



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

293 Route 18 South, Suite 330  
East Brunswick, NJ 08816  
[www.swinter.com](http://www.swinter.com)

Telephone: (866) 676-1972  
E-mail: [swinter@swinter.com](mailto:swinter@swinter.com)

June 18, 2010

## **Local Government Energy Program Energy Audit Report**

*For*

**Borough of Belmar  
Taylor Pavilion  
500 Ocean Avenue  
Belmar, New Jersey 07719**

*Project Number: LGEA30*



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## **INTRODUCTION**

On December 11, 2009, 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 Taylor Pavilion located in Belmar, New Jersey. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the buildings.

The Taylor Pavilion is a 5,776 square-foot, 1-story building built in 1983. The building contains a leased restaurant space, an area for beach badge sales, and a large gathering room equipped with restrooms, a residential type kitchen and storage space. The Pavilion serves as a community gathering area, a venue for small concerts, craft shows, and other special occasions. Operating hours are varied however the building remains usable throughout the year.

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/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.

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 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.

## EXECUTIVE SUMMARY

This document contains the energy audit report for the Taylor Pavilion located at 500 Ocean Avenue, Belmar, New Jersey 07719.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG-PMK staff on December 11, 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, October, 2008 through September, 2009, the Taylor Pavilion (less the leased space) consumed 20,617 kWh of electricity for a total cost of \$3,699. Taylor Pavilion (less the leased space) had consumed 5,247 therms of natural gas for a total cost of \$8,735.

With electricity and fossil fuel combined, the building consumed 595 MMBtus of energy at a total cost of \$12,434. Using an average of \$0.15/kWh the Borough could save approximately \$606 on their Taylor Pavilion electric bills by switching to a third party supplier. The Borough already purchases natural gas from a third party supplier, but the Borough could investigate prices from another third party supplier, because the current rate of \$1.66/therm is well above the average rate of \$1.55/therm. The Borough could save approximately \$601 on their natural gas bills for the Taylor Pavilion. Appendix B contains a complete list of third party energy suppliers.

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 buildings is 103 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 has entered energy information about the Taylor Pavilion building in the US Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. The building performance rating could not be determined because this is a mixed-use facility, comprised by non-eligible space types categorized as "Other".

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 Borough to continue entering utility data in *Energy Star Portfolio Manager* in order to track whether normalized source energy use over time.

(Refer to Section 1.3 for Energy Star Rating)

## Recommendations

### Category I Recommendations: Capital Improvements

- At the end of its useful life, the 15 gal. hot water heater should be converted to use natural gas
- Missing blown in insulation above the pavilion ceiling need to be infilled.
- Missing insulation below the floor should also be installed.

### Category II Recommendations: Operations & Maintenance

- Repair loose shingles on north Mansard section.
- Repair lifting flashing at sanitary vent piping.
- Repair loose insulation and install same in remaining non insulated area to insure uniform thermal barrier.
- Repair degassing windows on a rotating basis.
- It is recommended to remove the decommissioned exhaust fan and close off the existing duct and ceiling louvers or install new fan and replace existing louvers with a motorized damper to reduce infiltration.

### Category III Recommendations: Energy Conservation Measures (ECMs)

At this time, SWA/BSG-PMK highly recommends a total of **3** Energy Conservation Measures (ECMs) for the Taylor Pavilion building that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **\$172,500**. SWA/BSG-PMK estimates a first year savings of **\$17,812** with a simple payback of **9.7 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the building by **62,845 lbs of CO<sub>2</sub>/yr**, which is equivalent to removing approximately 5 cars from the roads each year.

There are various incentives that the Borough of Belmar could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommends that the Borough 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. No demand data for Taylor Pavilion was provided, but due to the facility's comparatively low electric consumption, it is highly unlikely that the demand would reach 200 kW in any month.

## SCOPE OF WORK – SUMMARY TABLE

ROI: Return on Investment (%)

**Assumptions:**

Discount rate: 3.2% per DOE FEMP guidelines

Electricity rate: \$0.18 /kWh

Energy price escalation rate: 0% per DOE FEMP guidelines

Gas rate: \$1.66 /therm

Avg. Annual Demand: 0.00000

Area of Building (SF)

5,776

Table 1 - 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	kWh 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	Lighting Upgrades	Empirical Data	\$1,860	\$360	\$1,500	1,366	0.00	0	0.81	\$0	\$246	15	\$2,893	6.10	93%	6%	14%	\$1,435	1,871
2	Install High-Efficiency Furnaces & BAS	Similar Projects	\$47,000	\$800	\$46,200	0	0.00	2,821	48.84	\$0	\$4,682	20	\$68,392	9.87	48%	2%	8%	\$9,699	33,003
3	19.2-kW Roof-Mounted PV System	Similar Projects	\$124,800	\$0	\$124,800	20,417	0.00	0.00	12.06	\$0	\$12,884	30	\$246,118	9.69	97%	3%	10%	\$127,723	27,971
TOTAL			\$173,660	\$1,160	\$172,500	21,783	0.00	0	61.70	\$0.00	\$17,812	-	\$246,118	9.68	-	-	-	\$138,837	62,845

NOTE: Demand data not available.

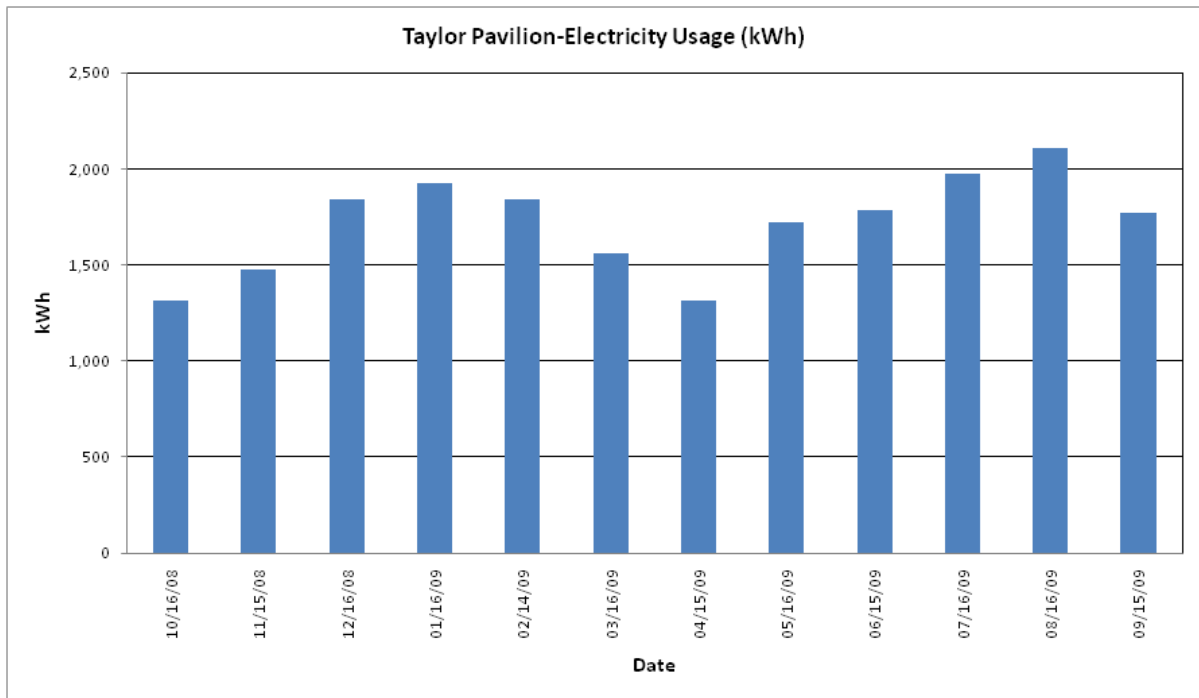
# 1. HISTORIC ENERGY CONSUMPTION

## 1.1. Energy Usage and Cost Analysis

SWA/ BSG-PMK analyzed utility bills from October, 2007 through September, 2009 that were received from the utility companies supplying the Taylor Pavilion building with electric and natural gas.

