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June 28, 2010

**Local Government Energy Program
Energy Audit Report**

For

***Township of Sparta
Public Works Facility Satellite Garage
9 Prices Lane
Sparta, NJ 07871***

Project Number: LGEA21



TABLE OF CONTENTS

INTRODUCTION.....	3
EXECUTIVE SUMMARY.....	4
1. HISTORIC ENERGY CONSUMPTION.....	8
1.1. ENERGY USAGE, LOAD PROFILES AND COST ANALYSIS.....	8
1.2. UTILITY RATE ANALYSIS.....	11
1.3. ENERGY BENCHMARKING.....	13
2. FACILITY AND SYSTEMS DESCRIPTION.....	15
2.1. BUILDING CHARACTERISTICS.....	15
2.2. BUILDING OCCUPANCY PROFILES.....	15
2.3. BUILDING ENVELOPE.....	15
2.3.1. EXTERIOR WALLS.....	15
2.3.2. ROOF.....	15
2.3.3. BASE.....	15
2.3.4. WINDOWS.....	15
2.3.5. EXTERIOR DOORS.....	15
2.3.6. BUILDING AIR TIGHTNESS.....	16
2.4. HVAC SYSTEMS.....	16
2.4.1. HEATING.....	16
2.4.2. COOLING.....	16
2.4.3. VENTILATION.....	16
2.4.4. DOMESTIC HOT WATER.....	16
2.5. ELECTRICAL SYSTEMS.....	16
2.5.1. LIGHTING.....	16
2.5.2. APPLIANCES.....	16
2.5.3. ELEVATORS.....	17
2.5.4. PROCESS AND OTHERS ELECTRICAL SYSTEMS.....	17
3. EQUIPMENT LIST.....	18
4. ENERGY CONSERVATION MEASURES.....	19
CATEGORY I RECOMMENDATIONS: CAPITAL IMPROVEMENTS.....	19
CATEGORY II RECOMMENDATIONS: OPERATIONS AND MAINTENANCE.....	19
CATEGORY III RECOMMENDATIONS: ENERGY CONSERVATION MEASURES.....	19
5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES.....	23
5.1. EXISTING SYSTEMS.....	23
5.2. WIND.....	23
5.3. SOLAR PHOTOVOLTAIC.....	23
5.4. SOLAR THERMAL COLLECTORS.....	23
5.5. COMBINED HEAT AND POWER.....	23
5.6. GEOTHERMAL.....	23
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES.....	23
6.1. ENERGY PURCHASING.....	23
6.2. ENERGY PROCUREMENT STRATEGIES.....	25
7. METHOD OF ANALYSIS.....	26
7.1. ASSUMPTIONS AND TOOLS.....	26
7.2. DISCLAIMER.....	26
APPENDIX A: LIGHTING STUDY.....	27
APPENDIX B: THIRD PARTY ENERGY SUPPLIERS (ESCOs).....	28

INTRODUCTION

As an approved energy consulting firm under the Local Government Energy Audit Program (LGEA), Steven Winter Associates, Inc. (SWA) was selected to perform an energy audit and assessment for the Township of Sparta buildings. For this audit, the PMK Group, an approved subcontractor under the LGEA, performed the assessment of the large mechanical and electrical systems including HVAC equipment. The audit included a review of Germany Flats – 12 Park Lake Road, Germany Flats – Storage Garage, Fire Headquarters, Library, Public Works Facility, Public Works Facility – Satellite Garage, Eagle’s Nest Well House as well as the Sparta Municipal Building. The buildings are located in Sparta, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Public Works Facility Satellite Garage building located at 9 Prices Lane, Sparta, NJ. The current conditions and energy-related information were collected in order to analyze and suggest the implementation of building improvements and energy conservation measures.

The Public Works Facility Satellite Garage was built in 1995 and consists of 1 floors with a total floor area of 6,000 square feet. The Satellite Garage is located at the same location as the main Department of Public Works facility and provides both cold and heated storage.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to Township of Sparta to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

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

- Section 1 and section 2 of the report cover a description and analysis of the building existing conditions.
- Section 3 provides a detail inventory of major electrical and mechanical systems in the building.
- Sections 4 through 7 provide a description of our recommendations.
- Appendices include further details and information supporting our recommendations.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Satellite Garage building located at 9 Prices Lane, Sparta, NJ. The building is a one-story commercial building with a total floor area of 6,000 square feet. The building was built in 1995 and provides both heated and cooled storage. The original structure has not undergone any major renovations or additions.

Based on the field visits performed by the SWA staff on August 25th and September 3rd, 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.

Existing conditions

From September 2008 through September 2009, the period of analysis for this audit, the building consumed 8,534 kWh or \$1,703 worth of electricity at an approximate rate of \$0.200/kWh and 3,545 gallons or \$5,038 worth of propane at an approximate rate of \$1.421/therm. The joint energy consumption for the building, including both electricity and fossil fuel, was 366 MMBtus of energy that cost a total of \$6,741.

