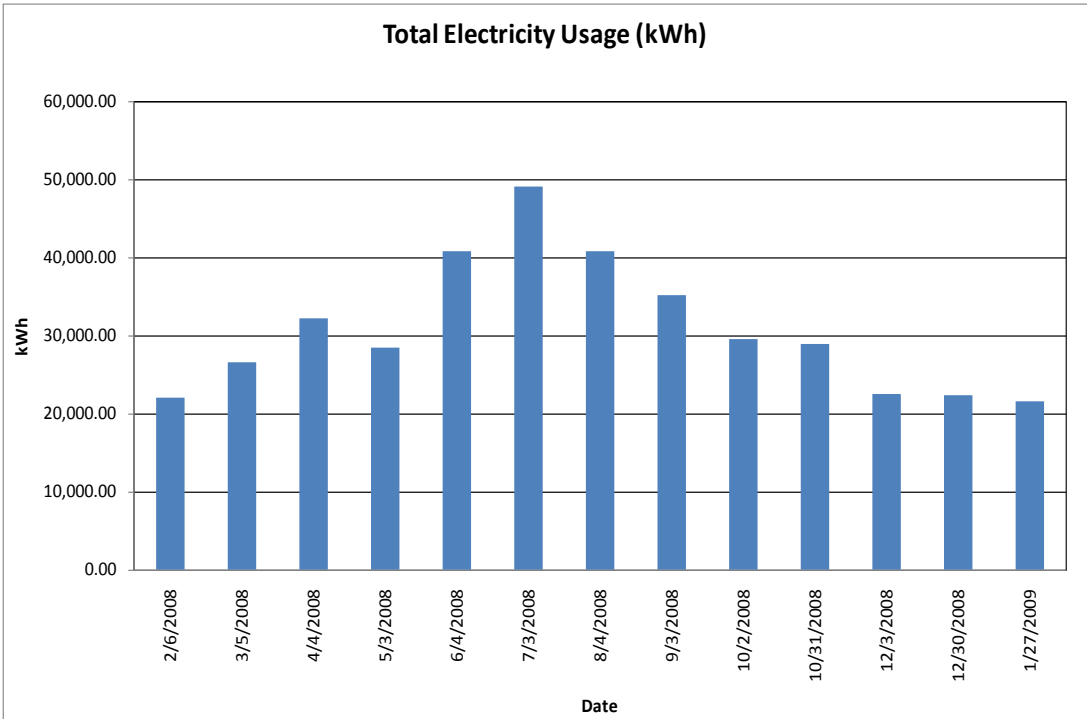
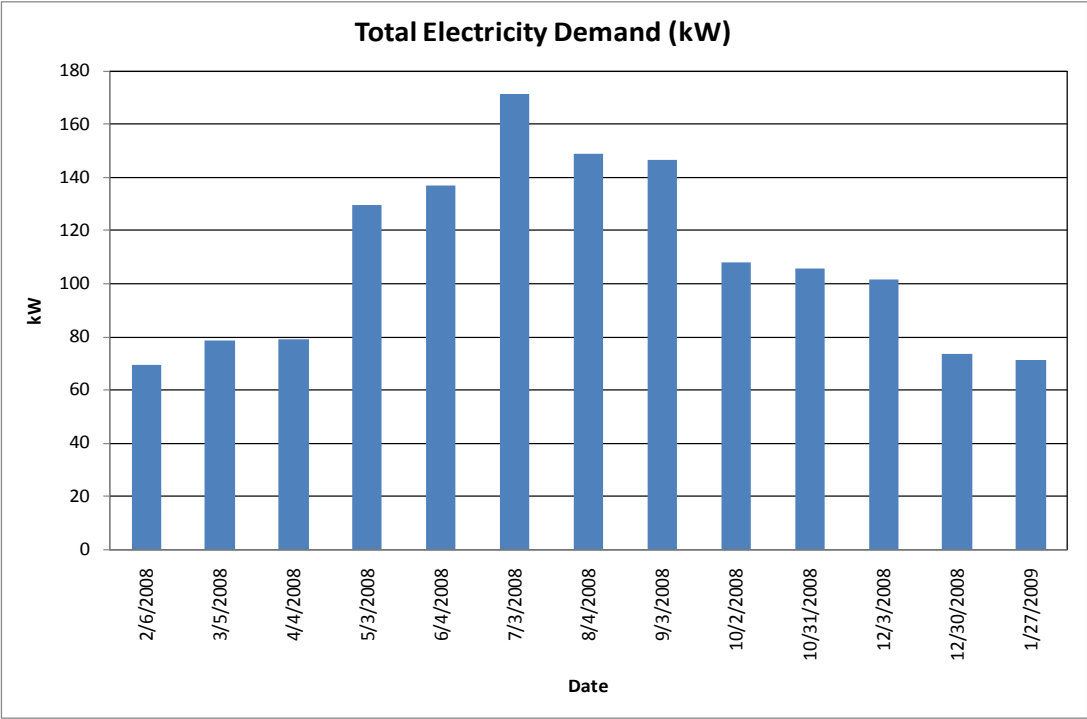
### **5.6. Wind**

