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*June 17, 2010*

**Local Government Energy Program  
Energy Audit Report**

*For*

***Middletown Township  
Public Library-Lincroft Branch  
730 Newman Springs Road  
Lincroft, NJ 07738***

***Project Number: LGEA41***



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## **INTRODUCTION**

Launched in 2008, the Local Government Energy Audit (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 the additional 25% will also be paid by the program. The Board of Public Utilities (BPU) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

On December 8, 2009, Steven Winter Associates, Inc. (SWA) and PMK Group, Inc., a business unit of Birdsall Services Group (BSG-PMK) (collectively “SWA/BSG-PMK”), performed an energy audit and assessment for the Public Library-Lincroft Branch Building. The building is located at 730 Newman Springs Road, Lincroft, New Jersey 07738, in Monmouth County. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Public Library – Lincroft Branch was built originally as a school house in 1908 and has a total of 3,328 square feet including the 1930 addition. The building is a historic one-room school house with restrooms, and a full unoccupied basement. The building is open from 1:00 PM to 5:00 PM and 6:00 PM to 8:00 PM Monday and Wednesday, 9:00 AM to 12:00 PM and 1:00 PM to 5:00 PM Tuesday and 1:00 PM to 5:00 PM Thursday and Friday. The building is occupied by approximately 1 to 2 employees during operating hours.

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 buildings.

## EXECUTIVE SUMMARY

This document contains the energy audit report for the Public Library-Lincroft Branch Building, located at 730 Newman Springs Road, Lincroft, New Jersey 07738.

Based on the field visit performed by BSG-PMK staff on December 8, 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.

### Current conditions

In the most recent full year of data collected, January, 2009 through December, 2009, the facility consumed a total of 33,774 kWh of electricity for a total cost of \$6,045 and 4,921 gallons of heating oil, for a total cost of \$14,659.

With electricity and fossil fuel combined, the building consumed 806 MMBtus of energy at a total cost of \$20,704.

SWA/BSG-PMK has entered energy information about the Facility in the US Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. 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 complex is 242 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 2009 baseline to track the changes in energy consumption associated with the energy improvements.

SWA/BSG-PMK also recommends that the Township of Middletown contact 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 \$ 0.029/kWh, which would have equated to \$979 for the past 12 months.

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 Township of Middletown to continue entering utility data in *Energy Star Portfolio Manager* in order to track whether normalized source energy use over time. The building's performance rating could not be determined because this is a mixed-use facility, comprised by non-eligible space types categorized as "Other".

(Refer to Section 1.3 for Energy Star Rating)

### Category I Recommendations: Capital Improvement Measures

- All windows are single-pane and in poor condition. In combination, the installation of thermal-pane windows and the conversion of the furnace and water heater to natural gas, would yield approximately \$365 annual energy cost savings, and would also increase

building air tightness. The calculated payback period was too long to make this measure a viable ECM.

- The exterior doors were found to be in poor condition, are also recommended for upgrade. The total annual energy cost savings would be approximately \$425.

### **Category II Recommendations: Operations and Maintenance**

- Based on the findings in SWA/BSG-PMK's survey, no operations and maintenance measures are recommended.

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

At this time, SWA/BSG-PMK highly recommends a total of three (3) Energy Conservation Measures (ECMs) for the Lincroft Library which are summarized in the following tables. The total investment cost for these ECMs is **\$11,175**. SWA/BSG-PMK estimates a first year savings of **\$9,314** with a simple payback of **1.2 years**. SWA and BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Lincroft Library building by **38,625 lbs of CO<sub>2</sub>**, which is equivalent to removing approximately three cars from the roads each year.

There are various incentives that the Township of Middletown could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommends that the Township 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 complex in the previous year was 16.6 kW.

The following tables summarize the proposed Energy Conservation Measures (ECM) and their economic relevance:

ROI: Return on Investment (%)

**Assumptions:**

Discount rate: 3.2% per DOE FEMP guidelines  
 Energy price escalation rate: 0% per DOE FEMP guidelines

Electricity rate: \$0.18 \$/kWh  
 Oil rate: \$2.13 \$/therm  
 Gas rate: \$1.50 \$/therm (statewide average)

Avg. Annual Demand: 0.005794

Area of Building (SF)

3,328

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 <sub>2</sub> Reduced, lbs/yr
1	Convert Furnace to Natural Gas	Similar Projects	\$23,450	\$18,760	\$4,690	0	0.00	2,871	86.26	\$0	\$8,646	20	\$126,289	0.54	12964%	648%	184%	\$123,946	33,586
TOTAL			\$23,450	\$18,760	\$4,690	0	0.00	2,871	86.26	\$0.00	\$8,646	-	\$126,289	0.54	-	-	-	\$123,946	33,586

Table 2 - Recommended 5-10 Year Payback ECMs																			
ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO <sub>2</sub> Reduced, lbs/yr
2	Lighting Upgrades	Empirical Data	\$3,890	\$855	\$3,035	2,049	0.99	0	2.10	\$0	\$369	15	\$4,339	8.23	286.47%	19%	9%	\$1,367	2,807
TOTAL			\$3,890	\$855	\$3,035	2,049	0.99	0	2.10	\$0.00	\$369	-	\$4,339	8.23	-	-	-	\$1,367	2,807

Table 3 - 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 <sub>2</sub> Reduced, lbs/yr
3	Convert Water Heater to Natural Gas	Similar projects	\$3,500	\$50	\$3,450	2,919	1.41	-151.04	-1.55	\$0	\$299	13	\$3,138	11.54	-70%	-5%	2%	-\$272	2,232
TOTAL			\$3,500	\$50	\$3,450	2,919	1.41	-151	-1.55	\$0.00	\$299	-	\$3,138	11.54	-	-	-	-\$272	2,232

