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January 20, 2010

Local Government Energy Program
Final Energy Audit Report

For

Wall Township
Department of Public Works
2301 Tiltons Corner Road
Wall Township, NJ 08736

Project Number: LGEA33

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INTRODUCTION

On October 22, 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 Public Works buildings located in Wall, New Jersey. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Department of Public Works facility, built in 1966, consists 32,520 square feet of office/garage space. It serves as office space or hub for approximately 71 township employees and a storage place for public work vehicles. The facility is in operation approximately 40 hours per week.

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 building.

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

EXECUTIVE SUMMARY

This document contains the energy audit report for the Public Works building located at 2301 Tiltons Corner Road, Wall, New Jersey 08736.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG-PMK staff on October 22, 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 – September, 2009), the building consumed 89,600 kWh or $15,754 worth of electricity and 8,364 therms or $13,430 worth of natural gas. The average aggregated cost of electricity was calculated to be $0.18/kWh and the average aggregated cost of natural gas was calculated to be $1.61/therm. With electricity and fossil fuel combined, the building consumed 1,142 MMBtus of energy at a total cost of $29,184. There is a potential cost savings of $501 per year on the natural gas bill and $2,688 per year on the electric bill by selecting a third party supplier.

In order to compare commercial buildings energy use equitably, the U.S. Environmental Protection Agency's (EPA) Energy Star *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 35 kBtu/sq.ft/year. It should be noted, however, that virtually all of the energy usage came from the main building, as the satellite garage contained only a small number of lighting fixtures and no heating or cooling systems. 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.

(Refer to Section 1.3 for Energy Star Rating)

Category I Recommendations: Capital Improvements

1) In the main DPW building, there are 9 12'x12' garage doors that are not insulated. The cumulative thermal resistance for these doors is less than 1 $\frac{\text{Btu}}{(\text{hr}\times\text{ft}^2\times^\circ\text{F})}$. A 2"-thick polystyrene-insulated door has a cumulative thermal resistance more than 10 times that amount. The 9 insulated doors would save a total of over $400 per year in heating costs and would reduce the amount of warm air leaving the building, making the air temperature more comfortable for the employees.

Category II Recommendations: Operations & Maintenance

1) All sink faucets and toilets should be converted to low-flow unit. Low-flow toilets use 1.6 gallons per flush, compared to 3.5 for standard units. These low-flow units cost approximately $1,700, and reduce water consumption by these units by 54%. Water consumptions for different types of faucets vary; low-flow commercial bathroom faucets, for example, are available at 2.75 gallons per minute and lower.
2) The exterior doors to the building need to be re-weather-stripped as necessary.
3) ECM #1, which calls for replacements for the window air-conditioners in the main DPW building, can be implemented by the maintenance staff. The two units can be replaced for about $500, and will pay for themselves in less than 3 years.

Category III Recommendations: Energy Conservation Measures (ECMs)

At this time, SWA/BSG-PMK highly recommends a total of five (5) Energy Conservation Measures (ECMs) for the DPW building that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **$504,289**. SWA/BSG-PMK estimates a first year savings of **$57,352** with a simple payback of **8.8 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the DPW building by **157,686 lbs of CO_2**, which is equivalent to removing approximately 13 cars from the roads each year. SWA/BSG-PMK also recommends that Wall Township contacts third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, it may be possible to save up to $0.03/kWh, which would have equated to $2,680 for the past 12 months.

There are various incentives that the Township of Wall 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 DPW in the previous year was 39.7 kW.

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, 1 st Yr Savings	kW, Demand Reduction/Mo	Therms, 1 st Yr Savings	kBtu/sq ft, 1 st Yr Savings	Est. Operating Cost, 1 st Yr Savings, $	Total 1 st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Window Air-Conditioner Replacements	Manufacturer	$900	$0	$900	1,127	0.4	0	0.12	$0.00	$212.37	10	$1,793	4.24	99%	10%	20%	$912	1,544
TOTAL			$900	$0	$900	1,127	0.4	0	0.12	$0.00	$212	-	$1,793	4.24	-	-	-	$912	1,544

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1 st Yr Savings	kW, Demand Reduction/Mo	Therms, 1 st Yr Savings	kBtu/sq ft, 1 st Yr Savings	Est. Operating Cost, 1 st Yr Savings, $	Total 1 st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Lighting Upgrades	Similar Projects	$22,826	$1,530	$21,296	20,511	7.6	0	2.15	$0.00	$3,606	15	$42,430	5.91	99%	7%	15%	$21,751	28,100
	Sensor Installations		$2,320	$250	$2,070	4,412	1.6	0	0.46	$0.00	$776	10	$6,549	2.67	216%	22%	36%	$4,546	6,044
3	69.6-kW Roof-Mounted PV System	Similar Projects	$452,400	$0	$452,400	74,903	27.9	0	7.86	$13,167.95	$50,119	30	$481,784	9.03	6%	0%	8%	$246,822	102,617
TOTAL			$477,546	$1,780	$475,766	99,826	37.2	0	10.47	$13,167.95	$54,501	-	$530,763	8.73	-	-	-	$273,118	136,761

Table 3 - Recommended Extended-Payback ECMs																			
ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1 st Yr Savings	kW, Demand Reduction/Mo	Therms, 1 st Yr Savings	kBtu/sq ft, 1 st Yr Savings	Est. Operating Cost, 1 st Yr Savings, $	Total 1 st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
4	Window Upgrades	Similar Projects	$25,048	$0	$25,048	0	0.0	1,513	4.65	$0.00	$2,437	35	$50,859	10.28	103%	3%	9%	$27,307	17,707
5	Convert Domestic Water Heater to Natural Gas	Similar Projects	$2,625	$50	$2,575	2,189	0.8	-113	-0.12	$0.00	$202	13	$2,126	12.72	-17%	-1%	0%	-$422	1,674
TOTAL			$27,673	$50	$27,623	2,189	0.8	1,400	4.54	$0.00	$2,639	-	$52,985	10.47	-	-	-	$26,885	19,380
			$506,119	$1,830	$504,289						$57,352								

ROI: Return on Investment (%)

Assumptions:

Discount rate:	3.2%	per DOE FEMP guidelines	Electricity rate:	$0.18	$/kWh (Entire Year)
Energy price escalation rate:	0%	per DOE FEMP guidelines		$0.19	$/kWh (Cooling Season Only)
			Gas rate:	$1.61	$/therm (Entire Year)
			Area of Building (SF)	32,520	

