Steven Winter Associates, Inc.
Architects and Engineers

50 Washington Street
Norwalk, CT 06854
www.swinter.com

Telephone (203) 8113-0200
Facsimile (203) 852-0741
E-mail: swinter@swinter.com

January 29, 2010

Local Government Energy Program
Energy Audit Final Report

For

Mount Olive Municipal Garage
Budd Lake, NJ 07828

Project Number: LGEA27

TABLE OF CONTENTS

INTRODUCTION

On September 22nd and October 19th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Mount Olive Municipal Garages. The audit included a review of the:

- Mount Olive Township Municipal Building
- Mount Olive Township Public Library
- Mount Olive Township Senior Citizen Center
- Mount Olive Township Municipal Garage

The buildings are located in Budd Lake, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Mount Olive Municipal Garage located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The single-story Mt. Olive Municipal Garage building was built in 1994, with renovations / additions in 2000. The building houses an office, a break room, a bathroom, parts storage areas and 4 truck bays that can accommodate 7 dump trucks. The building consists of 7,500 square feet of conditioned space. The Mt. Olive Municipal Garage building is occupied on weekdays by approximately 3 employees and staff from 6:00 AM - 4:30 PM. Penske is contracted to perform truck repairs.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to the Township of Mount Olive to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Mt. Olive Municipal building. SWA was informed that the Township of Mount Olive has been certified under the Sustainable Jersey program as one of 34 communities state wide to achieve the status.

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 (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Mt. Olive Municipal Garage building located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The Mt. Olive Municipal Garage building is a single-story building with a floor area of 7,500 square feet. The original structure was built in 1994, with renovations / additions in 2000.

Based on the field visits performed by the SWA staff on September 22nd and October 19th 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.

From September 2008 and August 2009 the Mt. Olive Municipal Garage building consumed 52,400 kWh or $9,273 worth of electricity at an approximate rate of $0.177/kWh and 4,858 therms or $7,457 worth of natural gas at an approximate rate of $1.535/therm. The joint energy consumption for the building, including both electricity and natural gas, was 665 MMBtu of energy that cost a total of $16,730.

SWA has entered energy information about the Mt. Olive Municipal Garage building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This (vehicle repair / service building) facility is comprised of non-eligible (Other) space type. SWA encourages the Township of Mount Olive to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. EPA is continually working to expand the available space types.

The Site Energy Use Intensity is 89 kBtu/ft^{2}yr compared to the national average of township vehicle repair / service building consuming 77 kBtu/ft^{2}yr. Implementing this report's recommendations will reduce use by approximately 27.7 kBtu/ft^{2}yr, which when implemented would make the building energy consumption better than the national average. There may be energy procurement opportunities for the Mt. Olive Municipal Garage building to reduce annual utility costs, which are $1,341 higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Mt. Olive Municipal 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

- Install CO / CO_2 detectors with alarms for the garage, office and break room areas
- Select NEMA Premium motors when replacing motors at the end of their useful operating lives

Category II Recommendations: Operations and Maintenance

- Maintain / repair garage doors so that they fully close and are sealed all around
- Thoroughly and evenly insulate space, plug all penetrations to the outside and replace damaged exterior wall and roof insulation. Install a removable, insulated cover (or gravity louvers) for the exhaust fan.
- Maintain roofs and verify water is draining correctly
- Maintain downspouts - repair / install missing downspouts as needed
- Provide weather stripping / air sealing
- Repair / seal wall cracks and penetrations
- Provide water efficient fixtures and controls

- Use Energy Star labeled appliances
- Use smart power electric strips
- Create an energy educational program

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

At this time, SWA highly recommends a total of **1** Energy Conservation Measure (ECM) for the Mt. Olive Municipal Garage building that is summarized in the following Table 1. The total investment cost for this ECM with incentives is **$9,192**. SWA estimates a first year savings of **$2,810** with a simple payback of **3.3 years**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Mt. Olive Municipal Garage building by **21,752 lbs of CO_2**, which is equivalent to removing approximately 2 cars from the roads each year or avoiding the need of 53 trees to absorb the annual CO_2 generated. SWA also recommends **3** ECMs with a total first year savings of **$26,964** that is summarized in Table 2.

There are various incentives that the Township of Mount Olive could apply for that could also help lower the cost of installing the ECMs, such as enroll in the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive program 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, to be rolled out soon, could also assist to cover 80% of the capital investment.

Renewable ECMs require application approval and negotiations with the utility and proof of performance. There is also a utility-sponsored loan program through JCP&L that would allow the building to pay for the installation of the PV system through a loan issued by JCP&L.

The following two tables summarize the proposed Energy Conservation Measures (ECM) 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 7.5 kW Wind rooftop system (with $3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	7.2	0	2,810	25	70,258	3.3	664	27	31	39,744	21,752
	TOTALS		**60,000**	**50,808**	**9,192**	**15,878**	**7.5**	**0**	**7.2**	**0**	**2,810**	**-**	**70,258**	**3.3**	**-**	**-**	**-**	**39,744**	**21,752**

Assumptions: Discount Rate: 3% 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

Table 2 - Recommended 5-10 Year Payback ECMs																		
ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
2.1	replace (7) Exit signs with incandescent lamps with LED fixtures	RS Means, Lit Search, NJ Clean Energy Program	910	140	770	552	0.3	0	0.3	18	115	15	1,466	6.7	124	8	12	605	756
3	install 30 kW PV rooftop system (with $1/W INCENTIVE and $600/1MWh SREC)	similar projects	225,000	30,000	195,000	34,033	30.0	0	15.5	0	26,424	25	150,594	7.4	134	5	11	153,427	46,625
2.2	replace (11) HPS fixtures with T8 fixtures	quote from electrical contractor	3,757	550	3,207	2,202	1.2	0	1.0	35	425	15	5,846	7.6	99	7	10	1,864	3,017
	TOTALS		**229,667**	**30,690**	**198,977**	**36,787**	**31.4**	**0**	**16.7**	**53**	**26,964**	**-**	**157,906**	**7.4**	**-**	**-**	**-**	**155,896**	**50,398**

1. HISTORIC ENERGY CONSUMPTION

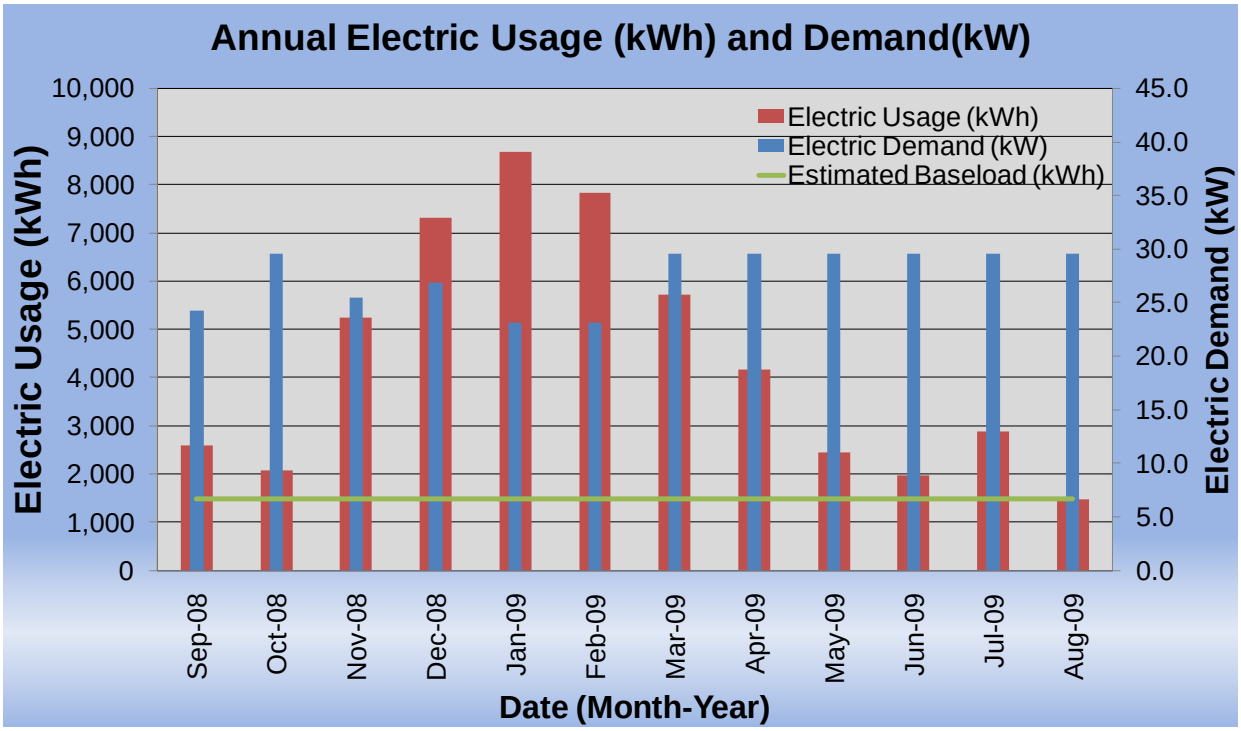
1.1. Energy usage and cost analysis

SWA analyzed utility bills from October 2007 through August 2009 that were received from the utility companies supplying the Mount Olive Municipal Garage with electric and natural gas.

