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February 23th, 2010

Local Government Energy Program
Final Energy Audit Report

For

Borough of Spring Lake
Borough Hall
423 Warren Ave
Spring Lake, NJ 07762

Project Number: LGEA29

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INTRODUCTION

On October 23rd, 26th and 28th, Steven Winter Associates, Inc. (SWA) and PMK Group, Inc., a business unit of Birdsall Services Group, (BSG-PMK), performed an energy audit and assessment of the Borough Hall building located in Spring Lake, 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 original Borough Hall building structure was built in 1897 and houses the municipal offices of the borough as well as a meeting room/courtroom, the historical society museum, and American Legion Post #432. Several additions and mechanical upgrades have occurred over the years, with major addition and renovations in 1923 and 1980. The building consists of 13,000 square feet over three floors. There are 12 permanent Borough employees and various numbers of historical society members, American Legion members, and seasonal part timers. Regular office hours are from 8 am to 4 pm, second floor museum is open to the public 4 hours per week. Planning Board meetings and American Legion Post meetings occur once a month each in the evenings.

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 and BSG-PMK estimated the energy and cost savings associated with the installation of each of the recommended energy conservation measures. The findings for the building are summarized in this report.

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

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

- 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

This document contains the energy audit report for the Borough Hall building located at 423 Warren Ave, Spring Lake, NJ 07762.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG-PMK staff on October 26th and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

Current conditions

In the most recent full year of data collected (10/1/08-9/30/09), the building consumed 54,600 kWh or $9,884.56 worth of electricity and 5,367therms or $7,490.87 worth of natural gas. The average aggregated cost of electricity was calculated to be $0.18/kWh and the average aggregated cost of natural gas was calculated to be $1.40/therm. With electricity and fossil fuel combined, the building consumed 723 MMBtus of energy at a total cost of $17,375.43.

BSG-PMK has entered energy information about the Borough Hall building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was not able to receive an Energy Star performance rating since the building is classified as a Hall building, which is currently ineligible for a performance score through the Benchmarking tool.

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

Recommendations (Summary)

Category I Recommendations: Capital Improvements.

1) Two 1.5-ton Sanyo condensing units, along with their corresponding indoor units, should be replaced on an as-fail basis. The total cost for replacing them with 1.5-ton Mitsubishi Mr. Slims, which use Puron refrigerant and have a Seasonal Energy Efficiency Rating (SEER) of 16, is $13,500. This would not be considered an ECM due to a long payback period.
2) Two Trane condensing units, one 3.5 tons and one 5 tons, should be replaced on an as-fail basis, along with their corresponding air-handlers. The 5 and 3 1/2-ton units would

cost approximately $17,000 each to replace. This also could not be considered an ECM due to a long payback.

Category II Recommendations: Operations & Maintenance.

1) All sink faucets and toilets should be converted to low-flow unit. Low-flow toilets use 1.6 gallons per flush, compared to 3.5 for standard units. Water consumptions for different types of faucets vary. These units are inexpensive, but due to the fact that public buildings in Spring Lake are not billed for water, the payback would be infinitely long, and therefore, this cannot be recommended as an ECM.
2) There are large openings in the attic soffits that extend to the outside of the building. These holes allow heat to enter the building in the summer, and exit the building in the winter. The attic itself is not temperature-controlled, but the infiltration impacts the rest of the building conditions. It is recommended that these holes be repaired in order to stop this excess infiltration.
3) The exterior doors to the building need to be re-weather-stripped as necessary.

Category III Recommendations: Energy Conservation Measures

At this time, SWA/BSG-PMK highly recommends a total of **3** Energy Conservation Measures (ECMs) for the Spring Lake Borough Hall building that are summarized in the following Table 1. The total investment cost for these ECMs with incentives is **$128,104**. SWA/BSG-PMK estimates a first year savings of **$7,471** with a simple payback of **17.1 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Borough Hall building by **60,135 lbs of CO_2**, which is equivalent to removing approximately 5 cars from the roads each year. SWA also recommends that the Borough of Spring Lake 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 $0.03/kWh, which would have equated to $1,638 for the past 12 months

There are various incentives that the Township of Spring Lake could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommends that the Township of Spring Lake apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, could also assist to cover up to 80% of the capital investment. In order to qualify, the facility being upgraded must not have had a peak demand that exceeded 200 kW in any of the preceding 12 months; the highest peak demand for the Borough Hall in the previous year was 32.3 kW.

Scope of Work – Summary Table

Definitions:
SPP: Simple Payback (years)
LoM: Life of Measure (years)
ROI: Return on Investment (%)
Assumptions:

Discount rate:	3.2%	per DOE FEMP guidelines	Electricity rate	$0.19	$/kWh (cooling season only)
Energy price escalation rate:	0%	per DOE FEMP guidelines		$0.18	$/kWh
			Gas rate	$1.40	$/therm
Avg. Annual Demand:	0.006709				
			Area of Building (SF)	13,000	

Table 1 - Highly Recommended 0-5 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Lighting Upgrade	Similar Projects	$13,614	$2,080	$11,534	15,363	8.59	0	4.03	$0	$2,781	15	$32,721	4.15	1225%	82%	23%	$21,662	21,047
TOTAL			$13,614	$2,080	$11,534	15,363	8.59	0	4.03	$0.00	$2,781	-	$32,721	4.15	-	-	-	$21,662	21,047

Table 2 - Recommended Extended-Payback ECMs																		
ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Window Upgrade	Similar Projects	$37,882	0	$37,882	774	0.43	1,227	9.64	$0	$1,858	35	$38,790	20.38	7%	0%	3%	$2,049	15,420
3	Boiler Upgrade with Outdoor Air Reset Control	Contractor - Struble Mechanical Associates, Fairfield, NJ	$80,000	$1,313	$78,688	0	0.00	2,023	15.56	$0	$2,832	25	$48,232	27.79	-155%	-6%	-1%	($29,374)	23,667
TOTAL			$117,882	$1,313	$116,570	774	0.43	3,250	25.20	$0.00	$4,690	-	$87,022	24.85	-	-	-	($27,325)	39,087

1. HISTORIC ENERGY CONSUMPTION

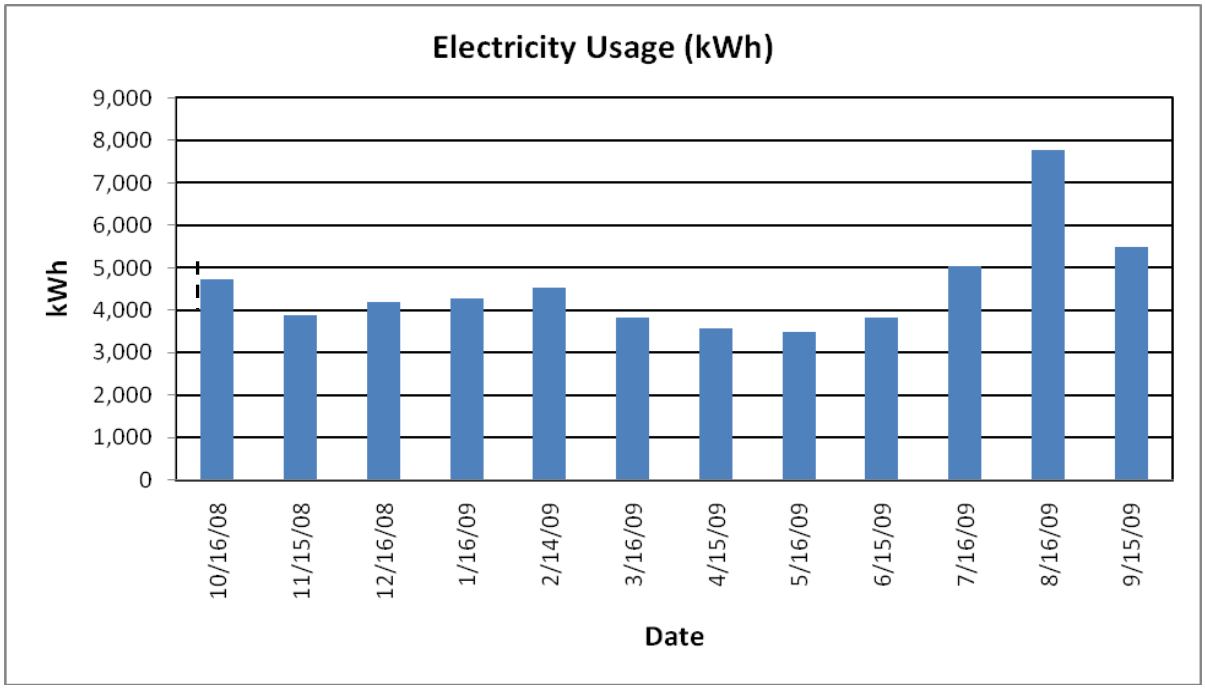
1.1. Energy usage and cost analysis

SWA analyzed utility bills from October 2007 through September 2009 that were received from the utility companies supplying the Borough Hall building with electric and natural gas.