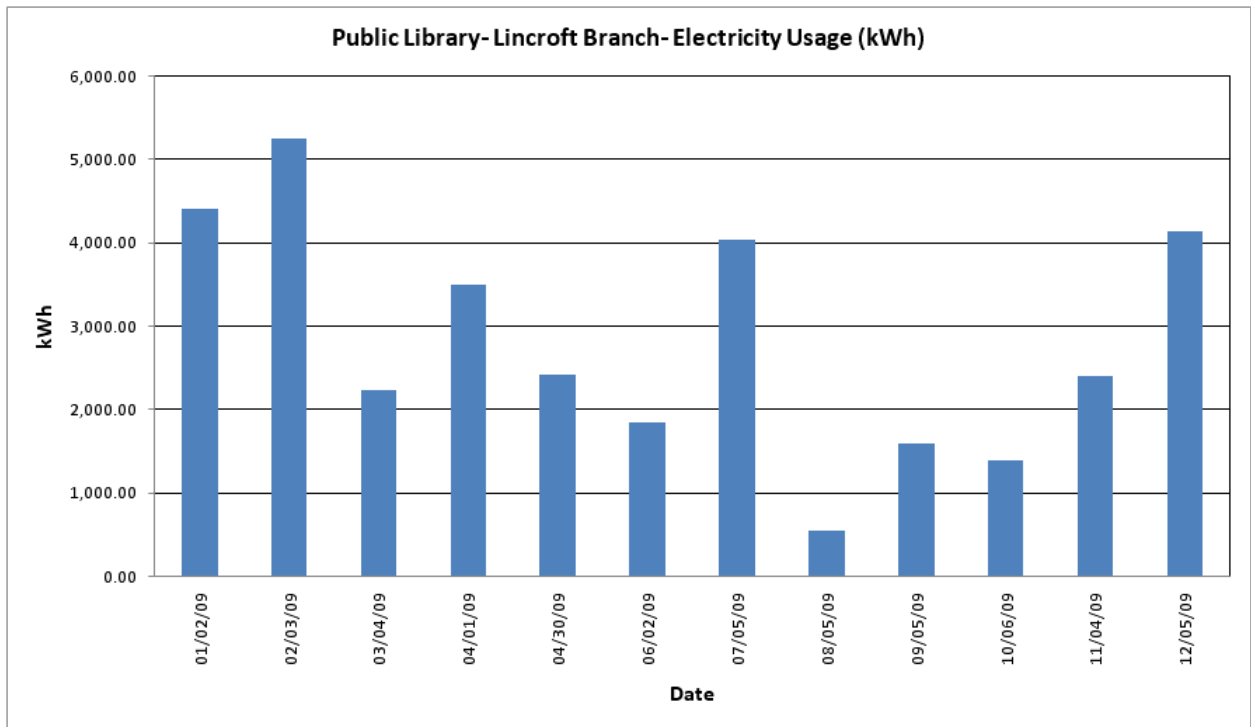
# 1. HISTORIC ENERGY CONSUMPTION

## 1.1 ENERGY USAGE AND COST ANALYSIS

SWA/BSG-PMK analyzed utility bills from December, 2007 through December, 2009 that were received from the utility companies supplying the Public Library- Lincroft Branch with electric and #2 heating oil.

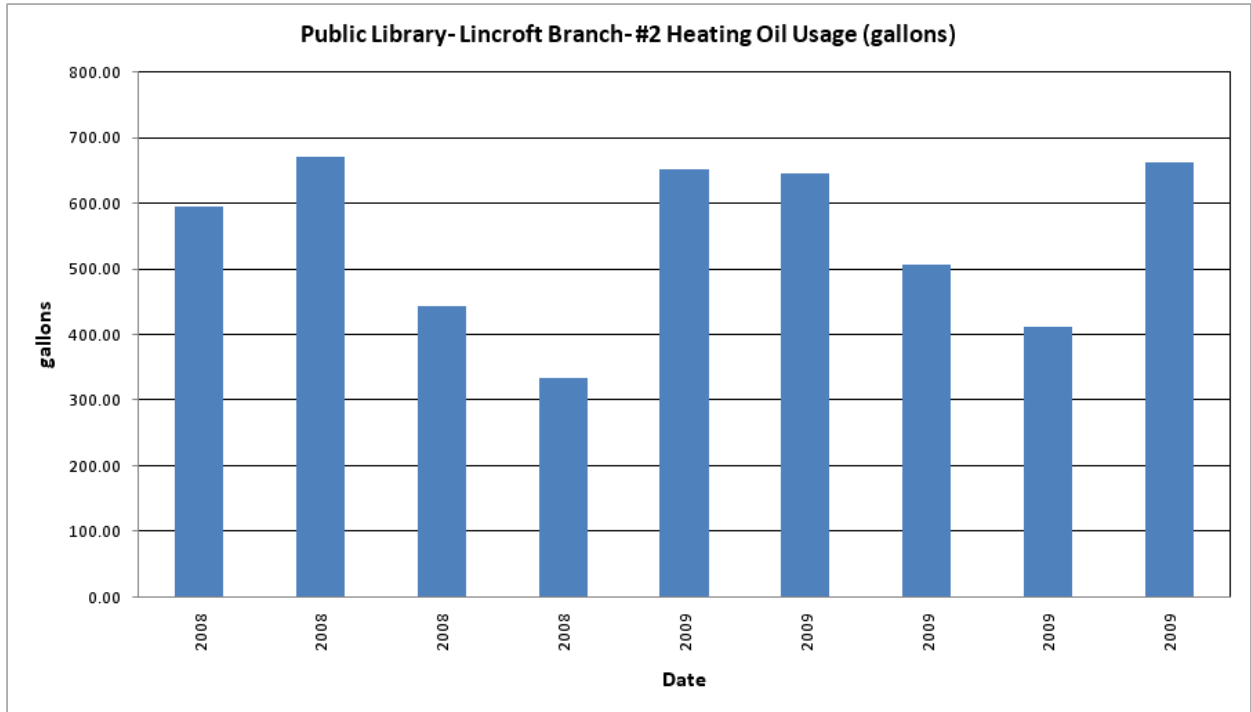
Electricity - The Public Library- Lincroft Branch is currently served by one electric meter and buys electricity from Jersey Central Power & Light at **an average rate of \$0.18/kWh** based on 12 months of utility bills from January, 2009 through December, 2009. The building consumed **33,774 kWh or \$6,045 worth of electricity** during that time span.

The following chart shows electricity usage for the building based on utility bills from January, 2009 through December, 2009:



#2 Heating Oil - The Public Library- Lincroft Branch buys heating oil from Lawes Coal Company at **an average rate of \$2.98/gallon** based on utility bills from 2008 through 2009. The building consumed **4,921 gallons or \$14,658.88 worth of #2 heating oil** during that time span.

The following chart shows the heating oil consumption for the building based on heating oil bills for the 2008-2009 period:



**Note:** The utility data supplied did not include the months of delivery.

## 1.2 UTILITY RATE

The Public Library- Lincroft Branch currently purchases electricity from Jersey Central Power & Light for electricity use (kWh) with a separate (kW) demand charge. The complex currently pays an average rate of approximately \$0.18/kWh based on the 12 months of utility bills of January, 2009 through December, 2009.

The Public Library- Lincroft Branch currently purchases heating oil supply and transmission from Lawes Coal Company at an average aggregated rate of \$2.98/gallon based on utility bills from 2008-2009.

## 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/BSG-PMK recommends that the Borough maintain the Portfolio Manager account at the link below. As the account is maintained, SWA/BSG-PMK can share with the Township and TRC 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)

**Username:** middletowntownship  
**Password:** middletown

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). SWA/BSG-PMK encourages the Township to continue entering utility data in Energy Star Portfolio Manager in order to track whether normalized source energy use over time.

The Site Energy Use Intensity is 242 kBtu/ft<sup>2</sup>yr compared to the national average of 104 kBtu/ft<sup>2</sup>yr for commercial buildings classified similarly by the Energy Star Portfolio Manager. Implementing this report's recommendations will reduce use by approximately 86.8 kBtu/ft<sup>2</sup>yr, which when implemented would lower the buildings energy consumption.



## STATEMENT OF ENERGY PERFORMANCE

### Public Library- Lincroft Branch

Building ID: 2061717  
 For 12-month Period Ending: August 31, 2009<sup>1</sup>  
 Date SEP becomes ineligible: N/A

Date SEP Generated: February 16, 2010

**Facility**  
 Public Library- Lincroft Branch  
 730 Newman Springs Road  
 Lincroft, NJ 07738

**Facility Owner**  
 Middletown Township  
 1 Kings Highway  
 Middletown, NJ 07749

**Primary Contact for this Facility**  
 Jason Greenspan  
 1 King's Highway  
 Middletown, NJ 07737

**Year Built:** 1908  
**Gross Floor Area (ft<sup>2</sup>):** 3,328

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

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

Electricity - Grid Purchase(kBtu)	123,045
Fuel Oil (No. 2) (kBtu)	682,510
Natural Gas - (kBtu) <sup>4</sup>	0
Total Energy (kBtu)	805,555

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

Site (kBtu/ft <sup>2</sup> /yr)	242
Source (kBtu/ft <sup>2</sup> /yr)	331

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

Greenhouse Gas Emissions (MtCO <sub>2</sub> e/year)	69
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#### Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

#### National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	34%
Building Type	Library

#### 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

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

#### Certifying Professional

N/A

#### Notes:

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

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

## 2. FACILITY AND SYSTEMS DESCRIPTION

### 2.1 Building Characteristics

The Public Library – Lincroft Branch was built originally as a school house in 1908 and is a total of 3,328 square feet including the 1930 addition. The building is a historic one-room school house with restrooms and a full, unoccupied basement.

