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Local Government Energy Program
Energy Audit Final Report

Borough of Park Ridge

Road Department Garage
18 Sulak Lane
Park Ridge, NJ 07656

Project Number: LGEA62

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EXECUTIVE SUMMARY

The Borough of Park Ridge Road Department Garage is a single-story building comprising a total conditioned floor area of 13,500 square feet. The original structure was built in the 1940's with additions in 1978. The following chart provides an overview of current energy usage in the building based on the analysis period of January 2009 through January 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	60,809	7,149	$33,367	61.0	1,190
Proposed	31,145	4,254	$25,783	33.1	532
Savings	29,664	2,895	7,584	27.9	658
% Savings	49%	40.5%	23%	46%	55%

There may be energy procurement opportunities for the Borough of Park Ridge Road Department Garage to reduce annual utility costs although they are on par with NJ average utility rates.

SWA has also entered energy information about the Road Department Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Repair/Vehicle Repair building is comprised of non-eligible ("Other") space type. The resulting score is 61.0 kBtu/sqft-yr, which is better than the average comparable building with a score of 77.0 kBtu/sqft-yr.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	3,651	2.7	9,826	36,313
5-10 Year	14,599	6.8	99,218	47,099
>10 year	142	12.8	1,816	1,608
Total	18,392	6.0	110,860	85,020

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 7 cars from the roads each year or avoiding the need of 207 trees to absorb the annual CO_2 generated.

Other recommendations to increase building efficiency pertaining to operations and maintenance and capital improvements are listed below:

Further Recommendations: SWA recommends that the Road Department Garage further explore the following:

- Capital Improvements
    - Install NEMA premium motors when replacements are required
    - Add insulation, at least R-13, above drop ceiling and tightly pack existing insulation.
    - SWA recommends that the interior crack in the cement block be inspected by a licensed professional.
    - Replace sagging acoustic tiles
    - Replace shingle roof installed in 1978. Based on similar projects, roof replacement typically has a payback in excess of 20 years
    - Replace all single-glazed windows with a low-E, double glazed type.
    - Replace photo luminescent exit Signs with LED type
    - Install AirMation or similar air cleaning systems
        - Or replace exhaust fans at end of useful life with high efficiency type

- Operations and Maintenance
    - Lower Vehicle Repair ventilation system heater temperature set point to 45˚F
    - Replace damaged/missing finishes on exterior stucco walls and siding
    - Replace missing eave vent panels
    - Install pan or strip flashing and drip edge detail at exterior window sills
    - Replace damaged rear garage door frame
    - Maintain roofs and downspouts and cap flashing
    - Provide weather-stripping/air-sealing
    - Repair/seal wall cracks and penetrations
    - Provide water-efficient fixtures and controls
    - Purchase the most energy-efficient ENERGY STAR® labeled appliances
    - Use smart power electric strips
    - Create an energy educational program

Financial Incentives and Other Program Opportunities

There are various incentive programs that the Borough of Park Ridge could apply for that could also help lower the cost of installing the ECMs.

Although the Borough of Park Ridge is their own electric provider and does not pay a societal benefit charge, as of April 1, 2010, the Borough's buildings are eligible for NJ Clean Energy Program incentives. The funds for this change are provided by the American Recovery and Reinvestment Act, ARRA. Therefore, applicants are subject to federal ARRA terms and conditions. The Borough of Park Ridge should investigate the procedure to obtain NJ Clean Energy incentives such as Direct Install and Pay for Performance under ARRA conditions. For more information including other programs that are available because the Borough is a regulated gas customer, call 866-NJSMART or visit NJCleanEnergy.com.

SWA could work with the Borough of Park Ridge, as already done with other clients, to provide all required data and applications for incentives such as Pay for Performance and other programs, as a continuation to this audit. Please refer to Appendix F for details.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program can subsidize up to 100% of the cost of the audit with the expectation that 25% of the audit cost will be spent on recommended energy conservations measures within a year of receiving the final energy audit report. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for the Road Department Garage at 18 Sulak Lane, Park Ridge, NJ. The process of the audit included facility visits on March 10, 2010 and March 24, 2010, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Borough of Park Ridge to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Road Department Garage.