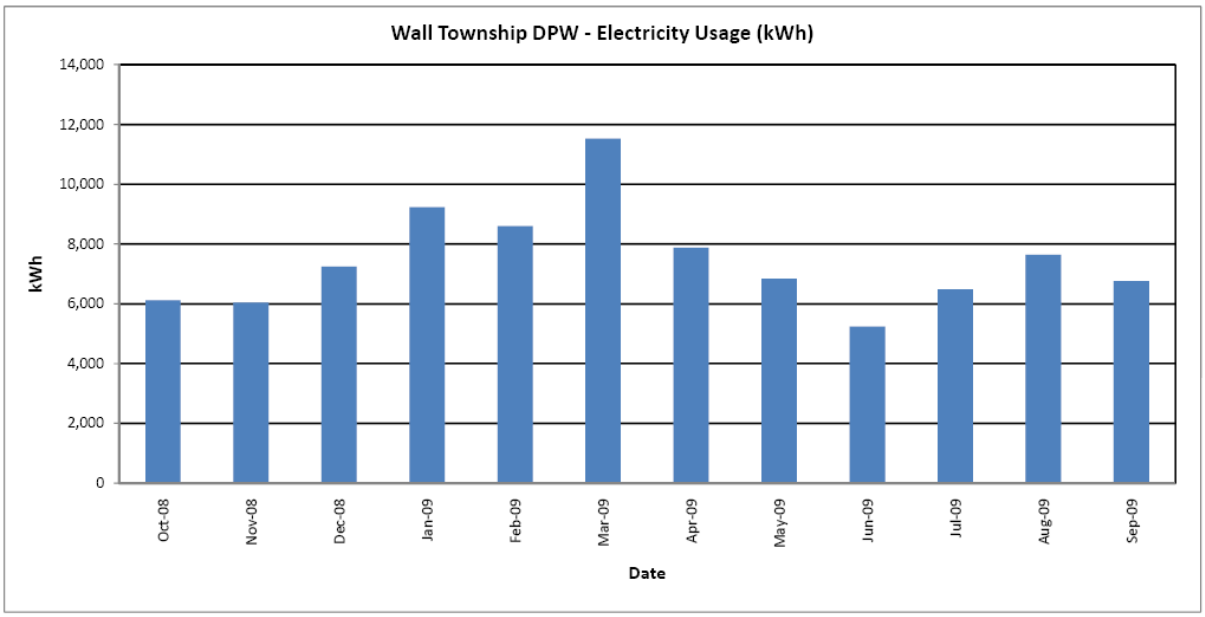
HISTORIC ENERGY CONSUMPTION

1.1. Energy usage and cost analysis

SWA/BSG-PMK analyzed utility bills from October, 2008 through September, 2009 that were received from the utility companies supplying the DPW building with electric and natural gas.

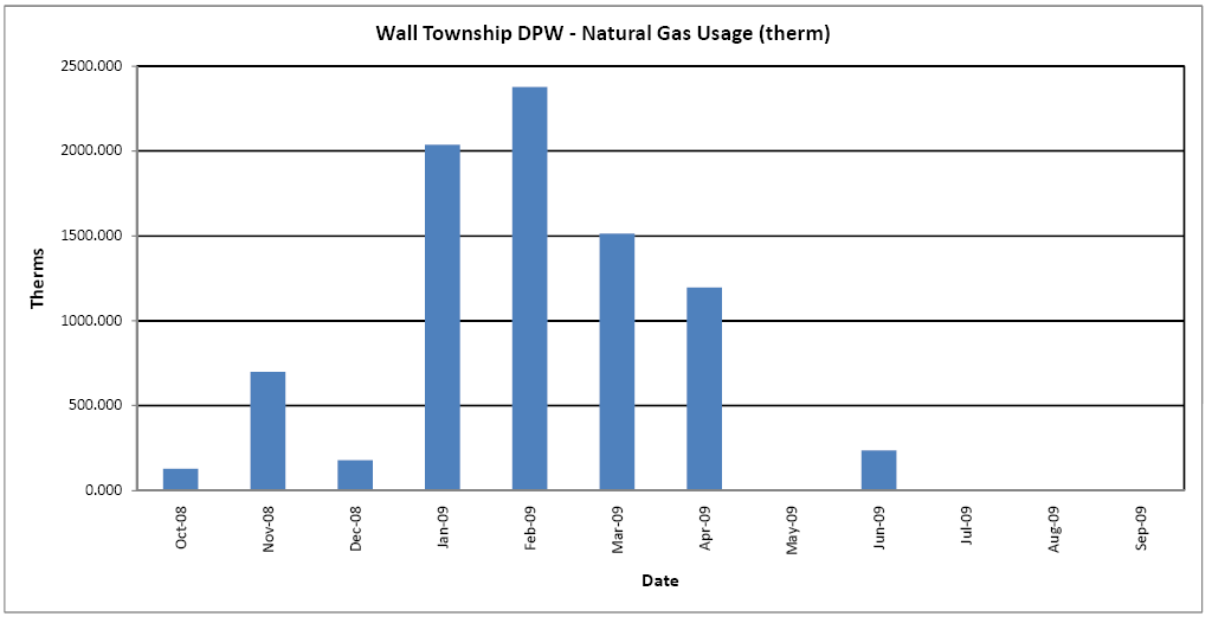
Electricity - The Public Works buildings are currently served by one electric meter. The Public Works buildings currently buy electricity from Jersey Central Power & Light at **an average rate of $0.18/kWh** based on 12 months of utility bills from October 2008 to September 2009. The Public Works buildings purchased **approximately 89,600 kWh or $15,754 worth of electricity** in the previous year. The average monthly demand was 33.41 kW.

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



Natural gas - The Public Works buildings are currently served by one meter for natural gas. The Public Works buildings currently buy natural gas from New Jersey Natural Gas at **an average aggregated rate of $1.61/therm** based on 12 months of utility bills for October 2008 to September 2009. The Public Works buildings purchased **approximately 8,364 therms or $13,430 worth of natural gas** in the previous year.

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



1.2. Utility rate

The Public Works buildings currently purchase 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 Public Works buildings currently purchase natural gas supply from New Jersey Natural Gas at an average aggregated rate of $1.61/therm based on 12 months of utility bills for October, 2008 through September, 2009.