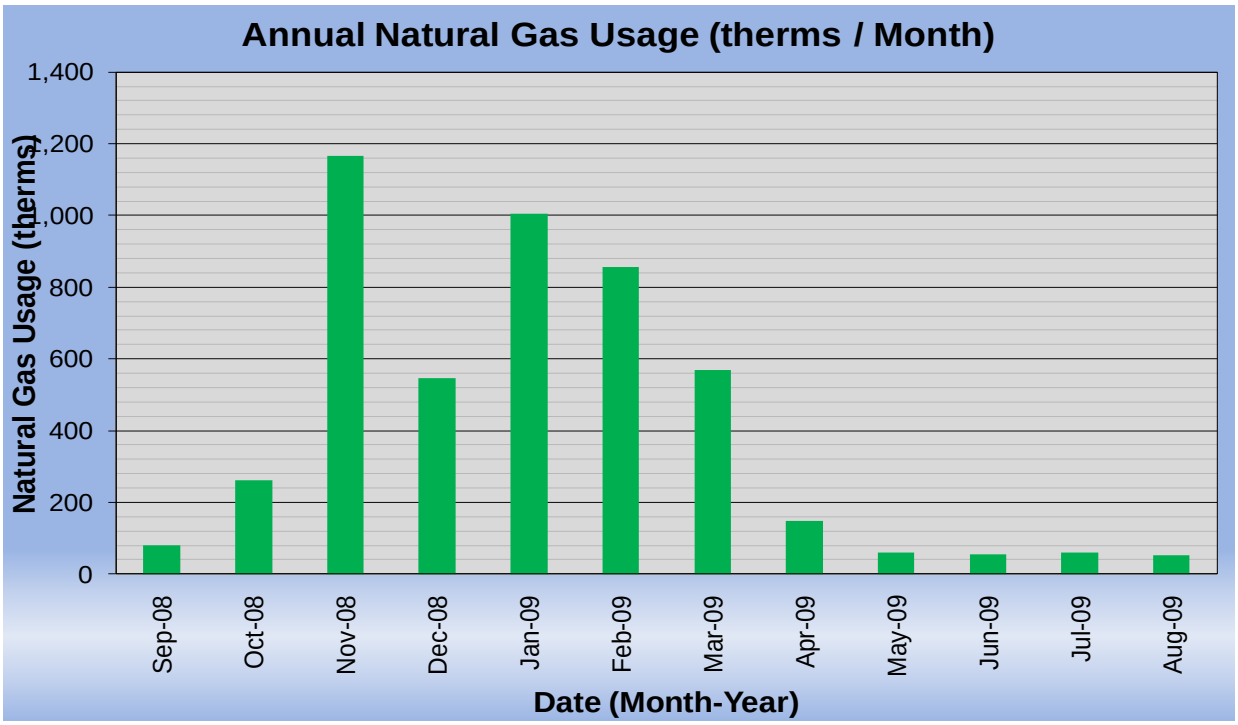
Electricity - The Mount Olive Municipal Garage is currently served by one electric meter. The Mt. Olive Municipal Garage building currently buys electricity from JCP&L at **an average rate of $0.177/kWh** based on 12 months of utility bills from September 2008 and August 2009. The Mt. Olive Municipal Garage building purchased **approximately 52,400 kWh or $9,273 worth of electricity** in the previous year. The average monthly demand was 28 kW.

Natural gas - The Mount Olive Municipal Garage is currently served by one meter for natural gas. The Mount Olive Municipal Garage currently buys natural gas from Elizabethtown Gas Co. at **an average aggregated rate of $1.535/therm** based on 12 months of utility bills for September 2008 and August 2009. The Mount Olive Municipal Garage purchased **approximately 4,858 therms or $7,457 worth of natural gas** in the previous year.

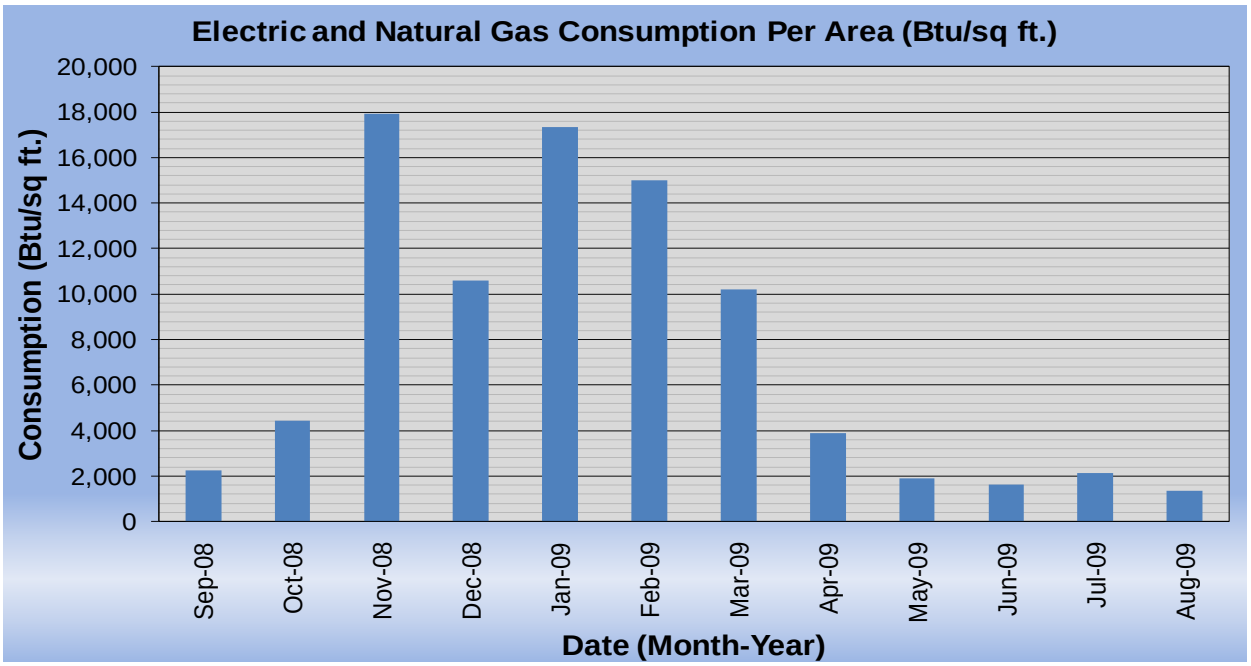
The following chart shows electricity use for the Mt. Olive Municipal Garage building based on utility bills for the 12 month period of September 2008 and August 2009.



The following chart shows the natural gas consumption for the Mt. Olive Municipal Garage building based on natural gas bills for the 12 month period of September 2008 and August 2009.