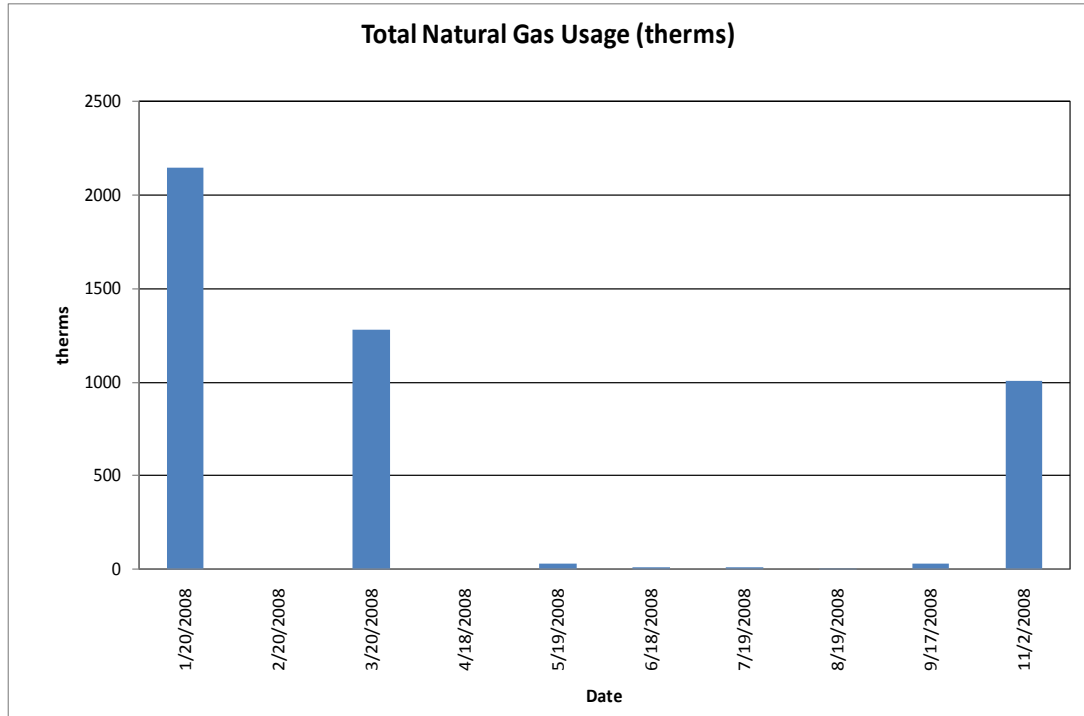
*Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.*

## **6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES**

### **6.1. Load profiles**

The average electrical peak demand for the previous year was 106.6 kW and the maximum peak demand was 171.2 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the other two charts show electric and gas usage (in kWh), respectively.