### 2.2 Building Occupancy Profiles

The building is open from 1:00 PM to 5:00 PM and 6:00 PM to 8:00 PM Monday and Wednesday, 9:00 AM to 12:00 PM and 1:00 PM to 5:00 PM Tuesday and 1:00 PM to 5:00 PM Thursday and Friday. The building is occupied by approximately 1 to 2 employees during operating hours.

### 2.3 Building Envelope

#### 2.3.1 Exterior Walls

The exterior walls are brick veneer finish over wood frame. The walls are in good condition. The interior walls are finished with original plaster.



#### 2.3.2 Roof

The roof is made up of two different systems. The original school house roof is constructed with original rafters with new sheathing finished with asphalt shingles in 2000. The 1930 addition is a flat built up tar roof with an applied reflective coating. The roof was found to be in good condition because of the repairs made in the year 2000.

#### 2.3.3 Base

The building has a full basement with cinderblock foundation walls and a concrete slab floor. It was found to be in fair condition.

#### 2.3.4 Windows

There are single pane steel frame windows on the addition of the building and original single pane wood framed windows on the original school house. The windows are in poor condition, and have been covered with clear plastic to reduce infiltration, and warrant replacement.

Category I Recommendation – Capital Improvements:  
All windows are single-pane and in poor condition. In combination, the installation of thermal-pane windows and the conversion of the furnace and water heater to natural gas, would yield approximately \$365 annual



energy cost savings, and would also increase building air tightness. The calculated payback period was too long to make this measure a viable ECM.



### 2.3.5 Exterior doors

The exterior doors are original wood doors with glass. The glass has been covered with a sheet of clear plastic to reduce energy loss. The doors are in poor condition.

Category I Recommendation – Capital Improvements: The exterior doors were found to be in poor condition, are also recommended for upgrade. The total annual energy cost savings would be approximately \$425.



### 2.3.6 Building air tightness

Building air tightness is poor. The windows and doors allow for infiltration.

## 2.4 HVAC Systems

### 2.4.1 Heating

Heating is provided by a Williamson forced air furnace, which is fueled by oil and has a capacity of 280 MBH. The unit has model number 1454-28-3-58.

Category III Recommendation – ECM #1: Replace the current oil fired furnace with high-efficiency modulating gas furnace. Natural gas is available on Newman Springs Road. The supply of natural gas to the building must be coordinated with New Jersey Natural Gas.

### 2.4.2 Cooling

The only cooling in the facility is provided by three window air-conditioners. All of these units is a 32,000 BTU AirTemp unit, having model number B6K32E7A-A and having an energy-efficiency ratio (EER) of 8.5.



*AirTemp window air-conditioner*

### 2.4.3 Ventilation

Natural ventilation is provided by doors and windows. Combustion gases are vented through a chimney

#### 2.4.4 Domestic Hot Water

Water is heated by a 40 gallon, 4.5 kW Rheem electric water heater, having model number 81V40D.

Category III Recommendation – ECM #3: The conversion of the electric water heater to a natural gas heater requires a connection of a gas line to the facility.



*Rheem electric water heater*

### 2.5 Electrical systems

#### 2.5.1 Lighting

A complete inventory of all interior and exterior light fixtures were examined and documented in Appendix A of this report including an estimated total lighting power consumption. The existing lighting fixtures in the main library area are in poor condition and should be replaced.

Our initial findings indicate that performing a detailed lighting upgrade for either retrofitting the existing fixtures or replacing the existing fixtures is shown in Appendix A.

A retrofit of all the existing fixtures will result in an annual savings of \$368.76 based on the current \$0.18/kWh and the current occupancy schedule. Implementation of this ECM will cost approximately \$3,890.00. Currently the Board of Public Utilities (BPU) would offer an estimated rebate of \$855.00, yielding a net cost of \$3,035.00 for this project. With a yearly savings of \$368.76, the payback on this ECM would about 8.2 years.

A replacement of the existing fixtures in the main library area and the retrofit of the remaining fixtures will result in an annual savings of \$368.76 based on the current \$0.18/kWh and the current occupancy schedule. Implementation of this ECM will cost approximately \$8,570.00. Currently the Board of Public Utilities (BPU) would offer an estimated rebate of \$1,365.00, yielding a net cost of \$7,205.00 for this project. With a yearly savings of \$368.76, the payback on this ECM would about 19.5 years.

Category III Recommendation - ECM #2: Recommend retrofitting 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. It is not recommended to install lighting sensors in certain areas, such as bathrooms, since the paybacks would be extremely high. Middletown has the option to replace the fixtures. However, the paybacks would increase to 19.5 years. If Middletown decides to replace the fixtures, a new ceiling is recommended. A new ceiling would increase the lighting reflectance resulting in increased lighting levels. A budget price for a new ceiling is approximately \$6.00/sq. ft.

#### 2.5.2 Appliances and Process

At this facility, there are 4 computers, a Sanyo mini-fridge, and a Sharp Carousel II microwave.

### **2.5.3 Elevators**

There are no elevators at this facility.

### **2.5.4 Other Electrical Systems**

There are currently no other significant energy impacting electrical systems installed at the Lincroft Library.

### 3. EQUIPMENT LIST

Building System	Description	Location	Model #	Fuel	Space Served	Estimated Remaining Useful Life %
Cooling	Window AC Unit, 32,000 BTU/Hr, EER 8.5 , (3)	Entire Building	AirTemp #B6K32E7A-A	Electric	Entire Building	40%
Heating	Oil Fired Furnace, 2 Gal/Hr (280 MBH)	Basement	Williamson #1454-283-58	No. 2 Fuel Oil	Entire building	0%
Heating	Circulation Pump	Basement	Nameplate not accessible	Electric	Boiler	0%
Domestic Hot Water	Domestic Hot Water Heater, 40 gal, 4500W	Basement	Rheem #81V40D	Electric	Entire building	50%

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

#### 4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Public Library-Lincroft Branch, BSG-PMK has separated the investment opportunities into three recommended categories:

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

##### Category I Recommendations: Capital Improvement Measures

- All windows are single-pane and in poor condition. In combination, the installation of thermal-pane windows and the conversion of the furnace and water heater to natural gas, would yield approximately \$365 annual energy cost savings, and would also increase building air tightness. The calculated payback period was too long to make this measure a viable ECM.
- The exterior doors were found to be in poor condition, are also recommended for upgrade. The total annual energy cost savings would be approximately \$425.

##### Category II Recommendations: Operations and Maintenance

- Based on the findings in SWA/BSG-PMK's survey, no operations and maintenance measures are recommended.