SWA has entered energy information about the Satellite Garage building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as a DPW building and therefore was not able to receive an Energy Star performance rating. SWA encourages the Township of Sparta to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 59.0 kBtu/ft²yr. .

Recommendations

Implementing this report's recommendations will reduce use by approximately 4.7 kBtu/ft²yr, which would decrease the building's energy use intensity to 54.3 kBtu/ft²yr.

SWA recommends a package of measures that addresses lighting as well as cooling systems. Inefficient lighting such as T12 fluorescent fixtures and incandescent are recommended to upgrade to more efficient options. There is one window air-conditioner located in the Satellite Garage that is recommended to be replaced.

Based on the assessment of the building, SWA has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- Increase wall insulation to R-19
- Increase ceiling insulation to R-30

Category II Recommendations: Operations and Maintenance

- Perform bi-annual inspections to maintain building weather-stripping and air-sealing

Category III Recommendations: Energy Conservation Measures

At this time, SWA highly recommends a total of **3** Energy Conservation Measures (ECMs) for the Satellite Garage building that is summarized in the following Table 1. The total investment cost for these ECMs with incentives is **\$1,995**. SWA estimates a first year savings of **\$1,710** with a simple payback of **1.2 years**.

The implementation of all the recommended ECMs would reduce the building electric usage by over 8,350 kWh or over 90% of the total electric usage. The building has a limited electric usage since it is primarily a storage garage. There are no recommended measures that would reduce propane usage. SWA estimates that implementing these ECMs will reduce the carbon footprint of the Satellite Garage building by **14,951 lbs of CO₂**, which is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 36 trees to absorb the annual CO₂ produced. SWA also recommends that the Township of Sparta 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 \$0.050/kWh, which would have equated to \$427 for the past 12 months.

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, Direct Install, ARRA grants available through the NJ Office of Clean Energy, 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>

The Direct Install program offers incentives for prescriptive measures that can offset up to 80% of the installed cost. The benefits and requirements of this program can be found at:

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

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

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.

The following table summarizes the proposed Energy Conservation Measures (ECMs) and their economic relevance.

Table 1 - Highly Recommended 0-5 Year Payback ECMs

ECM #	ECM description	Source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
1	Install 9 new CFL lamps	RSMMeans	180	0	180	2,062	0.4	0	1.2	27	439	5	2,001	0.4	1011.6	202.3	243.6	1,832	3,692
2	Install 6 new T8 fluorescent fixtures	RSMMeans	1,290	180	1,110	5,337	1.1	0	3.0	13	1,080	15	12,713	1.0	1045.3	69.7	97.3	11,788	9,556
3	Replace window AC unit	RSMMeans	705	0	705	951	0.0	0	0.5	0	190	15	2,238	3.7	217.5	14.5	26.2	1,566	1,703
TOTALS			2,175	180	1,995	8,350	1.5	0	4.7	40	1,710	-	16,952	1.2	-	-	-	15,186	14,951

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

Note: A 0.0 electrical demand reduction / month indicates that it is very low / negligible

1. HISTORIC ENERGY CONSUMPTION

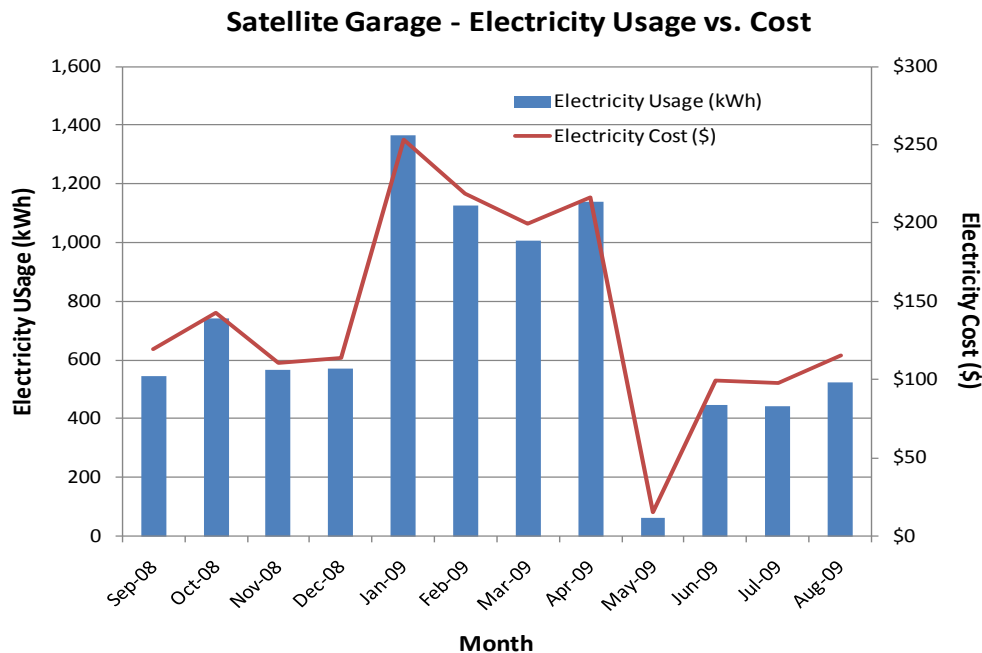
1.1. Energy usage, load profiles and cost analysis

SWA analyzed utility bills from **September 2008 through September 2009** (period of analysis) that were received from the utility companies supplying the Satellite Garage building with electricity and propane. The Satellite Garage building is currently contains one electric meter and receives truck deliveries of propane when necessary.