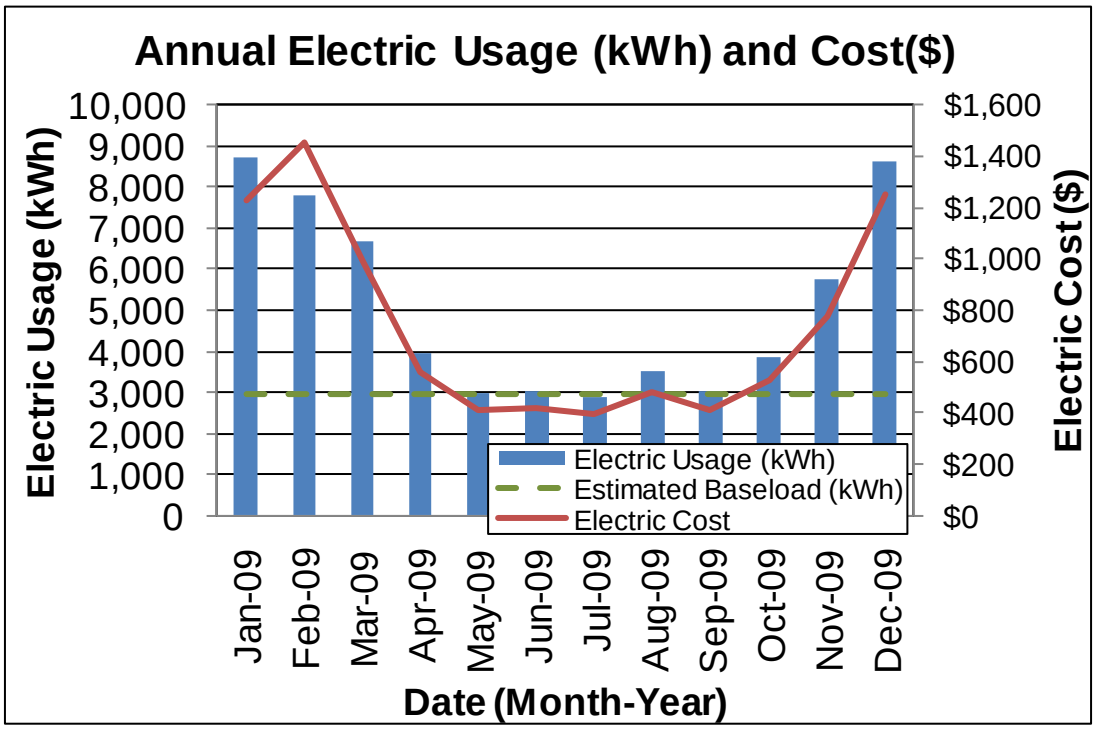
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from January 2008 through January 2010 that were received from the utility companies supplying the Road Department Garage with electric and natural gas. A 12 month period of analysis from January 2009 through January 2010 was used for all calculations and for purposes of benchmarking the building.

Electricity - The Road Department Garage is currently served by four electric meters. The Road Department Garage currently buys electricity from Park Ridge Electric at **an average aggregated rate of $0.146/kWh**. The Road Department Garage purchased **approximately 60,809 kWh, or $8,895 worth of electricity,** in the previous year. The average monthly demand was 52.0 kW and the annual peak demand was 99.0 kW.