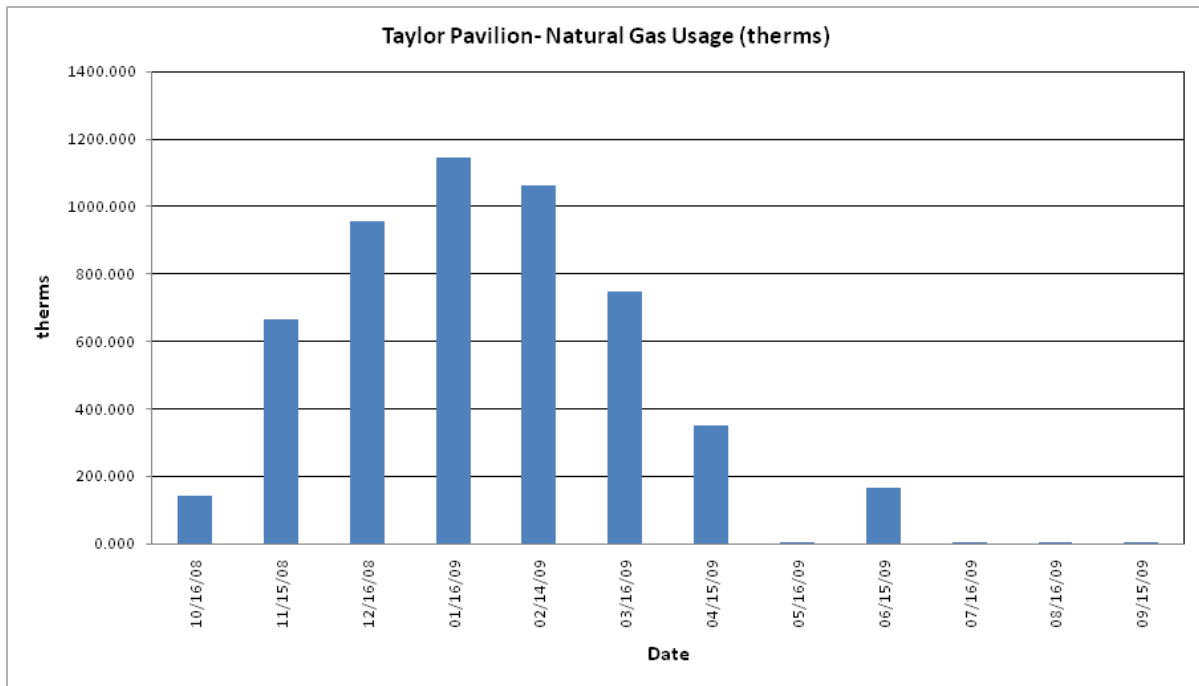
Electricity - The Taylor Pavilion building is currently served by one electric meter. The Taylor Pavilion building currently buys electricity from Jersey Central Power & Light at **an average rate of \$0.18/kWh** based on 12 months of utility bills from October 2008 to September 2009. The Taylor Pavilion building purchased **approximately 20,617 kWh or \$3,699 worth of electricity** in the previous year.

The following chart shows electricity usage for the building based on utility bills from October, 2008 through September, 2009:



Natural gas - The Taylor Pavilion building is currently served by one meter for natural gas. The Taylor Pavilion building currently buys natural gas from New Jersey Natural Gas at **an average aggregated rate of \$1.67/therm** based on 12 months of utility bills for October 2008 to September 2009. The Taylor Pavilion building purchased **approximately 5,248 therms or \$8,734.95 worth of natural gas** in the previous year.

The following chart shows natural gas usage for the building based on utility bills from October, 2008 through September, 2009:



## 1.2. Utility Rate

The Taylor Pavilion 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 through September, 2009.

The Taylor Pavilion building currently purchase natural gas supply from New Jersey Natural Gas at an average aggregated rate of \$1.66/therm based on 12 months of utility bills from October, 2008 through 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/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 Borough 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:** belmarboro  
**Password:** belmarboro

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

Borough 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 103 kBtu/ft<sup>2</sup>yr compared to the national average of 52 kBtu/ft<sup>2</sup>yr for commercial buildings classified by the Energy Star Portfolio Manager as “Other”. Implementing this report’s recommendations will reduce use by approximately 61.7 kBtu/ft<sup>2</sup>yr, which when implemented would lower the buildings energy consumption.



# STATEMENT OF ENERGY PERFORMANCE

## Taylor Pavillion

Building ID: 2019806  
 For 12-month Period Ending: September 30, 2009<sup>1</sup>  
 Date SEP becomes ineligible: N/A

Date SEP Generated: January 26, 2010

**Facility**  
 Taylor Pavillion  
 500 Ocean Ave  
 Belmar, NJ 07719

**Facility Owner**  
 Borough of Belmar  
 601 Main St.  
 Belmar, NJ 07719

**Primary Contact for this Facility**  
 Robbin Kirk  
 601 Main St  
 Belmar, NJ 07719

Year Built: 1983  
 Gross Floor Area (ft<sup>2</sup>): 5,776

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

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

Electricity - Grid Purchase(kBtu)	70,345
Natural Gas (kBtu) <sup>4</sup>	524,777
Total Energy (kBtu)	595,122

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

Site (kBtu/ft <sup>2</sup> /yr)	103
Source (kBtu/ft <sup>2</sup> /yr)	136

### Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO <sub>2</sub> e/year)	39
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### Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

### National Average Comparison

National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	33%
Building Type	Social/Meeting

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

### Meets Industry Standards<sup>6</sup> for Indoor Environmental Conditions:

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

**Certifying Professional**  
 N/A

#### Notes:

- 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.
- 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.
- Values represent energy consumption, annualized to a 12-month period.
- 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.
- Values represent energy intensity, annualized to a 12-month period.
- 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 Taylor Pavilion is a 5,776 square-foot, 1-story building built in 1983. The building contains a leased restaurant space, an area for beach badge sales, and a large gathering room equipped with restrooms, a residential type kitchen and storage space. The Pavilion serves as a community gathering area, a venue for small concerts, craft shows, and other special occasions. Operating hours are varied however the building remains usable throughout the year.

### 2.2. Building occupancy profiles

The peak occupancy for the Taylor Pavilion is approximately 275 occupants for special events. The normal operating hours during the summer months for the beach badge window is approximately 20 hours per week with one or two Borough employees during the summer season. During the summer there may be a small number of part time, seasonal employees. Public functions and meetings occur in the evenings and on weekends throughout the year.