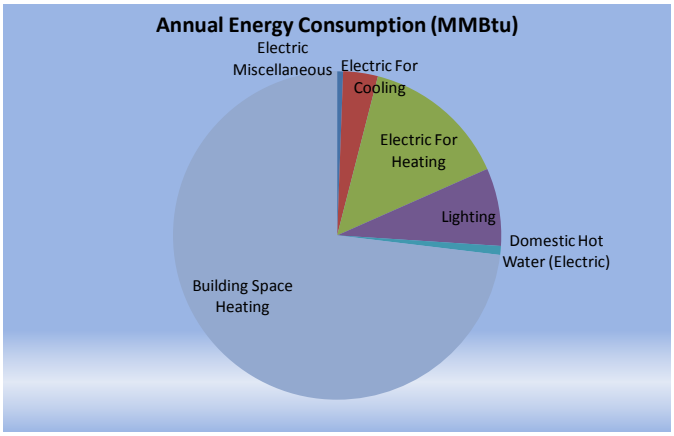


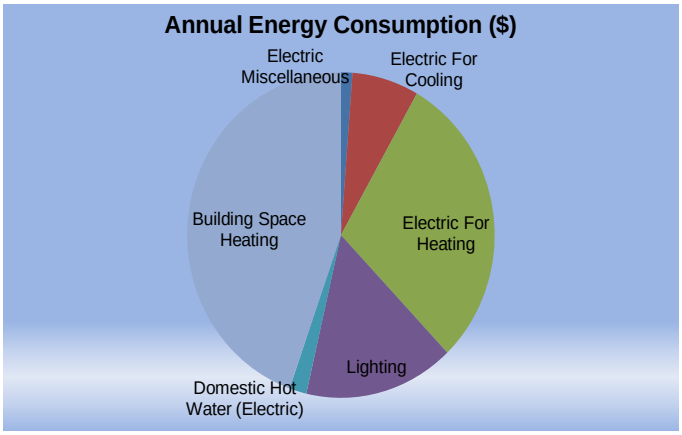
The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Mt. Olive Municipal Garage building based on utility bills for the 12 month period of September 2008 and August 2009.



The following table and chart pies show energy use for the Mt. Olive Municipal Garage building based on utility bills for the 12 month period of September 2008 and August 2009. Note electrical cost at $52/MMBtu of energy is more than 3 times as expensive to use as natural gas at $15/MMBtu.

2009 Annual Energy Consumption / Costs					
	MMBtu	**% MMBtu**	**$**	**% $**	**$/MMBtu**
Electric Miscellaneous	4	1%	$201	1%	52
Electric For Cooling	23	3%	$1,175	7%	52
Electric For Heating	96	14%	$4,955	30%	52
Lighting	51	8%	$2,640	16%	52
	6	1%	$302	2%	52
Domestic Hot Water (Gas)					
Building Space Heating	486	73%	$7,457	45%	15
Totals	665	100%	$16,730	100%	25
Total Electric Usage	179	27%	$9,273	55%	52
Total Gas Usage	486	73%	$7,457	45%	15
Totals	665	100%	$16,730	100%	25





1.2. Utility rate

The Mt. Olive Municipal Garage building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Mt. Olive Municipal Garage building currently pays an average rate of approximately $0.177/kWh based on the 12 months of utility bills of September 2008 and August 2009.

The Mt. Olive Municipal Garage building currently purchases natural gas supply from the Elizabethtown Gas Co. at a general service market rate for natural gas (therms). Elizabethtown Gas Co. also acts as the transport company. There is one gas meter that provides natural gas service to the Mt. Olive Municipal Garage building currently. The average aggregated rate (supply and transport) for the meter is approximately $1.535/therm based on 12 months of utility bills for September 2008 and August 2009.

Some of the minor unusual utility fluctuations that showed up for a couple of months on the utility bills may be due to adjustments between estimated and actual meter readings.

1.3. Energy benchmarking

SWA has entered energy information about the Mt. Olive Municipal Garage building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This (vehicle repair / service building) facility is comprised of non-eligible (Other) space type. Vehicle repair / service building space or "Other" can be used to classify a facility or a portion of a facility where the primary activity does not fall into any of the available space types. Consequently, the Mt. Olive Garage building is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 89 kBtu/sq ft yr compared to the national average of a township vehicle repair / service building consuming 77 kBtu/sq ft yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 7.2 kBtu/sqft yr, with an additional 16.7 kBtu/sq ft yr from the recommended ECMs and 3.7 kBtu/sq ft yr from improved ceiling and wall insulation upgrades. These recommendations could account for at least 27.7 kBtu/sq ft yr reduction, which when implemented would make the building energy consumption better than the national average.

Per the LGEA program requirements, SWA has assisted the Township of Mount Olive to create an *Energy Star Portfolio Manager* account and share the Mt. Olive Municipal Garage facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager site information with the Township of Mount Olive (user name of "mtolivetwp" with a password of "mtolivetwp") and TRC Energy Services (user name of TRC-LGEA).

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Township of Mount Olive - Municipal Garage

Building ID: 1924930
For 12-month Period Ending: August 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 29, 2009

Facility
Township of Mount Olive - Municipal Garage
206 Flanders-Drakestown
Budd Lake, NJ 07828

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1994
Gross Floor Area (ft²): 7,500

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	178,789
Natural Gas (kBtu)[4]	486,849
Total Energy (kBtu)	665,638

Energy Intensity[5]

Site (kBtu/ft²/yr)	89
Source (kBtu/ft²/yr)	148

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	53

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	-2%
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 single-story Mount Olive Municipal Garage building was originally built in 1994, with the break room and storage area above it renovated in 2000. The building houses an office, a break room, a bathroom, parts storage areas and 4 truck bays that can accommodate 7 dump trucks. The building consists of 7,500 square feet of conditioned space.

2.2. Building occupancy profiles

Occupancy for the entire Mt. Olive Municipal Garage building area is approximately 3 employees and staff personnel. Penske is contracted to perform truck repairs. The building is open weekdays 6:00 AM - 4:30 PM.

2.3. Building envelope

2.3.1.Exterior Walls

The Municipal Garage shell consists of a steel skeleton with CMU foundation and stem walls and partially insulated vertical metal panel walls. The inside is mostly unfinished with exposed CMU blocks or fiberglass insulation blankets installed between the steel structures. The two trailers behind the Garage building are in acceptable condition.

The metal panel walls were inspected and found to be in good condition except for some damaged / missing insulation blankets.

Damaged fiberglass insulation blankets

SWA recommends properly repairing, patching or replacing damaged wall insulation and adding insulation where missing in an effort to minimize energy loss year-round.

2.3.2.Roof

The metal roof is insulated with fiberglass blankets / Styrofoam type boards between the steel roof structures. Most of the interior is exposed. There weren't any signs of leakage detected or mentioned. Insulation boards were found to be damaged in some areas.

Also, there weren't any leaks reported for the detached trailers.

Some roof insulation boards were found to be damaged

SWA recommends properly repairing / patching or replacing damaged roof insulation in an effort to minimize energy loss.

2.3.3. Base

The building's base is a 4"concrete slab-on grade with a perimeter foundation and foundation walls. There weren't any moisture or water related issues reported or detected.

2.3.4. Windows

The single glazed aluminum frame windows were found to be in acceptable condition. SWA recommends inspecting the openings around the installed window air conditioning units regularly for air tightness to guarantee optimal performance.

2.3.5. Exterior doors

The 7 overhead type doors with metal panel exterior and panel insulation interior were found in acceptable condition. It was reported that some doors do not close completely.

SWA recommends inspecting all garage doors and replacing worn weather-stripping 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. Tight seals around doors will help ensure the building to be is kept continuously insulated.

2.3.6. Building air tightness

A wall fan and exterior louver were inspected for air tightness. Air infiltration through this un-insulated and uncovered fan can be costly during cooler months when the bays are heated. SWA recommends installing a removable, seasonal, insulated cover (or installing gravity louvers) during winter months. SWA also suggests air sealing, caulking and / or insulating around all plumbing, electrical, HVAC and structural envelope penetrations where feasible and possible. This should include the bottom and the top plates, recessed light fixtures, electrical boxes, chimney walls and window, or sleeve air conditioner units.

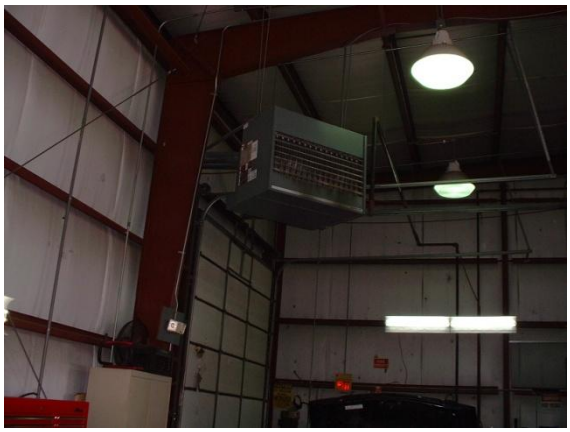
The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

The Mount Olive Municipal Garage is heated by a ceiling hung natural gas fired heater in the main shop and cooled by two window mounted air conditioners in the office and break room respectively.