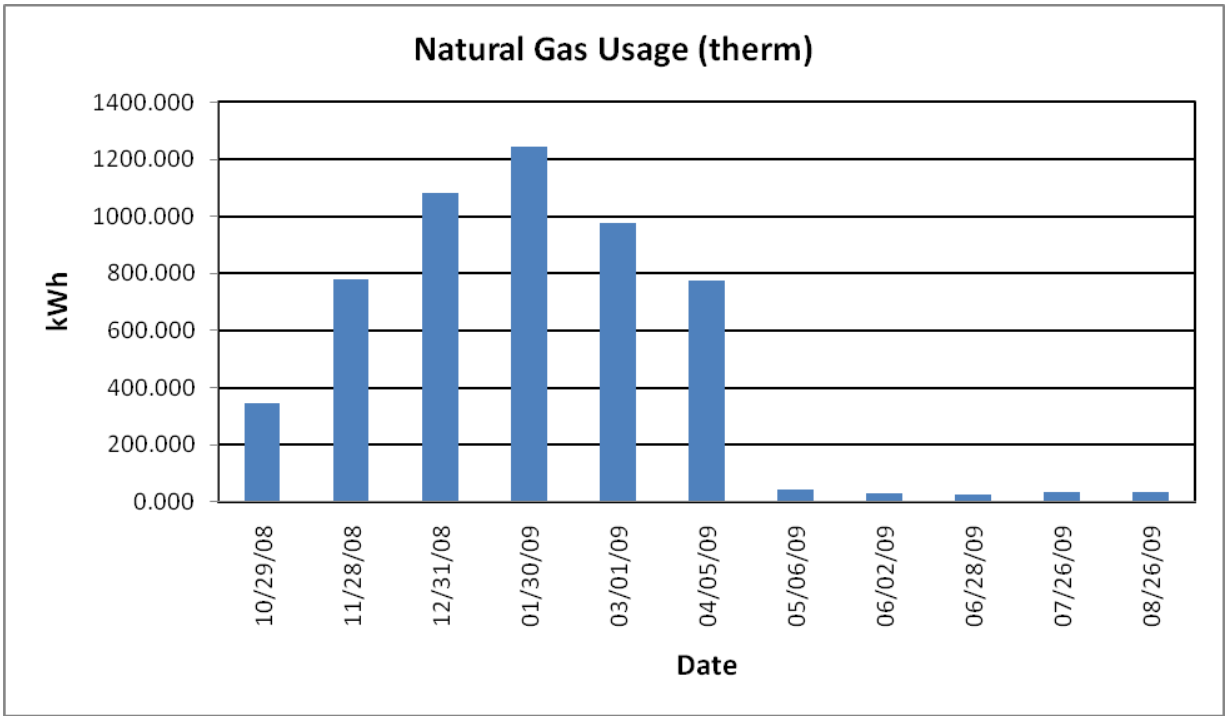
Electricity - The Borough Hall building is currently served by one electric meter. The Borough Hall building currently buys electricity from Jersey Central Power & Light at **an average rate of $0.18/kWh** based on 12 months of utility bills from October 2008 to September 2009. The Borough Hall building purchased **approximately 54,600 kWh or $9,884.56 worth of electricity** in the previous year. The average monthly demand was 30.53 kW.

Natural gas - The Borough Hall building is currently served by one meter for natural gas. The Borough Hall building currently buys natural gas from New Jersey Natural Gas at **an average aggregated rate of $1.40/therm** based on 12 months of utility bills for October 2008 to September 2009. The Borough Hall building purchased **approximately 5,367.055 therms or $7,490.87 worth of natural gas** in the previous year.

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



The following chart shows the natural gas usage for the Building based on utility bills for the 2008-2009 billing year:



1.2. Utility Rate

The Borough Hall building currently purchases electricity from Jersey Central Power & Light at an average rate of $0.18/kWh based on 12 months of utility bills from October 2008 to September 2009.

The Borough Hall building currently purchases natural gas supply from New Jersey Natural Gas at an average aggregated rate of $1.40/therm based on 12 months of utility bills for October 2008 to September 2009.

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

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

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

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Borough Hall building consists of one, 13,000sq. ft. three-story building. The Borough Hall building was built in 1897 with an addition in 1923 and renovations in 1980, consisting mostly of offices, a courtroom/meeting room, an American Legion Post in the basement and the Historical Society Museum on the top floor.

2.2. Building occupancy profiles

The peak occupancy for the Borough Hall building is approximately 12 permanent Borough employees at any given time during weekdays, during summer there may be a small number of part time, seasonal employees. Evening public meetings and American Legion and Historical Society events occur periodically afterhours and weekend. The building is typically occupied from 8:00 AM to 4:00 PM on weekdays only, throughout the entire year. The American Legion Post is used for a few hours in the evening on every third Wednesday of each month for meetings which start at 7:30 PM and the Historical Society maintains library hours on Thursdays between 10:00 AM and 12:00 PM and Sundays from 1:30 PM to 3:30 PM.

2.3. Building envelope

2.3.1. Exterior walls

The exterior walls consist of 3 ½" brick and mortar, wood substructure with interior walls made of plaster and board in the section built in 1897 and interior wall made of insulation and drywall in the 1923 and later additions. The total thickness of the outside walls is between 8"-10". Exterior and interior finishes of the envelope were found to be in age-appropriate, good condition and there are no recommendations to upgrade the building exterior.

2.3.2. Roof

The roof at the Borough Hall has multiple peaks constructed with wood and covered by asphalt shingles. There are no visible signs of water damage or improper drainage. The roof was generally in good condition. Upon examination from the inside it was determined that there were some openings between the roof and the exterior walls allowing daylight, outside air, and birds into the attic of the building.

Category II Recommendation: Operation and Maintenance #2: It is recommended that the Borough take action to seal up the gaps and holes to prevent infiltration of outside air and local wildlife from entering the building.

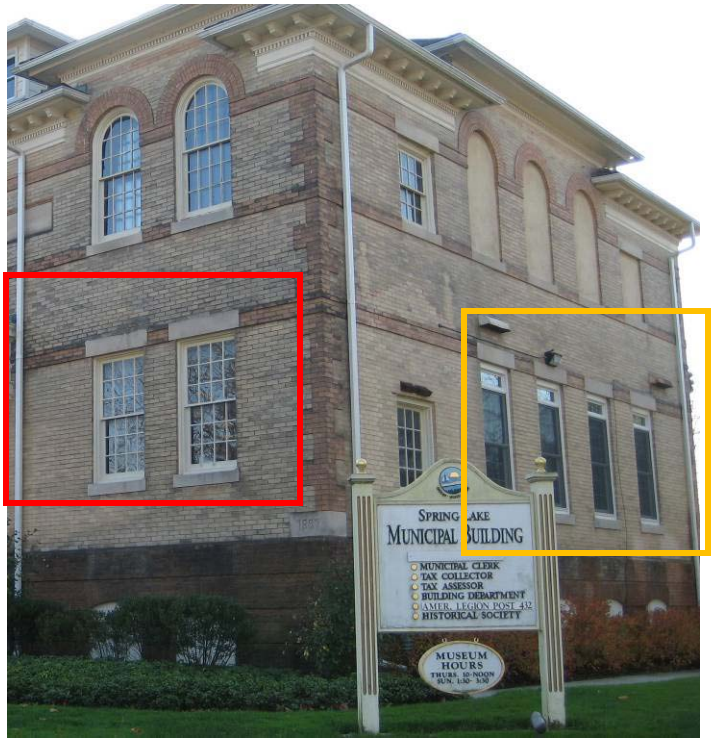
2.3.3. Base

The building's base is a 4" concrete slab-on sub grade with a perimeter footing and brick and masonry block walls. No water seepage through the slab or other issues related to thermal performance was detected.

2.3.4. Windows

There are 27 single pane original windows on the Borough Hall building; as well as, 28 thermal double pane windows mostly located on the back of the building, the 1923 and newer addition. A visual inspection found the windows to be in good condition. It is recommended that the 27 single pane windows be replaced with more energy efficient windows only if replacing the windows does not interfere with any long term goals of keeping the historical nature of the building intact.

Category III Recommendation: ECM #2: Recommend Replacement for existing windows with high efficiency units.



Red box highlights older single pane windows. Orange box outlines newer double pane windows

2.3.5. Exterior doors

The aluminum and vinyl exterior doors were inspected and observed to be in good condition except for some weather-stripping that started to show wear and tear at the time of the inspection. BSG-PMK 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. BSG-PMK 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.

Category II Recommendation: Operation and Maintenance #3: Recommends that the exterior doors of the building be re-weather-stripped as necessary.