### 2.3. Building envelope

#### 2.3.1. Exterior walls

The exterior walls are wood stud with and a combination of composite trim, painted T-111 and clapboard with batt insulation and interior wainscoating. Exterior and interior finishes of the envelope were found to be in good condition and there are no recommendations to upgrade the building exterior.

#### 2.3.2. Roof

The truss roof of the Taylor Pavilion is finished with plywood sheathing and a built up asphalt roof with and aluminum silver coat utilized to reduce interior heat gain and to preserve the roof surface. The perimeter roof is an asphalt shingled mansard. The roof was installed approximately 16 years ago and found to be in good condition with some need of minor repairs and a recoating due to extreme exposures.

Category II Repair and Maintenance: Repair loose shingles on north Mansard section. Remove out of service exhaust fan above Leased Space. Also repair lifting flashing at sanitary vent

piping.



**2.3.3.Base**

The buildings' base is made up of original treated wood beams on pilings with 2 x 12 floor joist R-19 batt insulation, with tongue and groove flooring. Some evidence of missing or loose insulation were found.

Category II Repair and Maintenance: Repair loose insulation and install same in remaining non insulated area to insure uniform thermal barrier

**2.3.4.Windows**

The building has double-pane vinyl windows that are showing signs of failing.

Category II Repair and Maintenance: The Borough is in the process of repairing degassing windows on a rotating basis.

**2.3.5.Exterior doors**

There are three main entry areas that the Borough has been diligent in replacing with new exterior grade doors. The doors are vinyl clad with thermal, double pane windows. The doors were found to be in good condition

**2.3.6.Building air tightness**

The Taylor Pavilion, Borough operated section, was inspected and it was determined that the building air tightness was in fair condition. There were some indications of un-insulated ceiling and under floor areas, as well as a rather significant infiltration through the decommissioned exhaust fan above the Leased Space. In addition there were two openings between the Leased Space and the shared attic space. One in the business office, and the other above a general kitchen exhaust fan.

Category II Repair and Maintenance: It is recommended to remove the decommissioned exhaust fan and close off the existing duct and ceiling louvers or install new fan and replace existing louvers with a motorized damper to reduce infiltration. In addition, any area missing blown in insulation above the pavilion ceiling need to be in-filled. All missing insulation below the floor should also be installed.



*Decommissioned Exhaust Fan*



*Louver opens to roof*  
Belmar Borough- Taylor Pavilion



*Vent in Office open to attic (below)*

Exhaust fan open to attic (below)



## 2.4. HVAC systems

### 2.4.1. Heating

The heating system is made up of two gas-fired 120,000 Btu input Borg-Warner furnaces located within truss attic area, the heating units are controlled by two individual programmable stats. The space temperature is set at 60 Deg F during unoccupied periods. Distribution is through rigid and flex ductwork to ceiling registers.

The Leased space is heated by a 80 % efficient Modine 80,000 Btu output-gas fired heater with integral thermostat.

Category III Recommendation – ECM #2: Replace the current furnaces with high-efficiency modulating furnaces. Also, install a building automation system (BAS) for night setback control of the heating system.

### 2.4.2. Cooling

The building is not air conditioned.

### 2.4.3. Ventilation

Natural ventilation is provided by open windows, and restroom exhaust fans. General exhaust in the leased area has been decommissioned.

### 2.4.4. Domestic Hot Water

The Pavilion area water is heated by an AO Smith 15 gallon electric water heater model # ELSC 15917. (Pictured left)

Category I Recommendation-At the end of its useful life, the 15 gal. hot water heater should be converted to use natural gas

The leased area water is heated by an A.O.Smith 100 gallon gas-fired water heater model # FSG100224. (Pictured right)



## **2.5. Electrical systems**

### **2.5.1. Lighting**

A complete inventory of all interior, exterior, and exit sign light fixtures were examined and documented in Appendix A of this report including an estimated total lighting power consumption. There are some incandescent lamps and T12 lamps found during the audit that are recommended to be upgraded to more efficient lamps. Our initial findings indicate that performing a detailed lighting upgrade per the recommendations in Appendix A will result in an annual savings.

Category III Recommendation - ECM #2: 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

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

Refrigerators, microwaves, and other kitchen appliances in the Pavilion kitchen as well as the leased area restaurant all are listed in the equipment list. The kitchen equipment in the Borough operated section of the building is in good condition.

### **2.5.3. Elevators**

The building is a single story structure with no elevators.

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

There are no other major electrical systems in the building

### 3. EQUIPMENT LIST

TAYLOR PAVILION							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimate. Remaining Useful Life %
Heating	(2) Borg Warner gas fired furnaces 120,000 Btu input	Attic	M# PBCH LD20 NL20A, S# S0288SP04	Natural Gas	Main Room	1985	0%
Cooling	N/A	-	-	-	-	-	-
Domestic Hot water	(1) AO Smith - 15 Gallon 1500 watt /120v residential grade 6yr. warrantee	Storage Room off main floor	M# ELSC 15 917, S# G06J052149	Electric	(2) restrooms & kitchen	2006	69%
Appliance	Hoshizaki - Ice Maker	Storage Room off main floor	M# KM-515MRH 115v 20 A	Electric	Kitchen	-	-
Hand dryer (2)	Excel Dryer Inc. 120 v 1500 watt	Mens/ Ladies rooms	M# XL-W, S# 295906	Electric	Mens/ Ladies rooms	-	-
Appliance	GE Hot Point Refrigerator	Kitchen-	M# CTX-18EACGRAA, S# SV764025	Electric	Pavilion	2000	47%
Appliance	Tappan Stove	Kitchen-		Electric	Pavilion	-	-
Appliance	GE Microwave, 1.58 kW	Kitchen-	M# JVM-1640AB, S# MV955991S	Electric	Pavilion	1999	50%