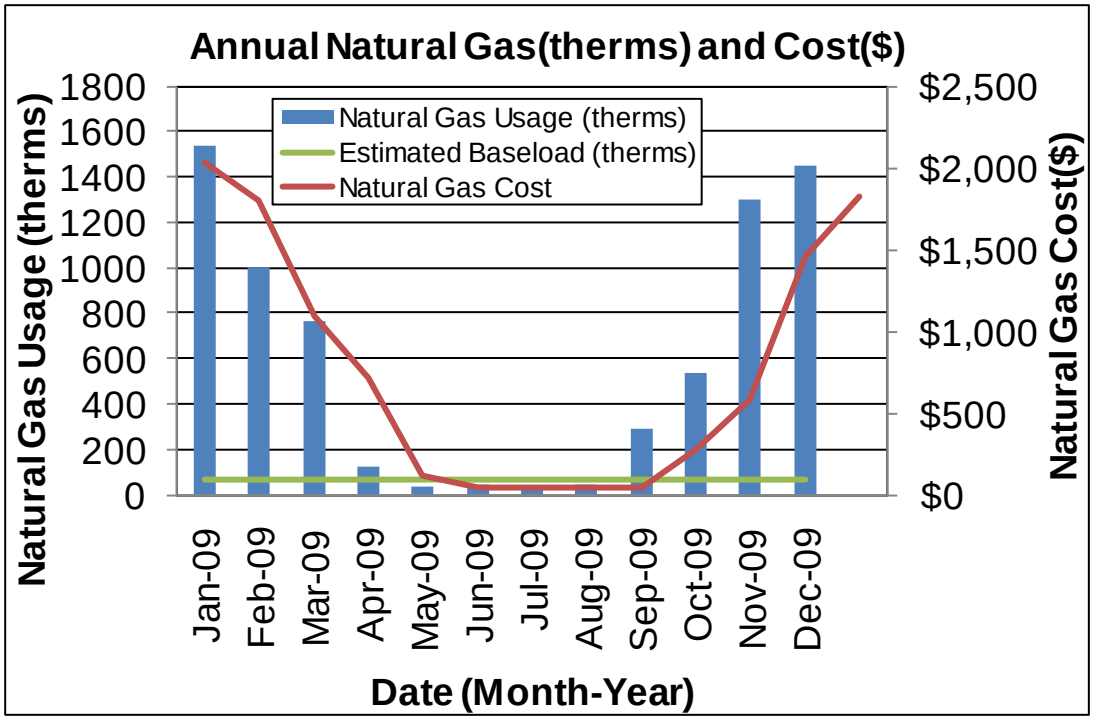
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Road Department Garage. Since the majority of the building is only heated and some of the heating equipment is electric powered, the electric costs are lowest in the summer months.