##### Category III Recommendations: Energy Conservation Measures

###### Summary table

ECM #	Description
1	Convert Furnace to Natural Gas
2	Lighting Upgrades
3	Convert Water Heater to Natural Gas

## ECM#1: Convert Furnace to Natural Gas

### Description:

Heating is provided by a Williamson oil burner, forced air furnace. The unit has passed its useful life of 20 years, and should be replaced by a more efficient unit. Due to the fact that the Lincroft Library pays \$2.98 per gallon of oil, equivalent to \$2.13 per therm, it is recommended that a natural gas line is brought and connected to the building. This connection requires coordination with New Jersey Natural Gas. The cost of natural gas in New Jersey is typically about \$1.50/therm. Natural Gas, modulating furnaces with efficiencies between 94% and 98% are available. The heating capacity of the current and proposed units is 280 MBH. Approximately, 50 feet of 2"-diameter piping would be needed to connect the furnace to the gas line. A programmable thermostat should also be installed to control the night setback temperature..

### Installation cost:

Estimated installed cost:

Piping: \$1,450 @ \$29/foot

Furnace: \$22,000

Total: \$23,450

Source of cost estimate: RS Means CostWorks 2009 (piping), similar projects (furnace)

### 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 <sub>2</sub> Reduced, lbs/yr
1	Convert Furnace to Natural Gas	Similar Projects	\$23,450	\$18,760	\$4,690	0	0.00	2,871	86.26	\$0	\$8,646	20	\$126,289	0.54	12964%	648%	184%	\$123,946	33,586

### Assumptions:

The annual heating consumption for the current system was taken from the energy bills. The building purchased 4,921 gallons of oil between October, 2008 and September, 2009, equivalent to 6,890 therms. The efficiency of the old furnace is assumed to be 70% of the original 80% efficiency rating or in its current state the furnace is 56% efficient. The new system will be 96% efficient. The saving was calculated using the following series of equations:

Current oil input: 6,890 therms

Current/proposed gas output:  $6,890 \text{ therms} \times 56\% = 3,858 \text{ therms}$

Proposed gas input:  $\frac{3,858 \text{ therms}}{96\%} = 4,019 \text{ therms}$

Savings:  $6,890 \text{ therms} - 4,019 \text{ therms} = 2,871 \text{ therms}$

**Rebates/financial incentives:**

This ECM may be eligible for incentives through New Jersey's Direct Install Program, which can incentivize up to 80% of the total installation cost, which we estimate to be \$18,760 for this measure. Please note that these incentive levels are estimates based on SWA's expected project cost and assumption of project eligibility. Actual incentive levels and project eligibility can only be determined through an Energy Assessment performed by a Direct Install Contractor.

**ECM#2: Lighting Upgrades & Occupancy Sensors**

**Description:**

Lighting at the Library – Lincroft Branch consists primarily of T-12 fluorescent lamps with magnetic ballasts. The exterior was lit with incandescent lamps that should be replaced with compact fluorescents. The exterior lighting also consist of H.I.D. wall mounted fixtures. It is recommended that all T-12 fixtures with magnetic ballasts be retrofit with T-8 lamps and electronic ballasts. Lighting replacement generally yields a very good payback, due to the fact that most lighting usage in commercial buildings is fairly high and the installation is relatively inexpensive.

**Recommended lighting upgrades are detailed in Appendix A.**

**Installation cost:**

<b>Summary</b>	<b>Lighting (Only)</b>	<b>Sensors (Only)</b>	<b>Complete Lighting Upgrade</b>
<b>Cost</b>	\$3,890.00	\$0.00	\$3,890.00
<b>Rebate</b>	\$855.00	\$0.00	\$855.00
<b>Net Cost</b>	\$3,035.00	\$0.00	<b>\$3,035.00</b>
<b>Savings (kWh)</b>	2,049	0	<b>2,049</b>
<b>Savings (\$)</b>	\$368.76	\$0.00	<b>\$368.76</b>
<b>Payback</b>	8.2		<b>8.2</b>

<b>Variables:</b>		<b>Assumptions:</b>	
\$0.18	Avg. Electric Rate (\$/kWh)	25%	Occupancy Sensor Savings (Avg)
	Avg. Demand Rate (\$/kW)	40%	Occupancy Sensor Savings(>Avg)
1404	Operating Hours/Year		
6	Operating Hours/Work Day		

Source of cost estimate: Empirical Data

**Economics (without incentives):**

ECM #	ECM description	Source	Est. Installed Cost, \$	Est. Incentives, \$	Net Est. ECM Cost with Incentives, \$	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, \$	Total 1st Yr Savings, \$	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, \$	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, \$	CO <sub>2</sub> Reduced, lbs/yr
2	Lighting Upgrades	Empirical Data	\$3,890	\$855	\$3,035	2,049	0.99	0	2.10	\$0	\$369	15	\$4,339	8.23	286.47%	19%	9%	\$1,367	2,807

**Assumptions:**

The electric cost used in this ECM was \$0.18/kWh, which was the Library – Lincroft Branch’s average rate for the 12-month period ranging from January, 2009 through December, 2009. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix A.

**Rebates/financial incentives:**

The New Jersey SmartStart offers rebates for upgrading lighting fixtures and installing lighting controls. The total rebate this ECM qualifies for is \$855.

### ECM #3: Convert Electric Water Heater to Natural Gas

**Description:**

Domestic hot water is provided by a 40-gallon electric water heater. A natural gas unit would be much more cost-efficient. The \$0.18/kWh cost the Lincroft Library currently pays for electricity is equivalent to \$5.27 per therm. Natural gas, by comparison, would cost about \$1.50 per therm. If ECM #1 is implemented and natural gas is brought to the building, gas would be available for a natural gas water heater. The cost stated below budgets 50 feet of piping to allow for the connection of natural gas.

**Installation cost:**

Estimated installed cost: Installation: \$3,500; rebates/incentives: \$50; total: \$3,450

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 <sub>2</sub> Reduced, lbs/yr
3	Convert Water Heater to Natural Gas	Similar projects	\$3,500	\$50	\$3,450	2,919	1.41	-151.04	-1.55	\$0	\$299	13	\$3,138	11.54	-70%	-5%	2%	-\$272	2,232

**Assumptions:**

Using the facility’s electricity bills from January, 2009 through December, 2009, it was determined that the cost of electricity is currently \$0.18/kWh. Natural gas costs in New Jersey are typically around \$1.50/therm.

To calculate the savings from switching from electricity to gas, a spreadsheet created by Rheem was used. The temperature rise of the heated water was set at 77°F on the spreadsheet, and the energy factor (a unit that specifies the efficiency of water heaters) is specified as 0.94 for new electric units and 0.62 for gas units. Weight of water was set at 8.33 pounds/ft.<sup>3</sup>. Using this data, the BTUs of output heat used for heating the water were calculated by the following equation:

$$BTU_{\text{output}} = \text{Vol.} \times \text{Wt.}_{\text{water}} \times \Delta \text{Temp.}$$

This value would be the same for the current and proposed units. The actual BTUs purchased by each unit are calculated using this value and the energy factors:

$$BTU_{\text{input}} = \frac{BTU_{\text{output}}}{\text{Energy Factor}}$$

The annual costs for heating the water can now be calculated using this data:

***Current***

Volume of Water Heated	Weight of Water	Temp. Rise (in °F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	Cost per kWh	Daily Cost to Heat the Water	Yearly Cost to Heat the Water
40	8.33	77	25,656	0.94	27,294	\$0.18	\$1.44	\$525.41

***Natural Gas***

Volume of Water Heated	Weight of Water	Temp. Rise (in °F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	Cost per Therm	Daily Cost to Heat the Water	Yearly Cost to Heat the Water
40	8.33	77	25,656	0.62	41,381	\$1.50	\$0.62	\$226.56

**Rebates/financial incentives:**

This ECM qualifies for a New Jersey SmartStart rebate of \$50.