2.3.6. Building air tightness

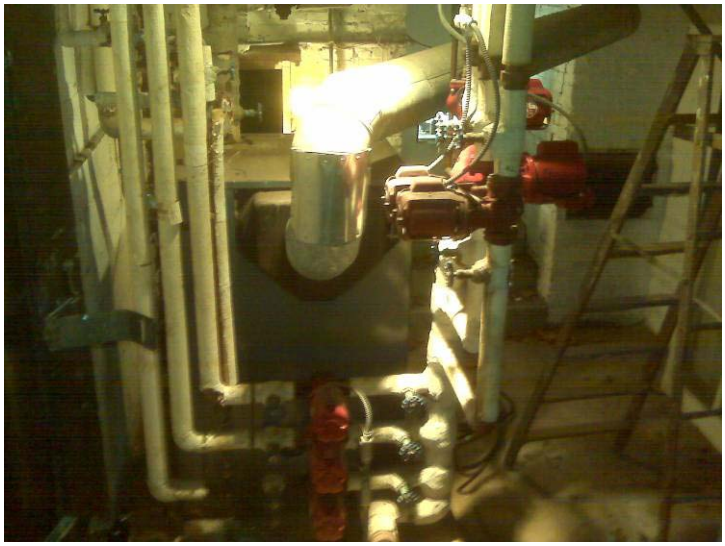
Through interviews with the regular occupants it was determined that the building air tightness was in good condition. There were no complaints of drafts or cold spots. There were no personal fans to supplement for loss of conditioned air.

Category II Recommendation: Operation and Maintenance #2: Sealing of the holes in the exterior molding that allow birds and air into and out of the attic to increase the air tightness of the building.

2.4. HVAC Systems

2.4.1. Heating

Heating is provided by a hot water Weil McLain boiler which is fueled by natural gas. The hot water from the boiler is distributed throughout the building through 6" Slant Fin baseboard radiators along the exterior walls in the 1923 section of the building and through cast iron radiators in the 1897 portion of the building. The boiler, the baseboard, and radiators are all in fair condition.



The boiler in the center of the picture provides heat and domestic hot water.

Category III Recommendation: ECM #3: Replacement of boiler with high-efficiency model, equipped with outdoor air reset control for additional energy savings.

2.4.2. Cooling

Cooling in the Borough Hall is provided by different equipment for different rooms. The telephone server room in the basement is cooled by a 5,000 BTU Goldstar window A/C unit, powered by electricity with a 9.7 EER value, and was installed recently.

The Zoning/Planning office is cooled by a Mitsubishi Mr. Slim system with an electric powered condenser outside feeding a wall hung ac unit inside. This newly installed system consumes 1Kw and has a SEER value of 13. The Courtroom on the first floor is also cooled by two Mitsubishi Mr. Slim split systems with two wall hung units and two condensers outside, as well as two Sanyo 18,000 btu/hr units hung on the walls with two condensing units outside. The Mitsubishi Mr. Slim systems are controlled by digital remote controls and are in good condition while the Sanyo systems use analog remotes and are in need of replacing.

The 1923 addition to the building is cooled via a Trane High Efficiency XB1000 condenser on grade in the front of the building which feeds a Fedder air-handling unit in the drop ceiling above the offices.

The rest of the building (the museum, administrative offices, the second floor) is cooled by two split systems with their respective condensing units located on grade in the rear of the building. One Trane XR13 manufactured in 2006 and one Trane High Efficiency XB1000 manufactured circa 2000. The Trane XR13 unit feeds the newly installed Lennox air-handler, located in the attic. The Trane High Efficiency XB1000 feeds a Trane air-handler in the attic which is in good condition.

2.4.3. Ventilation

Ventilation is provided by bathroom exhaust fans and manually operated windows.

2.4.4. Domestic Hot Water

Domestic Hot Water is provided by the boiler to the sinks in the building except in the basement bathroom which has an electric Reliance Hot Spot water heater.

2.5. Electrical systems

2.5.1. Lighting

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

Interior Lighting – See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Signs – See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exterior Lighting – See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

2.5.2. Appliances and process

There are 12 personal computers in the offices all appear to be in good condition. There is an energy star labeled dehumidifier in the American Legion post that runs periodically.

2.5.3. Elevators

There is one small hydraulic Concord elevator manufactured by the Mobility Elevator & Lift Company. The elevator services all the floors of the building and appears to be in good condition.

2.5.4. Other electrical systems

There are not currently any other significant energy impacting electrical systems installed at the Borough Hall building.

3. EQUIPMENT LIST

Building System	Description	Physical Location	Make/model	Fuel	Space served	Estimated Remaining useful life %
AHU	Air handling unit, Serial No. 5189173989, 208/230V, 1ph, 60Hz, 3/4 hp 4.3amps	Attic	Lennox/ CBS18-65-SP	Electric	3rd floor (Museum)	80%
AHU	Air Handling unit, Serial No. R254B5L2V, 1/4 hp 2 amp 208/230 V 1ph 60Hz	Attic	Trane/ TWQG030A140	Electric	3rd Floor (Museum)	55%
AHU	Air Handling Unit, Serial No. JP 336990, 115V 60 hz, 1ph, 5.5 amps, 1/3 hp	Ceiling above Office in 1923 section of Bldg	Fedder/ CFJ036C2A	Electric	Offices in 1923 section of Bldg	80%
Cooling	12 " Window A/C unit, 110 Volt, 4.8 Amps	Basement, Server/ telephone room	Goldstar/ WG5005	Electric	Basement, Server/ telephone room	60%
Cooling	Wall Hung A/C unit	Zoning/Planning Office	Mitsubishi Electric Mr Slim/ MS-A12WA	Electric	Zoning/Planning Office	80%
Cooling	2, Wall Mounted Air Conditioning units with Digital Remotes, 46"Wx11"Dx14"H, 208/230 V, 1 ph, 60 Hz, Max CFM 848	Court Room/Meeting room	Mitsubishi Electric Mr Slim/ MSYD30NA	Electric	Court Room/Meeting room	80%
Cooling	2, Wall Mounted Air Conditioning units with Remotes	Court Room/Meeting room	Sanyo/5AP181K	Electric	Court Room/Meeting room	60%
Cooling	Condensing Unit, 1 ph, 60Hz, 115V,10.28 RLA, 56 LRA, 1327 CFM, 96 lbs	Outside	Mitsubishi Mr Slim/ MUA12A-1	Electric	Zoning/Planning Office	80%
Cooling	2,Condensing Units, 1 ph, 60Hz,208/230V,16 RLA, 20 LRA, 1941 CFM, 141 lbs	Outside	Mitsubishi Mr Slim/ MUY-D30NA	Electric	Court Room/Meeting room	80%
Cooling	Trane High Efficiency XB1000 200/230 V 1 ph 60 hz 25 amps	Outside	Trane/ TTB042C100A1	Electric	1923 Section of Bldg via AHU in ceiling	40%
Cooling	Trane XR13, 208/230V, 60 Hz, 1ph	Outside	Trane/ 4TTR3036A1000A	Electric	AHU In Attic	80%
Cooling	Trane High Efficiency XB1000 200/230 V 1 ph 60 hz 38 amps	Outside	Trane/ TTB060D100A6	Electric	AHU In Attic	40%
Cooling	2, Condensing Units,208/230V, 1 ph 60Hz	Outside	Sanyo/SAP181C	Electric	Court Room/Meeting room	20%
Cooling	Trane High Efficiency XB1000,208/230 V, 1 ph, 60Hz	Outside	Trane/TTB030C100A1	Electric	AHU In Attic	33%
DHW	Circulation pump, 1/2 hp	Boiler Room	Baldor/ VWI1303A	Electric	Entire Bldg	60%

Domestic Hot Water	Small Electric Hot Water Heater soley for the Bathroom Sink	Basement Bathroom	Reliance Hot Spot/ 12 ISOS4FK	Electric	Basement Bathroom	60%
Domestic Water	Slop Sink	Basement, storage room	-	-	Basement, storage room	20%
Domestic Water	Bathroom Sink	Basement Bathroom	-	-	Basement Bathroom	20%
Domestic Water	Bathroom- Toilet	Basement Bathroom	-	-	Basement Bathroom	20%
Elevator	Small Hydraulic Elevator	Entire Bldg	Concord/ Mobility Elevator & Lift Co.	Electric, Hydraulic	Entire Bldg	60%
Heating	Circulation pump for hot water from the boiler, 1/4 hp, 115 V, 3 amps, 1 ph, 1725 rpm, Built 2007	Boiler Room	Bell & Gossett/ 189134 E79	Electric	Basement Office	60%
Heating	Circulation pump for hot water from the boiler, 115V, 1.9amp, 1 ph, 1725 rpm, Built 1995	Boiler Room	Bell & Gossett/ 189134 H59	Electric	Legion Hall	60%
Heating	Circulation pump for hot water from the boiler, 115V, 1.9amp, 1 ph, 1725 rpm, Built 1989	Boiler Room	Bell & Gossett/ 118844 C98	Electric	Court Room/Meeting room	60%
Heating	Circulation pump for hot water from the boiler,115V, 1.9amp, 1 ph, 1725 rpm	Boiler Room	Bell & Gossett/ Series #: 100 JW-106189	Electric	Mayors Office	60%
Heating	Circulation pump for hot water from the boiler	Boiler Room	Armstrong/810119-001	Electric	Historical society	60%
Heating	Circulation pump for hot water from the boiler, 1/4 hp,115V, 1.9amp, 1 ph, 1725 rpm	Boiler Room	Bell & Gossett/ FQJ56A17D57F P	Electric	Museum Historical Society	60%
Heating	Circulation pump for Hot water from the boiler,115V, 1.9amp, 1 ph, 1725 rpm	Boiler Room	Bell & Gossett/ 189134	Electric	Entire Bldg	60%
Heating	6' Baseboard Radiant Heaters, Hot water from Boiler	Exterior Walls	Slant Fin	Hot Water	Exterior Walls	60%
Heating	Cast Iron Radiators, Hot water from Boiler	Mayors Office, Courtroom, Museum	-	Hot Water	Mayors Office, Courtroom, Museum	0%
Heating	Type 1-C1, built 1981, Water and Steam Boiler, Max 50 psi, Boiler Size: BGH86WF, Input Gas: 882 MBH, Water 626.1 MBH	Boiler Room	Weil McLain	Natural Gas	Entire Bldg	60%
Heating	Burner, Control Volts 115 amps 6, motor volts 115 amp 7.4	Boiler Room	Power Flame Burner/ CR1-G-12	Natural Gas	Entire Bldg	60%
Ventilation	Bathroom Ceiling fan, exhaust to roof, constantly on,270 CFM,120v, 60Hz, 1.1Amp	Basement Bathroom	NuTone/8170	Electric	Basement Bathroom	60%