Electricity – The Satellite Garage building currently buys electricity from JCP&L at **an average rate of \$0.200/kWh** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 8,534 kWh or \$1,703 worth of electricity** in the previous year. The Satellite Garage building is charged separately for demand (kW) which has been factored into each monthly bill. Based on the same time period, the electric meter also has **an average monthly demand of 5.5 kW and a monthly peak demand of 7.1 kW**.

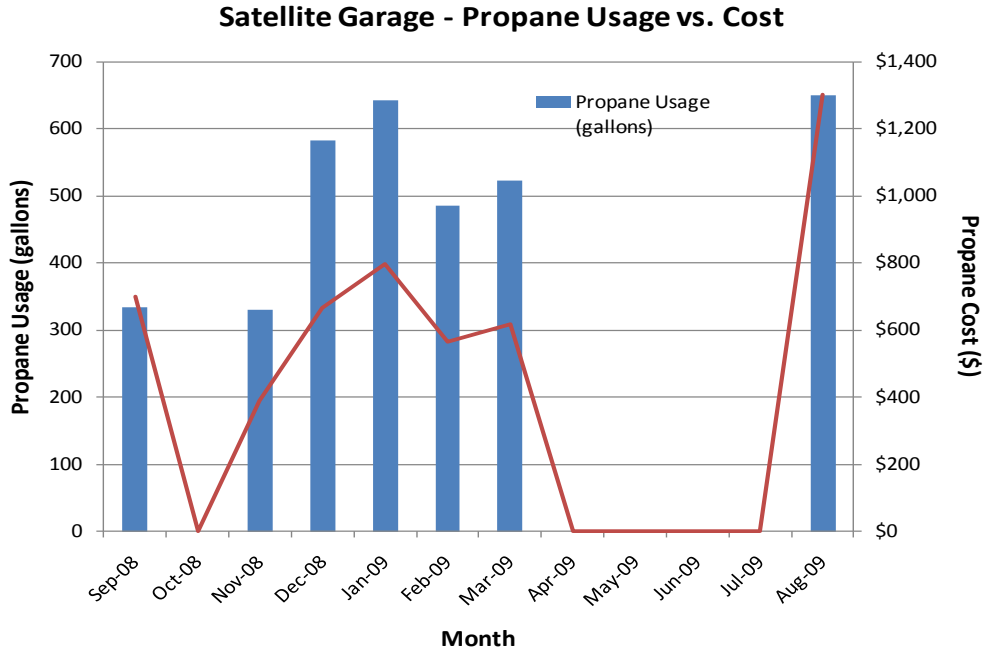
Propane – The Satellite Garage building currently receives truck deliveries of propane as necessary to a 1,000 gallon storage tank. The building currently buys propane from Amerigas at **an average rate of \$1.421/therm** based on 12 months of utility bills from September 2008 to September 2009. The building purchased **approximately 3,545 gallons or \$5,038 worth of propane** in the previous year.

The following chart shows electricity use versus cost for the Satellite Garage building based on utility bills for the 12 month period of September 2008 to September 2009.



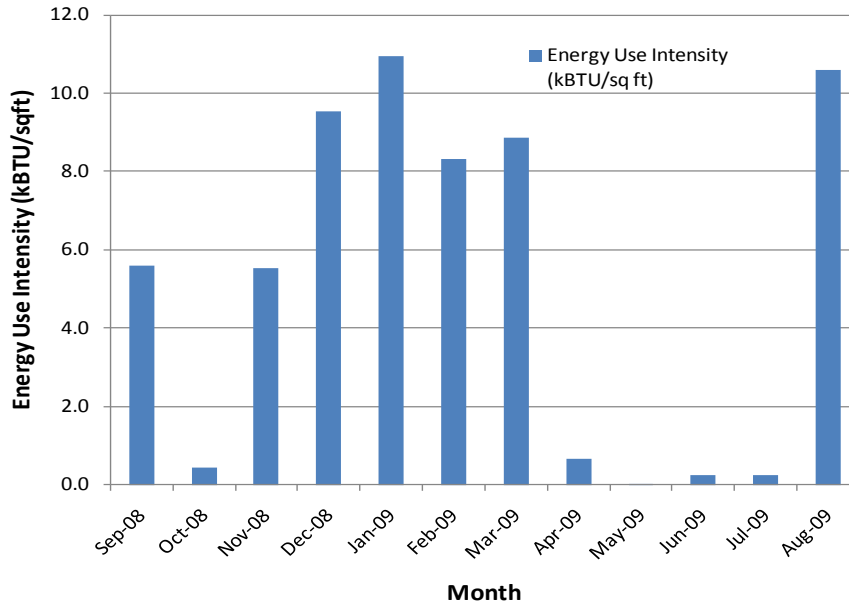
The electricity cost follows a trend line similar to that of the electricity usage as expected.