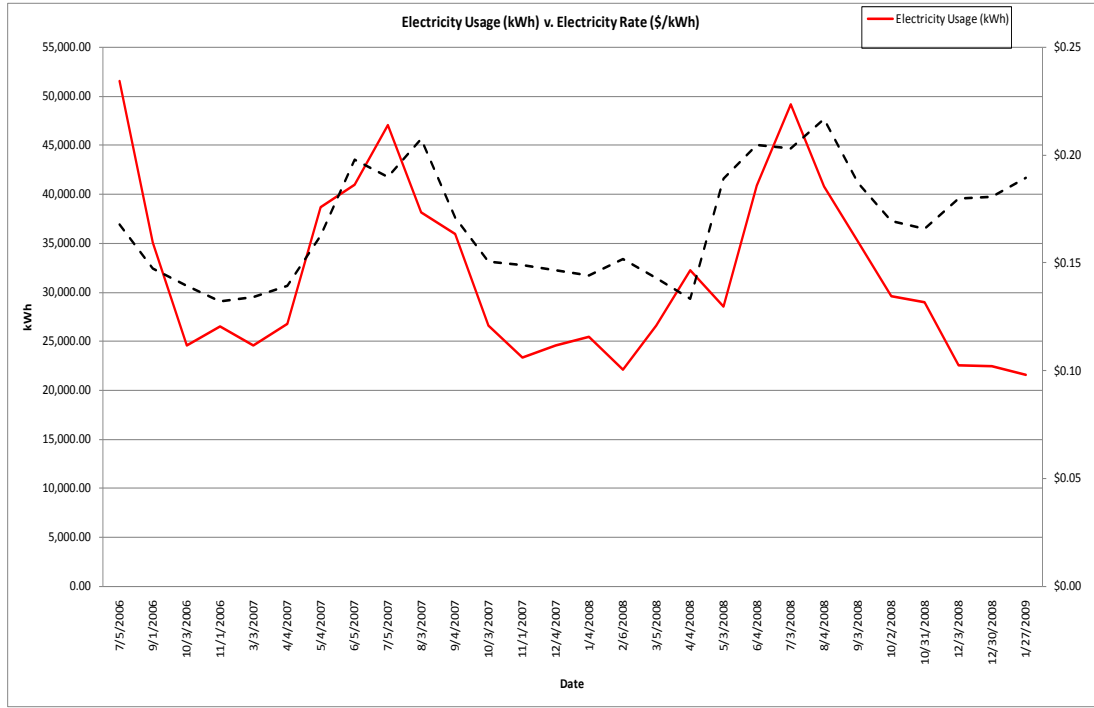
\*Natural Gas usage shows inconsistencies

## 6.2. Tariff analysis

The Rutherford Library currently buys electricity from PSEG at the GSGHC2 GSGH LPLS general service rate that accounts for off-peak and on-peak hours, which charges customers based on the market rate of electricity usage as well as monthly peak demands. Gas is purchased from PSEG at a general service rate which charges customers based on the market rate of natural gas usage. General Service rates are appropriate for this building due to its size.

## 6.3. Energy Procurement strategies

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



*Electricity prices reflect electricity usage*

A chart showing natural gas rates could not be generated due to inconsistencies in the natural gas billing.

## 7. METHOD OF ANALYSIS

### 7.1. Assumptions and methods

Energy modeling method: Spreadsheet-based calculation methods  
Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)  
RS Means 2009 (Building Construction Cost Data)  
RS Means 2009 (Mechanical Cost Data)  
Note: Cost estimates also based on utility bill analysis and prior experience with similar projects.

### 7.2. Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. All costs estimated in our analysis 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