2.4.1.Heating

The Garage workspace heating is provided by a ceiling mounted Sterling gas heater (installed in 2007), 400,000 Btu/hr input capacity, 80% thermal efficiency, controlled by manual thermostat. Four infrared ceiling heaters were disconnected and abandoned in place two years ago because they were not providing sufficient heat in the bay work areas for the mechanics to perform their work comfortably. The office and break room heating is provided by electric baseboard heaters controlled by manual thermostats. SWA was advised that the Garage supervisor diligently sets back thermostats at night.



Garage work area heater

2.4.2.Cooling

The Mt. Olive Municipal Garage building office and break room are air conditioned during the summer by two window units.

2.4.3.Ventilation

The Mount Olive Garage building ventilation is achieved via natural cross ventilation and an exhaust fan (on a manual switch). SWA recommends installation of a couple of CO / CO_2 detectors with alarms for the garage, office and break room areas with an option to turn on / off the Garage exhaust fan as a safety feature.

2.4.4. Domestic Hot Water

The domestic hot water (DHW) for the Mt. Olive Municipal Garage building is provided by a General Electric heater with 20 gal storage and two 2,000 Watt electric coils. This heater has 50% estimated useful operating life left and appears in satisfactory condition. Considerations should be given to replacing it with a high efficiency condensing type gas fired heater when it has reached the end of its operating life.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Mt. Olive Municipal Garage building currently consists of mostly T12 and T8 fluorescent fixtures and high pressure sodium lamps for the garage work spaces. Based on measurements of lighting levels for each space, there are not any vastly over-illuminated areas. SWA recommends replacing T12 fixtures and magnetic ballasts with T8 fixtures and electronic ballasts if cost justified, as well as replacing high pressure sodium lamps with T8 4 lamp fixtures for improved lighting at the working area at the floor level. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Lights - Exit signs were found to be incandescent type. SWA recommends replacing Exit signs with LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of CFL and high pressure sodium fixtures. Exterior lighting is controlled by photocells for some and a switch for less commonly used fixtures. SWA is not recommending at this time any upgrades to the exterior lighting or photocells.

2.5.2. Appliances and process

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 use as little as 315 kWh / yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: 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. Also, energy vending miser devices are now available for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions (DVDs, stereos, computers, and kitchen appliances which now have internal memories or clocks which always require a trickle of power) in meeting areas use approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances (i.e. fridges, coffee makers, televisions, etc) be plugged in to power strips and turned off each evening just as the lights are turned off. The Mount Olive Municipal Garage computers are generally NOT programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3. Elevators

The Mount Olive Municipal Garage is a single-story building without elevators.

2.5.4. Others electrical systems

There are not currently any other significant energy impacting electrical systems installed at the Mt. Olive Municipal Garage.

3. EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Equip Age	Estimated Remaining Useful Life %
Cooling	2 window mounted ACs, 5,000 Btu/hr in office, 10,000 Btu/hr in break room	office and break room	Fedders	Electric	Municipal Garage	2000	40%
Heating	4 tube radiant heaters disconnected	hanging from garage ceiling	Viking	Electric	Municipal Garage	abandoned in place	abandoned in place
Heating	ceiling mounted gas heater, 400,000 Btu/hr input capacity, 80% thermal eff., controlled by manual thermostat	hanging from garage ceiling	Sterling QVSF400	Natural Gas / Electric	Municipal Garage	2007	90%
Heating	office heating via electric baseboard controlled with manual thermostat	office	missing nameplate	Electric	Garage Office	1994	30%
Ventilation	1 exhaust fan on switch	wall mounted	missing nameplate	Electric	Municipal Garage	1994	30%
Pressurized Air	Instrument Air, 10 Hp motor running ~1-1/2 hrs /day	garage work room	Ingersoll Rand T30, Baldor motor 37F428X33	Electric	Municipal Garage	1994	30%
Domestic Hot Water	20 gal storage, 2 coils, 2,000 Watt upper and 2000 Watt lower	mezzanine above office and break room	General Electric GE20P6A	Electric	Municipal Garage	2003	50%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Municipal Garage	2000	40%

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 Mount Olive Municipal Garage, 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

- Install CO / CO_2 detectors with alarms for the garage, office and break room areas with an option to turn on / off the Garage exhaust fan as a safety feature.

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

Category II Recommendations: Operations and Maintenance

- Maintain / repair garage doors so that they fully close and are sealed all around.

- Thoroughly and evenly insulate space (with batt insulation) and plug all penetrations to the outside. SWA recommends properly repairing / patching or replacing damaged exterior wall and roof insulation in an effort to minimize energy loss. Also, install a removable, seasonal, insulated cover (or gravity louvers) for the exhaust fan.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.

- Maintain downspouts - Repair / install missing downspouts as needed to prevent water / moisture infiltration and insulation damage.

- Provide weather stripping / air sealing - SWA observed that exterior door weather-stripping in places was beginning to deteriorate. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Repair / seal wall cracks and penetrations - SWA recommends as part of the maintenance program to install proper flashing and seal wall penetrations wherever necessary in order to keep insulation dry and effective.

- Provide water efficient fixtures and controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and / or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.

- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize their energy use. The US Department of Energy offers free information for hosting energy efficiency educational programs and plans, for more information please visit: http://www1.eere.energy.gov/education/ .

Category III Recommendations: Energy Conservation Measures - Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	install 7.5 kW Wind rooftop system
2.1 & 2.2	replace high pressure sodium lamps and T12 with T8 fixtures and install Exit sign LED fixtures
	Description of Recommended 5-10 Year Payback ECMs
3	install 30 kW PV rooftop system

ECM#1: *Install 7.5 kW Wind system*

Description:

Wind power production may be applicable for the Mount Olive Municipal Garage location, because of the thermal winds generated in the area. Currently, the Mount Olive Municipal Garage does not use any renewable energy systems. Updated renewable energy systems such as "magnetic" vertical axis wind turbines (MVAWT) can be mounted on building roofs offset a 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. Wind 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 presents below the economics of installing a 7.5 kW Wind system to offset electrical demand for the building and reduce the annual net electric consumption for the building, however there are insufficient guaranteed incentives for NJ rebates at this time for this investment. The Mount Olive Municipal Garage is not eligible for a 30% federal tax credit. The Mount Olive Municipal Garage may consider applying for a grant and / or engage a Wind Power generator / leaser who would install the Wind system and then sell the power at a reduced rate.

There are many possible locations for a 7.5kW Wind system installation on top of the building ample roof area. The supplier would need to first determine via recorded analysis at the proposed location(s) consistency and wind speeds available. Area winds of 10 mph will run turbines smoothly and capture the needed power. This is a roof-mounted wind turbine (used for generating electricity) that spins around a vertical axis like a merry-go-round instead of like a windmill, as do more traditional horizontal axis wind turbines (HAWTs). A typical 7.5 kW MVAWT wind system has a 20 ft diameter turbine by 10 ft tall.