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

4. ENERGY CONSERVATION MEASURES

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

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

Category I Recommendations: Capital Improvements.

1) Two 1.5-ton Sanyo condensing units, along with their corresponding indoor units, should be replaced on an as-fail basis. The total cost for replacing them with 1.5-ton Mitsubishi Mr. Slims, which use Puron refrigerant and have a Seasonal Energy Efficiency Rating (SEER) of 16, is $13,500. This would not be considered an ECM due to a long payback period.
2) Two Trane condensing units, one 3.5 tons and one 5 tons, should be replaced on an as-fail basis, along with their corresponding air-handlers. The 5-ton unit would cost $17,000 to replace, and the 3.5-ton unit a few thousand less. This also could not be considered an ECM due to a long payback.

Category II Recommendations: Operations & Maintenance

1) All sink faucets and toilets should be converted to low-flow unit. Low-flow toilets use 1.6 gallons per flush, compared to 3.5 for standard units. Water consumptions for different types of faucets vary. These units are inexpensive, but due to the fact that public buildings in Spring Lake are not billed for water, the payback would be infinitely long, and therefore, this cannot be recommended as an ECM.
2) There are large holes in the attic walls that extend to the outside of the building. These holes allow heat to enter the building in the summer, and exit the building in the winter. The attic itself is not temperature-controlled, but the infiltration could affect the temperature in the rest of the building. It is recommended that these holes be repaired in order to stop this excess infiltration.
3) The exterior doors to the building need to be re-weather-stripped as necessary.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM #	Description
1	Lighting Upgrade
2	Boiler Upgrade with Outdoor Air Reset Control
3	Window Upgrade

ECM#1: Lighting Upgrade

Description:

Lighting at the Spring Lake Borough Hall consists primarily of T-12 fluorescent bulbs with magnetic ballasts. Standard 40-inch T-12's, for example, require 48 watts of power; by comparison, equivalent 32-inch, T-8 fluorescent bulbs with electronic ballasts require 30 watts and have a near equal lighting output, reducing the energy required to power the bulb by 37.5%. It is recommended that all T-12 fixtures with magnetic ballasts be replaced with T-8 fixtures with electronic ballasts. Lighting replacement generally yields a very good payback, due to the fact that most lighting in commercial buildings is used thousands of hours per year and the installation is fairly inexpensive.

Also in the building are incandescent bulbs, of various wattages. It is recommended that these be replaced with compact fluorescents. Only a 26-watt compact fluorescent is needed to produce quantities of light equivalent to that of a 100-watt incandescent, for a 74% reduction in required energy.

Eight of the Borough Hall's eleven exit signs are lit by incandescent bulbs, while the others are lit by light-emitting diodes (LEDs). Incandescent exit signs require 15 watts of power, while LED exit signs only require 2 watts, for a reduction in energy consumption of 87%. It is recommended that all incandescent exit signs be replaced by LED units.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

Estimated installed cost: Installation: $13,614; rebates/incentives: $2,080; total: $11,534
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Lighting Upgrade	Similar Projects	$13,614	$2,080	$11,534	15,363	8.59	0	4.03	$0	$2,781	15	$32,721	4.15	1225%	82%	23%	$21,662	21,047

Assumptions:

The electric cost used in this ECM was $0.15/kWh, which was the Borough Hall's average rate for the 12-month period ranging from October 1st, 2008 through September 30th, 2009. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix A.

Rebates/financial incentives:

The New Jersey SmartStart rebate for upgrading lighting fixtures to LED exit signs and T-8 bulbs ranges from $10 to $20 per bulb. The total rebate this ECM qualifies for is $2,080.

ECM#2: Window Upgrades

Description:

The windows at the Borough Hall are well-beyond their useful life of 35 years. They are thin and single-paned; such windows do not provide much thermal resistance. In addition, the current units are not equipped with thermal breaks, allowing for excess infiltration of air into and out of the building. Replacing the windows with double-paned units with aluminum framing and thermal breaks will prevent heat from escaping in the winter and entering in the summer, therefore reducing the amount the heating and cooling systems need to work, saving energy and adding longevity to the lives of the systems.

Installation cost:

Estimated installed cost: $37,901
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Window Upgrade	Similar Projects	$37,882	0	$37,882	774	0.43	1,227	9.64	$0	$1,858	35	$38,790	20.38	7%	0%	3%	$2,049	15,420

Assumptions:

The area of the windows that are recommended to be replaced is 611 square feet. Energy costs used, taken from 12 months of the Borough Hall's energy bills, were $1.40 per therm for natural gas and $0.19 per kWh for electricity during the cooling season. The cost of installation, using several similar projects as a guideline, was determined assuming $62 per square-foot of windows. The current windows are single-paned, and have a thermal resistance (R-value) of 0.90, equivalent to an overall heat transfer coefficient (U-factor) of 1.11. The proposed windows have an R-value of 3.8 and a U-factor of 0.26. The efficiency of the current boiler, as will be stated in ECM #3, is 60%, and the mean SEER (Seasonal Energy Efficiency Ratio) for the current air conditioning units, due to the age and condition of the units, is approximately 8, or 80% of the original SEER values, which were all around 10. The assumed indoor temperature in the cooling season is 72°F, and for the heating season, 68°F. The calculations were performed using a heat transfer analysis, with 5°F bin temperature data for Newark, NJ. The first step in calculating the savings is to multiply the annual hourly occurrences for each 5°F bin by the difference between that temperature and the desired indoor temperature (bin temperatures above 72°F were considered to be the cooling season, and below were considered to be a heating season), and sum all of these values for heating and cooling. The unit for these two values will be

hrs.×°F, and shall be represented as $(t \times \Delta T)$, with *t* representing time and ΔT representing the temperature difference. Current and proposed heat loss were calculated using the following equations:

$$U \times Area \times (t \times \Delta T)_{cool} = \text{Annual heat loss, cooling (in BTU)}$$

$$U \times Area \times (t \times \Delta T)_{heat} = \text{Annual heat loss, heating (in BTU)}$$

The energy savings, in BTUs, were calculated using the difference between the current and proposed heat losses, for heating and cooling. Electric and natural gas savings were calculated using the following equations:

$$\frac{(\text{Cost of Electric}) \times (\text{Energy Savings})_{cool}}{SEER \times 1{,}000} = \text{Electric Savings}$$

$$\frac{(\text{Cost of Electric}) \times (\text{Energy Savings})_{heat}}{100{,}000.4 \frac{BTU}{therm} \times (\text{Efficiency})_{boiler}} = \text{Natural Gas Savings}$$

Rebates/financial incentives:

No rebates or incentives for window upgrades could be found.

ECM#3: Boiler Upgrade with Outdoor Air Reset Control and Domestic Water Heater

Description:

Heating is provided by a hot water Weil McLain boiler, which is fueled by natural gas. The unit has surpassed its useful life of 25 years, and because it also provides domestic hot water, it is forced to run in the cooling seasons, when it would otherwise not be operating. It is recommended that the boiler be replaced by a high-efficiency condensing boiler. Along with this unit, it is recommended that a gas-fired domestic water heater be installed, which will save energy by allowing the boiler to not operate during the cooling seasons. The pumps associated with the heating system, also beyond their useful lives, should also be replaced with high-efficiency units. It is also recommended that hot water outdoor air reset control be installed. These controls can decrease the hot water supply temperature during low building heating load conditions, and then reset it when the building load increases. Outdoor air reset generally decreases heating costs by 8-15%.