Existing Lighting Conditions																
#	Building	Level/Floor	Measured Lighting Level in Footcandles	Location in Building	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/Lamp	Hrs/Day	Energy Use (Watt hours/day)	Annual Energy Use (kWh/year)	Controls	Daylighting possible?	Total Power (W)
1	Library	Attic	60	Mechanical Rooms	4' linear T8	electronic	7	2	fluorescent	32	4	1792	468	Switch	No	448
2	Library	Attic	42	Chiller Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
3	Library	Stairwell	20	Stairwells	26W CFL	-	5	1	CFL	26	13	1690	441	Switch	No	130
4	Library	2nd Floor	100	Boiler Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
5	Library	1st Floor	60	Electrical Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
6	Library	1st Floor	45	Mechanical Room	4' linear T8	electronic	5	2	fluorescent	32	4	1280	334	Switch	No	320
7	Library	1st Floor	130	Periodical Room	4' linear T12	magnetic	39	4	fluorescent	34	13	68952	17996	Switch	No	5304
8	Library	1st Floor	130	Periodical Room	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
9	Library	1st Floor	30	Staff Room	4' linear T12	magnetic	13	4	fluorescent	34	13	22984	5999	Switch	No	1768
10	Library	1st Floor	17	Staff Room	26W CFL	-	6	1	CFL	26	13	2028	529	Switch	No	156
11	Library	1st Floor	17	Staff Room	Fluorescent Exit Sign	-	1	1	fluorescent	14	24	336	88	None	No	14
12	Library	1st Floor	60	Work Room	4' linear T12	magnetic	33	2	fluorescent	34	13	29172	7614	Switch	No	2244
13	Library	1st Floor	60	Work Room	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
14	Library	1st Floor	44	Vault Room	4' linear T12	magnetic	3	2	fluorescent	34	13	2652	692	Switch	No	204
15	Library	1st Floor	4	Storage	26W CFL	-	1	1	CFL	26	2	52	14	Switch	No	26
16	Library	1st Floor	18	Small Hallway	26W CFL	-	4	2	CFL	26	13	2704	706	Switch	No	208
17	Library	1st Floor	18	Small Hallway - Storage	26W CFL	-	1	1	CFL	26	2	52	14	Switch	No	26
18	Library	1st Floor	25	Auditorium	4' linear T12	magnetic	11	4	fluorescent	34	13	19448	5076	Switch	No	1496
19	Library	1st Floor	17	Kitchen	4' linear T12	magnetic	1	2	fluorescent	34	13	884	231	Switch	No	68
20	Library	1st Floor	25	Auditorium	4' linear T12	magnetic	2	2	fluorescent	34	13	1768	461	Switch	No	136
21	Library	1st Floor	25	Auditorium	4' linear T12	magnetic	2	2	fluorescent	34	13	1768	461	Switch	No	136
22	Library	1st Floor	25	Auditorium	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
23	Library	1st Floor	23	Vestibule	26W CFL	-	4	2	CFL	26	13	2704	706	Switch	No	208
24	Library	1st Floor	10	Vestibule	40W Incandescent	-	2	2	Incandescent	40	13	2080	543	Switch	No	160
25	Library	1st Floor	-	Exterior vestibule	26W CFL	-	1	2	CFL	26	12	624	163	Timer	No	52
26	Library	1st Floor	60	Children's Room	4' linear T12	magnetic	103	2	fluorescent	34	13	91052	23765	Switch	No	7004
27	Library	1st Floor	40	Story Alcove	4' linear T12	magnetic	6	2	fluorescent	34	13	5304	1384	Switch	No	408
28	Library	1st Floor	60	Children's Room	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