The installation of a renewable Wind power generating system could serve as a good educational tool and exhibit for the community. **It is very important that Wind measurements and recordings are taken at the chosen location for at least a couple of months to assure that sufficient wind and speed is available for proper operation and to meet incentive requirements.**

Installation cost:

Estimated installed cost: $9,192
Source of cost estimate: Similar projects

Economics (with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
1	install 7.5 kW Wind rooftop system (with $3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	7.2	0	2,810	25	70,258	3.3	664	27	31	39,744	21,752

Assumptions: SWA estimated the cost and savings of the system based on past wind projects. SWA projected physical dimensions based on a 7.5 kW-Enviro Energies turbine system. **SWA assumes that the relatively low height (~30 ft) compared to the taller horizontal axis turbines is acceptable to the NJ BPU as long as the average documented annual wind speed is 11 mph at the hub.**

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive at this time only for vertically spinning high altitude turbines
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Wind Upfront Incentive Program, Expected performance buy-down (EPBB) is modeled on an annual kWh production of 1-16,000 kWh for a $3.20/kWh upfront incentive level. This has been incorporated in the above costs, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#2: *Building Lighting Upgrades*

Description:

On the days of the site visits, SWA completed a lighting inventory of the Mt. Olive Municipal Garage building (see Appendix A). SWA recommends replacing T12 fixtures and magnetic ballasts with T8 fixtures and electronic ballasts if it is cost justified, as well as replacing high pressure sodium lamps with T8 4 lamp fixtures for improved lighting at the working area at the floor level. Since Exit signs were found to be incandescent type, SWA recommends replacing Exit signs with LED type. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Mount Olive may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $10,267
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program; Quoted bids*

Economics (Some of the options considered with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
2.1	replace (7) Exit signs with incandescent lamps with LED fixtures	RS Means, Lit Search, NJ Clean Energy Program	910	140	770	552	0.3	0	0.3	18	115	15	1,466	6.7	124	8	12	605	756
2.2	replace (11) HPS fixtures with T8 fixtures	quote from electrical contractor	3,757	550	3,207	2,202	1.2	0	1.0	35	425	15	5,846	7.6	99	7	10	1,864	3,017
not pro-posed	replace (34) T12 with T8 fixtures	RS Means, Lit Search, NJ Clean Energy Program	7,310	1,020	6,290	1,332	0.7	0	0.6	18	253	15	3,536	24.8	-40	-3	-6	-3,267	1,825
	TOTALS		**11,977**	**1,710**	**10,267**	**4,086**	**2.1**	**0**	**1.9**	**70**	**793**	**-**	**10,848**	**12.9**	**-**	**-**	**-**	**-798**	**5,598**

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 2 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - LED Exit signs ($10-20 per fixture) - Maximum incentive amount is $140.*
- *NJ Clean Energy - T5 and T8 lamps with electronic ballast in existing facilities ($10-30 per fixture, depending on quantity and lamps) Maximum incentive amount is $1,020.*
- *JCP&L - T5 and T8 lamps with electronic ballast in existing facilities ($50 per fixture, depending on quantity and lamps) Maximum incentive amount is $550.*

Options for funding the Lighting ECM: *This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*

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

ECM#3: *Install 30 kW PV system*

Description:

Currently, the Mt. Olive Municipal Garage building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs, and can offset a 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 presents below the economics, and recommends at this time that Township of Mount Olive further review installing a 30 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Mt. Olive Municipal Garage building is not eligible for a 30% federal tax credit. Instead, the Township of Mount Olive may consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. JCP&L provides the ability to buy SRECs at $600 / MWh or best market offer.

There are many possible locations for a 30 kW PV installation on the building roofs and away from shade. A commercial multi-crystalline 230 Watts panel (37.0 volts, 8.24 amps) has 17.5 square feet of surface area (13. 1 Watts per square foot). A 30 kW system needs approximately 130 panels, which would take up 2,283 square feet. The installation of a renewable Solar Photovoltaic power generating system could also serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $195,000
Source of cost estimate: Similar projects

Economics (with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
3	install 30 kW PV rooftop system (with $1/W INCENTIVE and $600/1MWh SREC)	similar projects	225,000	30,000	195,000	34,033	30.0	0	15.5	0	26,424	25	150,594	7.4	134	5	11	153,427	46,625

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (230 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $1.00 / watt Solar PV application for systems 50kW or less. Incentive amount for this application is $30,000 for the Mt. Olive Municipal building.

http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total of $20,400 / year has been incorporated in the above costs for the Township of Mount Olive, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

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

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There aren't currently any existing renewable energy systems.

5.2. Wind

Description:

Pleases see the above recommended ECM#1.

5.3. Solar Photovoltaic

Pleases see the above recommended ECM#3.

5.4. Solar Thermal Collectors

Description:

Solar thermal collectors are not cost effective for this building and would not be recommended due to the insufficient and not constant use of domestic hot water throughout the building to justify the expenditure.

5.5. Combined Heat and Power

Description:

CHP is not applicable for this building because of absence of a major cooling system and insufficient domestic hot water use.

5.6. Geothermal

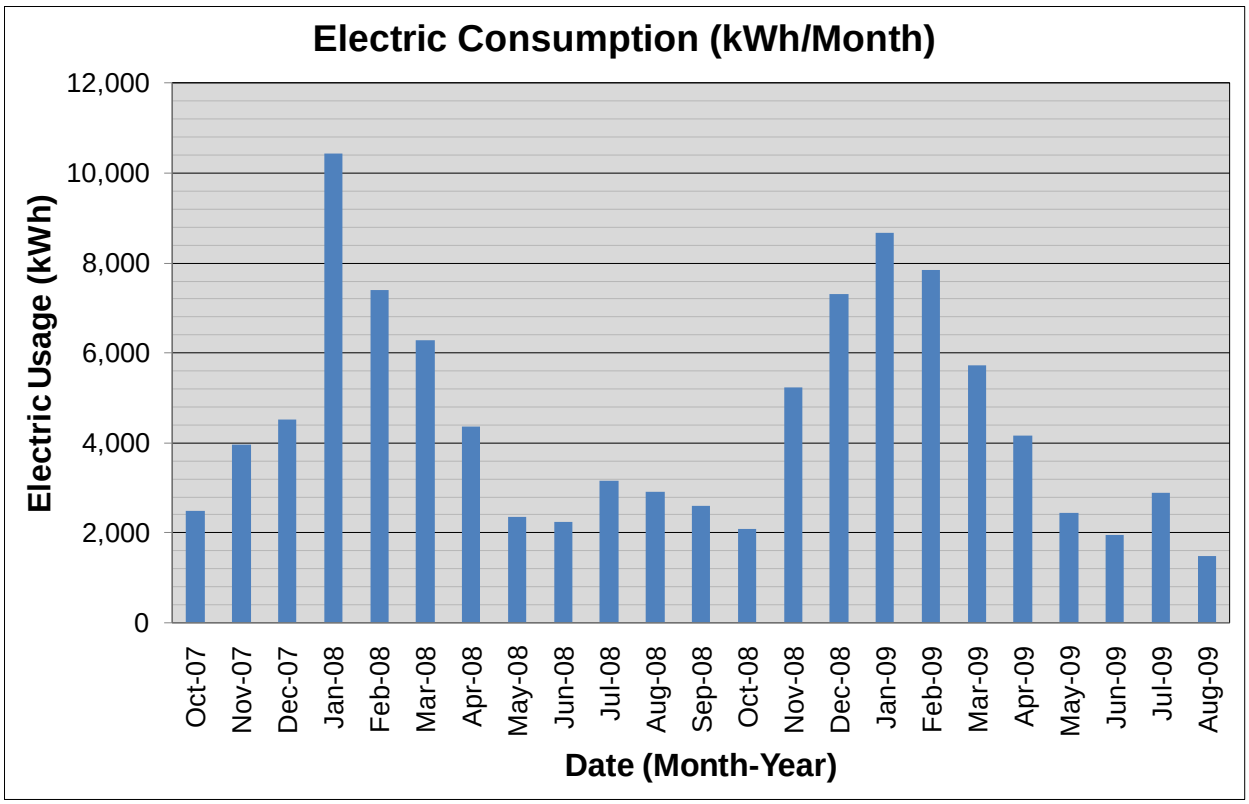
Description:

Geothermal is not applicable for this building because it would not be cost effective, since it would require replacement of the existing HVAC system, of which major components still have as a whole a number of useful operating years.