Installation cost:

Estimated installed cost: Installation: $80,000; rebates/incentives: $1,313; total: $78,688
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, $	CO2 Reduced, lbs/yr
3	Boiler Upgrade with Outdoor Air Reset Control	Contractor - Struble Mechanical Associates, Fairfield, NJ	$80,000	$1,313	$78,688	0	0.00	2,023	15.56	$0	$2,832	25	$48,232	27.79	-155%	-6%	-1%	($29,374)	23,667

Assumptions:

The cost per therm of natural gas that was used, taken from twelve months of the Borough Hall's energy bills, was $1.40. Also taken from the energy bills was the annual heating consumption for the system, 5,404 therms. The annual savings by the new system was the annual fuel consumption, multiplied by the difference between the efficiencies of the new and old systems. In the new system, all replacement units have a 95% efficiency; in the old system, the efficiency, due to the age and condition of the unit, was assumed to be 60%, or 75% of the original efficiency of the system, which was 80%. An additional 8% of the annual fuel consumption was added to the savings, representing the energy saved by the outdoor air reset control. The

input capacity of the old boiler was 882 MBH, but the capacity of the new boiler is recommended to be 750 MBH, because due to the difference in efficiencies, the output capacity is still higher.

Rebates/financial incentives:

This system qualifies for a New Jersey SmartStart rebate of $1,313, at $1.75 per MBH of the new boiler.

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are currently no existing renewable energy systems.

5.2. Solar Photovoltaic

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

5.3. Solar Thermal Collectors

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

5.4. Combined Heat and Power

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

5.5. Geothermal

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

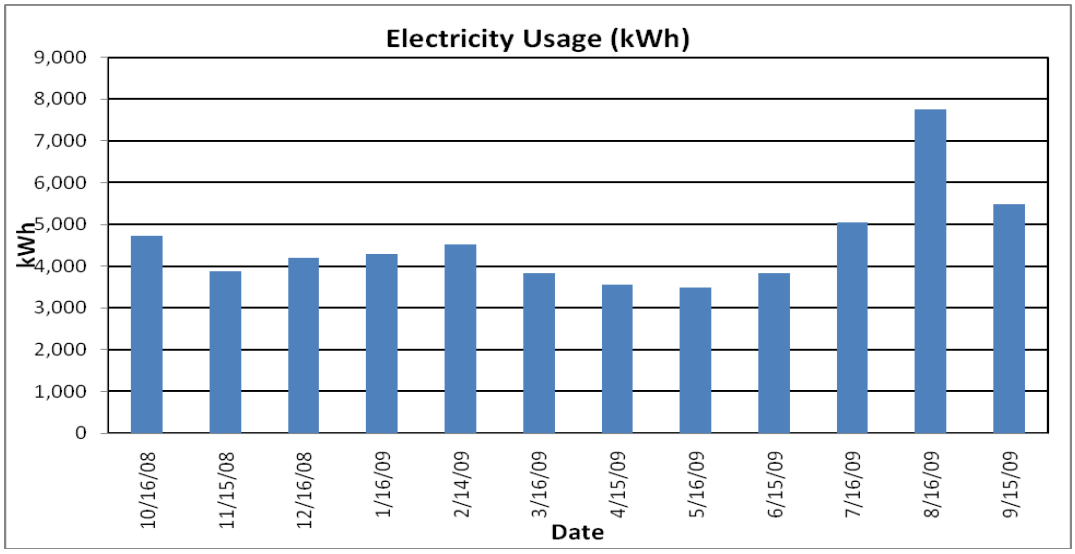
5.6. Wind

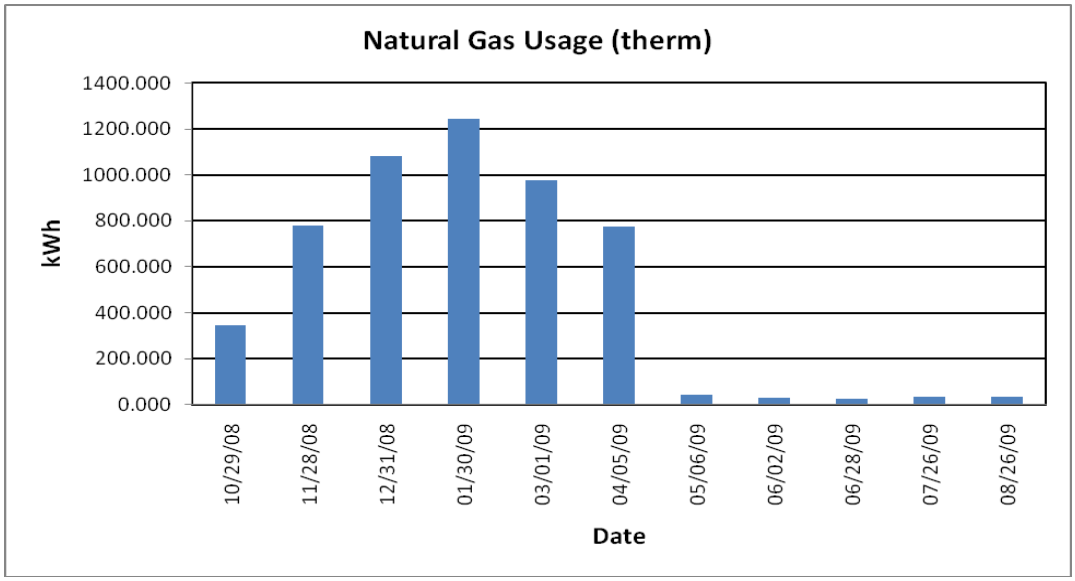
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

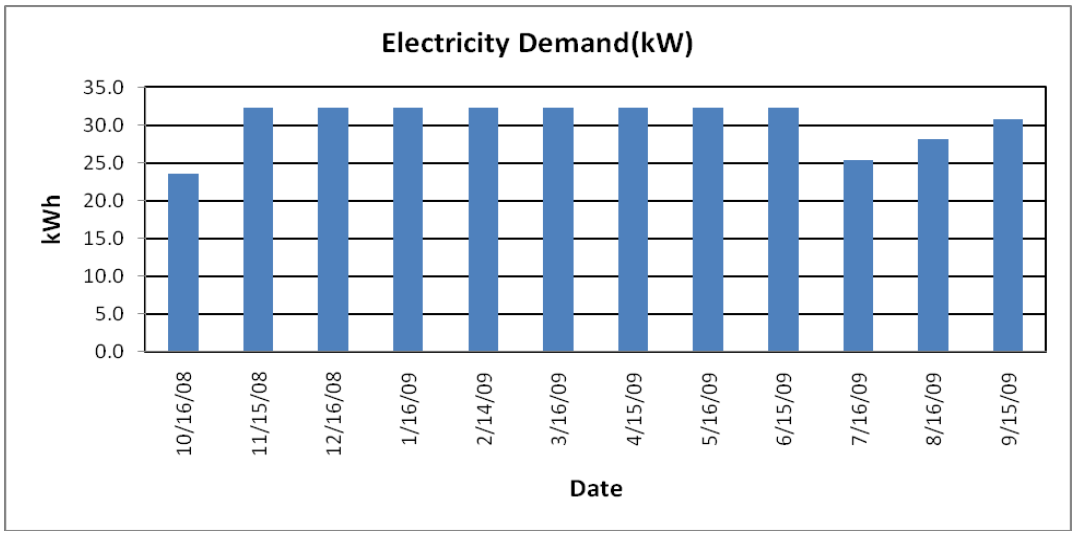
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

The average electrical peak demand for the previous year was 30.5 kW and the maximum peak demand was 32.3 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the other two charts show electric and gas usage (in kWh), respectively.


Electricity Usage (kWh)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
kWh
10/16/08
11/15/08
12/16/08
1/16/09
2/14/09
3/16/09
4/15/09
5/16/09
6/15/09
7/16/09
8/16/09
9/15/09
Date