29	Library	1st Floor	-	Children's Vestibule	26W CFL	-	2	1	CFL	26	13	676	176	Switch	No	52
30	Library	1st Floor	-	Children's Exterior	26W CFL	-	2	2	CFL	26	12	1248	326	Switch	No	104
31	Library	1st Floor	18	Women's Room	4' linear T12	magnetic	1	1	fluorescent	34	13	442	115	Switch	No	34
32	Library	1st Floor	18	Men's Room	4' linear T12	magnetic	1	1	fluorescent	34	13	442	115	Switch	No	34
33	Library	1st Floor	15	Bathroom Hall	26W CFL	-	5	2	CFL	26	13	3380	882	Switch	No	260
34	Library	1st Floor	15	Bathroom Hall	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
35	Library	1st Floor	35	Stairwell	26W CFL	-	11	2	CFL	26	13	7436	1941	Switch	No	572
36	Library	1st Floor	83	Director's Office	4' linear T12	magnetic	2	8	fluorescent	34	13	7072	1846	Switch	No	544
37	Library	1st Floor	83	Director's Office	50W flood lights	-	8	1	Incandescent	50	13	5200	1357	Switch	No	400
38	Library	1st Floor	30	Director's Bath	40W Incandescent	-	1	2	Incandescent	40	4	320	84	Switch	No	80
39	Library	1st Floor	84	William's Office	4' linear T12	magnetic	1	8	fluorescent	34	13	3536	923	Switch	No	272
40	Library	1st Floor	-	William's Display Case	4' linear T12	magnetic	2	4	fluorescent	34	13	3536	923	Switch	No	272
41	Library	1st Floor	67	Secretary's Office	4' linear T12	magnetic	6	4	fluorescent	34	13	10608	2769	Switch	No	816
42	Library	1st Floor	27	Director's Office	26W CFL	-	1	1	CFL	26	13	338	88	Switch	No	26
43	Library	1st Floor	30	Director's Bath	40W Incandescent	-	1	2	Incandescent	40	4	320	84	Switch	No	80
44	Library	2nd Floor	40	Library - High Ceiling portion	2' U-shaped T12	magnetic	3	2	fluorescent	34	13	2652	692	Switch	No	204
45	Library	2nd Floor	40	Library - High Ceiling portion	4' linear T12	magnetic	47	4	fluorescent	34	13	83096	21688	Switch	No	6392
46	Library	2nd Floor	-	Chandelier	27W CFL	-	24	1	CFL	27	13	8424	2199	Switch	No	648
47	Library	2nd Floor	30	Library	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
48	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T12	magnetic	57	2	fluorescent	34	13	50388	13151	Switch	No	3876
49	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T12	magnetic	54	1	fluorescent	34	13	23868	6230	Switch	No	1836
50	Library	1st Floor	35	Library - Lower Ceiling portion	Fluorescent Exit Sign	-	2	1	fluorescent	14	24	672	175	None	No	28
51	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T12	magnetic	52	4	fluorescent	34	13	91936	23995	Switch	No	7072
52	Library	1st Floor	35	Library - Lower Ceiling portion	2' linear T12	magnetic	2	2	fluorescent	20	13	1040	271	Switch	No	80
53	Library	1st Floor	50	Library - front of first floor	2' U-shaped T12	magnetic	6	2	fluorescent	34	13	5304	1384	Switch	No	408
54	Library	1st Floor	50	Library - front of first floor	27W CFL	-	7	1	CFL	27	13	2457	641	Switch	No	189
55	Library	1st Floor	56	First floor meeting room	4' linear T12	magnetic	2	8	fluorescent	34	13	7072	1846	Switch	No	544
56	Library	1st Floor	56	First floor meeting room	27W CFL	-	8	1	CFL	27	13	2808	733	Switch	No	216
57	Library	1st Floor	-	Hallway to Offices	27W CFL	-	1	1	CFL	27	13	351	92	Switch	No	27