## **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 viable 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.

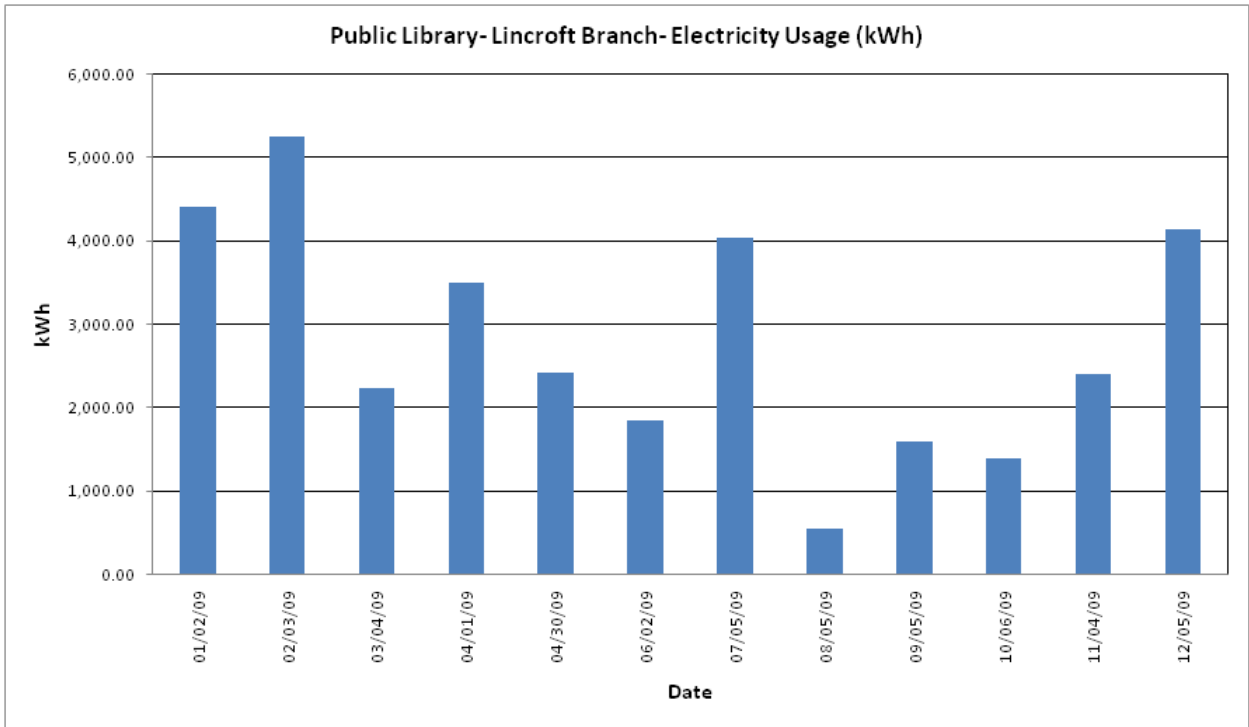
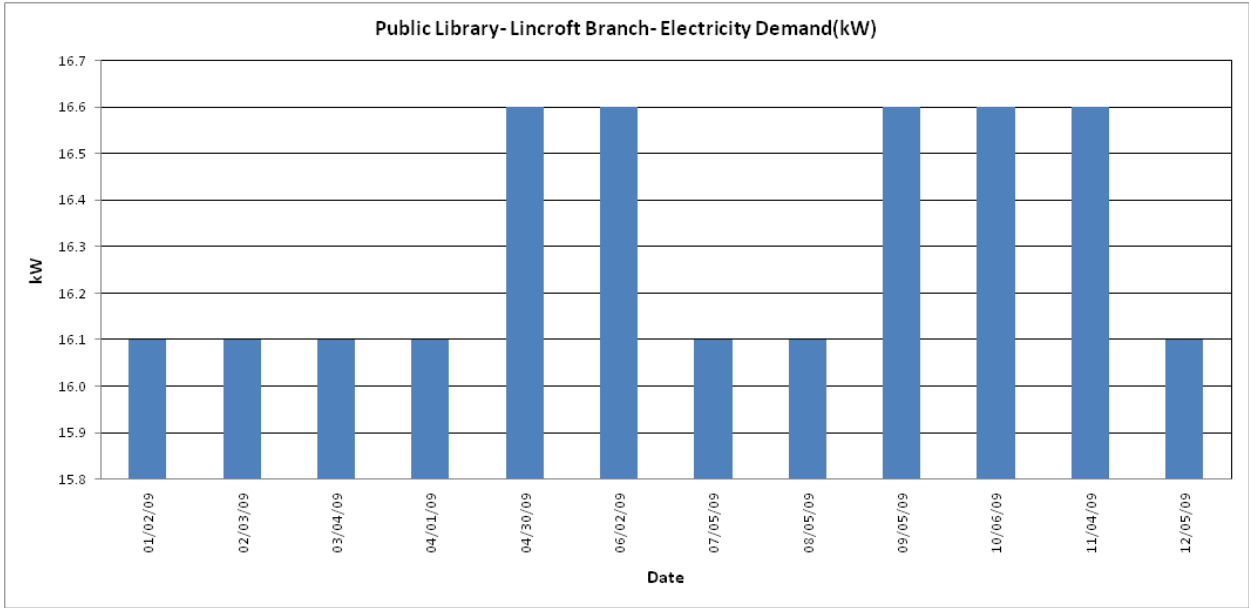
### **5.6 Wind**

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.

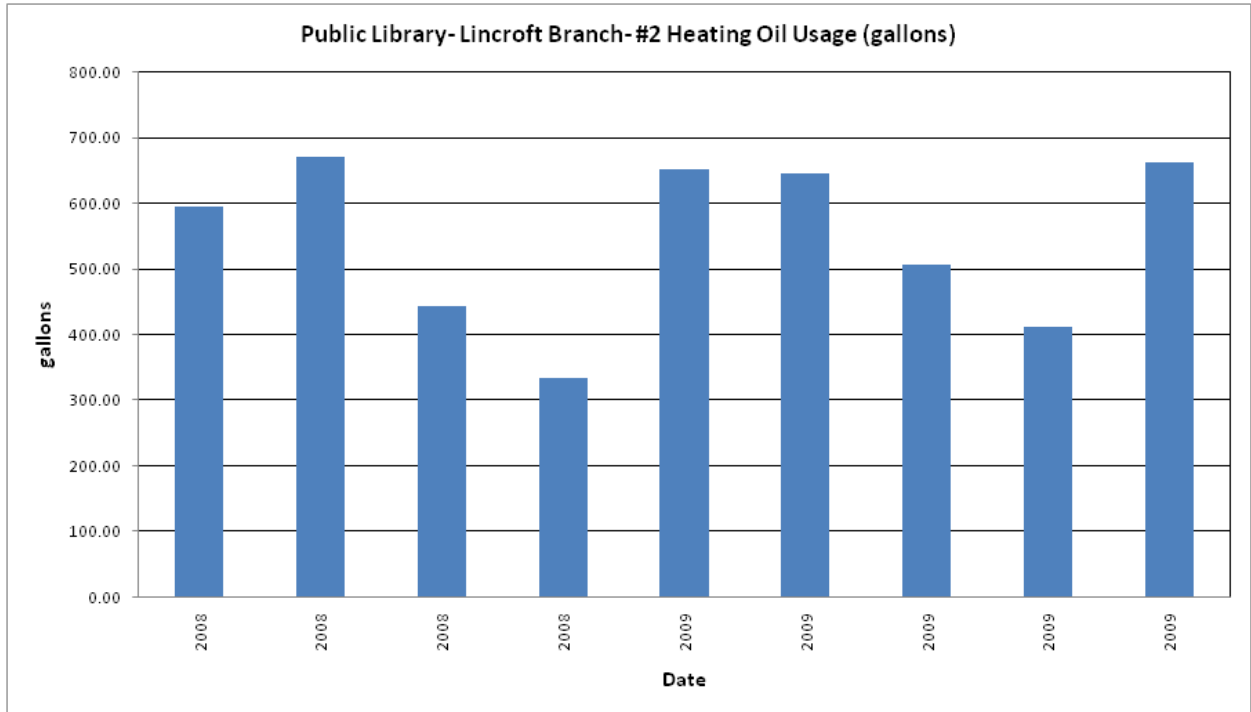
## **6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES**