Some of the minor 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 Township of Wall maintain the Portfolio Manager account at the link below. As the account is maintained, SWA/BSG-PMK can share with the Township of Wall 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

Username: *WallTownship* **Password:** *walltownship*

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 of Wall 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 35 kBtu/ft^{2}yr compared to the national average of a Service Garage consuming 77 kBtu/ft^{2}yr. Implementing this report's recommendations will reduce use by approximately 15.1 kBtu/ft^{2}yr, which when implemented would lower the buildings energy consumption.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Public Works

Building ID: 1967790
For 12-month Period Ending: September 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: January 06, 2010

Facility
Public Works
Tiltons Corner Road
Wall, NJ 07719

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1966
Gross Floor Area (ft²): 32,520

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	305,715
Natural Gas (kBtu)[4]	836,434
Total Energy (kBtu)	1,142,149

Energy Intensity[5]	
Site (kBtu/ft²/yr)	35
Source (kBtu/ft²/yr)	58

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	91

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	-61%
Building Type	Service (Vehicle Repair/Service, Postal Service)

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Public Works facilities, built in approximately 1966, consist of 32,520 square feet of office/garage space. There are two buildings, the main building and a satellite garage. The buildings are in good condition.

2.2. Building occupancy profiles

The Public Works facilities serve as office space or hub for approximately 71 township employees and a storage place for public work vehicles. The facility is in operation approximately 40 hours per week.

2.3. Building envelope

2.3.1. Exterior walls

The exterior walls of the main facility were constructed from concrete block. The walls of the satellite garage consisted of poured concrete foundation wall with butler building upper section and metal roof.

2.3.2. Roof

The main facility has a flat EPDM roof with mechanically-fastened ISO board. The satellite garage has a pitched roof, with standing-seam metal roofing. The roof appeared to be in good condition, with no visible leaks and no problems noted by employees.

2.3.3. Base

The buildings' bases are concrete slab-on grade. No water seepage through the slab was detected nor was the slab cracked or damaged. The foundations of these buildings are in good condition.

2.3.4. Windows

Most windows are ¼"-thick single-pane, without thermal breaks with exception to three that have been upgraded. There were no windows in the satellite garage.

Category III Recommendations: ECM #4: Recommends replacing all single-pane units with energy-saving, thermal-pane windows.

2.3.5. Exterior doors

Garage doors are new, but are not insulated. The cumulative thermal resistance of the doors is about 0.9 $\frac{Btu}{(hr \times ft^2 \times ^\circ F)}$, most of which is simply the inside and outside air films. There are a few exterior 3'x7' doors, all of which provide ample insulation. The doors are in good condition.

Category I Recommendations: Capital Investments #1: Recommends that all garage doors in the main building be replaced with insulated ones.

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

2.3.6. Building air tightness

Due to the nature of the use of these buildings, the garage and bay doors are constantly being opened and closed. This does not force the issue of wasted energy in the satellite garage, as there are no heating or cooling systems of any kind. In the main facility, this does not cause a loss of energy in the summer, as there are no cooling systems, with the exception of a couple window air-conditioners in a couple offices. The garage doors allow a large amount of heat to escape in the winter. Most of the windows are single-pane, allowing for additional heat loss.

2.4. HVAC systems

2.4.1. Heating

The main building's heating system consists of gas radiant heat. The garage is heated by six gas infrared heating tubes and two high-intensity Reznor gas infrared heaters. The specifications for these units could not be located.

2.4.2. Cooling

The garage is not air-conditioned; instead, it is cooled by a series of fans high on the walls. Two offices are cooled by small, old window air-conditioners, the models and specifications of which could not be found. Based on the characteristics of these units, they were each determined to be about 8,000 BTUs.

Category III Recommendations: ECM #1: Recommends that the window air-conditioners be replaced with units with a high-SEER value.

2.4.3. Ventilation

Ventilation is provided by large windows and garage doors, which are open quite frequently. There are six exhaust fans on the roof of the main building, and the garage has five blowers along the roof's peak that provide ventilation to the building. At the time of the audit the fans and blowers were found to be in good condition.

2.4.4. Domestic Hot Water

Water, for the sinks in the main building, is heated by a Rheem Rheemglas Fury water heater with model # 82V30-2. It was installed in 2004 and has a capacity of 30 gallons. It is an electric unit, with a heating capacity of 4.5 kW. It is in fair condition, but it would be more energy efficient to convert to a natural gas fueled unit.

Category III Recommendations- ECM #5: Convert electric hot water heater to natural gas.

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. Our initial findings indicate that performing a detailed lighting upgrade per the recommendations in Appendix A will result in an annual savings of $ 4,081.88 based on the current $0.18/Kwh and the current occupancy schedule. Implementation of this ECM will cost approximately $25,146. Currently the Board of Public Utilities (BPU) would offer an estimated Rebate of $1,780, yielding a net cost of $23,366 for this project. With a yearly savings of $4,081.88 the payback on this ECM would about 6 years.

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. Also recommend installing lighting sensors to certain areas where lights typically remain lit when unoccupied for long periods of time.

Refer to Appendix A for further details.

2.5.2. Appliances and process

In addition to the DPW's working equipment, there are approximately 5 computers, and a refrigerator & microwave in the break room.

2.5.3. Elevators

There are no elevators installed at this facility.

2.5.4. Other electrical systems

The outdoor area lights are on the buildings electrical account, but do not have a meter and consume a consistent 586 kWh a month.

3. EQUIPMENT LIST

Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating	6 infrared heating tubes	Garage ceiling (main building)	Nameplate not accessible	Natural gas	Garage	2002	68%
Heating	2 high-intensity infrared heaters (175 MBH)	Garage ceiling (main building)	Reznor	Natural gas	Garage	2002	68%
Cooling	2 window air-conditioners	2 office windows (main building)	Nameplate not accessible	Electric	2 offices	Approx. 2000	0%
Domestic Hot Water	4.5 kW (15.4 MBH) water heater with a 30 gallon tank	Garage (main building)	Rheem Rheemglas Fury M# 82V30-2	Electric	Entire facility	2004	62%
Controls	Setback thermostats	Throughout garage (main building)	Honeywell	Electric	Garage (heaters)	Approx. 2005	50%
Ventilation	6 exhaust fans	Roof	Nameplates missing	Electric	Main building	1966	10%
Ventilation	5 blowers	Roof peak	Roof not accessible	Electric	Satellite garage	1966	10%

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

1) In the main DPW building, there are 9 12'x12' garage doors that are not insulated. The cumulative thermal resistance for these doors is less than 1 $\frac{\text{Btu}}{(\text{hr}\times\text{ft}^2\times^\circ\text{F})}$. A 2"-thick polystyrene-insulated door had a cumulative thermal resistance more than 10 times that amount. The 9 insulated doors would save a total of over $400 per year in heating costs and would reduce the amount of warm air leaving the building, making the air temperature more comfortable for the employees. When less heat leaves the building, this also decreases the demand for heat to be produced by the heating system; lessening the amount of work the system needs to do to keep a constant temperature and extending the life of the equipment.