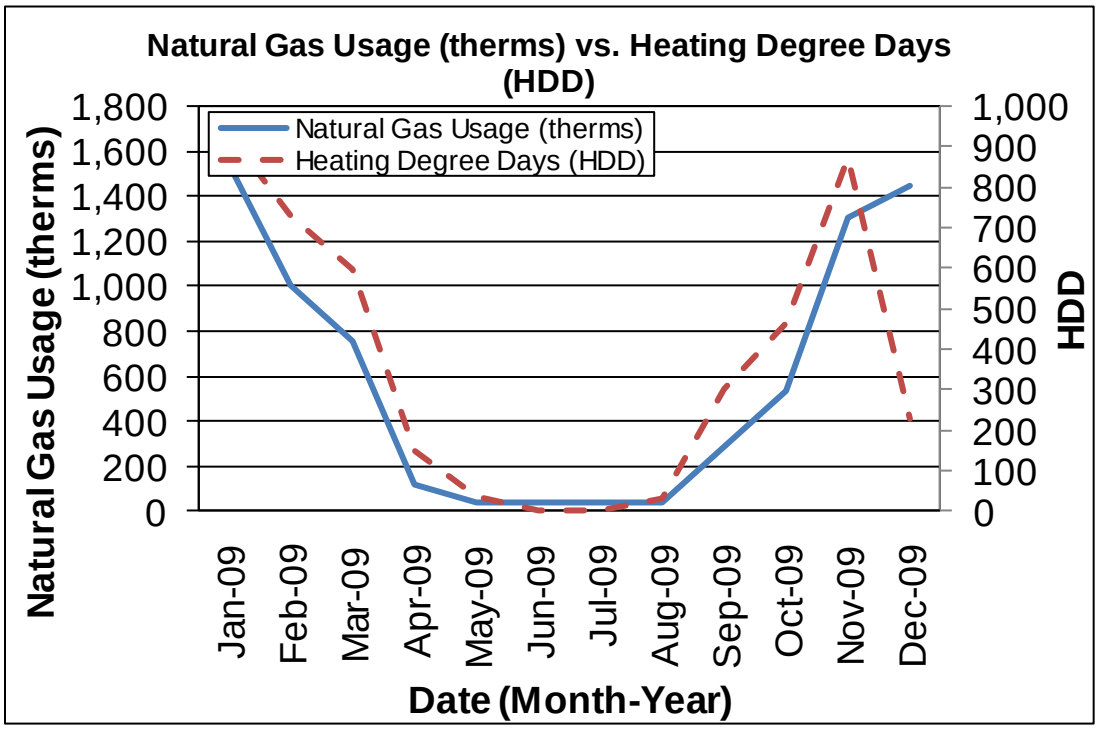


Natural gas - The Road Department Garage is currently served by one meter for natural gas. The Road Department Garage currently buys natural gas from PSE&G at **an average aggregated rate of $1.124/therm**. The Road Department Garage purchased **approximately 7,149 therms, or $8,039 worth of natural gas,** in the previous year.

The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the Road Department

Garage. Most of the heating equipment is fueled by natural gas, so the usage is very low in the summer, only providing gas for domestic hot water.



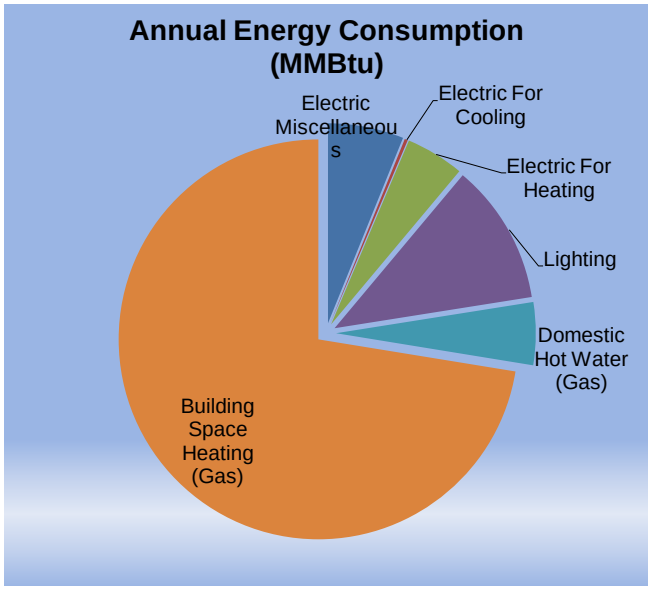


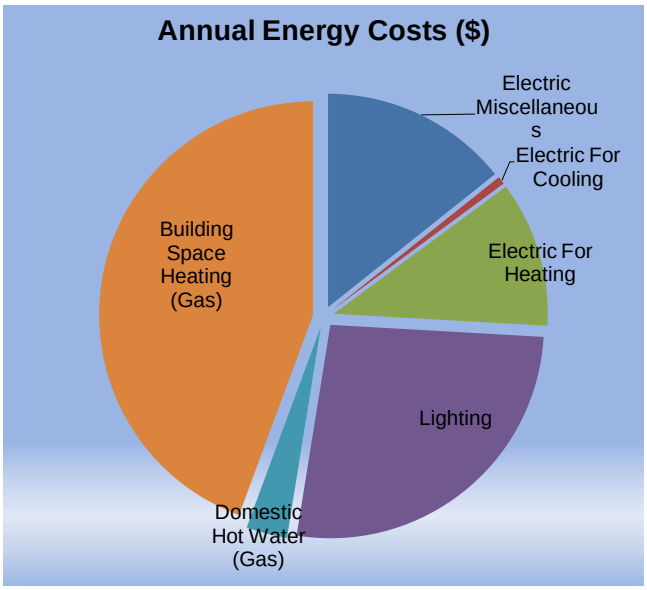
The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the