### **6.1 Load profiles**

The average electrical peak demand for the facility during previous year was 16.3 kW and the maximum peak demand was 16.6 kW. The electric and heating oil load profiles for this project are presented in the following charts. The first chart shows the electric demand (in kW) for the previous 12 months and the other two charts show electric (in kWh) and heating oil usage (in gallons), respectively.



**NOTE:** The fluctuation in electric consumption is caused by variations in occupancy and usage.

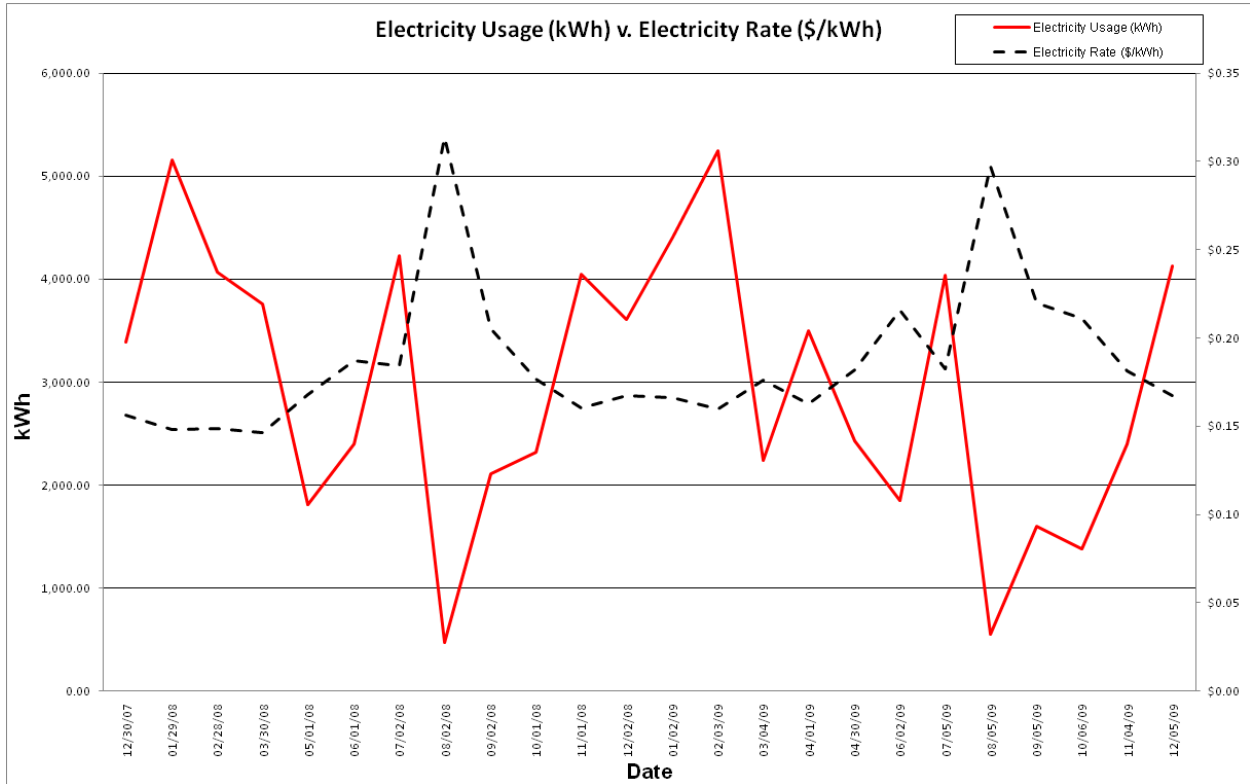


## 6.2 Energy Procurement strategies

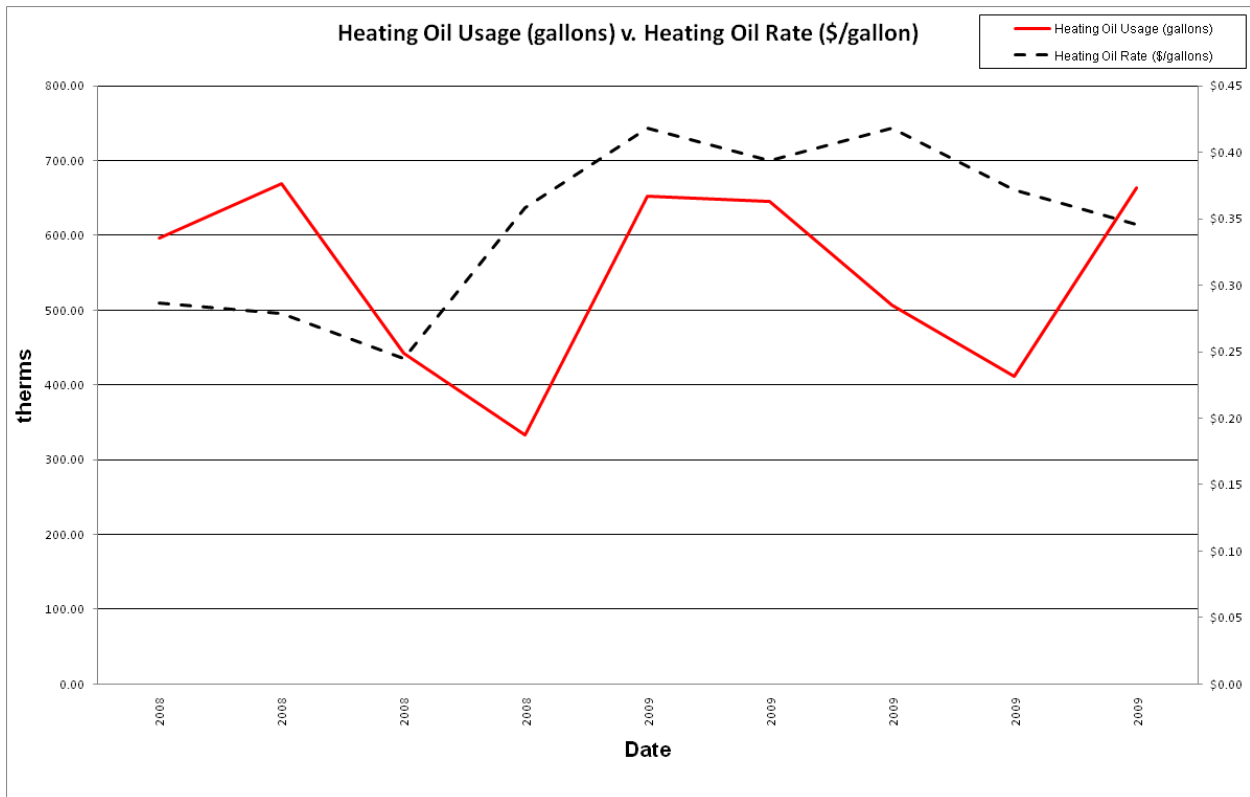
Billing analysis shows price fluctuations of over 20% over the course of the year for the building’s electrical and natural gas accounts. This may be reflective of the utility tariffs under which the building owner secures its’ energy supply. These tariffs often include seasonally adjusted demand charges, or seasonally adjusted usage charges which reflect the markets for the underlying energy commodity. For example, a utility often has tariffs which charge more for electricity in the summer when demand for capacity is high and, the marginal producer of electricity is a higher cost generator who otherwise would not be running in the winter, or shoulder seasons.