Category II Recommendations: Operations and Maintenance

1) All sink faucets and toilets should be converted to low-flow unit. Low-flow toilets use 1.6 gallons per flush, compared to 3.5 for standard units. Water consumptions for different types of faucets vary; low-flow commercial bathroom faucets, for example, are available at 2.75 gallons per minute and lower.
2) The exterior doors to the building need to be re-weather-stripped as necessary.
3) ECM #1, which calls for replacements for the window air-conditioners in the main DPW building, can be implemented by the maintenance staff. The two units can be replaced for about $500, and will pay for themselves in less than 3 years.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description
1	Window Air-Conditioner Replacements
2	Lighting Upgrades & Occupancy Sensors
3	69.6 kW Roof-Mounted PV Systems
4	Window Upgrades
5	Convert Domestic Water Heater to Natural Gas

ECM #1: Window Air-Conditioner Replacements

Description:
Two offices are cooled by window air-conditioners. Neither unit has a visible capacity rating, but both appeared to be 8,000 BTUs. It is recommended that, due to the fact that both units are old and in poor condition, that they be replaced. Newer room air-conditioner models have higher Energy Efficiency Ratios (EERs), and many of which meet EnergyStar specifications.

Installation cost:
Estimated installed cost: $450 each ($310 for equipment), $900 total
Source of cost estimate: RS Means CostWorks 2009

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Window Air-Conditioner Replacements	Manufacturer	$900	$0	$900	1,127	0.4	0	0.12	$0.00	$212.37	10	$1,793	4.24	99%	10%	20%	$912	1,544

Assumptions:
Using the facility's electricity bills from October 1st, 2008 through September 30th, 2009, it was determined that the cost of electricity during the cooling season (May through September) is currently $0.18/kWh. EER (Energy Efficiency Ratio, or the ratio of cooling capacity to electric consumption) values for the new units are 10.8. Original EER values for the current units were estimated to be lower, at 8.5, and their age and condition indicates a decrease of their EERs of 20%, to 6.8. 1,024 cooling degree-days and a 0.4% dry-bulb temperature of 93°F were used for calculations; this data was provided by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE). The desired indoor temperature during the cooling season was assumed to be 74°F.

The following equation, the degree-day equation for cooling systems, was used to calculate the electric consumptions of the current and proposed air-conditioners:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24\ \frac{\text{hours}}{\text{day}}}{1{,}000\times\text{EER}\times\left(\text{Temp.}_{0.4\%}\text{-Temp.}_{\text{indoor}}\right)}=\text{Electric Consumption (in kWh)}$$

Using this information, it was calculated that the new room air-conditioners would reduce the DPW's annual electric consumption by 1,127 kWh, totaling an annual savings of $212 and yielding a 4.2-year payback. The decrease in energy consumption is due to less electricity being required to produce the required BTUs of cooling.

Rebates/financial incentives:
No rebates for room air-conditioners are available.

ECM#2: Lighting Upgrades and Occupancy Sensors

Description:
Lighting at the Department of Public Works consists primarily of T-12 fluorescent bulbs with magnetic ballasts. Standard 40-watt T-12's, for example, requires 48 watts of power; by comparison, equivalent 32-watt, T-8 fluorescent bulbs with electronic ballasts require 30 watts and have a near equal lighting output, reducing the energy by 37.5%. It is recommended that all T-12 fixtures with magnetic ballasts be replaced with T-8 fixtures with electronic ballasts. Lighting replacement generally yields a very good payback, due to the fact that most lighting in commercial buildings is used thousands of hours per year and the installation is fairly inexpensive. A few fixtures at the facility have already been upgraded to T-8's, and this report has taken this into consideration.

Also in the building are 100-watt incandescent lamps. It is recommended that these be replaced with compact fluorescents. Only a 26-watt compact fluorescent is needed to produce quantities of light equivalent to that of a 100-watt incandescent, for a 74% reduction in required energy. There is also one halogen fixture, which is not recommended for replacement.

Lighting sensors are another way to save energy in commercial buildings, in rooms where lights typically stay on while the space is unoccupied. These sensors turn the lights on when the room is occupied, and off when it is not. This can lead to a reduction in energy use by 50% or more. In this facility, lighting sensors were recommended in offices, work rooms, and locker rooms.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:
Estimated installed cost: Lighting: $22,826; sensors: $2,320; total: $25,146
Rebates/incentives: Lighting: $1,530; sensors: $250; total: $1,780
Net cost, with incentives: Lighting: $25,146; sensors: $1,780; total: $23,366
Source of estimates: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Lighting Upgrades	Similar Projects	$22,826	$1,530	$21,296	20,511	7.6	0	2.15	$0.00	$3,606	15	$42,430	5.91	99%	7%	15%	$21,751	28,100
	Sensor Installations		$2,320	$250	$2,070	4,412	1.6	0	0.46	$0.00	$776	10	$6,549	2.67	216%	22%	36%	$4,546	6,044

Assumptions:
The electric cost used in this ECM was $0.18/kWh, which was the DPW's average rate for the 12-month period ranging from October 1, 2008 through September 30, 2009. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix A.

Rebates/financial incentives:
The New Jersey SmartStart rebate for upgrading lighting fixtures to LED exit signs and T-8 lamps ranges from $10 to $20 per fixture. The total rebate this ECM qualifies for is $1,780.

ECM #3: 69.6-kW Roof-Mounted PV System

Description:

Currently, the Department of Public Works building 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 present below the economics of installing a 69.6-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 348 commercial multi-crystalline 200 watt panels would generate 74,903 kWh of electricity per year, or 83.6% of the DPW's annual electric consumption.

Installation cost:

Estimated installed cost: $452,400; SREC revenue included in "Total 1st 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, $	CO_2 Reduced, lbs/yr
3	69.6-kW Roof-Mounted PV System	Similar Projects	$452,400	$0	$452,400	74,903	27.9	0	7.86	$13,167.95	$50,119	30	$481,784	9.03	6%	0%	8%	$246,822	102,617

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.