average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following graphs, pie charts, and table show energy use for the Road Department Garage based on utility bills for the 12 month period. Note: electrical cost at $43/MMBtu of energy is four times as expensive as natural gas at $11/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	56	6%	$2,419	14%	43
Electric For Cooling	2	0%	$100	1%	43
Electric For Heating	44	5%	$1,867	11%	43
Lighting	105	11%	$4,509	27%	43
Domestic Hot Water (Gas)	47	5%	$527	3%	11
Building Space Heating (Gas)	668	72%	$7,512	44%	11
Totals	922	100%	$16,934	100%	
Total Electric Usage	207	22%	$8,895	53%	43
Total Gas Usage	715	78%	$8,039	47%	11
Totals	922	100%	$16,934	100%	

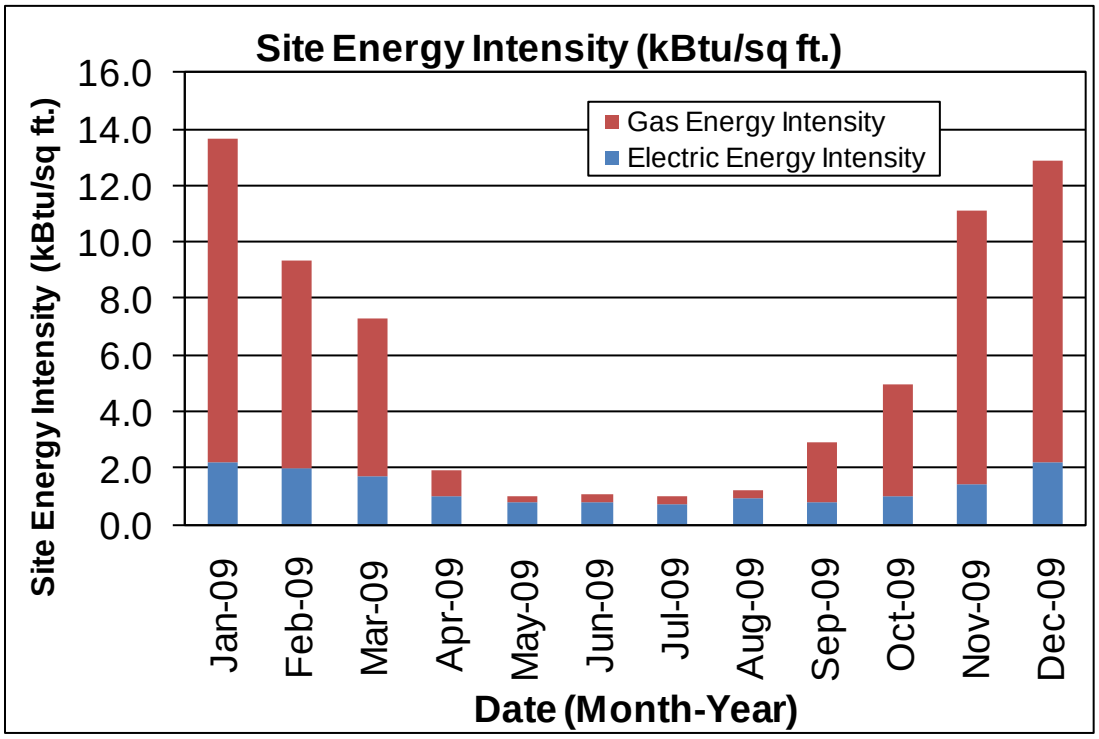




Energy benchmarking

SWA has entered energy information about the Road Department Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Service/Vehicle Repair facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Road Department Garage is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 61.0 kBtu/ft^2-yr compared to the national average of a Service/Vehicle Repair building consuming 77.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "Other" space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the Borough of Park Ridge desire to reach this average there are other large scale and financially less advantageous improvements that can be made, such as envelope window, door and insulation upgrades that would help the building reach this goal.