The following chart shows propane use versus cost for the Satellite Garage building based on utility bills for the 12 month period of September 2008 to September 2009.



The following chart shows combined propane and electric consumption in kBtu/sq ft for the Satellite Garage building based on utility bills for the 12 month period of September 2008 to September 2009.

Satellite Garage - Annual Energy Use Intensity

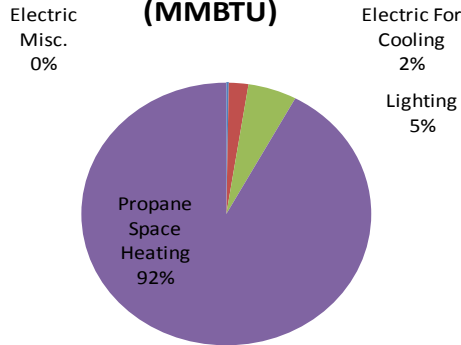


Energy Use Intensity shows minor fluctuations throughout the year during the heating and cooling seasons. The graph shows peaks during months that propane was delivered, since propane is delivered irregularly and corresponding energy use is attributed to the month that it was delivered.

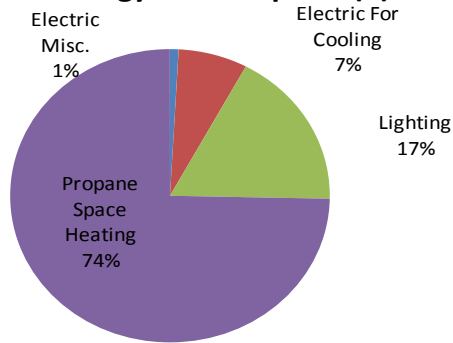
The following table and chart pies show energy use for the Satellite Garage building based on utility bills for the 12 month period of September 2008 to September 2009. Note electrical cost at \$58.7/MMBtu of energy is more than 3.5 times the cost of propane at \$14.9/MMBtu.

2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	1	0%	\$59	1%	58.7
Electric For Cooling	8	2%	\$470	7%	58.7
Lighting	20	5%	\$1,174	17%	58.7
Propane Space Heating	337	92%	\$5,021	74%	14.9
Totals		100%	\$6,724	100%	
Total Electric Usage	29	8%	\$1,703	25%	58.7
Total Gas Usage	337	92%	\$5,038	75%	14.9
Totals	366	100%	\$6,741	100%	

Annual Energy Consumption (MMBTU)



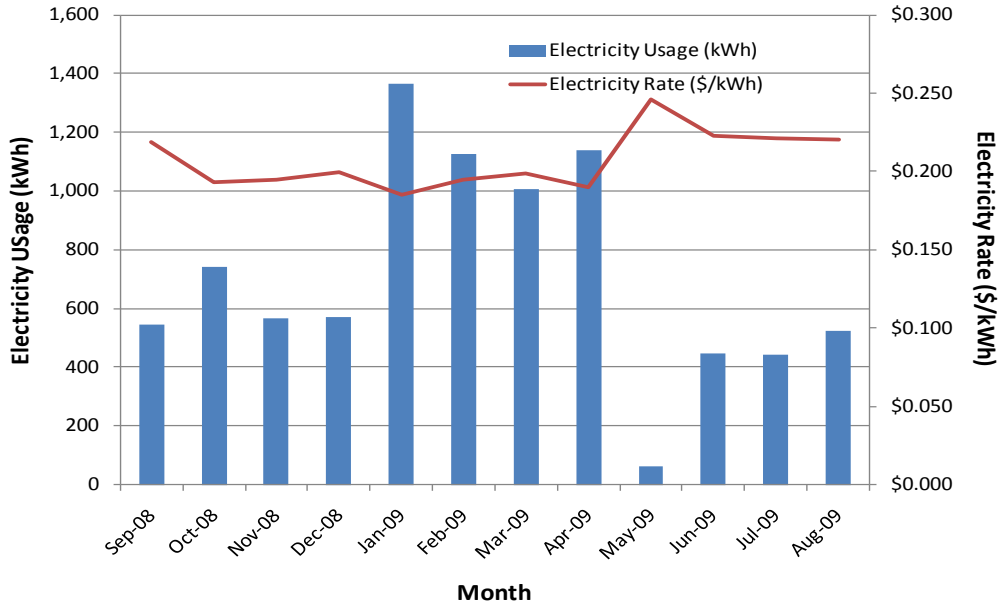
Annual Energy Consumption (\$)