Proposed Lighting Conditions																
#	Building	Level/Floor	Measured Lighting Level in Footcandles	Location in Building	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/Lamp	Hrs/Day	Energy Use (Watt hours/day)	Annual Energy Use (kWh/year)	Controls	Daylighting possible?	Total Power (W)
1	Library	Attic	60	Mechanical Rooms	4' linear T8	electronic	7	2	fluorescent	32	4	1792	468	Switch	No	448
2	Library	Attic	42	Chiller Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
3	Library	Stairwell	20	Stairwells	26W CFL	-	5	1	CFL	26	13	1690	441	Switch	No	130
4	Library	2nd Floor	100	Boiler Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
5	Library	1st Floor	60	Electrical Room	4' linear T8	electronic	3	2	fluorescent	32	4	768	200	Switch	No	192
6	Library	1st Floor	45	Mechanical Room	4' linear T8	electronic	5	2	fluorescent	32	4	1280	334	Switch	No	320
7	Library	1st Floor	130	Periodical Room	4' linear T8	electronic	39	4	fluorescent	32	13	64896	12598	Switch	No	4992
8	Library	1st Floor	130	Periodical Room	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
9	Library	1st Floor	30	Staff Room	4' linear T8	electronic	13	4	fluorescent	32	13	21632	4199	Switch	No	1664
10	Library	1st Floor	17	Staff Room	26W CFL	-	6	1	CFL	26	13	2028	529	Switch	No	156
11	Library	1st Floor	17	Staff Room	LED Exit Sign	-	1	1	LED	5	24	120	31	None	No	5
12	Library	1st Floor	60	Work Room	4' linear T8	electronic	33	2	fluorescent	32	13	27456	5330	Switch	No	2112
13	Library	1st Floor	60	Work Room	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
14	Library	1st Floor	44	Vault Room	4' linear T8	electronic	3	2	fluorescent	32	13	2496	485	Switch	No	192
15	Library	1st Floor	4	Storage	26W CFL	-	1	1	CFL	26	2	52	14	Switch	No	26
16	Library	1st Floor	18	Small Hallway	26W CFL	-	4	2	CFL	26	13	2704	706	Switch	No	208
17	Library	1st Floor	18	Small Hallway - Storage	26W CFL	-	1	1	CFL	26	2	52	14	Switch	No	26
18	Library	1st Floor	25	Auditorium	4' linear T8	electronic	11	4	fluorescent	32	13	18304	3553	Switch	No	1408
19	Library	1st Floor	17	Kitchen	4' linear T8	electronic	1	2	fluorescent	32	13	832	162	Switch	No	64
20	Library	1st Floor	25	Auditorium	4' linear T8	electronic	2	2	fluorescent	32	13	1664	323	Switch	No	128
21	Library	1st Floor	25	Auditorium	4' linear T8	electronic	2	2	fluorescent	32	13	1664	323	Switch	No	128
22	Library	1st Floor	25	Auditorium	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
23	Library	1st Floor	23	Vestibule	26W CFL	-	4	2	CFL	26	13	2704	706	Switch	No	208
24	Library	1st Floor	10	Vestibule	13W CFL	-	2	2	CFL	13	13	676	176	Switch	No	52
25	Library	1st Floor	-	Exterior vestibule	26W CFL	-	1	2	CFL	26	12	624	163	Timer	No	52
26	Library	1st Floor	60	Children's Room	4' linear T8	electronic	103	2	fluorescent	32	13	85696	16635	Switch	No	6592
27	Library	1st Floor	40	Story Alcove	4' linear T8	electronic	6	2	fluorescent	32	13	4992	969	Switch	No	384
28	Library	1st Floor	60	Children's Room	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