Per the LGEA program requirements, SWA has assisted the Borough of Park Ridge to create an *ENERGY STAR® Portfolio Manager* account and share the Road Department Garage facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager account information with the Borough of Park Ridge (user name of "parkridgeboro" with a password of *"1parkridge1")* and TRC Energy Services (user name of "TRC-LGEA").

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. Some 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.

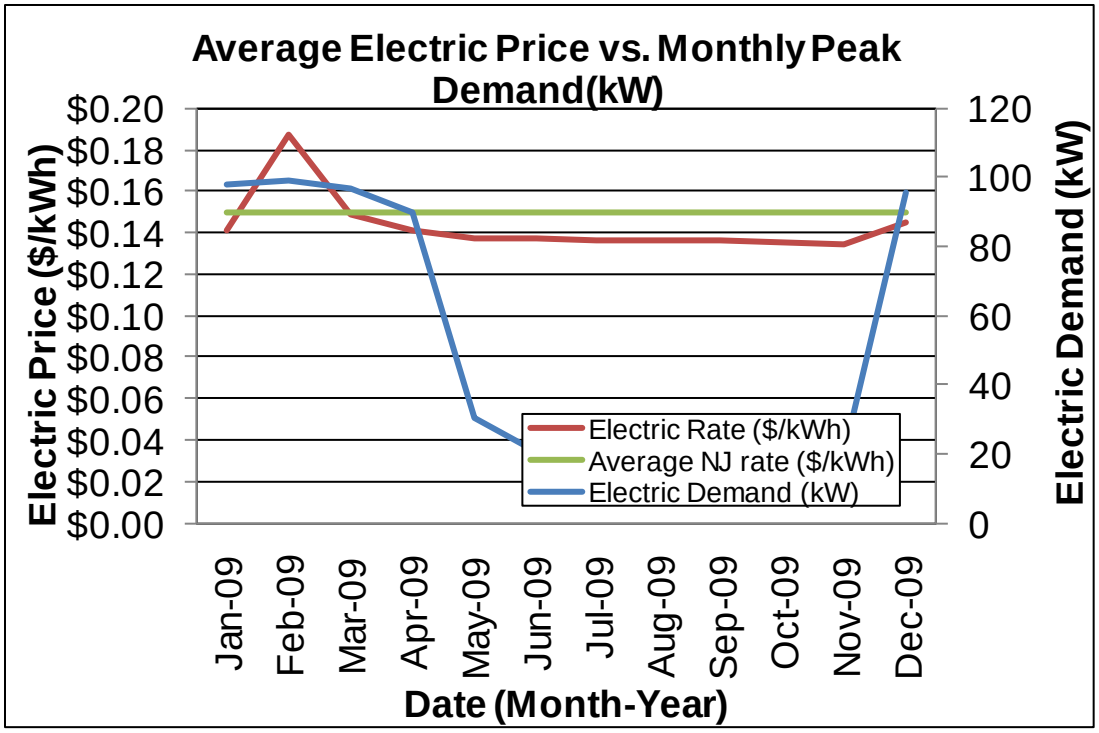
The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the Borough of Park Ridge is paying a general service rate for natural gas. Demand cost is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. The building is direct metered and currently purchases electricity at a general service rate for usage with an additional charge for electrical demand factored into each monthly bill. There general service rate for electric charges are market-rate based on use. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