1.2. Utility rate analysis

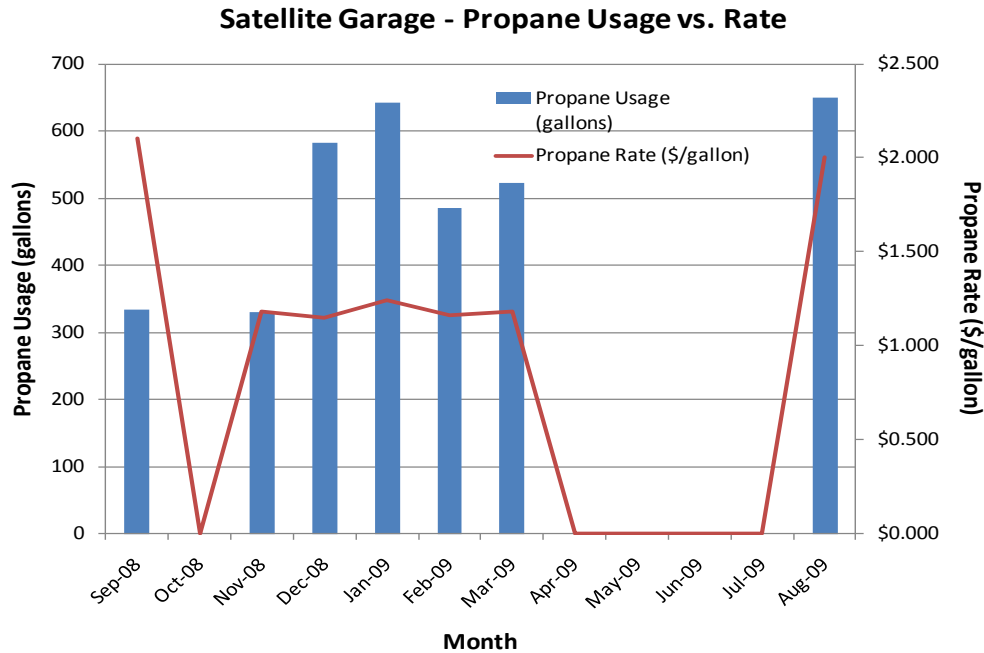
The Satellite Garage building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) including a separate (kW) demand charge that is factored into each monthly bill. The Satellite Garage building currently pays an average rate of approximately \$0.200/kWh based on the 12 months of utility bills of September 2008 to September 2009. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. The electric rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.

Satellite Garage - Electricity Usage vs. Rate



The electricity rate fluctuates inversely proportional to usage, as expected. Typically, the more units of electricity that are used by the building, the cheaper electricity becomes per unit. Some rate fluctuations may be due to estimated utility readings as opposed to actual readings.

The Satellite Garage building currently purchases propane from Amerigas at a general service market rate for propane deliveries (gallons). The building currently pays an average rate of approximately \$1.421/gallon based on the 12 months of utility bills of September 2008 to September 2009. The propane rate does not show large fluctuations since it is delivered as needed and not on a continual basis.



The above chart confirms that the utility rate for propane shows minor fluctuations throughout the year based on the way that it is delivered and billed.

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

SWA has entered energy information about the Satellite Garage building in the U.S. Environmental Protection Agency’s (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as a DPW/Storage building. The building was not able to receive an Energy Star performance rating since the building is classified as a DPW/Storage building, which is currently ineligible for a performance score through the Benchmarking tool. SWA encourages the Township of Sparta to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 59.0 kBtu/ft²yr.

Implementing this report’s highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 4.7 kBtu/ft²yr.

Per the LGEA program requirements, SWA has assisted the Township of Sparta to create an *Energy Star Portfolio Manager* account and has shared the Satellite Garage building information to allow future data to be added and tracked using the benchmarking tool. SWA is sharing this Portfolio Manager Site information with TRC Energy Services. As per requirements, the account information is provided below:

Username: SpartaTownship
 Password: SPARTA2009

Also, below is a performance rating that is generated based on historical energy consumption from the Portfolio Manager Benchmarking tool.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE Township of Sparta - DPW Satellite Garage

Building ID: 2019965
For 12-month Period Ending: August 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 26, 2010

Facility	Facility Owner	Primary Contact for this Facility
Township of Sparta - DPW Satellite Garage 9 Prices Lane Sparta, NJ 07871	N/A	N/A

Year Built: 1995
Gross Floor Area (ft²): 6,000

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	29,118
Liquid Propane (kBtu)	324,900
Natural Gas - (kBtu) ⁴	0
Total Energy (kBtu)	354,018

Energy Intensity⁵

Site (kBtu/ft ² /yr)	59
Source (kBtu/ft ² /yr)	71

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	25
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Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	-67%
Building Type	Other

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 Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

N/A

Notes:

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

The government estimates the average time needed to fill out this form is 8 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 (2022T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The single-story Satellite Garage building was built in 1995 and consists of a total floor area of 6,000 square feet. The building is located at the same location as the DPW garage and provides cooled and heated storage.