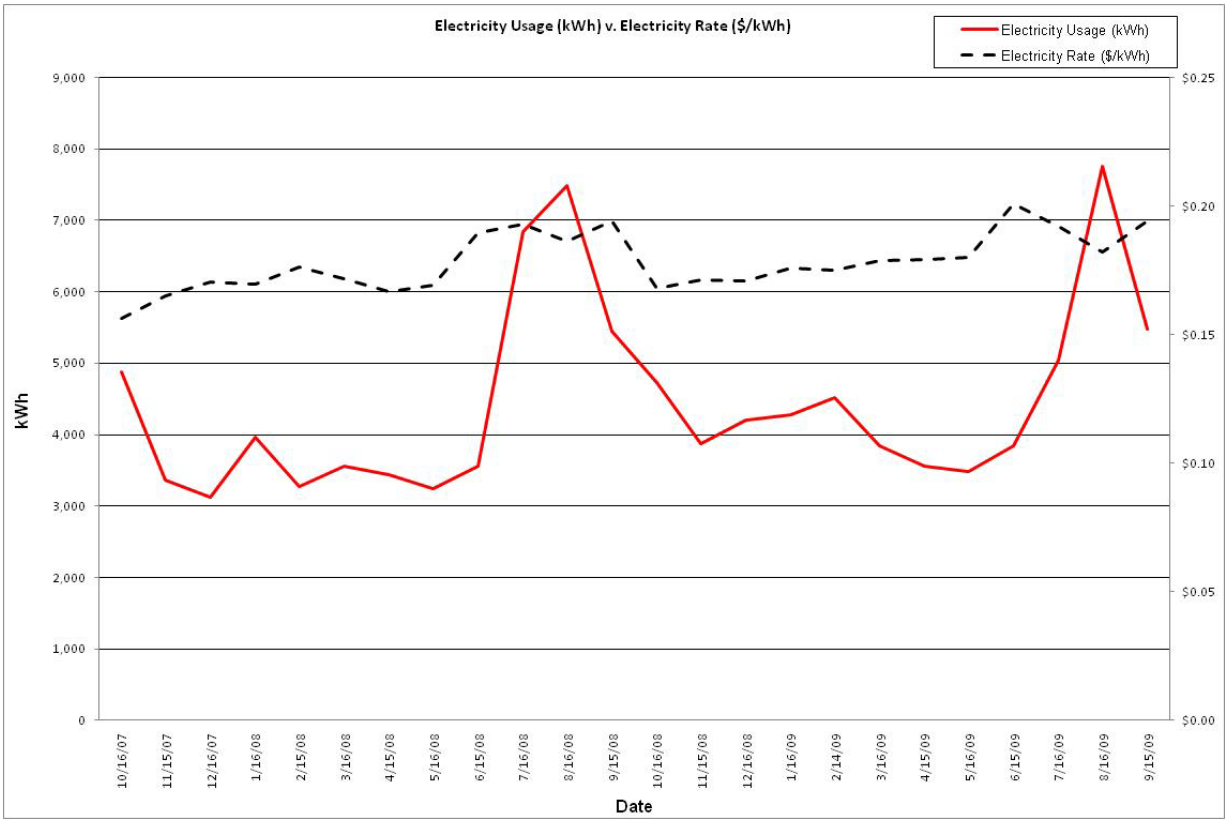

Natural Gas Usage (therm)
1400.000
1200.000
1000.000
800.000
600.000
400.000
200.000
0.000
kWh
10/29/08
11/28/08
12/31/08
01/30/09
03/01/09
04/05/09
05/06/09
06/02/09
06/28/09
07/26/09
08/26/09
Date


Electricity Demand(kW)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
kWh
10/16/08
11/15/08
12/16/08
1/16/09
2/14/09
3/16/09
4/15/09
5/16/09
6/15/09
7/16/09
8/16/09
9/15/09
Date

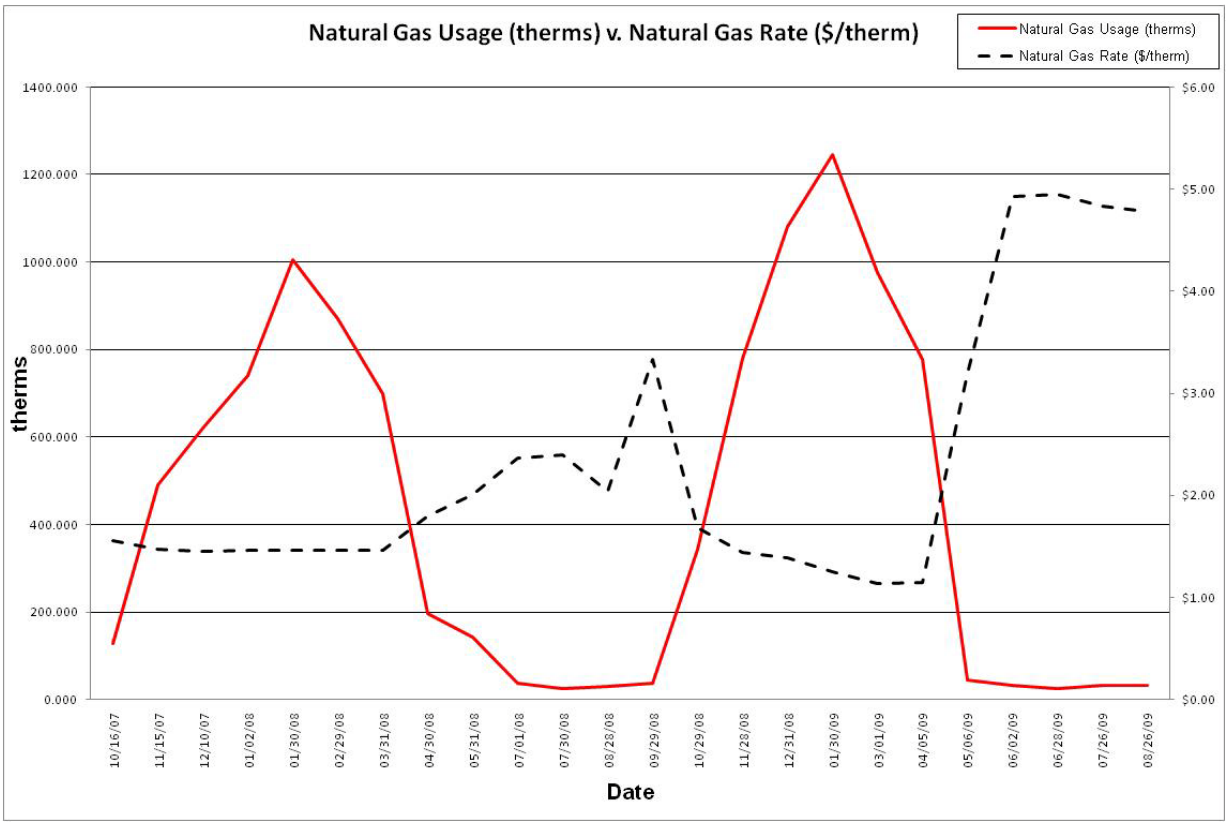
Currently, New Jersey commercial buildings of similar type pay $0.150/kWh for electricity and $1.55/therm for natural gas. The average electricity rate for the buildings is $.18/kWh, which means there is a potential cost savings of $1,638 per year. The gas rate for the building is $1.51/therm which is better than the average gas cost. A small cost savings potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates. SWA recommends that the Borough of Spring Lake 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 building. Appendix B contains a complete list of third party energy suppliers for the Borough of Spring Lake service area.

6.2. Energy Procurement Strategies

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



Electricity prices reflect electricity usage



Natural gas prices fluctuate as expected with usage

7. METHOD OF ANALYSIS

7.1. Assumptions and methods

Energy modeling method: Spreadsheet-based calculation methods

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

7.2. Disclaimer

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

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

Appendix A: Lighting Study

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Borough of Spring Lake
Borough Hall
423 Warren Ave, Spring Lake, NJ

Lighting Upgrades
Estimated Cost: $13,614.00
SmartStart Rebate: ($2,080.00)
Estimated Cost w/Rebate: $11,534.00
Estimated Savings: $2,780.74
Estimated Payback: 4.1

Sensor Upgrades (Pre-Lighting Upgrade)
Estimated Cost: $0.00
SmartStart Rebate: $0.00
Estimated Cost w/Rebate: $0.00
Estimated Savings: $0.00
Estimated Payback: 0.0

Lighting & Sensor Upgrades
Estimated Cost: $13,614.00
SmartStart Rebate: ($2,080.00)
Estimated Cost w/Rebate: $11,534.00
Estimated Savings: $2,780.74
Estimated Payback: 4.1