ECM #4: Window Upgrades

Description:
The windows at the DPW facility are beyond their useful life of 35 years. They are inefficient, single-pane windows without thermal breaks, and allow for significant heat loss due to infiltration, or air passing through the window opening, and conductance, radiation passing through the glass. Replacing the windows with double-pane units with aluminum framing and thermal breaks will prevent heat from escaping in the winter and entering in the summer, therefore reducing the amount the heating and cooling systems need to work, saving energy and adding longevity to the lives of the systems.

Installation cost:
Estimated installed cost: $25,048
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
4	Window Upgrades	Similar Projects	$25,048	$0	$25,048	0	0.0	1,513	4.65	$0.00	$2,437	35	$50,859	10.28	103%	3%	9%	$27,307	17,707

Assumptions:
The area of the windows in the DPW that are recommended to be replaced is 404 square feet, and the volume of the building was measured to be approximately 476,000 cubic feet (the satellite garage has no windows to measure or upgrade, and therefore could not be included in the volume). Energy costs used, taken from 12 months of the DPW's energy bills, were $1.61 per therm for natural gas and $0.18 per kWh for electricity. However, since there is no central cooling system in place, there was assumed to be no electrical savings. The cost of installation, using several similar projects as a guideline, was determined assuming $62 per square-foot of window opening. The calculations were performed using following equations and values from a window replacement ECM found in *Energy Conservation for Housing: A Workbook*, developed by the US Department of Housing and Urban Development, Office of Policy Development and Research:

Conductance savings factors:
- Natural gas: 0.180
- Electric: 3.692

Infiltration savings factors:
- Natural gas: 0.0009
- Electric: 0.0178

Heating degree-day zone factor: 3.02

Conduction loss savings (perform calculation twice, once using the conductance savings factor for natural gas, and once using the one for electric):

(Heating Degree-Day Zone Factor)×(Building Volume)×(Conductance Savings Factor)=(Conduction Loss Savings)

Infiltration loss saving (perform calculation twice, once using the infiltration savings factor for natural gas, and once using the one for electric):`

(Heating Degree-Day Zone Factor)×(Building Volume)×(Infiltration Savings Factor)=(Infiltration Loss Savings)

Total annual savings, natural gas:

(Cost of Natural Gas)×(Natural Gas Conduction Loss Savings+Natural Gas Infiltration Loss Savings)=(Total Annual Natural Gas Savings)

Total annual savings, electric:

(Cost of Electric)×(Electric Conduction Loss Savings+Electric Infiltration Loss Savings)=(Total Annual Electric Savings)

Payback:

$$\frac{\text{Total Cost}}{\text{Total Electric Savings+Total Gas Savings}}=\text{Payback (in years)}$$

Rebates/financial incentives:
No rebates or incentives for window upgrades could be found.

ECM #5: Convert Electric Water Heater to Natural Gas

Description:
Domestic hot water is provided by a Rheem electric water heater, which has a volume of 30 gallons. As a cost saving measure, a natural gas water heater would be more cost-efficient than an electric. The current water heater is located in the same room as a gas-fired furnace, so switching to a gas-fired water heater is economically feasible.

Installation cost:
Estimated installed cost: Installation: $2,625; rebates/incentives: $50; total: $2,575
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
5	Convert Domestic Water Heater to Natural Gas	Similar Projects	$2,625	$50	$2,575	2,189	0.8	-113	-0.12	$0.00	$202	13	$2,126	12.72	-17%	-1%	0%	-$422	1,674

Assumptions:
Using the facility's electricity bills from October 1st, 2008 through September 30th, 2009, it was determined that the cost of electricity during the cooling season (May through September) is currently $0.18/kWh, which is equivalent to $5.15 per therm. By comparison, the DPW pays a rate of $1.61 per therm, making electric heat 220% more expensive.

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 the electric unit, and 0.62 for the gas unit.

The proposed unit would actually consume more therms of energy annually than the current one, but due to the difference in electric and gas rates, would save $202 annually and yield a 12.72-year payback.

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

Refer to ECM #3 under Section 4.

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.