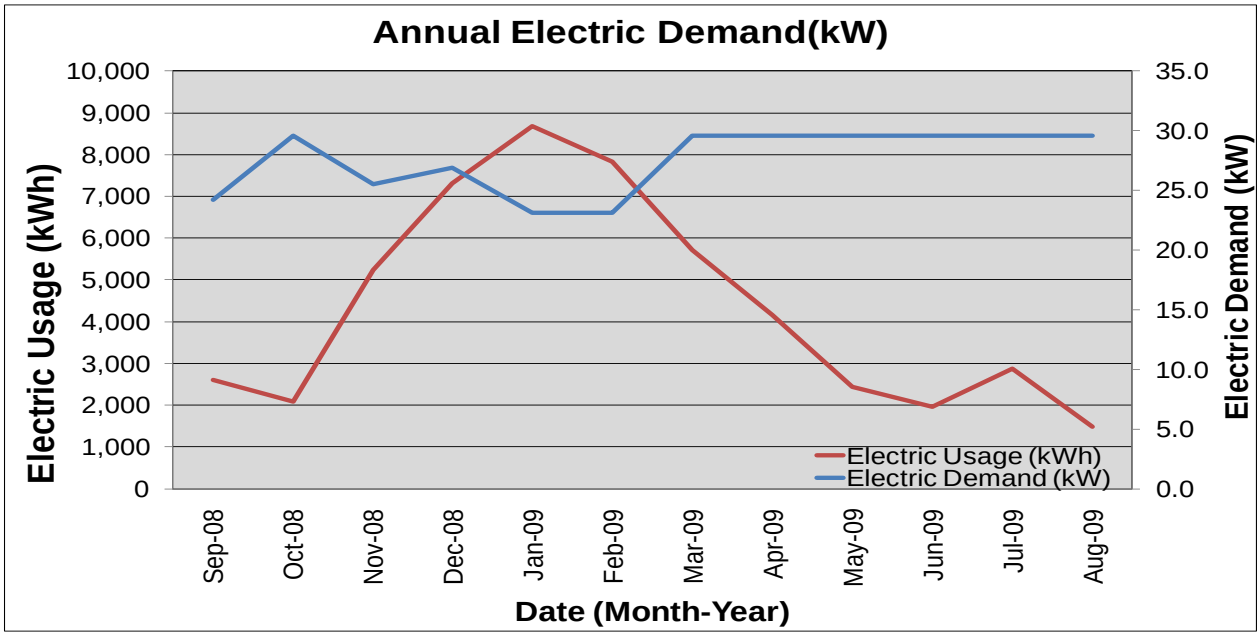
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

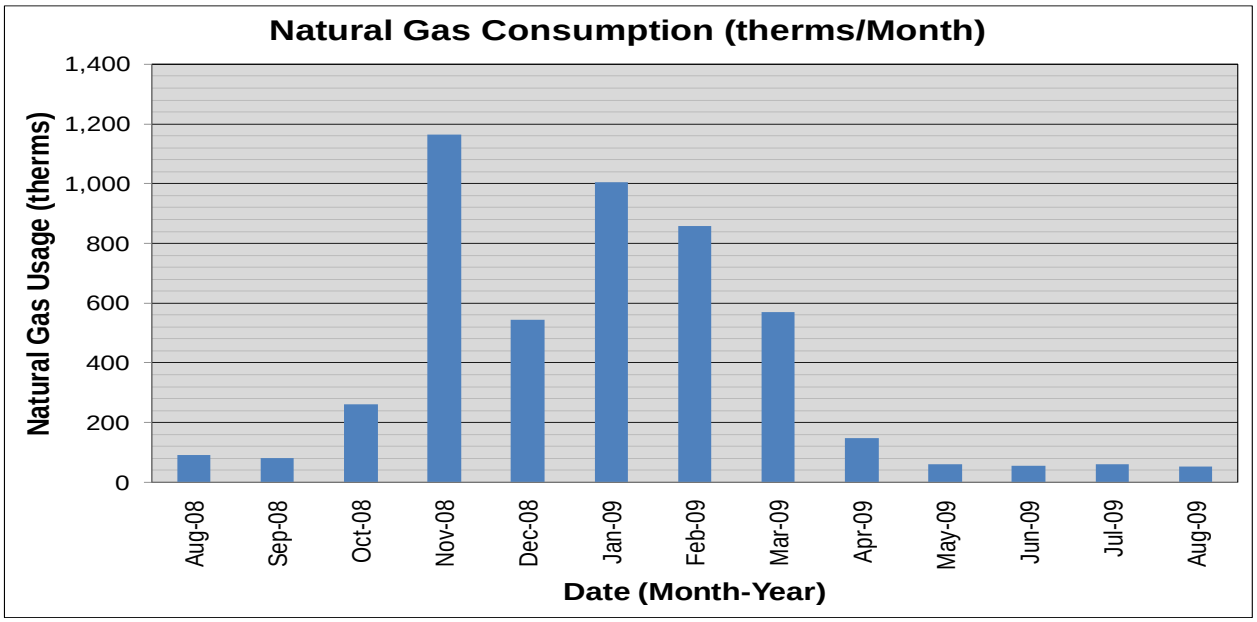
The following are charts that show the annual electric and natural gas load profiles for the Mount Olive Municipal Garage.

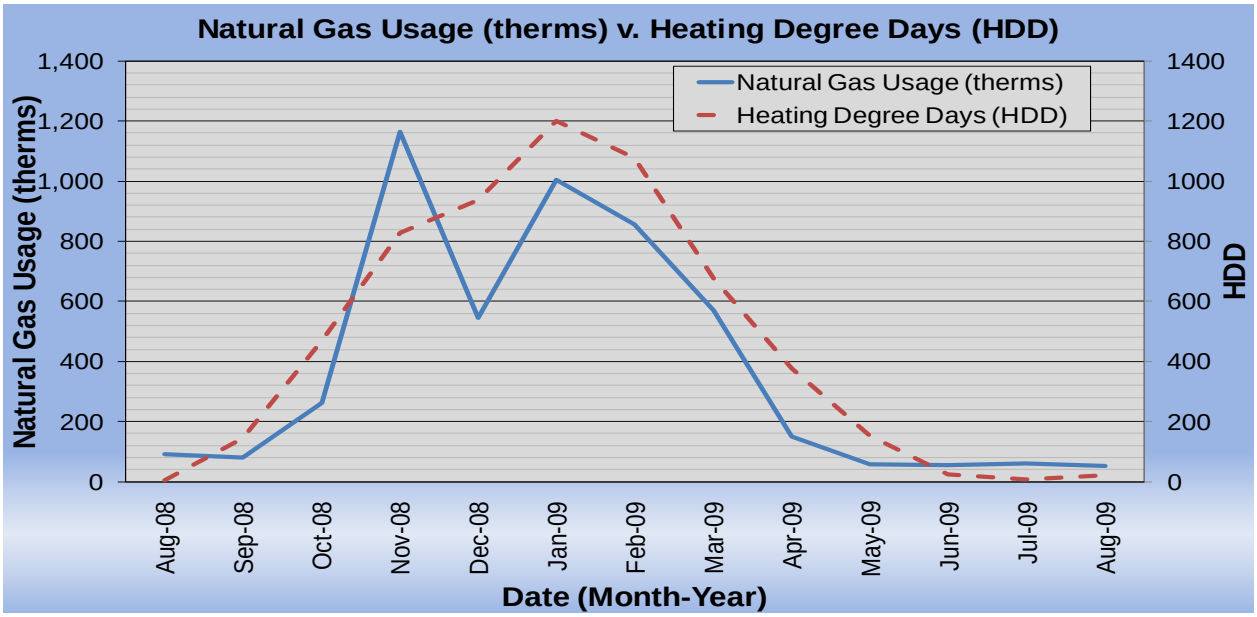


Some minor unusual electric fluctuations shown may be due to adjustments between estimated and actual meter readings. Also, note on the following chart how the electrical Demand peaks (except for a few unusual fluctuation anomalies) follow the electrical consumption and are a steady draw.



The following is a chart of the natural gas annual load profile for the building, peaking in the coldest months of the year and a chart showing natural gas consumption following the "heating degree days" curve. Some utility bills have more than one month estimated and combined.