Continued on next page

**ADJACENT LEASED AREA (Not included in Audit Scope)**

<b>Building System</b>	<b>Description</b>	<b>Locations</b>	<b>Model #</b>	<b>Fuel</b>	<b>Space Served</b>	<b>Estimate. Remaining Useful Life</b>
Heating	Modine Unit heater 100,000 Btuh input- 80,000 Btuh output	Main dining area.	PD 100AA0111	Natural Gas	Restaurant Dining Area	
Cooling						
Ventilation	Master Flow Exhaust Fan	Kitchen Ceiling	PG-2/CGM30	Electric	Kitchen area	-
Ventilation	Ceiling Fans (2)	Dining area Ceiling	-	-	-	-
Domestic Hot water	A.O. Smith 82 gallon - 80,000 Btuh 100 Deg Rise 81.9 Gal/hr.	Office closet	FSG 100 224	Gas	Restaurant	
Appliance	Custom Cool Reach in Freezer	Dinning area	GDF 2SC	Electric	To go products	-
Appliance	Master Bilt Refrigerator 208v 7.4 amp	Dinning area	IHC-27	Electric	Self Serv	-
Appliance	Cornelius Coca-Cola Machine	Dinning area	ED 175	Electric	Self Serv	-
Appliance	Auto Bar Controls- Ice Tea dispenser	Dinning area	WB RT 4N	Electric	Self Serv	-
Appliance	Bunn Coffee Maker 120v 14.9amp	Dinning area	CWTF-35	Electric	Self Serv	-
Appliance	Vitamin Water Reach in True Manufacturer 1/3 Hp 7.2 amp	Dinning area	GDM-26	Electric	Self Serv	-
Appliance	Vector Bug lamp	Kitchen	-	Electric	Kitchen	-
Appliance	Coca Cola Reach in True Manufacturer 1/2 Hp 10.2 amps	Kitchen	GDM 45	Electric	Kitchen	-
Appliance	Hobart Slicer 1/3 Hp 6.2 amps	Kitchen	1712	Electric	Kitchen	-
Appliance	True Refrigerator 1/3 Hp 7.4 Amps	Kitchen	TWT-27F	Electric	Kitchen	-
Appliance	Locwood Refrigerator	Kitchen	-	Electric	Kitchen	-
Appliance	Sunfire Stove/Oven 4 Burner 22,000 Btuh Ea. 25,000 Btuh Oven	Kitchen	SX-4-20	Gas	Kitchen	-
Appliance	Grill	Kitchen	TMDC (I) -24	Gas	Kitchen	-
Appliance	Star Manuf. Griddle 20,000 Btuh/ Burner	Kitchen	648TB	Gas	Kitchen	-
Appliance	Traulsen Cooler	Kitchen	-	-	-	-
Appliance	American Range Fryer 40,000 Btuh / Burner	Kitchen	AF-45	Gas	Kitchen	-

Appliance	Trystar Fryer 38,000 Btuh Ea.	Kitchen	-	-	-	-
Appliance	Vest frost 115v 5.5 Amp	Kitchen	IKG 203	Electric	Kitchen	-
Appliance	Heat Craft Walk in Box Evaporator 1/20 Hp	Kitchen	ADTO 52AJ	Electric	Kitchen	-
Appliance	Sandwich Prep	Kitchen	Delfield Refg.	Electric	Kitchen	-
Appliance	Beverage Aire	Kitchen	-	Electric	Kitchen	-
Appliance	Manitowoc Ice Inc. Ice Maker - 12.1 amps	Kitchen	QYO 804A	Electric	Kitchen	-

**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/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

- At the end of its useful life, the 15 gal. hot water heater should be converted to use natural gas
- Missing blown in insulation above the pavilion ceiling need to be infilled.
- Missing insulation below the floor should also be installed.

##### Category II Recommendations: Operations & Maintenance

- Repair loose shingles on north Mansard section.
- Repair lifting flashing at sanitary vent piping.
- Repair loose insulation
- Install same in remaining non insulated area to insure uniform thermal barrier.
- Repair degassing windows on a rotating basis.
- It is recommended to remove the decommissioned exhaust fan and close off the existing duct and ceiling louvers or install new fan and replace existing louvers with a motorized damper to reduce infiltration.

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

###### Summary table

ECM #	Description
1	Lighting Upgrades
2	Install High-Efficiency Furnaces & BAS
3	19.2-kW Roof-Mounted PV System

**ECM #1: Lighting Upgrades**

**Description:**

Lighting at the Taylor Pavilion consists primarily of T-12 fluorescent lamps with magnetic ballasts. The exterior was lit with compact fluorescent 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>	\$1,860.00	\$0.00	\$1,860.00
<b>Rebate</b>	\$360.00	\$0.00	\$360.00
<b>Net Cost</b>	\$1,500.00	\$0.00	<b>\$1,500.00</b>
<b>Savings</b>	\$245.84	\$0.00	<b>\$245.84</b>
<b>Payback</b>	6.1		<b>6.1</b>

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, \$	CO2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	\$1,860	\$360	\$1,500	1,366	0.00	0	0.81	\$0	\$246	15	\$2,893	6.10	619%	41%	14%	\$1,435	1,871

**Assumptions:**

The electric cost used in this ECM was \$0.18/kWh, which was the facilities’ average rate for the 12-month period ranging from October, 2008 through September, 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 \$360.

## ECM#2: Install High-Efficiency Furnaces & BAS

### Description:

Taylor Pavilion is heated by two 120-MBH, gas-fired furnaces, located in the attic. They have surpassed their 20-year useful life, and should be replaced. High-efficiency, modulating furnaces are now available, with efficiencies up to 95%. The current units are rated at 80% efficiency. The replacement units should be evaluated and resized to service the necessary heating load.

Additionally, the building's temperature control is by programmable thermostats. Do to irregular occupancy a simplified building automation system (BAS) would provide the ability to monitor and control the building's temperature and lighting controls remotely. The temperature would be adjusted automatically when the facility is not in use, and save energy by not causing excess heating to be used when the building is unoccupied.

### Installation cost:

Estimated installed cost: \$16,000 for each furnace, \$15,000 for the BAS, \$47,000 total

Source of cost estimate: Contractor

### 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
2	Install High-Efficiency Furnaces & BAS	Similar Projects	\$47,000	\$800	\$46,200	0	0.00	2,821	48.84	\$0	\$4,682	20	\$68,392	9.87	48%	2%	8%	\$9,699	33,003

### Assumptions:

The cost per therm of natural gas that was used, taken from twelve months of Taylor Pavilion's energy bills, was \$1.66. Also taken from the energy bills was the annual heating consumption for the two furnaces, the only gas-consuming units in the buildings, 5,248 therms. The proposed furnaces are 98% efficient; the current units, due to their age and condition, can be assumed to decrease by 10%, to 70%. The saving was calculated using the following series of equations:

Current gas input: 5,248 therms

Current/proposed gas output: 5,248 therms×70%=3,673 therms

Proposed gas input:  $\frac{3,673 \text{ therms}}{95\%}=3,867 \text{ therms}$

Savings: 5,248 therms-3,867 therms=2,101 therms

The savings for the BAS can now be calculated. For the heating season, the occupied and unoccupied temperatures were assumed to be 68°F and 60°F, respectively. There is no cooling system in the building. Using the gas bills, the total heating consumption was determined to be 5,248 therms of natural gas, which was 100% of Taylor Pavilion's natural gas consumption. The average hours of setback were estimated to be 8 hours every night and 2 hours every day. Due to the fact that the savings come from setting the temperature back, much like a programmable thermostat, the savings were calculated using Honeywell's Commercial Programmable Thermostat Energy Savings Calculator, an Excel spreadsheet, which assumes 3% savings per degree of setback for the heating season, and 6% for the cooling season.

**Rebates/financial incentives:**

This ECM is eligible for New Jersey's SmartStart Rebate, which pays up to \$400 for each furnace, or \$800 for this measure.

### ECM #3: 19.2-kW Roof-Mounted PV System

#### Description:

Currently, Taylor Pavilion does not use any renewable energy systems. Renewable energy systems, such as photovoltaic panels, can be mounted on the roof of the facility and can offset a significant portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc. being used within the region, demand charges go up to offset the utility’s cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building’s electrical demand, resulting in a higher cost savings as well. SWA/BSG-PMK presents the economics of installing a 19.2-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 96 commercial multi-crystalline, 200 watt panels would generate 20,417 kWh of electricity per year, or 99.0% of the Taylor Pavilion’s annual electric consumption.