2.2. Building occupancy profiles

The Satellite Garage is occupied by 1 employee for approximately 25 hours per week. .

2.3. Building envelope

2.3.1.Exterior Walls

The garage building consists of a wood frame with vertical steel wall panels. According to a visual inspection the total wall insulation was found to be approximately R-5. SWA recommends increasing wall insulation to R-19 in the garage building if heated storage is desired during most winter months. The metal panel walls were found to be in good condition

2.3.2.Roof

The low pitch standing seam metal roof of the building showed no visual signs of leakage. SWA recommends increasing ceiling insulation to R-30 if heated storage is desired during most winter months.

2.3.3.Base

The building's base is a 4" concrete slab-on grade with a perimeter footing. There were no visible signs of water or moisture problems found during the inspection of both buildings.

2.3.4.Windows

The building contains metal frame fixed double hung vinyl type double pane windows. The windows were in acceptable condition.

As a preventive measure SWA recommends exterior and interior inspections of all windows as part of each building's routine maintenance schedule to ensure air and water tight performance year round.

2.3.5.Exterior doors

The metal exterior doors were observed to be in functional, acceptable condition except for some missing or worn weather-stripping, including the insulated overhead type doors.

SWA recommends that the exterior doors of the building be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. Tight seals around doors will help ensure the building to be kept continuously insulated.

2.3.6. Building air tightness

In addition to the above mentioned recommendations SWA suggests air sealing, caulking and/ or insulating around all plumbing, electrical, HVAC and structural envelope penetrations. This should include bottom and top plates, recessed lighting fixtures, electrical boxes and chimney walls and window, or sleeve air conditioner units. The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

2.4.1. Heating

The Satellite Garage building is heated by 75 MBH radiant heating tubes, with an additional 100 MBH Modine High Efficiency II unit heater.

2.4.2. Cooling

The Satellite Garage building is cooled by a GE 15,000 BTUH window unit, Model #AVM15DAV1.

2.4.3. Ventilation

Ventilation is provided by an exhaust fan and supplemental ventilation is provided manually by opening doors and windows.

2.4.4. Domestic Hot Water

Not applicable, the Satellite Garage does not contain DHW equipment.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – The Satellite Garage building contains efficient T12 fluorescent fixtures with magnetic ballasts that should be upgraded to T8 fluorescent lighting with electronic ballasts. The interior lighting also contains a mix of Probe Start Metal Halides, Halogen bulbs and incandescent bulbs that should all be upgraded to CFLs that provide an equivalent amount of light. See Appendix A for complete existing and proposed lighting schedule.

Exit Lights – There are no exit signs for this building.

Exterior Lighting – There are no exterior lights for this building.

2.5.2. Appliances

SWA performed a basic survey of appliances installed at the Satellite Garage building. Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators of similar size to the existing units, use as little as 315 kWh/year. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large energy as well as cost savings. Look for the Energy Star label when replacing appliances and equipment including; window air conditioners,

refrigerators, printers, computers, copy machines, etc. More information can be found in the “Products” section of the Energy Star website at: <http://www.energystar.gov>

2.5.3.Elevators

The building is one story and therefore contains no elevator.

2.5.4.Process and others electrical systems

There are no other electrical systems present within the building.

3. EQUIPMENT LIST

Inventory

Building System	Description	Physical Location	Model #	Fuel	Space Served	Estimated Remaining Useful Life %
Heating	(4) unit heaters (100 MBH)	Ceiling	Modine High-Efficiency II	Propane	Satellite garage	50%
Heating	Radiant heating tubes	Ceiling	Reflect-O-Ray, Model #2700-24-15	Propane	Satellite garage	50%
Cooling	Window air-conditioner (15,000 BTU), 9.0 EER	Wall	GE, Model #AVM15DAV1	Electric	Satellite garage	20%

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Municipal building, SWA has separated the investment opportunities into three recommended categories:

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

Category I Recommendations: Capital Improvements

- Increase wall insulation to R-19 – Since the building is used primarily for storage, SWA recommends increasing exterior wall insulation to a minimum value of R-19 if any major construction or renovation is performed on the building.
- Increase ceiling insulation – Since the building is used primarily for storage, SWA recommends increasing ceiling insulation to a minimum value of R-30 if any major construction or renovation is performed on the building.

Category II Recommendations: Operations and Maintenance

- Perform bi-annual inspections to maintain building weather-stripping and air-sealing – SWA recommends bi-annual inspections as a form of preventative maintenance of the exterior surfaces. Building staff should inspect exterior walls for signs of excessive moisture or air leakage.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install 9 new CFL lamps
2	Install 6 new T8 fluorescent fixtures
3	Replace window AC unit

ECM#1: Install 9 new CFL lamps

Description:

SWA identified 9 lighting fixtures that were inefficient and could benefit from being upgraded to CFL lamps. These fixtures contained a mix of metal halide, halogen and incandescent bulbs. A complete lighting schedule has been attached in Appendix A of this report.