Average Cost/kW: $0.18

	Existing Fixtures				Upgrade	Recommended Fixtures				Fixture Use	Recommended	Post-Sensor	Lighting				Occupancy Sensors (ONLY)				Lighting & Occupancy Sensors			
Room/Area	Type	Ballast	Wattage	Qty.	Type	Type	Ballast	Wattage	Qty.	(hr/yr)	Controls	Use (hr/yr)	Cost ($)	SmartStart Rebate ($)	Savings ($)	Payback (yrs)	Cost ($)	SmartStart Rebate ($)	Savings ($)	Payback (yrs)	Cost ($)	SmartStart Rebate ($)	Savings ($)	Payback (yrs)
Boiler Room	Inc60	-	60	1	Replace	CFL14	-	14	1	600	-	600	$7.00	$0.00	$5.00	1.40	$0.00	$0.00	$0.00	0.0	$7.00	$0.00	$5.00	1.40
	Inc75	-	75	1	Replace	CFL20	-	20	1	600	-	600	$15.00	$0.00	$5.97	2.51	$0.00	$0.00	$0.00	0.0	$15.00	$0.00	$5.97	2.51
Storage	2F40T12	Magnetic	96	1	Retrofit	2F32T8	Electronic	60	1	600	-	600	$70.00	$10.00	$3.91	15.35	$0.00	$0.00	$0.00	0.0	$70.00	$10.00	$3.91	15.35
Storage/Electrical Closet	2F20T12	Magnetic	56	1	Retrofit	2F17T8	Electronic	31	1	600	-	600	$7.00	$0.00	$2.72	2.58	$0.00	$0.00	$0.00	0.0	$7.00	$0.00	$2.72	2.58
	Inc60	-	60	1	Replace	CFL14	-	14	1	600	-	600	$7.00	$0.00	$5.00	1.40	$0.00	$0.00	$0.00	0.0	$7.00	$0.00	$5.00	1.40
Rear Hallway	2F40T12	Magnetic	96	2	Retrofit	2F32T8	Electronic	60	2	2600	-	2600	$140.00	$20.00	$33.88	0.00	$0.00	$0.00	$0.00	0.0	$140.00	$20.00	$33.88	3.54
Main Hallway	4F40T12	Magnetic	192	7	Retrofit	4F32T8	Electronic	112	7	2600	-	2600	$770.00	$140.00	$263.54	2.39	$0.00	$0.00	$0.00	0.0	$770.00	$140.00	$263.54	2.39
	2F40T12U	Magnetic	92	2	Retrofit	2F32T8U	Electronic	59	2	2600	-	2600	$160.00	$20.00	$31.06	4.51	$0.00	$0.00	$0.00	0.0	$160.00	$20.00	$31.06	4.51
Breakroom	4F40T12	Magnetic	192	4	Retrofit	4F32T8	Electronic	112	4	2600	-	2600	$440.00	$80.00	$150.59	2.39	$0.00	$0.00	$0.00	0.0	$440.00	$80.00	$150.59	2.39
Restroom	CTFL30	Magnetic	30	1	Retrofit	CTFL12	Electronic	12	1	1000	-	1000	$25.00	$0.00	$3.26	7.67	$0.00	$0.00	$0.00	0.0	$25.00	$0.00	$3.26	7.67
Code Enforcement	4F40T12	Magnetic	192	4	Retrofit	4F32T8	Electronic	112	4	2600	-	2600	$440.00	$80.00	$150.59	2.39	$0.00	$0.00	$0.00	0.0	$440.00	$80.00	$150.59	2.39
Building Dept.	4F40T12	Magnetic	192	8	Retrofit	4F32T8	Electronic	112	8	2600	-	2600	$880.00	$160.00	$301.18	2.39	$0.00	$0.00	$0.00	0.0	$880.00	$160.00	$301.18	2.39
File Room/Storage	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	1000	-	1000	$220.00	$40.00	$28.96	6.22	$0.00	$0.00	$0.00	0.0	$220.00	$40.00	$28.96	6.22
Storage Room	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	1000	-	1000	$220.00	$40.00	$28.96	6.22	$0.00	$0.00	$0.00	0.0	$220.00	$40.00	$28.96	6.22
Office	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	2600	-	2600	$220.00	$40.00	$75.30	2.39	$0.00	$0.00	$0.00	0.0	$220.00	$40.00	$75.30	2.39
File Room/Storage	2F96T12	Magnetic	207	2	Replace	2F96T8	Electronic	109	2	1000	-	1000	$440.00	$50.00	$35.48	10.99	$0.00	$0.00	$0.00	0.0	$440.00	$50.00	$35.48	10.99
Rear Exit	Inc75	-	75	4	Replace	CFL20	-	20	4	600	-	600	$15.00	$0.00	$23.89	0.63	$0.00	$0.00	$0.00	0.0	$15.00	$0.00	$23.89	0.63
American Legion Post	4F40T12	Magnetic	192	4	Retrofit	4F32T8	Electronic	112	4	1600	-	1600	$440.00	$80.00	$92.67	3.88	$0.00	$0.00	$0.00	0.0	$440.00	$80.00	$92.67	3.88
Stairs	CTFL30	Magnetic	30	2	Retrofit	CTFL12	Electronic	12	2	2600	-	2600	$25.00	$0.00	$16.94	1.48	$0.00	$0.00	$0.00	0.0	$25.00	$0.00	$16.94	1.48
Main Hallway	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	2600	-	2600	$220.00	$40.00	$75.30	2.39	$0.00	$0.00	$0.00	0.0	$220.00	$40.00	$75.30	2.39
Clerks Office	4F40T12	Magnetic	192	8	Retrofit	4F32T8	Electronic	112	8	2600	-	2600	$880.00	$160.00	$301.18	2.39	$0.00	$0.00	$0.00	0.0	$880.00	$160.00	$301.18	2.39
Back Office (Clerks Office)	4F40T12	Magnetic	192	4	Retrofit	4F32T8	Electronic	112	4	2600	-	2600	$440.00	$80.00	$150.59	2.39	$0.00	$0.00	$0.00	0.0	$440.00	$80.00	$150.59	2.39
Courtroom/Meeting room	8F40T12	Magnetic	384	4	Retrofit	8F32T8	Electronic	224	4	2600	-	2600	$880.00	$160.00	$301.18	2.39	$0.00	$0.00	$0.00	0.0	$880.00	$160.00	$301.18	2.39
Breakroom	4F40T12	Magnetic	192	1	Retrofit	4F32T8	Electronic	112	1	2600	-	2600	$110.00	$20.00	$37.65	2.39	$0.00	$0.00	$0.00	0.0	$110.00	$20.00	$37.65	2.39
Private Office	CFL14	-	14	2	None	-	-	-	2	2600	-	2600	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
	Inc60	-	60	4	Replace	CFL14	-	14	4	2600	-	2600	$28.00	$0.00	$86.59	0.32	$0.00	$0.00	$0.00	0.0	$28.00	$0.00	$86.59	0.32
Mens Room	CTFL30	Magnetic	30	1	Retrofit	CTFL12	Electronic	12	1	1000	-	1000	$25.00	$0.00	$3.26	7.67	$0.00	$0.00	$0.00	0.0	$25.00	$0.00	$3.26	7.67
Womens Room	CTFL30	Magnetic	30	1	Retrofit	CTFL12	Electronic	12	1	1000	-	1000	$25.00	$0.00	$3.26	7.67	$0.00	$0.00	$0.00	0.0	$25.00	$0.00	$3.26	7.67
Elevator	Inc60	-	60	4	Replace	CFL14	-	14	4	2600	-	2600	$28.00	$0.00	$86.59	0.32	$0.00	$0.00	$0.00	0.0	$28.00	$0.00	$86.59	0.32
Third floor Hallway	Inc60	-	60	1	Replace	CFL14	-	14	1	2600	-	2600	$7.00	$0.00	$21.65	0.32	$0.00	$0.00	$0.00	0.0	$7.00	$0.00	$21.65	0.32
Museum	Inc60	-	60	49	Replace	CFL14	-	14	49	208	-	208	$343.00	$0.00	$84.86	4.04	$0.00	$0.00	$0.00	0.0	$343.00	$0.00	$84.86	4.04
Rear room	2F40T12	Magnetic	96	2	Retrofit	2F32T8	Electronic	60	2	2600	-	2600	$140.00	$20.00	$33.88	3.54	$0.00	$0.00	$0.00	0.0	$140.00	$20.00	$33.88	3.54
Restroom	Inc60	-	60	2	Replace	CFL14	-	14	2	2600	-	2600	$14.00	$0.00	$43.30	0.32	$0.00	$0.00	$0.00	0.0	$14.00	$0.00	$43.30	0.32
Main Showcase Room	F40T12	Magnetic	250	28	Replace	F32T8	Electronic	250	28	208	-	208	$4,900.00	$700.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$4,900.00	$700.00	$0.00	0.00
	Inc60	-	60	6	Replace	CFL14	-	14	6	208	-	208	$42.00	$0.00	$10.39	4.04	$0.00	$0.00	$0.00	0.0	$42.00	$0.00	$10.39	4.04
Closet	Inc30	-	30	1	Replace	CFL7	-	7	1	208	-	208	$7.00	$0.00	$0.87	8.08	$0.00	$0.00	$0.00	0.0	$7.00	$0.00	$0.87	8.08
Stairs to Attic	Inc60	-	60	2	Replace	CFL14	-	14	2	208	-	208	$14.00	$0.00	$3.46	4.04	$0.00	$0.00	$0.00	0.0	$14.00	$0.00	$3.46	4.04
Office	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	2600	-	2600	$220.00	$40.00	$75.30	2.39	$0.00	$0.00	$0.00	0.0	$220.00	$40.00	$75.30	2.39
Exit Signs	Exit Inc	-	15	8	Replace	Exit LED	-	2	8	8760	-	8760	$640.00	$80.00	$164.90	3.40	$0.00	$0.00	$0.00	0.0	$640.00	$80.00	$164.90	3.40
	Exit LED	-	2	3	None	Exit LED	-	2	3	8760	-	8760	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
Plan Room	4F40T12	Magnetic	192	1	Retrofit	4F32T8	Electronic	112	1	2600	-	2600	$110.00	$20.00	$37.65	2.39	$0.00	$0.00	$0.00	0.0	$110.00	$20.00	$37.65	2.39
File Room	2F96T8	Electronic	109	3	None	-	-	-	-	2600	-	2600	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00

Appendix B: Third Party Energy Suppliers (ESCOs)