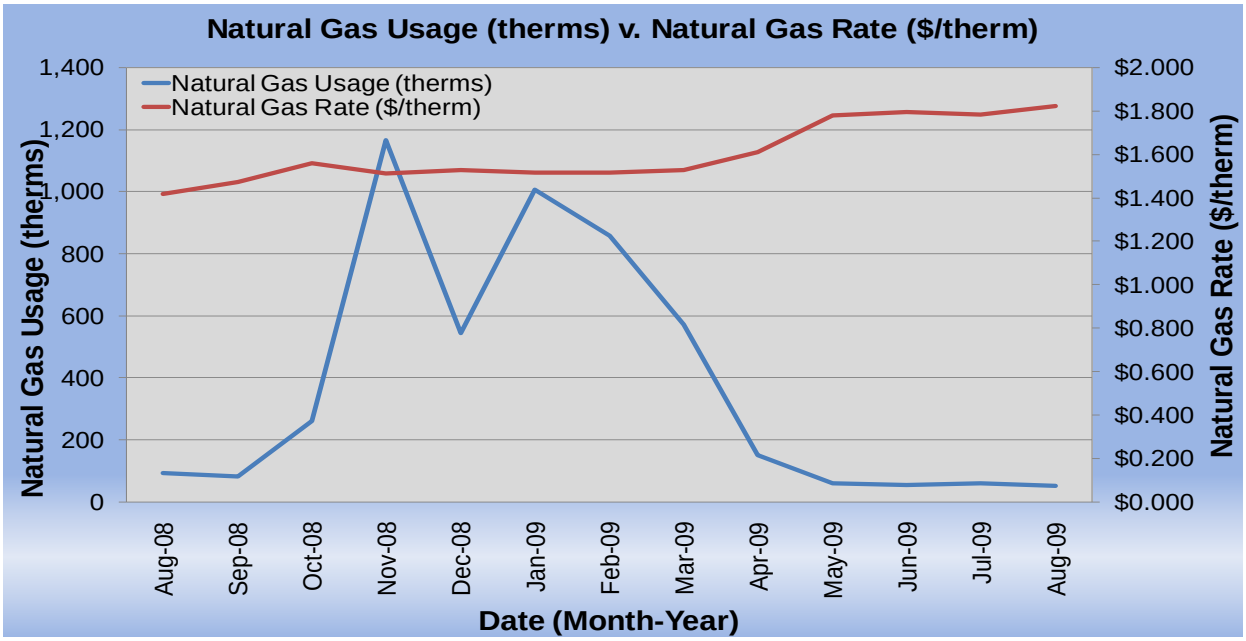




6.2. Tariff analysis

Currently, natural gas is provided to the Mt. Olive Municipal main building via one gas meter with the Elizabethtown Gas Co. acting as the supply and also the transport company. Gas is provided by the Elizabethtown Gas Co. at a general service rate. The suppliers' general service rate for natural gas charges a market-rate price based on use and the Mt. Olive Municipal Garage building billing does not breakdown demand costs for all periods. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. The high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for

the non-heating months. Thus the building pays for fixed costs such as meter reading charges during the summer months.

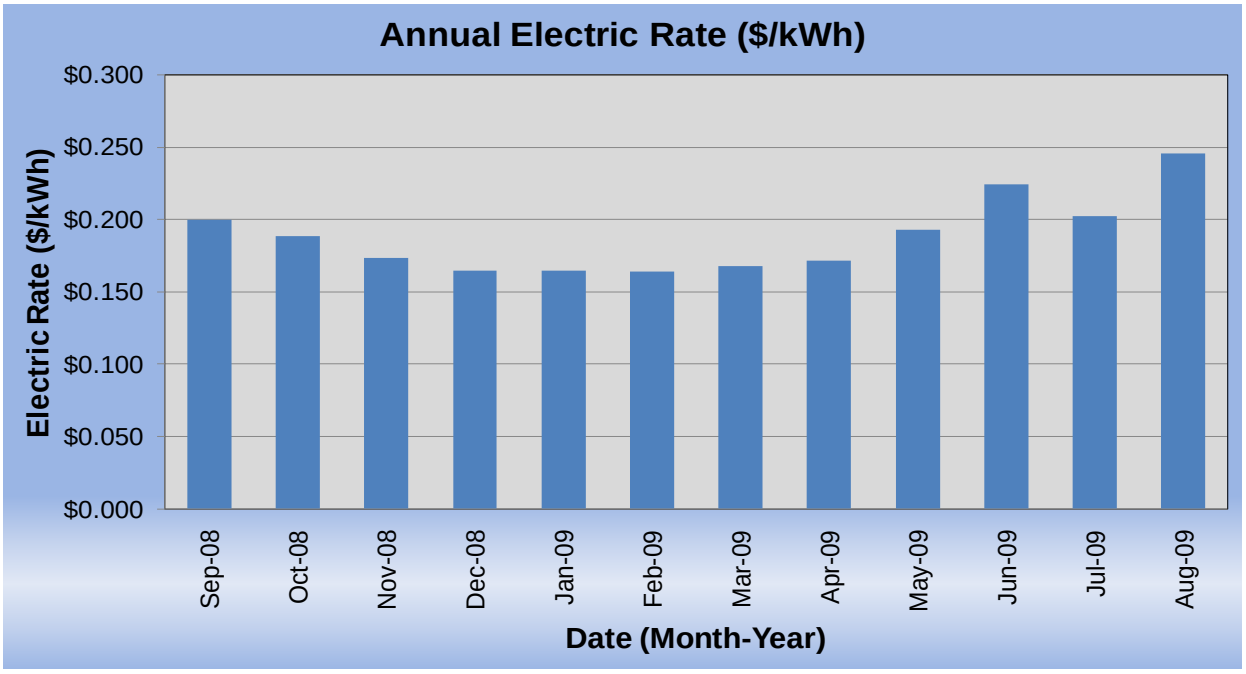


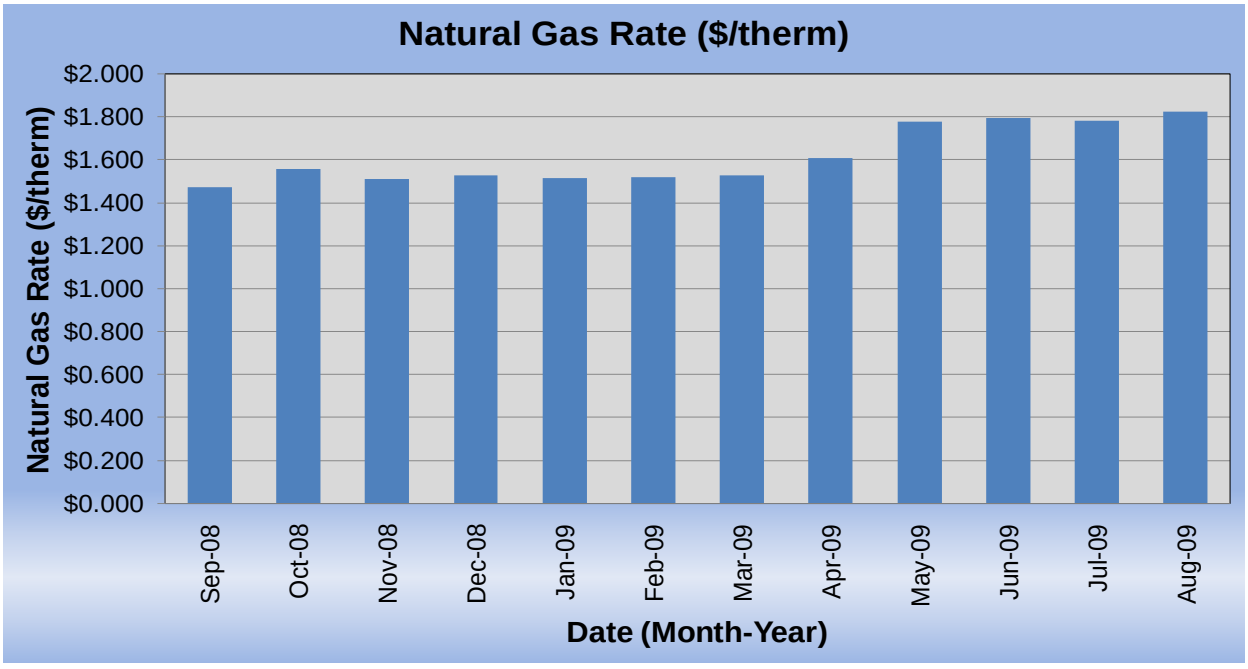
The Mt. Olive Municipal Garage building is direct-metered and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Mt. Olive Municipal Garage building billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by the HVAC condensing units and air handlers.