Installation cost:

Estimated installed cost: \$180

Source of cost estimate: *RS Means; Published and established costs*

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	Install 9 new CFL lamps	RSMeans	180	0	180	2,062	0.4	0	1.2	27	439	5	2,001	0.4	1011.6	202.3	243.6	1,832	3,692

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:

There are currently no incentives available for this measure.

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

ECM#2: Install 6 new T8 fluorescent fixtures

Description:

The Satellite Garage building currently contains 6 inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each of these fixtures with a new fixture equipped with T8 fluorescent bulbs and electronic ballasts. Typically upgrading from T12 fluorescent with magnetic to T8 fluorescent with electronic ballasts provides a 30% savings. A complete lighting schedule has been attached in Appendix A of this report.

Installation cost:

Estimated installed cost: \$1,110

Source of cost estimate: *RS Means; Published and established costs*

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	Install 6 new T8 fluorescent fixtures	RSMMeans	1,290	180	1,110	5,337	1.1	0	3.0	13	1,080	15	12,713	1.0	1045.3	69.7	97.3	11,788	9,556

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:

*NJ Clean Energy Prescriptive Lighting – T-8 lamps with electronic ballast in existing facilities (\$30 per fixture)
Maximum incentive amount is \$180*

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

ECM#3: Replace window AC unit

Description:

One room in the Satellite Garage contains a window air conditioner. This unit does not have a visible capacity rating, but appeared to be 10,000 BTUs. It is recommended, due to the fact that the unit is old and in poor condition, that it is replaced. Newer room air-conditioner models have higher Energy Efficiency Ratios (EERs) and many of which meet Energy Star specifications.

Installation cost:

Estimated installed cost: \$705

Source of cost estimate: RS Means; Published and established costs

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	Replace window AC unit	RSMeans	705	0	705	951	0.0	0	0.5	0	190	15	2,238	3.7	217.5	14.5	26.2	1,566	1,703

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes that EER values for a new thru-wall unit are 9.8. SEER values are more accurate for calculating energy savings, and several equations for converting EER to SEER have been formed, all of which increase EER by 14-25% in the conversion. A conservative estimate would be to use the lower end of this range, which would increase the units’ ratings from 9.8 to 11.2. The original SEER values for the current unit were estimated to be slightly lower, 11.0 and their age and condition decreased their SEERs by 25%, to 8.25. Climate data was provided by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE). The values of 1,024 cooling degree-days and a 0.4% dry-bulb temperature of 93°F were used. The desired indoor temperature during the cooling season was assumed to be 74°F.

Rebates / financial incentives:

There are currently no incentives available for this recommendation.

Options for funding ECM:

NJ Office of Clean Energy – SmartStart, Direct Install programs

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are not currently any existing renewable energy systems.

5.2. Wind

Wind turbines have been recommended for the Public Works Facility that is located on the same site.

5.3. Solar Photovoltaic

Solar Photovoltaic panels have been recommended for the Public Works Facility that is located on the same site.

5.4. Solar Thermal Collectors

Solar thermal collectors are not recommended for this project because they would require modification to the existing domestic hot water system and/or heat distribution system, which would not be cost-effective.

5.5. Combined Heat and Power

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

5.6. Geothermal

Geothermal is not applicable for this building because it would require significant modifications to the existing HVAC system, which would not be cost effective.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

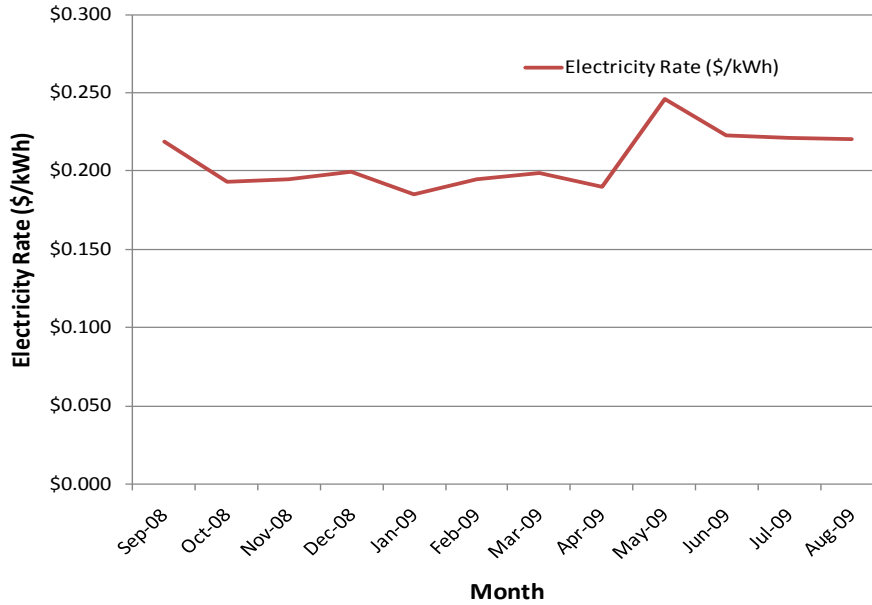
6.1. Energy Purchasing

The Satellite Garage building receives propane via truck deliveries to a 1,000 gallon tank on an as needed basis. Amerigas supplies propane to the building. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased via one incoming meter from JCP&L without an ESCO. SWA analyzed the utility rate for propane and electricity supply over an extended period. Electric bill analysis shows fluctuations of 25% over the most recent 12 month period. Propane bill analysis shows fluctuations up to 46% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and escalating energy costs in 2008.