29	Library	1st Floor	-	Children's Vestibule	26W CFL	-	2	1	CFL	26	13	676	176	Switch	No	52
30	Library	1st Floor	-	Children's Exterior	26W CFL	-	2	2	CFL	26	12	1248	326	Switch	No	104
31	Library	1st Floor	18	Women's Room	4' linear T8	electronic	1	1	fluorescent	32	13	416	81	Switch	No	32
32	Library	1st Floor	18	Men's Room	4' linear T8	electronic	1	1	fluorescent	32	13	416	81	Switch	No	32
33	Library	1st Floor	15	Bathroom Hall	26W CFL	-	5	2	CFL	26	13	3380	882	Switch	No	260
34	Library	1st Floor	15	Bathroom Hall	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
35	Library	1st Floor	35	Stairwell	26W CFL	-	11	2	CFL	26	13	7436	1941	Switch	No	572
36	Library	1st Floor	83	Director's Office	4' linear T8	electronic	2	8	fluorescent	32	13	6656	1292	Switch	No	512
37	Library	1st Floor	83	Director's Office	25W Refl. CFLs	-	8	1	CFL	25	13	2600	679	Switch	No	200
38	Library	1st Floor	30	Director's Bath	20W CFL	-	1	2	CFL	20	4	160	42	Switch	No	40
39	Library	1st Floor	84	William's Office	4' linear T8	electronic	1	8	fluorescent	32	13	3328	646	Switch	No	256
40	Library	1st Floor	-	William's Display Case	4' linear T8	electronic	2	4	fluorescent	32	13	3328	646	Switch	No	256
41	Library	1st Floor	67	Secretary's Office	4' linear T8	electronic	6	4	fluorescent	32	13	9984	1938	Switch	No	768
42	Library	1st Floor	27	Director's Office	26W CFL	-	1	1	CFL	26	13	338	88	Switch	No	26
43	Library	1st Floor	30	Director's Bath	20W CFL	-	1	2	CFL	20	4	160	42	Switch	No	40
44	Library	2nd Floor	40	Library - High Ceiling portion	2' U-shaped T8	electronic	3	2	fluorescent	20	13	1560	485	Switch	No	120
45	Library	2nd Floor	40	Library - High Ceiling portion	4' linear T8	electronic	47	4	fluorescent	32	13	78208	15182	Switch	No	6016
46	Library	2nd Floor	-	Chandelier	27W CFL	-	24	1	CFL	27	13	8424	2199	Switch	No	648
47	Library	2nd Floor	30	Library	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
48	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T8	electronic	57	2	fluorescent	32	13	47424	9206	Switch	No	3648
49	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T8	electronic	54	1	fluorescent	32	13	22464	4361	Switch	No	1728
50	Library	1st Floor	35	Library - Lower Ceiling portion	LED Exit Sign	-	2	1	LED	5	24	240	63	None	No	10
51	Library	1st Floor	35	Library - Lower Ceiling portion	4' linear T8	electronic	52	4	fluorescent	32	13	86528	16797	Switch	No	6656
52	Library	1st Floor	35	Library - Lower Ceiling portion	2' linear T8	electronic	2	2	fluorescent	17	13	884	190	Switch	No	68
53	Library	1st Floor	50	Library - front of first floor	2' U-shaped T8	electronic	6	2	fluorescent	32	13	4992	969	Switch	No	384
54	Library	1st Floor	50	Library - front of first floor	27W CFL	-	7	1	CFL	27	13	2457	641	Switch	No	189
55	Library	1st Floor	56	First floor meeting room	4' linear T8	electronic	2	8	fluorescent	32	13	6656	1292	Switch	No	512
56	Library	1st Floor	56	First floor meeting room	27W CFL	-	8	1	CFL	27	13	2808	733	Switch	No	216
57	Library	1st Floor	-	Hallway to Offices	27W CFL	-	1	1	CFL	27	13	351	92	Switch	No	27