6.3. Energy Procurement strategies

The Mt. Olive Municipal Garage building receives natural gas via one incoming meter. The Elizabethtown Gas Co. supplies the gas and transports it. 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 directly for the main Mt. Olive Municipal Garage building from JCP&L without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations up to 33% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 22% 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 recent escalating energy costs. The average estimated NJ commercial utility rates for electric and gas are $0.150/kWh and $1.550/therm respectively. The Mt. Olive Municipal Garage building annual utility costs are $1,413 higher for electric and $73 lower for natural gas for a total of $1,341 lower, when compared to the average estimated NJ commercial utility rates. SWA recommends that the Township of Mount Olive further explore opportunities of purchasing both natural gas and electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Mt. Olive Municipal Garage. Appendix B contains a complete list of third party energy suppliers for the Mt. Olive Township service area. The Township of Mount Olive may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and natural gas 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. Also, the Mt. Olive Municipal Garage building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time (without a large capital investment) 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. Demand Response could be an option in the future when the Township of Mount Olive may install a large enough back-up emergency generator. The following charts show the Mt. Olive Municipal Garage building monthly spending per unit of energy in 2009.





7. METHOD OF ANALYSIS

7.1. Assumptions and tools

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

7.2. Disclaimer

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

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, 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)
1	GF	Main Bays	Parabolic	E	4'T8	14	2	32	S	4	291	6	902	1,141	N/A	Parabolic	4'T8	E	S	14	2	32	4	291	6	902	1141	0	0	0
2	GF	**Main Bays**	Screw-in	N	HPS	11	1	250	S	4	291	63	2,813	4,008	T8	Parabolic	4'T8	E	S	11	4	32	4	291	13	1421	1805	2,202	0	2,202
3	GF	**Main Bays**	Screw-in	N	MH	2	1	175	S	4	291	44	394	510	N/A	Screw-in	MH	N	S	2	1	175	4	291	44	394	510	0	0	0
4	GF	**Main Bays**	Parabolic	M	4'T12	4	2	40	S	4	291	15	335	442	T8	Parabolic	4'T8	E	S	4	2	32	4	291	6	262	326	116	0	116
5	GF	**Main Bays**	Exit Sign	N	Inc	4	1	15	N	24	365	0	60	526	LEDex	Exit Sign	LED	N	N	4	1	5	24	365	1	21	210	315	0	315
6	GF	**Office**	Parabolic	M	4'T12	2	2	40	S	8	291	15	175	442	T8	Parabolic	4'T8	E	S	2	2	32	8	291	6	134	326	116	0	116
7	GF	**Office**	Exit Sign	N	Inc	2	1	15	N	24	365	0	30	263	LEDex	Exit Sign	LED	N	N	2	1	5	24	365	1	11	105	158	0	158
8	GF	**Office**	Exit Sign	N	Inc	1	1	15	N	24	365	0	15	131	LEDex	Exit Sign	LED	N	N	1	1	5	24	365	1	6	53	79	0	79
9	GF	**Office**	Parabolic	M	4'T12	4	4	40	S	8	291	24	664	1,713	T8	Parabolic	4'T8	E	S	4	4	32	8	291	13	525	1313	400	0	400
10	GF	**Bathroom Men**	Screw-in	N	CFL	1	1	13	S	2	291	0	13	8	N/A	Screw-in	CFL	N	S	1	1	13	2	291	0	13	8	0	0	0
11	GF	**Bathroom Women**	Screw-in	N	CFL	1	1	13	S	2	291	0	13	8	N/A	Screw-in	CFL	N	S	1	1	13	2	291	0	13	8	0	0	0
12	GF	**Wash Bay**	Screw-in	N	MH	4	1	175	S	1	291	44	744	255	N/A	Screw-in	MH	N	S	4	1	175	1	291	44	744	255	0	0	0
13	Ext	**Exterior**	Screw-in	N	CFL	2	1	15	S	12	365	0	30	131	N/A	Screw-in	CFL	N	S	2	1	15	12	365	0	30	131	0	0	0
14	1	**Main area C/D**	Parabolic	M	4'T12	12	2	40	S	4	291	15	975	1,327	T8	Parabolic	4'T8	E	S	12	2	32	4	291	6	774	978	349	0	349
15	1	**Main area A/B**	Parabolic	M	4'T12	12	2	40	S	4	291	15	975	1,327	T8	Parabolic	4'T8	E	S	12	2	32	4	291	6	774	978	349	0	349
16	1	Main area A/B	Exit Sign	N	LED	2	1	5	N	24	365	1	11	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	11	105	0	0	0
17	1	Main area C/D	Exit Sign	N	LED	2	1	5	N	24	365	1	11	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	11	105	0	0	0
18	Ext	**Exterior / Flagpole**	HID	N	HPS	1	1	250	PC	12	365	63	313	1,371	N/A	HID	HPS	N	PC	1	1	250	12	365	63	313	1371	0	0	0
Totals:						**81**	**26**	**1,178**					**8,473**	**13,813**						**81**	**29**	**890**			**212**	**6,359**	**9,727**	**4,086**	**0**	**4,086**
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																													

Proposed Lighting Summary Table			
Total Surface Area (SF)	7,500		
Average Power Cost ($/kWh)	0.177		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,502	1,502	**0**
Exterior Power (watts)	343	343	**0**
Total Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	12,310	8,224	**4,086**
Lighting Power (watts)	8,130	6,016	**2,114**
Lighting Power Density (watts/SF)	1.08	0.80	**0**
Estimated Cost of Fixture Replacement ($)	10,267		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**793**		

Legend:

Fixture Type	Lamp Type	Control Type	Ballast Type	Retrofit Category
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Installl new T8)
Pin	1'T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2'T5	T (Timer)		CFL (Install new CFL)
Recessed	3'T5	PC (Photocell)		LEDex (Install new LED Exit)
2'U-shape	4'T5	D (Dimming)		LED (Install new LED)
Circiline	2'T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3'T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4'T8			
	6'T8			
	8'T8			
	2'T12			
	3'T12			
	4'T12			
	6'T12			
	8'T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium			
	LPS (Low Pressure Sodium)			

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

JCP&L ELECTRICAL SERVICE TERRITORY Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com	**BOC Energy Services, Inc.** 1135 Mountain Avenue Murray Hill, NJ 011374 (800) 247-2644 www.boc.com	**Commerce Energy, Inc.** 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-84113 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 Corp.** 300 Madison Avenue Morristown, NJ 0113113 (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	**Integrys Energy Services, Inc.** 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integrysenergy.com	**Strategic Energy, LLC** 55 Madison Avenue, Suite 400 Morristown, NJ 011360 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-31139 www.libertypowercorp.com	**Pepco Energy Services, Inc.** 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (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 The Mac-Cali Building 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) 800-756-3749 www.south jerseyenergy.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 080113 (856) 273-9995 www.ugienergyservices.com	**American Powernet Management, LP** 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com	**ConEdison Solutions** Cherry Tree, Corporate Center 1135 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450 212-1138-3124 www.creditsuisse.com	**Sprague Energy Corp.** 12 Ridge Road Chatham Township NJ 011328 (800) 225-1560 www.spragueenergy.com	

ELIZABETHTOWN GAS COMPANY NATURAL GAS SERVICE TERRITORY Last Updated: 06/15/09		
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6BUYGAS (6-289427) www.cooperativenet.com	**Direct Energy Services, LLP** 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com	**Glacial Energy of New Jersey, Inc.** 207 LaRoche Avenue Harrington Park, NJ 07640 1-877-569-2841 www.glacialenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com	**UGI Energy Services, Inc. d/b/a GASMARK** 704 East Main Street, Suite 1 Moorestown, NJ 08057 856-273-9995 www.ugienergyservices.com	**Great Eastern Energy** 116 Village Riva, Suite 200 Princeton, NJ 08540 888-651-4121 www.greateastern.com
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com	**Metromedia Energy, Inc.** 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com	**Intelligent Energy** 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327 800-375-1277 www.mxenergy.com	**NATGASCO (Mitchell Supreme)** 532 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com	**Metro Energy Group, LLC** 14 Washington Place Hackensack, NJ 07601 888-53-Metro www.metroenergy.com
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com	**Stuyvesant Energy LLC** 10 West Ivy Lane, Suite 4 Englewood, NJ 07631 800-646-6457 www.stuyfuel.com	**Pepco Energy Services, Inc.** 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928 800-225-1560 www.spragueenergy.com	**South Jersey Energy Company** One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm	**Woodruff Energy** 73 Water Street Bridgeton, NJ 08302 800-557-1121 www.woodruffenergy.com