#### Installation cost:

Estimated installed cost: \$124,800; SREC revenue included in “Total 1<sup>st</sup> Year Savings”  
 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, \$	CO2 Reduced, lbs/yr
3	19.2-kW Roof-Mounted PV System	Similar Projects	\$124,800	\$0	\$124,800	20,417	0.00	0	12.06	\$0	\$12,884	30	\$246,118	9.69	324%	11%	10%	\$127,723	27,971

#### Assumptions:

Cost of installation was estimated, using data from similar projects, at \$7,000 per kW. Annual energy savings were calculated via “PV Watts”, an online tool on the website of the National Renewable Energy Laboratory.

**Rebates/financial incentives:**

This ECM is eligible for New Jersey's Solar Renewable Energy Certificates (SREC). SRECs are marketable certificates issued to the owner of a PV system for each 1,000 kWh (1MWh) of electricity generated. SRECs are sold or traded separately from the power generated; the income from the sale of the SREC can be used to offset the cost of the system by applying the revenue to a loan payment or debt service. The value of the SREC is market driven, and is controlled by the amount of the Solar Alternative Compliance Payment (SACP) which is set by the NJBPU. The SREC market is derived from New Jersey's Renewable Portfolio Standard (RPS), which requires that all licensed energy suppliers in the state invest in energy generated from renewable sources, with specific requirements for solar power. If a supplier does not invest by purchasing SRECs, the supplier must pay the SACP for a percentage of the total annual power produced. Since SRECs typically trade just below the SACP, there is an incentive for the supplier to buy SRECs. The SREC Program provides a market for SRECs to be created and verified on the owner's behalf. The New Jersey Clean Energy program facilitates the sale of SRECs to New Jersey electric suppliers. PV system owners in New Jersey with a grid-connected PV system are eligible to participate in New Jersey's SREC Program.

The NJBPU has stated its intention to continue to operate a program of rebates and SRECs. On September 12, 2007, the NJBPU approved an SREC only pilot incentive program. The program set the SACP at an initial value of \$711, decreasing annually for an eight (8) year period. SRECs would be generated for fifteen (15) years (referred to as the Qualification Life), and have a two (2) year trading life. The NJBPU believes that to achieve an internal rate of return of twelve (12) percent, the target SREC price would be \$611, reducing by three (3) percent per year for the same eight (8) year period that the SACP is set.

BSG-PMK/SWA has reviewed several funding options for the purposes of subsidizing the costs for installing the energy conservation measures noted within this report.

Although funding options are constantly changing and updating this project may benefit from enrolling in a number of alternative programs such as the; The NJ SmartStart program with Technical Assistance, alternate funding by applying for financing and competitive grants through the United States Department of Energy as well as local utility incentive programs in an effort to offset a portion of the cost of ECM implementation.

The Smart Start program offers reimbursement incentives for various equipment purchases, and lighting incentives. The benefits and requirements of this program can be found at:

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

Financial assistance is also available through the United States Department of Energy in the form of; Grants, Cooperative Research and development agreements, small business innovation research, and Loan Guarantee Programs. Further information for these programs is available at:

[http://www1.eere.energy.gov/financing/types\\_assistance.html](http://www1.eere.energy.gov/financing/types_assistance.html)

Local Utility incentives such as a Direct Install Program, offer incentives that can provide up to 80% subsidy of the cost to install particular ECM's. As each utility company has different guidelines and incentives it is important to contact your local utility authority for eligibility in these programs.

Additional funding may also be found through the following funding methods:

- Energy Savings Improvement Program (ESIP) – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements.
- Municipal Bonds – Municipal bonds are a bond issued by a city or other local government, or their agencies. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.
- Power Purchase Agreement – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as “power purchase agreements.” These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system.

BSG-PMK/SWA recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

## 5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

### 5.1. Existing systems

There are currently no existing renewable energy systems.

### 5.2. Solar Photovoltaic

As a result of our study, the roof of the Taylor Pavilion building has been identified as conducive for the application of a Photovoltaic (PV) system.

Based on the goal of generating as much of the building's electric load as possible utilizing renewable energy while meeting the limitations of usable space available, a PV system with a design capacity of 19.2 kW was selected. The total annual generating capacity of the system is 20,417 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).



Station Identification		Results			
City:	Atlantic_City	Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Energy Value (\$)
State:	New_Jersey	1	2.09	905	162.90
Latitude:	39.45° N	2	2.87	1170	210.60
Longitude:	74.57° W	3	3.95	1780	320.40
Elevation:	20 m	4	4.95	2119	381.42
PV System Specifications		5	5.73	2490	448.20
DC Rating:	19.2 kW	6	6.09	2458	442.44
DC to AC Derate Factor:	0.770	7	5.97	2461	442.98
AC Rating:	14.8 kW	8	5.32	2210	397.80
Array Type:	Fixed Tilt	9	4.48	1820	327.60
Array Tilt:	0.0°	10	3.28	1380	248.40
Array Azimuth:	195.0°	11	2.20	888	159.84
Energy Specifications		12	1.80	735	132.30
Cost of Electricity:	18.0 ¢/kWh	Year	4.07	20417	3675.06

This proposed PV system would include 96 flat, crystalline PV modules installed on the roof. The system is based on commonly used 200 Watt PV modules, and one (1) inverter for conversion to AC power.

The proposed system would generate approximately 99 percent of the electric power consumed annually by the Taylor Pavilion building. It is noted this system would supplement the utility power supply since PV electricity production is based on weather and the system size is limited to 99 percent.

The estimated cost of construction would be approximately \$124,800 for this system. The approximate annual savings would be \$12,884, which would make the approximate payback 8.2 years

<b>PV System – Taylor Pavilion</b>		
	<b>Savings</b>	<b>Cost</b>
<b>Estimated Cost Of Construction</b>		\$124,800
<b>REIP Incentive</b>		-\$19,200
<b>Township Investment</b>		\$105,600
<b>First Year Electric Energy Savings</b>	\$3,675	
<b>Estimated Annual SREC Revenue</b>	\$10,209	
<b>Annual Maintenance</b>		\$1,000
<b>First Year Savings</b>	\$12,884	
<b>Simple Payback Analysis</b>	Approximately 8 Years	

If the Client is interested in moving forward, a structural analysis of the roofs must be performed to confirm they will support the addition of PV modules.