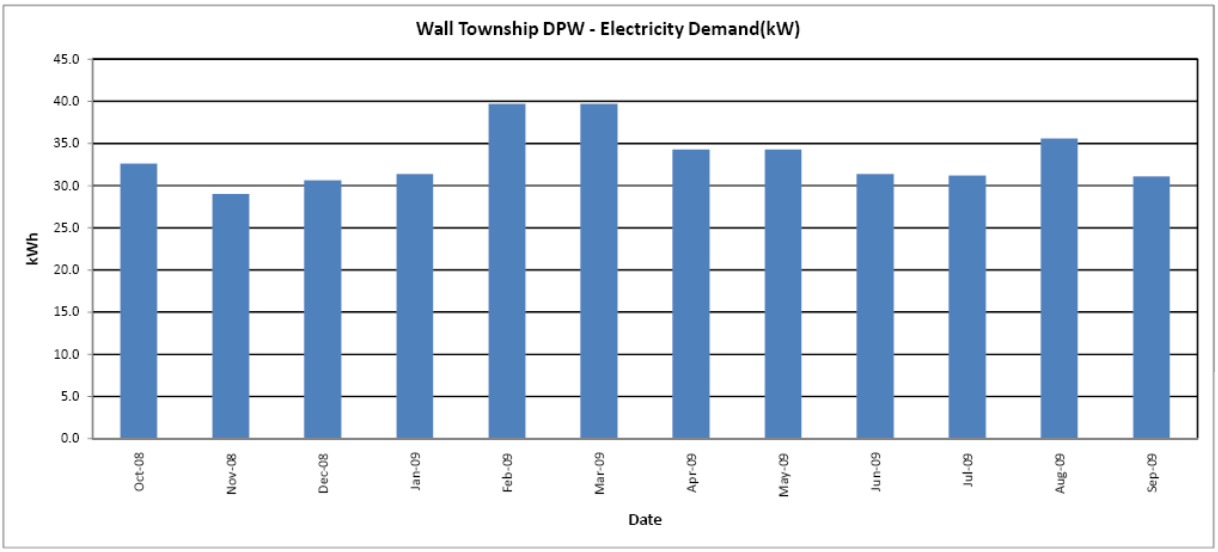
5.6. Wind

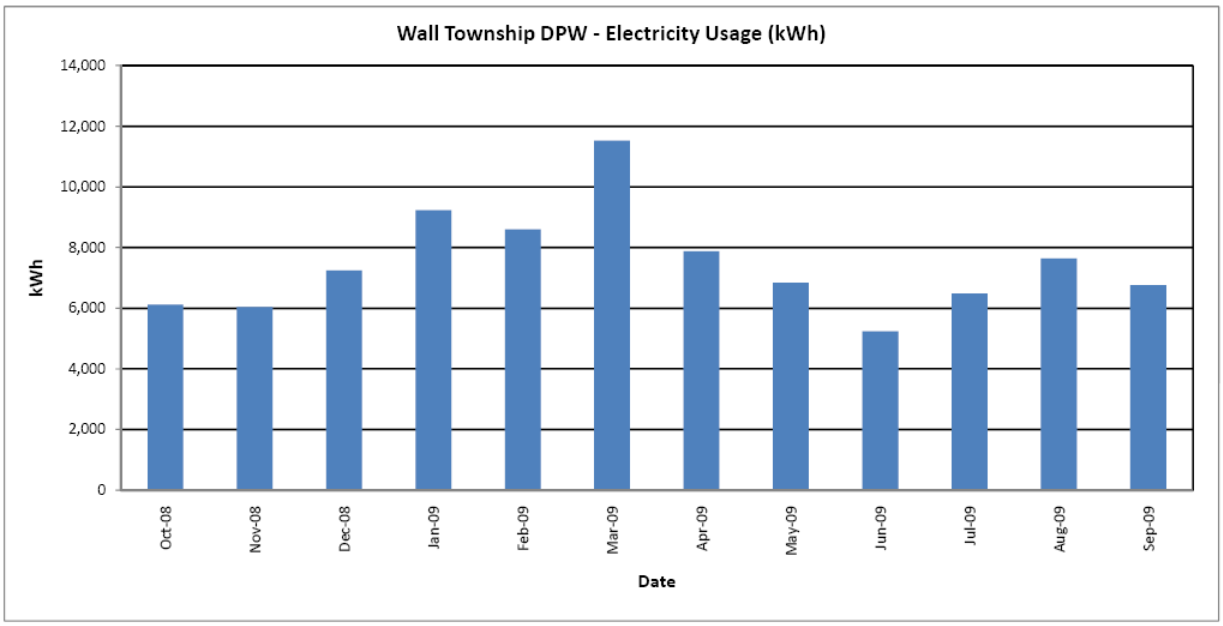
Wind power production is not appropriate for this location because required land is not available for the wind turbine. The available wind energy resource is also very low.

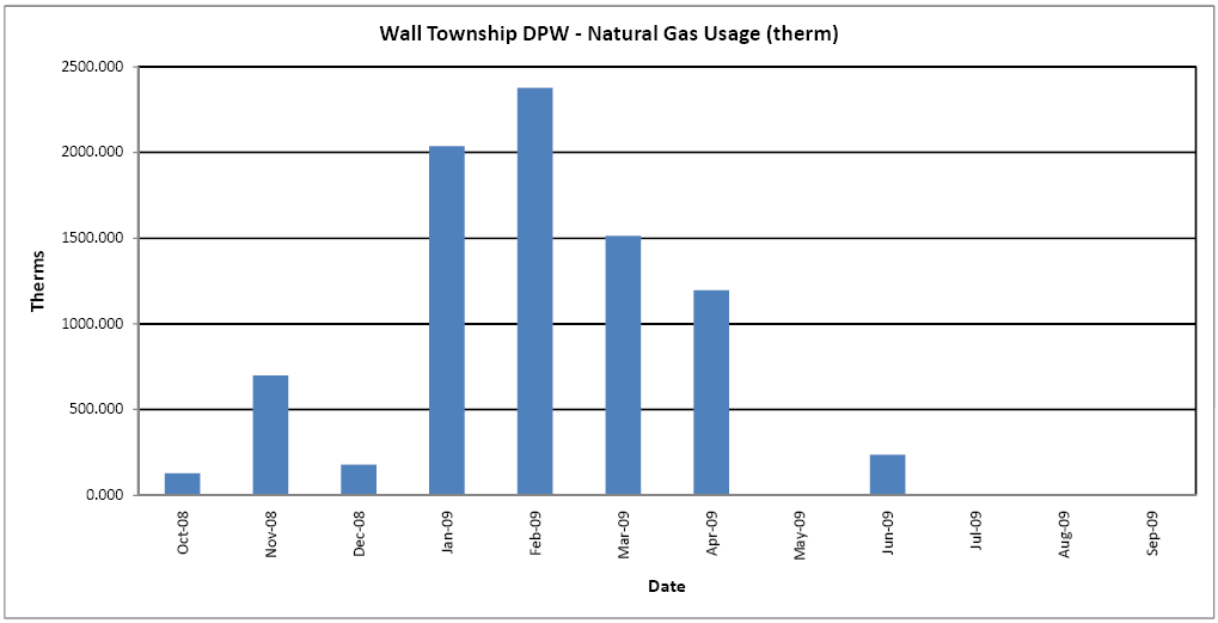
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Energy Purchasing

The average electrical peak demand for the previous year was 33.5 kW and the maximum peak demand was 39.7 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (kW) for the previous 12 months and the other two charts show electric and gas usage (kWh and therms).