Buildings which have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier who can provide them with fixed pricing over the course of a contract term as well as attain purchasing economies which may not be available on a utilities default tariff (basic generation service in the case of electric and basic gas service in the case of natural gas). SWA/BSG-PMK recommends that the Township of Middletown contact 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 \$ 0.029/kWh, which would have equated to \$979 for the past 12 months.

Contact the NJ Energy Choice Program for further information on companies that can act as third party (non-utility) energy suppliers. Purchasing energy from a third party supplier can reduce price fluctuations and can ultimately reduce the annual cost of energy for the facility. Appendix B contains a complete list of third party energy suppliers.



*Electricity prices generally reflect electricity usage*



*Heating Oil prices fluctuate as expected with usage*

**Note:** The utility data supplied did not include the months of delivery.

## 7. METHOD OF ANALYSIS

### 7.1 Assumptions and tools

Energy modeling tool: established / standard industry assumptions, E-Quest  
Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)  
RS Means 2009 (Building Construction Cost Data)  
RS Means 2009 (Mechanical Cost Data)  
Published and established specialized equipment material and labor costs.  
Cost estimates also based on utility bill analysis and prior experience with similar projects

### 7.2 Disclaimer

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

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

# LIGHTING ANALYSIS - Retrofit

Middletown Township  
Library - Lincroft Branch  
730 Newman Springs Road



Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade (\$)	SmartStart Rebate per Upgrade
1	(2) 4'34W T12 Lamps, Magnetic Ballasts / Retrofit with T8 Lamps, Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	45	\$60.00	\$15.00
2	Incandescent Exit Sign / Upgrade to LED	15W Exit	15	LED	2	9	\$40.00	\$10.00
3	6" Circular Fluorescent Fixture	1L6" (DIA) EE/ELEC	26	1L4' T8/ELEC	26	2	\$125.00	\$0.00
4	(4) 4'34W T12 Lamps, Magnetic Ballasts / Retrofit with T8 Lamps, Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	6	\$90.00	\$15.00
5	150W Metal Halide HID Fixture / No Upgrade	150W MH/BALLAST	195	No Upgrade	195	4	\$0.00	\$0.00
6	250W Metal Halide HID Fixture / No Upgrade	250W MH/BALLAST	286	No Upgrade	286	1	\$0.00	\$0.00
7	75W Incandescent Lamp	75W INCANDESCENT	75	26W CF/SI	28	4	\$10.00	\$0.00
8						0	\$0.00	\$0.00
9						0	\$0.00	\$0.00
10						0	\$0.00	\$0.00
11						0	\$0.00	\$0.00
12						0	\$0.00	\$0.00

## Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$3,890.00	\$0.00	\$3,890.00
Rebate	\$855.00	\$0.00	\$855.00
Net Cost	\$3,035.00	\$0.00	\$3,035.00
Savings (kWh)	2,049	0	2,049
Savings (\$)	\$368.76	\$0.00	\$368.76
Payback	8.2		8.2

### Variables:

\$0.18	Avg. Electric Rate (\$/kWh)
	Avg. Demand Rate (\$/kW)
1404	Operating Hours/Year
6	Operating Hours/Work Day

### Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings(>Avg)

### Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/Work Day	Hrs/Year	Existing				Proposed			kW Reduction	Lighting				Occupancy Sensors (ONLY)				Lighting & Occupancy Sensors							
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts		Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Controls Type	Qty.	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	SmartStart Rebate Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)
<b>Totals:</b>					6113				4653	1.46	2049	\$3,890.00	\$368.76	10.5			0	\$0.00	\$0.00		\$855.00	\$0.00	2049	\$3,035.00	\$368.76	8.2		
1	1	Main Room	6	1404	2L4' EE/STD	18	1440		2L4' T8/ELEC	18	1098	0.342	480	\$1,080.00	\$86.43	12.5			0	\$0.00	\$0.00		\$270.00	\$0.00	480	\$810.00	\$86.43	9.4
2	1	Main Room	6	1404	2L4' EE/STD	18	1440		2L4' T8/ELEC	18	1098	0.342	480	\$1,080.00	\$86.43	12.5			0	\$0.00	\$0.00		\$270.00	\$0.00	480	\$810.00	\$86.43	9.4
3	2	Main Room	6	1404	15W Exit	9	135		LED	9	18	0.117	164	\$360.00	\$29.57	12.2			0	\$0.00	\$0.00		\$90.00	\$0.00	164	\$270.00	\$29.57	9.1
4	1	Bathroom	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$120.00	\$9.60	12.5			0	\$0.00	\$0.00		\$30.00	\$0.00	53	\$90.00	\$9.60	9.4
5	1	Back Hall	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$120.00	\$9.60	12.5			0	\$0.00	\$0.00		\$30.00	\$0.00	53	\$90.00	\$9.60	9.4
6	1	Back Hall	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$120.00	\$9.60	12.5			0	\$0.00	\$0.00		\$30.00	\$0.00	53	\$90.00	\$9.60	9.4
7	3	Women's Room	6	1404	1L6" (DIA) EE/EL	2	52		1L4' T8/ELEC	2	52	0	0	\$250.00	\$0.00				0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$250.00	\$0.00	
8	4	Side Room	6	1404	4L4' EE/STD	6	960		4L4' T8/ELEC	6	660	0.3	421	\$540.00	\$75.82	7.1			0	\$0.00	\$0.00		\$90.00	\$0.00	421	\$450.00	\$75.82	5.9
9	1	Kitchen Area	6	1404	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	27	\$60.00	\$4.80	12.5			0	\$0.00	\$0.00		\$15.00	\$0.00	27	\$45.00	\$4.80	9.4
10	1	Basement	0.5	117	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	4	\$120.00	\$0.80	149.9			0	\$0.00	\$0.00		\$30.00	\$0.00	4	\$90.00	\$0.80	112.5
11	7	Basement	0.5	117	75W INCANDESC	1	75		26W CF/SI	1	28	0.047	5	\$10.00	\$0.99	10.1			0	\$0.00	\$0.00		\$0.00	\$0.00	5	\$10.00	\$0.99	10.1
12	7	Bathroom	6	1404	75W INCANDESC	1	75		26W CF/SI	1	28	0.047	66	\$10.00	\$11.88	0.8			0	\$0.00	\$0.00		\$0.00	\$0.00	66	\$10.00	\$11.88	0.8
13	5	Outside Lights	7	2555	150W MH/BALLA	4	780		No Upgrade	4	780	0	0	\$0.00	\$0.00				0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$0.00	\$0.00	
14	6	Outside Lights	7	2555	250W MH/BALLA	1	286		No Upgrade	1	286	0	0	\$0.00	\$0.00				0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$0.00	\$0.00	
15	7	Outside Lights	7	2555	75W INCANDESC	2	150		26W CF/SI	2	56	0.094	240	\$20.00	\$43.23	0.5			0	\$0.00	\$0.00		\$0.00	\$0.00	240	\$20.00	\$43.23	0.5