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

Third Party Gas Suppliers for Elizabethtown Gas Co. Service Territory	Telephone & Web Site
Cooperative Industries	(800) 628-9427
412-420 Washington Avenue	www.cooperativenet.com
Belleville, NJ 07109	
Direct Energy Services, LLC	(866) 547-2722
120 Wood Avenue, Suite 611	www.directenergy.com
Iselin, NJ 08830	
Gateway Energy Services Corp.	(800) 805-8586
44 Whispering Pines Lane	www.gesc.com
Lakewood, NJ 08701	
UGI Energy Services, Inc.	(856) 273-9995
704 East Main Street, Suite 1	www.ugienergyservices.com
Moorestown, NJ 08057	
Great Eastern Energy	(888) 651-4121
116 Village Riva, Suite 200	www.greateastern.com
Princeton, NJ 08540	
Glacial Energy of New Jersey, Inc.	(877) 569-2841
207 LaRoche Avenue	www.glacialenergy.com
Harrington Park, NJ 07640	
Hess Corporation	(800) 437-7872
1 Hess Plaza	www.hess.com
Woodbridge, NJ 07095	
Intelligent Energy	(800) 724-1880
2050 Center Avenue, Suite 500	www.intelligentenergy.org
Fort Lee, NJ 07024	
Metromedia Energy, Inc.	(877) 750-7046
6 Industrial Way	www.metromediaenergy.com
Eatontown, NJ 07724	
MxEnergy, Inc.	(800) 375-1277
510 Thornall Street, Suite 270	www.mxenergy.com
Edison, NJ 08837	
NATGASCO (Mitchell Supreme)	(800) 840-4427
532 Freeman Street	www.natgasco.com
Orange, NJ 07050	
Pepco Energy Services, Inc.	(800) 363-7499
112 Main Street	www.pepco-services.com
Lebanon, NJ 08833	
PPL EnergyPlus, LLC	(800) 281-2000
811 Church Road	www.pplenergyplus.com
Cherry Hill, NJ 08002	
South Jersey Energy Company	(800) 756-3749
One South Jersey Plaza, Route 54	www.southjerseyenergy.com
Folsom, NJ 08037	
Sprague Energy Corp.	(800) 225-1560
12 Ridge Road	www.spragueenergy.com
Chatham Township, NJ 07928	
Woodruff Energy	(800) 557-1121
73 Water Street	www.woodruffenergy.com
Bridgeton, NJ 08302	

Appendix C: Historical Utility Billing Data

Electric:

Borough of Spring Lake			Account Number	10017012996	JCP&L							
Borough Hall			SF	13000								
5th Ave			Rate	GSCM								
Spring Lake, NJ 07762												

From	To	Mid-Period	Month-Year	Usage (kWh)	Demand (kW)	Electric Cost	Season	HDD	Est. Baseload kWh/month	Period Length (days)	Avg. rate $/kWh
10/1/2007	10/31/2007	10/16/07	Oct-07	4,880	25.3	$763.24		182	03120	30	$0.16
11/1/2007	11/30/2007	11/15/07	Nov-07	3,360	34.0	$554.88		642	03120	29	$0.17
12/1/2007	12/31/2007	12/16/07	Dec-07	3,120	34.0	$531.45		901	03120	30	$0.17
1/1/2008	1/31/2008	1/16/08	Jan-08	3,960	34.0	$672.11		950	03120	30	$0.17
2/1/2008	2/29/2008	2/15/08	Feb-08	3,280	34.0	$578.39		849	03120	28	$0.18
3/1/2008	3/31/2008	3/16/08	Mar-08	3,560	34.0	$611.36		694	03120	30	$0.17
4/1/2008	4/30/2008	4/15/08	Apr-08	3,440	34.0	$573.82		374	03120	29	$0.17
5/1/2008	5/31/2008	5/16/08	May-08	3,240	34.0	$548.62		257	03120	30	$0.17
6/1/2008	6/30/2008	6/15/08	Jun-08	3,560	34.0	$674.86		28	03120	29	$0.19
7/1/2008	7/31/2008	7/16/08	Jul-08	6,840	32.3	$1,318.75		6	03120	30	$0.19
8/1/2008	8/31/2008	8/16/08	Aug-08	7,480	28.2	$1,392.78		38	03120	30	$0.19
9/1/2008	9/30/2008	9/15/08	Sep-08	5,440	27.5	$1,055.64		80	03120	29	$0.19
10/1/2008	10/31/2008	10/16/08	Oct-08	4,720	23.5	$792.75		380	03120	30	$0.17
11/1/2008	11/30/2008	11/15/08	Nov-08	3,880	32.3	$663.87		628	03120	29	$0.17
12/1/2008	12/31/2008	12/16/08	Dec-08	4,200	32.3	$716.84		848	03120	30	$0.17
1/1/2009	1/31/2009	1/16/09	Jan-09	4,280	32.3	$752.69		1173	03120	30	$0.18
2/1/2009	2/28/2009	2/14/09	Feb-09	4,520	32.3	$790.98		820	03120	27	$0.17
3/1/2009	3/31/2009	3/16/09	Mar-09	3,840	32.3	$686.94		747	03120	30	$0.18
4/1/2009	4/30/2009	4/15/09	Apr-09	3,560	32.3	$637.77		422	03120	29	$0.18
5/1/2009	5/31/2009	5/16/09	May-09	3,480	32.3	$626.52		176	03120	30	$0.18
6/1/2009	6/30/2009	6/15/09	Jun-09	3,840	32.3	$770.74		61	03120	29	$0.20
7/1/2009	7/31/2009	7/16/09	Jul-09	5,040	25.4	$967.32		26	03120	30	$0.19
8/1/2009	8/31/2009	8/16/09	Aug-09	7,760	28.2	$1,414.03		7	03120	30	$0.18
9/1/2009	9/30/2009	9/15/09	Sep-09	5,480	30.8	$1,064.11		97	03120	29	$0.19

Natural Gas:

Account number	33313660011	NJN										
Rate	xxxxx											
Factor	conversion factor											
SF	13000											

From	To	Mid-Period	CCF	Usage (therms)	Gas Cost ($)	Season	HDD	Period Length (days)	Therms/day	Btu/sqft/hdd	Avg. Rate ($/therms)
10/1/2007	10/31/2007	10/16/07		127.978	$199.56		182	30	4.266	5.409	$1.56
11/1/2007	11/30/2007	11/15/07		489.533	$720.66		642	29	16.880	5.865	$1.47
12/1/2007	12/20/2007	12/10/07		620.594	$903.52		901	19	32.663	5.298	$1.46
12/21/2007	1/15/2008	01/02/08		739.464	$1,077.87		950	25	29.579	5.988	$1.46
1/16/2008	2/13/2008	01/30/08		1004.544	$1,462.95		950	28	35.877	8.134	$1.46
2/14/2008	3/16/2008	02/29/08		871.235	$1,270.81		849	31	28.104	7.894	$1.46
3/17/2008	4/15/2008	03/31/08		698.661	$1,022.08		694	29	24.092	7.744	$1.46
4/16/2008	5/14/2008	04/30/08		195.340	$350.33		374	28	6.976	4.018	$1.79
5/15/2008	6/16/2008	05/31/08		143.083	$287.01		257	32	4.471	4.283	$2.01
6/17/2008	7/16/2008	07/01/08		36.677	$86.61		28	29	1.265	10.076	$2.36
7/17/2008	8/13/2008	07/30/08		25.205	$60.43		6	27	0.934	32.314	$2.40
8/14/2008	9/12/2008	08/28/08		30.380	$61.99		38	29	1.048	6.150	$2.04
9/13/2008	10/15/2008	09/29/08		36.628	$122.13		80	32	1.145	3.522	$3.33
10/16/2008	11/11/2008	10/29/08		343.547	$579.28		380	26	13.213	6.954	$1.69
11/12/2008	12/15/2008	11/28/08		778.823	$1,124.74		628	33	23.601	9.540	$1.44
12/16/2008	1/15/2009	12/31/08		1081.758	$1,496.83		848	30	36.059	9.813	$1.38
1/16/2009	2/13/2009	01/30/09		1245.094	$1,557.69		1173	28	44.468	8.165	$1.25
2/14/2009	3/17/2009	03/01/09		975.942	$1,110.47		820	31	31.482	9.155	$1.14
3/18/2009	4/23/2009	04/05/09		777.178	$893.48		747	36	21.588	8.003	$1.15
4/24/2009	5/18/2009	05/06/09		43.886	$140.20		422	24	1.829	0.800	$3.19
5/19/2009	6/16/2009	06/02/09		31.248	$153.81		176	28	1.116	1.366	$4.92
6/17/2009	7/10/2009	06/28/09		25.025	$123.80		61	23	1.088	3.156	$4.95
7/11/2009	8/10/2009	07/26/09		32.280	$156.15		26	30	1.076	9.550	$4.84
8/11/2009	9/10/2009	08/26/09		32.274	$154.42		7	30	1.076	35.466	$4.78