### 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.

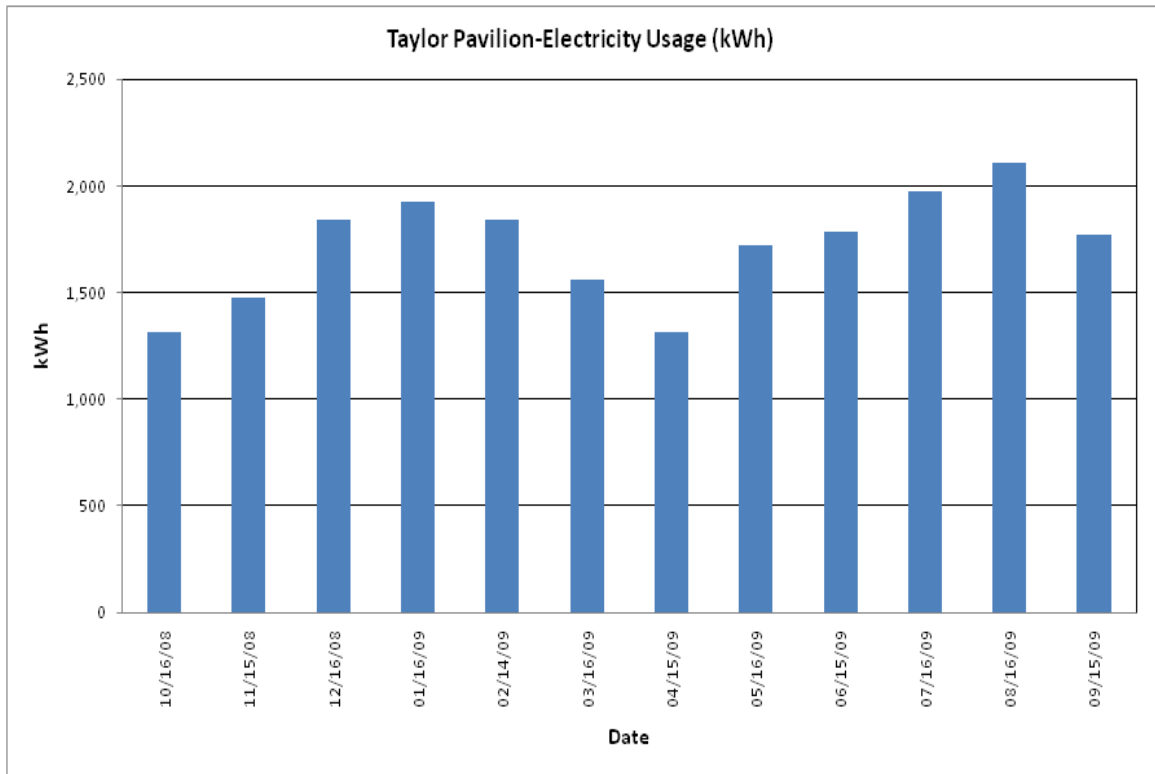
### 5.6. Wind

Wind power production is not appropriate for this location because of permitting, zoning, and probable citizen opposition.

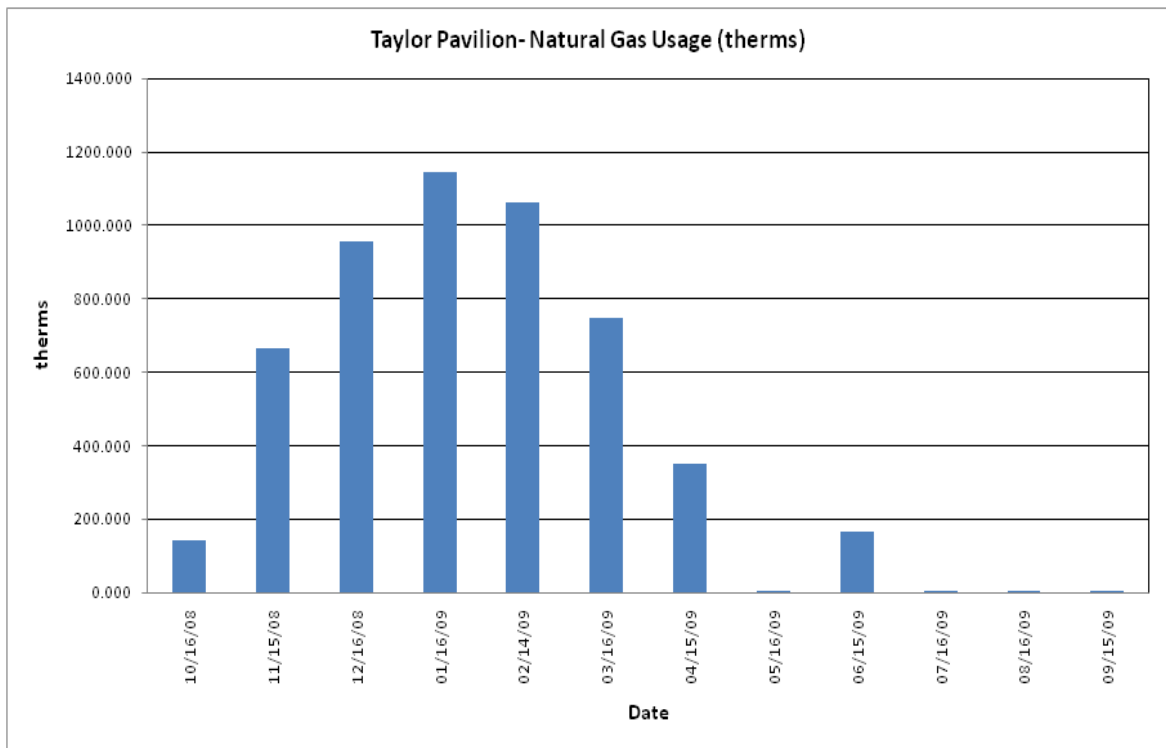
## 6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

### 6.1. Load profiles

The electrical demand for the Taylor Pavilion was absent from the previous year’s utility consumption data. The average electrical peak demand and the maximum peak demand remain unknown at the time of this energy audit. The electric and gas load profiles for this project are presented in the following charts. The two charts below show electric and gas usage (in kWh and therms, respectively) for the previous 12 months.



The increased usage in the winter months is likely attributed to the electric hot water heater. The electric hot water heater is located in the storage room which has no heating, the water heater is working over time to reheat and maintain temperature.



The natural gas usage chart shows the highest usage in the winter, therefore it can be concluded that natural gas is used primarily for heating the building. The spike in usage in June can be attributed to a probable meter reading estimate.

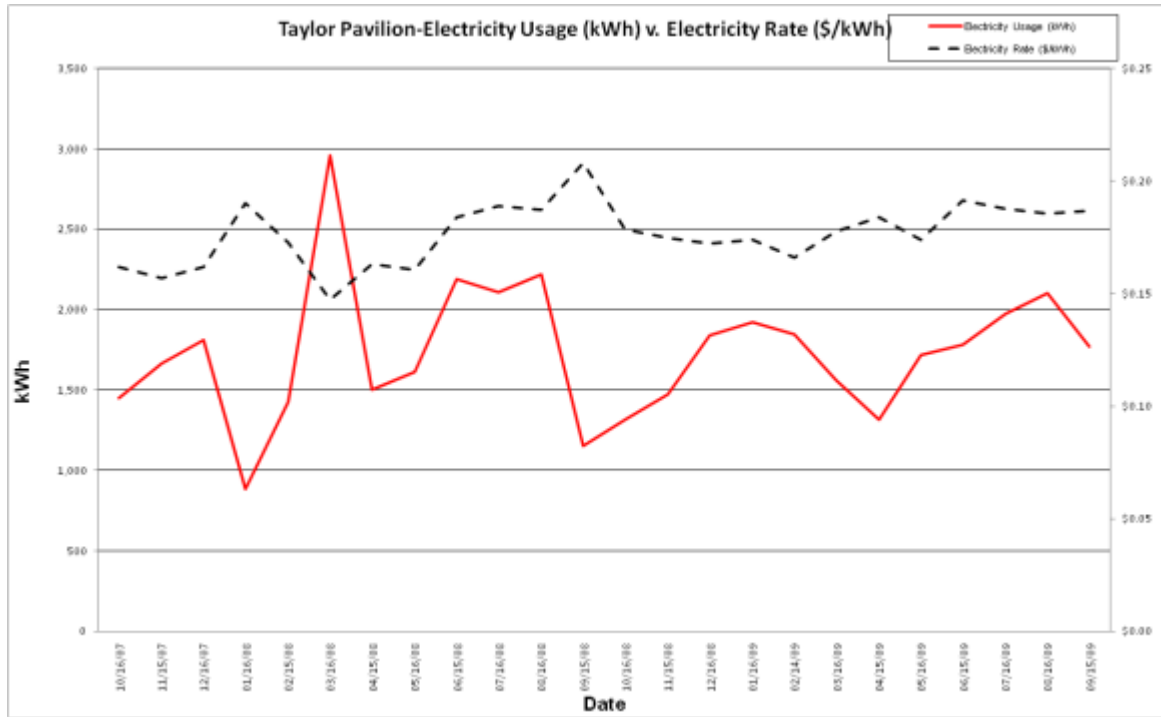
## 6.2. Energy Procurement strategies

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.