Existing Lighting Energy Usage (kWh/year)	154,064
Proposed Lighting Energy Usage (kWh/year)	110,201
Existing Lighting Costs (\$/year)	\$26,191
Proposed Lighting Costs (\$/year)	\$18,734
Estimated Savings (kWh/year)	43,863
Estimated Savings (\$/year)	\$7,457
Existing Lighting Power Density (W/sqft)	46,326
Proposed Lighting Power Density (W/sqft)	43,303

## Appendix B: Third Party Energy Suppliers (ESCOs)

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
<b>Hess Corporation</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 <a href="http://www.hess.com">www.hess.com</a>
<b>American Powernet Management, LP</b> 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 <a href="http://www.americanpowernet.com">www.americanpowernet.com</a>
<b>BOC Energy Services, Inc.</b> 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 <a href="http://www.boc.com">www.boc.com</a>
<b>Commerce Energy, Inc.</b> 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 <a href="http://www.commerceenergy.com">www.commerceenergy.com</a>
<b>ConEdison Solutions</b> 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 <a href="http://www.conedsolutions.com">www.conedsolutions.com</a>
<b>Constellation NewEnergy, Inc.</b> 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 <a href="http://www.newenergy.com">www.newenergy.com</a>
<b>Credit Suisse, (USA) Inc.</b> 700 College Road East Princeton, NJ 08450	(212) 538-3124 <a href="http://www.creditsuisse.com">www.creditsuisse.com</a>
<b>Direct Energy Services, LLC</b> 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 <a href="http://www.directenergy.com">www.directenergy.com</a>
<b>FirstEnergy Solutions</b> 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 <a href="http://www.fes.com">www.fes.com</a>
<b>Glacial Energy of New Jersey, Inc.</b> 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 <a href="http://www.glacialenergy.com">www.glacialenergy.com</a>
<b>Metro Energy Group, LLC</b> 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 <a href="http://www.metroenergy.com">www.metroenergy.com</a>
<b>Integrus Energy Services, Inc.</b> 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 <a href="http://www.integrusenergy.com">www.integrusenergy.com</a>
<b>Liberty Power Delaware, LLC</b> Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 <a href="http://www.libertypowercorp.com">www.libertypowercorp.com</a>
<b>Liberty Power Holdings, LLC</b> Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 <a href="http://www.libertypowercorp.com">www.libertypowercorp.com</a>
<b>Pepco Energy Services, Inc.</b> 112 Main St. Lebanon, NJ 08833	(800) 363-7499 <a href="http://www.pepco-services.com">www.pepco-services.com</a>
<b>PPL EnergyPlus, LLC</b> 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a>
<b>Sempra Energy Solutions</b> 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 <a href="http://www.semprasolutions.com">www.semprasolutions.com</a>
<b>South Jersey Energy Company</b> One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>
<b>Sprague Energy Corp.</b> 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 <a href="http://www.spragueenergy.com">www.spragueenergy.com</a>
<b>Strategic Energy, LLC</b> 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 <a href="http://www.sel.com">www.sel.com</a>
<b>Suez Energy Resources NA, Inc.</b> 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 <a href="http://www.suezenergyresources.com">www.suezenergyresources.com</a>
<b>UGI Energy Services, Inc.</b> 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 <a href="http://www.ugienergyservices.com">www.ugienergyservices.com</a>

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
<b>Cooperative Industries</b> 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 <a href="http://www.cooperativenet.com">www.cooperativenet.com</a>
<b>Direct Energy Services, LLC</b> 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 <a href="http://www.directenergy.com">www.directenergy.com</a>
<b>Dominion Retail, Inc.</b> 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 <a href="http://www.retail.dom.com">www.retail.dom.com</a>
<b>Gateway Energy Services Corp.</b> 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 <a href="http://www.gesc.com">www.gesc.com</a>
<b>UGI Energy Services, Inc.</b> 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 <a href="http://www.ugienergyservices.com">www.ugienergyservices.com</a>
<b>Great Eastern Energy</b> 116 Village Riva, Suite 200 Princeton, NJ 08540	(888) 651-4121 <a href="http://www.greateastern.com">www.greateastern.com</a>
<b>Hess Corporation</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 <a href="http://www.hess.com">www.hess.com</a>
<b>Hudson Energy Services, LLC</b> 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 <a href="http://www.hudsonenergyservices.com">www.hudsonenergyservices.com</a>
<b>Intelligent Energy</b> 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 <a href="http://www.intelligentenergy.org">www.intelligentenergy.org</a>
<b>Keil &amp; Sons</b> 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 <a href="http://www.systrumenergy.com">www.systrumenergy.com</a>
<b>Metro Energy Group, LLC</b> 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 <a href="http://www.metroenergy.com">www.metroenergy.com</a>
<b>MxEnergy, Inc.</b> 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 <a href="http://www.mxenergy.com">www.mxenergy.com</a>
<b>NATGASCO (Mitchell Supreme)</b> 532 Freeman Street Orange, NJ 07050	(800) 840-4427 <a href="http://www.natgasco.com">www.natgasco.com</a>
<b>Pepco Energy Services, Inc.</b> 112 Main Street Lebanon, NJ 08833	(800) 363-7499 <a href="http://www.pepco-services.com">www.pepco-services.com</a>
<b>PPL EnergyPlus, LLC</b> 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a>
<b>Sempra Energy Solutions</b> 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 <a href="http://www.semprasolutions.com">www.semprasolutions.com</a>
<b>South Jersey Energy Company</b> One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>
<b>Sprague Energy Corp.</b> 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 <a href="http://www.spragueenergy.com">www.spragueenergy.com</a>
<b>Stuyvesant Energy LLC</b> 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 <a href="http://www.stuyfuel.com">www.stuyfuel.com</a>
<b>Woodruff Energy</b> 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 <a href="http://www.woodruffenergy.com">www.woodruffenergy.com</a>