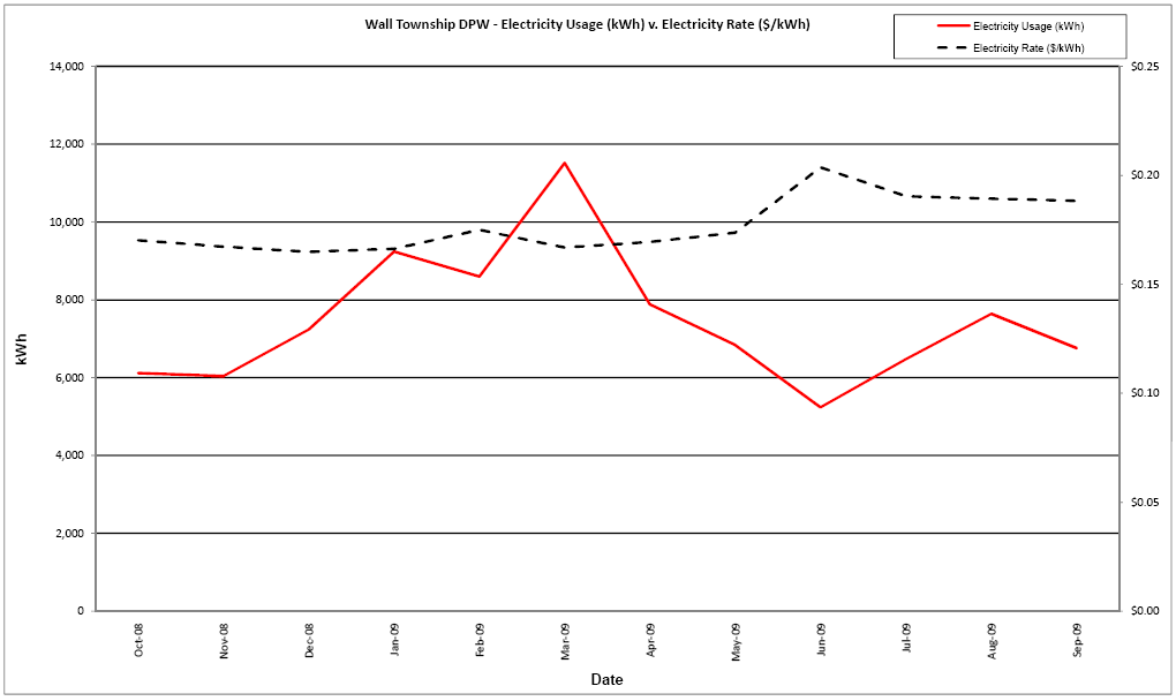




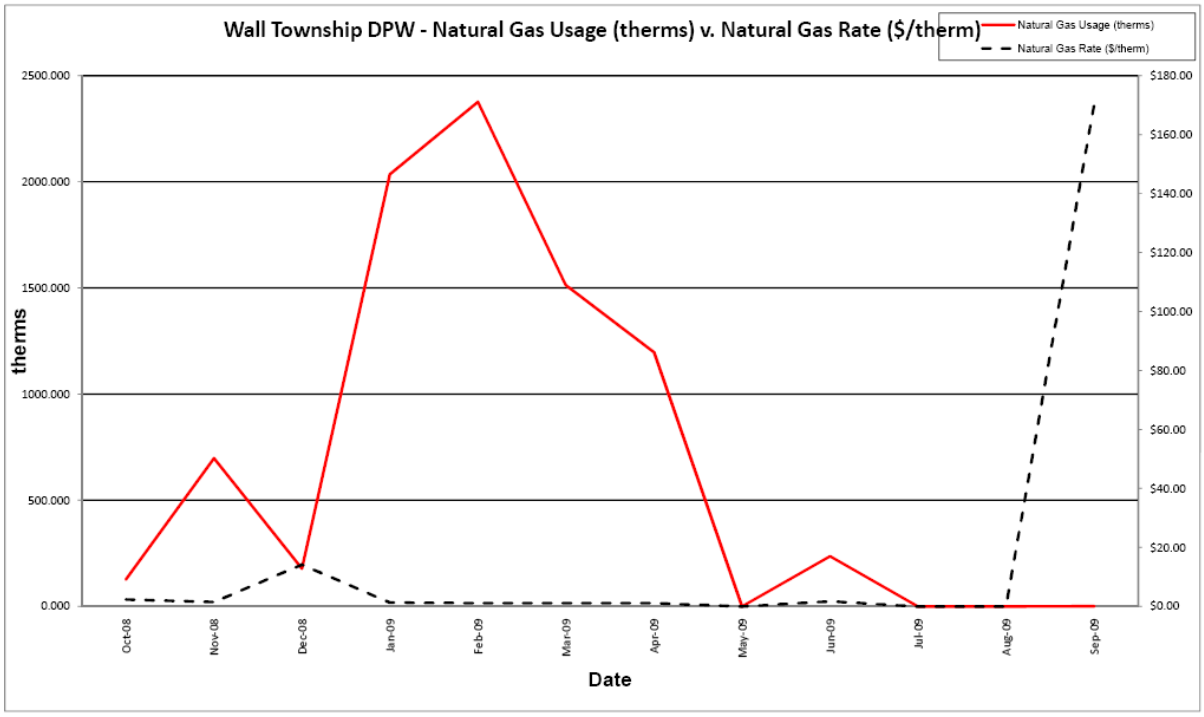
6.2. Energy Procurement strategies

The building would not be eligible for enrollment in a Demand Response Program, because there is not the capability at this time to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option.

Currently, New Jersey commercial buildings of similar type pay $0.150/kWh for electricity and $1.55/therm for natural gas. The electricity rate for the building is $0.18/kWh, which means there is a potential cost savings of $2,688 per year. The gas rate for the building is $1.61/therm, which means there is a potential cost savings of $501 per year. A cost savings potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates. SWA/BSG-PMK recommends that Wall Township further explore opportunities of purchasing electricity from third party energy suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the building. Appendix B contains a complete list of third party energy suppliers for the Wall Township service area.



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.

Township of Wall
Department of Public Works
Tiltons Corner Road & Ridgewood Road, Wall, NJ

Lighting Upgrades
Estimated Cost: $21,296.00
Estimated Savings: $3,605.87
Estimated Payback: 5.905927319

Sensor Upgrades (Pre-Lighting Upgrade)
Estimated Cost: $2,070.00
Estimated Savings: $890.31
Estimated Payback: 2.325021133

Lighting & Sensor Upgrades
Estimated Cost: $46,732.00
Estimated Savings: $4,153.61
Estimated Payback: 11.25