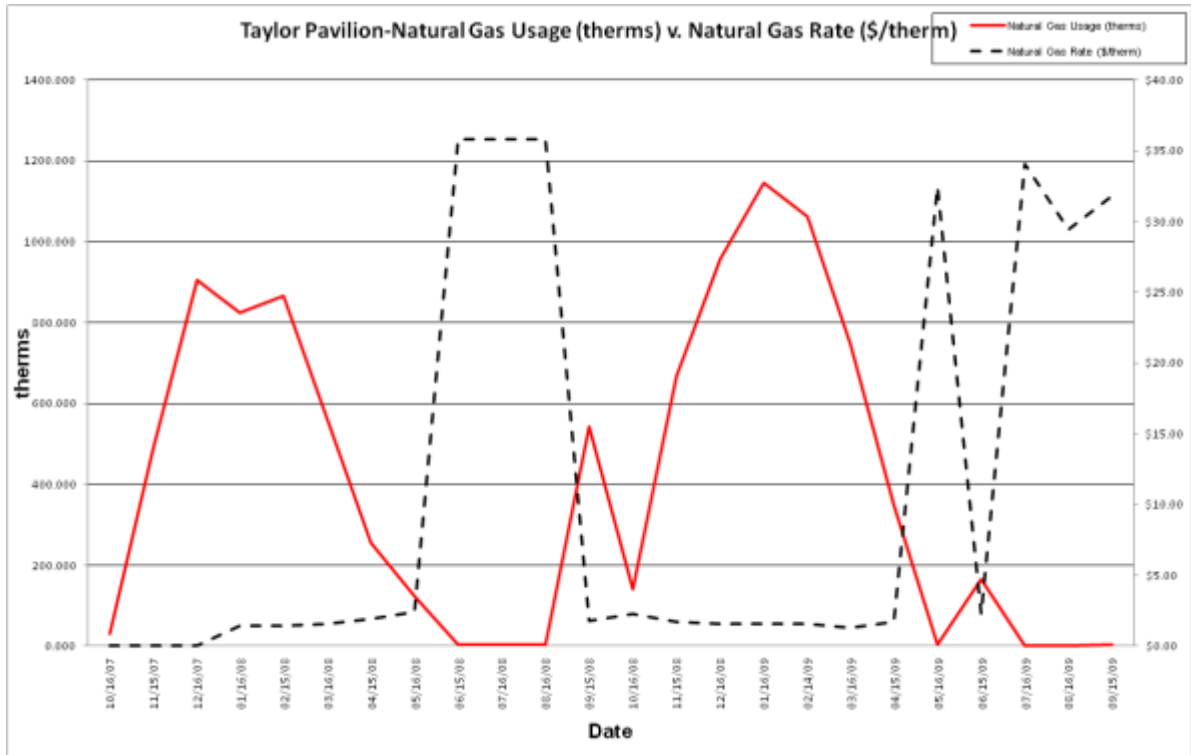
Buildings which have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier who can provide them with fixed pricing over the course of a contract term as well as attain purchasing economies which may not be available on a utilities default tariff (basic generation service in the case of electric and basic gas service in the case of natural gas).

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.

Using an average of \$0.15/kWh the Borough could save approximately \$606 on their Taylor Pavilion electric bills by switching to a third party supplier. The Borough already purchases natural gas from a third party supplier, but the Borough could investigate prices from another third party supplier, because the current rate of \$1.66/therm is well above the average rate of \$1.55/therm . The Borough could save approximately \$601 on their natural gas bills for the Taylor Pavilion. 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.***

# LIGHTING ANALYSIS

Borough of Belmar  
Taylor Pavillion  
500 Ocean Ave, Belmar, NJ



Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade (\$)	SmartStart Rebate per Upgrade
1	(2) 34W T12 Lamps, Magnetic Ballast / Retrofit with (2) 28W T8 Lamps, Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	23	\$70.00	\$15.00
2	(2) 8' T12 Lamp, Magnetic Ballast / Retrofit with (2) 8' T8 Lamp, Electronic Ballast	2L8' EE/STD	138	2L8' T8/ELEC	118	1	\$80.00	\$15.00
3	(2) 8' T8 Lamps, Electronic Ballasts / No Upgrade	2L8' T8/ELEC	118	2L8' T8/ELEC	118	2	\$0.00	\$0.00
4	15W Compact Fluorecent / No Upgrade	15W CF	15	15W CF	15	2	\$0.00	\$0.00
5	75W Incandescent / Replace with 27W Compact Fluorecent	75W INCANDESCENT	75	27W CF	27	3	\$10.00	\$0.00
6	60W Incandescent Lamp / Replace with 23W Compact Fluorecent	60W INCANDESCENT	60	23W CF	23	2	\$10.00	\$0.00
7	Exit Incandescent	15W EXIT	15	LED	2	3	\$40.00	\$0.00
8	44W Compact Fluorescent Lamp / No Upgrade	44W CF/SI	44	No Upgrade	44	27	\$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	\$1,860.00	\$0.00	\$1,860.00
Rebate	\$360.00	\$0.00	\$360.00
Net Cost	\$1,500.00	\$0.00	\$1,500.00
Savings	\$245.84	\$0.00	\$245.84
Payback	6.1		6.1