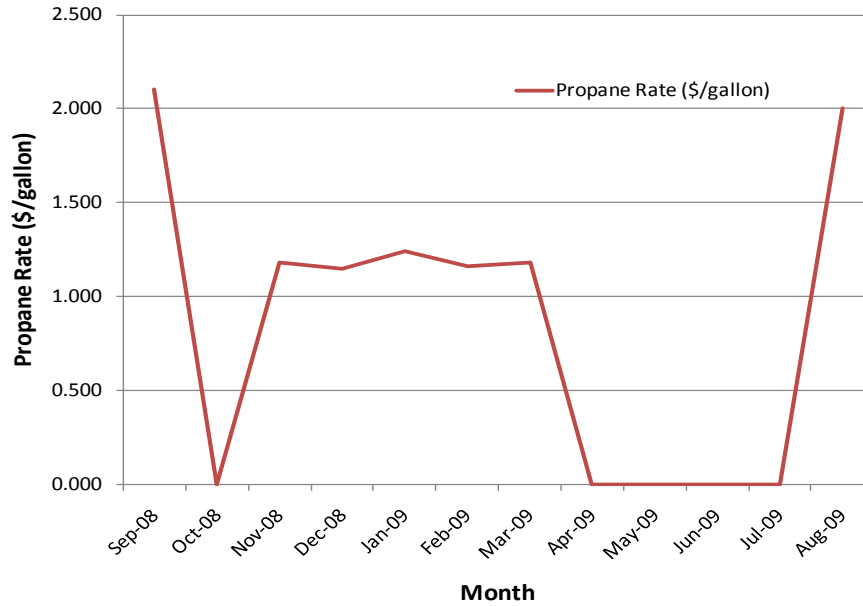
Currently, New Jersey commercial buildings of similar type pay \$0.150/kWh for electricity and \$1.30/gallon for propane. Currently, the electricity rate for the Satellite Garage building is \$.200/kWh, which means there is a potential cost savings of \$427per year. The current propane rate for the Satellite Garage building is \$1.421/gallon which is higher than the average rate but is high due to the fact that the building requires so little propane and gas is delivered as needed, not continuously. A large cost savings

potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates. SWA recommends that the Township of Sparta 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 Satellite Garage building. Appendix B contains a complete list of third party energy suppliers for the Township of Sparta service area. The Township of Sparta may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and propane use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country and in New Jersey.

Satellite Garage - Annual Electricity Rate



Satellite Garage - Annual Propane Rate



6.2. Energy Procurement strategies

Also, the Satellite Garage building would not be eligible for enrollment in a Demand Response Program, because there isn't 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.

7. METHOD OF ANALYSIS

7.1. Assumptions and tools

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

7.2. Disclaimer

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

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

Appendix A: Lighting Study

Location			Existing Fixture Information											Retrofit Information											Annual Savings					
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
194	GF	Maint building	Parabolic	E	2'T12	4	4	34	S	9	261	0	544	1,278	T8	Parabolic	4'T8	E	S	4	4	34	9	261	0	544	1,278	0	0	0
195	GF	Maint Bay 1	Screw-in	None	MH	1	4	300	S	6	261	0	1,200	1,879	T8	#N/A	T8 2'	E	S	1	4	16	6	261	0	64	100	1,779	0	1,779
196	GF	Maint Bay 2	Screw-in	None	MH	1	8	300	S	6	261	0	2,400	3,758	T8	#N/A	T8 2'	E	S	1	8	16	6	261	0	128	200	3,558	0	3,558
197	GF	Maint Bay 2	Screw-in	None	Hal	1	1	200	S	6	261	0	200	313	CFL	Screw-in	CFL	None	S	1	1	66.667	6	261	0	67	104	209	0	209
198	Ext	Maint Bay 2	Screw-in	None	Hal	1	3	150	DL	12	261	0	450	1,409	CFL	Screw-in	CFL	None	DL	1	3	50	12	261	0	150	470	940	0	940
199	Ext	Maint Bay 2	Screw-in	None	Inc	7	1	75	T	10	261	0	525	1,370	CFL	Screw-in	CFL	None	T	7	1	25	10	261	0	175	457	914	0	914
Totals:						15	21	1,059	0				5,319	10,008						15	21	208				1,128	2,609	7,399	0	7,399

Appendix B: Third Party Energy Suppliers (ESCOs)
<http://www.state.nj.us/bpu/commercial/shopping.html>

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Integrays Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integraysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com