Average Cost/kW: $0.18

													Lighting				Occupancy Sensors (ONLY)				Lighting & Occupancy Sensors			
	Existing Fixtures				Upgrade Type	Recommended Fixtures				Fixture Use	Recommended Controls	Post-Sensor Use (hr/yr)	Cost ($)	SmartStart Rebate	Savings ($)	Payback (yrs)	Cost ($)	SmartStart Rebate	Savings ($)	Payback (yrs)	Cost ($)	SmartStart Rebate	Savings ($)	Payback (yrs)
Room/Area	Type	Ballast	Wattage	Qty.		Type	Ballast	Wattage	Qty.															
Garage	2F32T8	Electronic	60	6	None	2F32T8	Electronic	60	6	2080	-	2080	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
Garage	2F96T12	Magnetic	207	69	Retrofit	2F96T8	Electronic	109	69	2080	-	2080	$17,250.00	$690.00	$2,472.62	6.70	$0.00	$0.00	$0.00	0.0	$17,250.00	$690.00	$2,472.62	6.70
Garage	Halogen	-	-	1	None	-	-	-	1	2080	-	2080	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
Office	2F40T12	Magnetic	96	10	Retrofit	2F32T8	Electronic	60	10	2080	OSW	1400	$700.00	$100.00	$131.64	4.56	$200.00	$20.00	$114.76	1.6	$900.00	$120.00	$203.37	3.84
Work Room	2F40T12	Magnetic	96	3	Retrofit	2F32T8	Electronic	60	3	2080	OSW	1400	$210.00	$30.00	$39.49	4.56	$200.00	$20.00	$34.43	5.2	$410.00	$50.00	$61.01	5.90
Electrical Room	2F96T12	Magnetic	207	1	Retrofit	2F96T8	Electronic	109	1	200	-	200	$250.00	$10.00	$3.45	69.65	$0.00	$0.00	$0.00	0.0	$250.00	$10.00	$3.45	69.65
Locker Room	4F32T8	Electronic	112	1	None	4F32T8	Electronic	112	1	2080	OSR	1040	$0.00	$0.00	$0.00	0.00	$260.00	$35.00	$20.48	11.0	$260.00	$35.00	$20.48	10.99
Carpentry Shed*	2F40T12	Magnetic	96	10	Retrofit	2F32T8	Electronic	60	10	2080	OSW	1400	$700.00	$100.00	$131.64	4.56	$200.00	$20.00	$114.76	1.6	$900.00	$120.00	$203.37	3.84
Carpentry Shed*	3F40T12	Magnetic	151	10	Retrofit	3F32T8	Electronic	90	10	2080		1400	$900.00	$200.00	$223.06	3.14	$0.00	$0.00	$180.51	0.0	$900.00	$200.00	$330.64	2.12
Garage	2F40T12	Magnetic	96	2	Retrofit	2F32T8	Electronic	60	2	2080	-	2080	$140.00	$20.00	$26.33	4.56	$0.00	$0.00	$0.00	0.0	$140.00	$20.00	$26.33	4.56
Hallway	2F40T12	Magnetic	96	2	Retrofit	2F32T8	Electronic	60	2	2080	-	2080	$140.00	$20.00	$26.33	4.56	$0.00	$0.00	$0.00	0.0	$140.00	$20.00	$26.33	4.56
Office	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	2080	OSW	1400	$220.00	$40.00	$58.51	3.08	$200.00	$20.00	$45.90	3.9	$420.00	$60.00	$85.28	4.22
Office	2F40T12U	Magnetic	92	1	Retrofit	2F32T8U	Electronic	59	1	2080		1400	$80.00	$10.00	$12.07	5.80	$0.00	$0.00	$11.00	0.0	$80.00	$10.00	$19.12	3.66
Office	2F40T12	Magnetic	96	2	Retrofit	2F32T8	Electronic	60	2	2080	OSW	1400	$140.00	$20.00	$26.33	4.56	$200.00	$20.00	$22.95	7.8	$340.00	$40.00	$40.67	7.38
Locker Room	4F40T12	Magnetic	192	2	Retrofit	4F32T8	Electronic	112	2	2080	OSR	1040	$220.00	$40.00	$58.51	3.08	$260.00	$35.00	$70.21	3.2	$480.00	$75.00	$99.46	4.07
Landscaping Storage	2F40T12	Magnetic	96	1	Retrofit	2F32T8	Electronic	60	1	2080	OSW	1400	$70.00	$10.00	$13.16	4.56	$200.00	$20.00	$11.48	15.7	$270.00	$30.00	$20.34	11.80
Landscaping Storage	2F96T12	Magnetic	207	1	Retrofit	2F96T8	Electronic	109	1	2080		1400	$250.00	$10.00	$35.84	6.70	$0.00	$0.00	$24.75	0.0	$250.00	$10.00	$48.87	4.91
Stairs	2F40T12U	Magnetic	92	1	Retrofit	2F32T8U	Electronic	59	1	2080	-	2080	$80.00	$10.00	$12.07	5.80	$0.00	$0.00	$0.00	0.0	$80.00	$10.00	$12.07	5.80
Stairs	2F20T12	Magnetic	56	1	Retrofit	2F17T8	Electronic	31	1	2080	-	2080	$70.00	$10.00	$9.14	6.56	$0.00	$0.00	$0.00	0.0	$70.00	$10.00	$9.14	6.56
Office	2F40T12U	Magnetic	92	4	Retrofit	2F32T8U	Electronic	59	4	2080	OSW	1400	$320.00	$40.00	$48.27	5.80	$200.00	$20.00	$43.99	4.1	$520.00	$60.00	$76.48	6.01
Office	4F40T12	Magnetic	192	4	Retrofit	4F32T8	Electronic	112	4	2080		1400	$440.00	$80.00	$117.01	3.08	$0.00	$0.00	$91.81	0.0	$440.00	$80.00	$170.57	2.11
Office	4F40T12	Magnetic	192	1	Retrofit	4F32T8	Electronic	112	1	2080	OSW	1400	$110.00	$20.00	$29.25	3.08	$200.00	$20.00	$22.95	7.8	$310.00	$40.00	$42.64	6.33
Men's Room	Inc100	-	100	1	Replace	CFL26	-	26	1	1500	-	1500	$23.00	$0.00	$19.51	1.18	$0.00	$0.00	$0.00	0.0	$23.00	$0.00	$19.51	1.18
Women's Room	Inc100	-	100	1	Replace	CFL26	-	26	1	1500	-	1500	$23.00	$0.00	$19.51	1.18	$0.00	$0.00	$0.00	0.0	$23.00	$0.00	$19.51	1.18
Work Room	2F40T12	Magnetic	96	7	Retrofit	2F32T8	Electronic	60	7	2080	OSW	1400	$490.00	$70.00	$92.15	4.56	$200.00	$20.00	$80.33	2.2	$690.00	$90.00	$142.36	4.21
Satellite Garage - Outside	Metal Halide	-	250	3	None	Metal Halide	-	250	3	8760	-	8760	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
Satellite Garage - Inside of Gara	Metal Halide	-	250	5	None	Metal Halide	-	250	5	8760	-	8760	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00
Satellite Garage - Storage Area	Metal Halide	-	250	12	None	Metal Halide	-	250	12	8760	-	8760	$0.00	$0.00	$0.00	0.00	$0.00	$0.00	$0.00	0.0	$0.00	$0.00	$0.00	0.00

Appendix B: Third Party Energy Suppliers (ESCOs)

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

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