## Variables:

\$0.18	Avg. Electric Rate (\$/kWh)
	Avg. Demand Rate (\$/kW)
2080	Operating Hours/Year
8	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)	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	SmartStart Rebate Lighting	SmartStart Rebate Sensors	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)
<b>Totals:</b>							3822			3108	0.714	1366	\$1,860.00	\$245.84	7.6	0	\$0.00	\$0.00		\$360.00	\$0.00	1366	\$1,500.00	\$245.84	6.1	
1	1	Community Space	8	2080	2L4' EE/STD	20	1600		2L4' T8/ELEC	20	1220	0.38	790	\$1,400.00	\$142.27	9.8	0	0	\$0.00		\$300	\$0	790	\$1,100.00	\$142.27	7.7
2	2	Storage area	3	780	2L8' EE/STD	1	138		2L8' T8/ELEC	1	118	0.02	16	\$80.00	\$2.81	28.5	0	0	\$0.00		\$15	\$0	16	\$65.00	\$2.81	23.1
3	3	Kitchen	5	1300	2L8' T8/ELEC	2	236		2L8' T8/ELEC	2	236	0	0	\$0.00	\$0.00		0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	
4	4	Restroom	4	1040	15W CF	2	30		15W CF	2	30	0	0	\$0.00	\$0.00		0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	
5	5	Attic	1	260	75W INCANDESCENT	3	225		27W CF	3	81	0.144	37	\$30.00	\$6.74	4.5	0	0	\$0.00		\$0	\$0	37	\$30.00	\$6.74	4.5
6	6	Restroom	4	1040	60W INCANDESCENT	2	120		23W CF	2	46	0.074	77	\$20.00	\$13.85	1.4	0	0	\$0.00		\$0	\$0	77	\$20.00	\$13.85	1.4
7	1	Beachbadge Office	7	1820	2L4' EE/STD	3	240		2L4' T8/ELEC	3	183	0.057	104	\$210.00	\$18.67	11.2	0	0	\$0.00		\$45	\$0	104	\$165.00	\$18.67	8.8
8	7	Exit Signs	24	8760	15W EXIT	3	45		LED	3	6	0.039	342	\$120.00	\$61.50	2.0	0	0	\$0.00		\$0	\$0	342	\$120.00	\$61.50	2.0
9	8	Exterior Lights	22	5720	44W CF/SI	27	1188		No Upgrade	27	1188	0	0	\$0.00	\$0.00		0	0	\$0.00		\$0	\$0	0	\$0.00	\$0.00	

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

**JCP&L SERVICE TERRITORY**

**Last Updated: 12/09/09**

**\*CUSTOMER CLASS - R – RESIDENTIAL C – COMMERCIAL I -INDUSTRIAL**

<b>Supplier</b>	<b>Telephone &amp; Web Site</b>	<b>*Customer Class</b>
<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>C ACTIVE</b>
<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>C/I ACTIVE</b>
<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>C/I ACTIVE</b>
<b>FirstEnergy Solutions Corp.</b> 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 <a href="http://www.fes.com">www.fes.com</a>	<b>C/I ACTIVE</b>
<b>Glacial Energy of New Jersey, Inc.</b> 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 <a href="http://www.glacialenergy.com">www.glacialenergy.com</a>	<b>C/I ACTIVE</b>
<b>Hess Corporation</b> 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 <a href="http://www.hess.com">www.hess.com</a>	<b>C/I ACTIVE</b>
<b>Integrays Energy Services, Inc.</b> 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 <a href="http://www.integraysenergy.com">www.integraysenergy.com</a>	<b>C/I ACTIVE</b>
<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>C/I ACTIVE</b>

<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>	C/I ACTIVE
<b>Linde Energy Services</b> 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 <a href="http://www.linde.com">www.linde.com</a>	C/I ACTIVE
<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>	C/I ACTIVE
<b>Pepco Energy Services, Inc.</b> 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) <a href="http://www.pepco-services.com">www.pepco-services.com</a>	C/I ACTIVE
<b>PPL EnergyPlus, LLC</b> 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a>	C/I ACTIVE
<b>Sempra Energy Solutions</b> The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 <a href="http://www.semprasolutions.com">www.semprasolutions.com</a>	C/I ACTIVE
<b>South Jersey Energy Company</b> One South Jersey Plaza Route 54 Folsom, NJ 08037	(800) 800-756-3749 <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a>	C/I ACTIVE
<b>Suez Energy Resources NA, Inc.</b> 333 Thornall Street 6th Floor Edison, NJ 08837	(888) 644-1014 <a href="http://www.suezenergyresources.com">www.suezenergyresources.com</a>	C/I ACTIVE
<b>UGI Energy Services, Inc.</b> 704 East Main Street Suite 1 Moorestown, NJ 08057	(856) 273-9995 <a href="http://www.ugienergyservices.com">www.ugienergyservices.com</a>	C/I ACTIVE

**NJ NATURAL GAS CO. SERVICE TERRITORY**

Last Updated: 12/09/09

\*CUSTOMER CLASS - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL

Supplier	Telephone & Web Site	*Customer Class
<b>Cooperative Industries</b> 412-420 Washington Avenue Belleville, NJ 07109	800-6-BUYGAS (6-289427) <a href="http://www.cooperativenet.com">www.cooperativenet.com</a>	C/I ACTIVE
<b>Direct Energy Services, LLP</b> 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-547-2722 <a href="http://www.directenergy.com">www.directenergy.com</a>	R/C/I INACTIVE
<b>Gateway Energy Services Corp.</b> 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 <a href="http://www.gesc.com">www.gesc.com</a>	R/C/I ACTIVE
<b>UGI Energy Services, Inc. d/b/a/ GASMAR</b> 704 East Main Street, Suite 1 Moorestown, NJ 08057	856-273-9995 <a href="http://www.ugienergyservices.com">www.ugienergyservices.com</a>	C/I ACTIVE
<b>Hess Energy, Inc.</b> One Hess Plaza Woodbridge, NJ 07095	800-437-7872 <a href="http://www.hess.com">www.hess.com</a>	C/I ACTIVE
<b>Intelligent Energy</b> 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-724-1880 <a href="http://www.intelligentenergy.org">www.intelligentenergy.org</a>	R/C/I ACTIVE
<b>Metromedia Energy, Inc.</b> 6 Industrial Way Eatontown, NJ 07724	877-750-7046 <a href="http://www.metromediaenergy.com">www.metromediaenergy.com</a>	C/I ACTIVE
<b>MxEnergy, Inc.</b> 510 Thornall Street, Suite 270 Edison, NJ 08837	800-375-1277 <a href="http://www.mxenergy.com">www.mxenergy.com</a>	R/C/I ACTIVE
<b>NATGASCO (Mitchell Supreme)</b> 532 Freeman Street Orange, NJ 07050	800-840-4GAS <a href="http://www.natgasco.com">www.natgasco.com</a>	C ACTIVE
<b>NJ Gas &amp; Electric</b> 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	866-568-0290 <a href="http://www.NewJerseyGasElectric.com">www.NewJerseyGasElectric.com</a>	R/C ACTIVE

<b>Palmco Energy 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>C/I ACTIVE</b>
<b>Pepco Energy Services, Inc.</b> 112 Main Street Lebanon, NJ 08833	800-363-7499 <a href="http://www.pepco-services.com">www.pepco-services.com</a>	<b>C/I ACTIVE</b>
<b>PPL EnergyPlus, LLC</b> 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a>	<b>C/I ACTIVE</b>
<b>South Jersey Energy Company</b> One South Jersey Plaza, Route 54 Folsom, NJ 08037	800-756-3749 <a href="http://www.sjindustries.com/sje.htm">www.sjindustries.com/sje.htm</a>	<b>R/C/I ACTIVE</b>
<b>Sprague Energy Corp.</b> 12 Ridge Road Chatham Township, NJ 07928	800-225-1560 <a href="http://www.spragueenergy.com">www.spragueenergy.com</a>	<b>C/I ACTIVE</b>
<b>Woodruff Energy</b> 73 Water Street Bridgeton, NJ 08302	800-557-1121 <a href="http://www.woodruffenergy.com">www.woodruffenergy.com</a>	<b>R/C/I ACTIVE</b>

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