# LIGHTING ANALYSIS - Replace

Middletown Township  
Library - Lincroft Branch  
730 Newman Springs Road



Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade (\$)	SmartStart Rebate per Upgrade
1	(2) 4' 34W T12 Lamps, Magnetic Ballasts / Replace with new fixture using T8 lamps and electronic ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	45	\$150.00	\$25.00
2	Incandescent Exit Sign / Upgrade to LED	15W Exit	15	LED	2	9	\$40.00	\$10.00
3	6" Circular Fluorescent Fixture	1L6" (DIA) EE/ELEC	26	1L4' T8/ELEC	26	2	\$125.00	\$0.00
4	(4) 4' 34W T12 Lamps, Magnetic Ballasts / Replace with new fixture using T8 lamps and electronic ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	6	\$195.00	\$25.00
5	150W Metal Halide HID Fixture / No Upgrade	150W MH/BALLAST	195	No Upgrade	195	4	\$0.00	\$0.00
6	250W Metal Halide HID Fixture / No Upgrade	250W MH/BALLAST	286	No Upgrade	286	1	\$0.00	\$0.00
7	75W Incandescent Lamp	75W INCANDESCENT	75	26W CF/SI	28	4	\$10.00	\$0.00
8						0	\$0.00	\$0.00
9						0	\$0.00	\$0.00
10						0	\$0.00	\$0.00
11						0	\$0.00	\$0.00
12						0	\$0.00	\$0.00

## Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$8,570.00	\$0.00	\$8,570.00
Rebate	\$1,365.00	\$0.00	\$1,365.00
Net Cost	\$7,205.00	\$0.00	\$7,205.00
Savings (kWh)	2,049	0	2,049
Savings (\$)	\$368.76	\$0.00	\$368.76
Payback	19.5		19.5

## Variables:

\$0.18	Avg. Electric Rate (\$/kWh)
	Avg. Demand Rate (\$/kW)
1404	Operating Hours/Year
6	Operating Hours/Work Day

## Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings(>Avg)

## Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/Work Day	Hrs/Year	Existing				Proposed			kW Reduction	Lighting				Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts		Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)
<b>Totals:</b>					6113		4653	1.46	2049	\$8,570.00	\$368.76	23.2	0	\$0.00	\$0.00		\$1,365.00	\$0.00	2049	\$7,205.00	\$368.76	19.5				
1	1	Main Room	6	1404	2L4' EE/STD	18	1440		2L4' T8/ELEC	18	1098	0.342	480	\$2,700.00	\$86.43	31.2	0	\$0.00	\$0.00		\$450.00	\$0.00	480	\$2,250.00	\$86.43	26.0
2	1	Main Room	6	1404	2L4' EE/STD	18	1440		2L4' T8/ELEC	18	1098	0.342	480	\$2,700.00	\$86.43	31.2	0	\$0.00	\$0.00		\$450.00	\$0.00	480	\$2,250.00	\$86.43	26.0
3	2	Main Room	6	1404	15W Exit	9	135		LED	9	18	0.117	164	\$360.00	\$29.57	12.2	0	\$0.00	\$0.00		\$90.00	\$0.00	164	\$270.00	\$29.57	9.1
4	1	Bathroom	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$300.00	\$9.60	31.2	0	\$0.00	\$0.00		\$50.00	\$0.00	53	\$250.00	\$9.60	26.0
5	1	Back Hall	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$300.00	\$9.60	31.2	0	\$0.00	\$0.00		\$50.00	\$0.00	53	\$250.00	\$9.60	26.0
6	1	Back Hall	6	1404	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	53	\$300.00	\$9.60	31.2	0	\$0.00	\$0.00		\$50.00	\$0.00	53	\$250.00	\$9.60	26.0
7	3	Women's Room	6	1404	1L6" (DIA) EE/EL	2	52		1L4' T8/ELEC	2	52	0	0	\$250.00	\$0.00		0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$250.00	\$0.00	
8	4	Side Room	6	1404	4L4' EE/STD	6	960		4L4' T8/ELEC	6	660	0.3	421	\$1,170.00	\$75.82	15.4	0	\$0.00	\$0.00		\$150.00	\$0.00	421	\$1,020.00	\$75.82	13.5
9	1	Kitchen Area	6	1404	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	27	\$150.00	\$4.80	31.2	0	\$0.00	\$0.00		\$25.00	\$0.00	27	\$125.00	\$4.80	26.0
10	1	Basement	0.5	117	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	4	\$300.00	\$0.80	374.9	0	\$0.00	\$0.00		\$50.00	\$0.00	4	\$250.00	\$0.80	312.4
11	7	Basement	0.5	117	75W INCANDESC	1	75		26W CF/SI	1	28	0.047	5	\$10.00	\$0.99	10.1	0	\$0.00	\$0.00		\$0.00	\$0.00	5	\$10.00	\$0.99	10.1
12	7	Bathroom	6	1404	75W INCANDESC	1	75		26W CF/SI	1	28	0.047	66	\$10.00	\$11.88	0.8	0	\$0.00	\$0.00		\$0.00	\$0.00	66	\$10.00	\$11.88	0.8
13	5	Outside Lights	7	2555	150W MH/BALLA	4	780		No Upgrade	4	780	0	0	\$0.00	\$0.00		0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$0.00	\$0.00	
14	6	Outside Lights	7	2555	250W MH/BALLA	1	286		No Upgrade	1	286	0	0	\$0.00	\$0.00		0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$0.00	\$0.00	
15	7	Outside Lights	7	2555	75W INCANDESC	2	150		26W CF/SI	2	56	0.094	240	\$20.00	\$43.23	0.5	0	\$0.00	\$0.00		\$0.00	\$0.00	240	\$20.00	\$43.23	0.5

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

Supplier	Telephone & Web Site
<b>American Powernet Management, LP</b> 437 North Grove St. Berlin, NJ 08009 Attn: Brian Vayda	877-977-2636  <a href="mailto:bvayda@americanpowernet.com">bvayda@americanpowernet.com</a> <a href="http://www.americanpowernet.com">www.americanpowernet.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> Cherry Tree Corporate Center 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 07962	(800) 977-0500 Supply chain website <a href="http://www.firstenergycorp.com/supplierregistration">www.firstenergycorp.com/supplierregistration</a> <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	1-877-569-2841  <a href="http://www.glacialenergy.com">www.glacialenergy.com</a>
<b>Hess Corporation</b> 1 Hess Plaza Woodbridge, NJ 070956	(800) 437-7872 Tom Miller <a href="http://www.hess.com">www.hess.com</a>
<b>Integrus Energy Services, Inc.</b> 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	1-877-763-9977 Dole Janssen: 920-617-6029 Charles Kuntz: 614-844-4324 <a href="http://www.integrusenergy.com">www.integrusenergy.com</a>

Supplier	Telephone & Web Site
<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	(866) 769-3799 <a href="http://www.libertypowercorp.com">www.libertypowercorp.com</a>
<b>Palmco Power NJ, LLC</b> One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 <a href="http://www.PalmcoEnergy.com">www.PalmcoEnergy.com</a>
<b>Pepco Energy Services, Inc.</b> 112 Main Street Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) <a href="http://www.pepco-services.com">www.pepco-services.com</a>
<b>PPL Energy Plan, 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> The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 732-596-6400-Tony Buck <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 Gary Bean <a href="mailto:gbean@sjindustries.com">gbean@sjindustries.com</a> <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>

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