Energy Procurement strategies

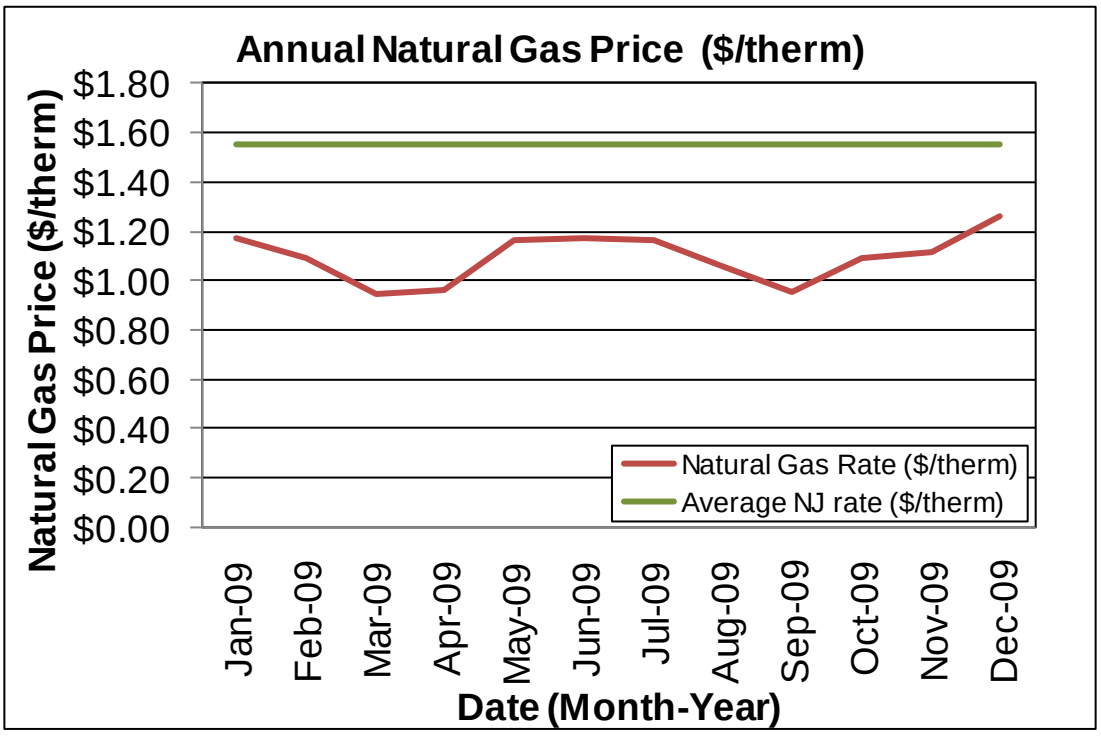
Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rates for electric are $0.150/kWh, which higher than with the overall electric rate for the Road Department Garage of $0.146/kWh. Electric bill analysis shows fluctuations up to 28% over the most recent 12 month period.

The drop in electric demand during the summer in the chart below is due to a sharp electric demand decrease for the Vehicle Ventilation System during the summer months. This is expected since maintenance trucks are more active during winter months for storm related issues and the large 77 kW electric duct heater for the system is active only in the winter.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Road Department Garage pays a highly competitive rate of $1.124/therm. Natural gas bill analysis shows fluctuations up to 28% over the most recent 12 month period.



Utility rate 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.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on visits from SWA on March 10, 2010 and March 24, 2010, the following data was collected and analyzed.

Building Characteristics

The single-story, (slab on grade), 13,500 square feet Park Ridge DPW Building was originally constructed in the 1940's with additions completed in 1978. It houses four main areas: Vehicle Repair, Reserve Space, Landscape and Road Garage in addition to a break room and several offices and utility areas.

Front Façade

Rear Façade

North Façade

Building Occupancy Profiles

Its occupancy is approximately 5 to 10 staff daily from 6:30am to 3:30 pm, with staff out of the building for many hours of the day.

Building Envelope

Due to unfavorable weather conditions (min. 18 deg. F delta-T in/outside and no/low wind), no exterior envelope infrared (IR) images were taken during the field audit.

Exterior Walls

The exterior wall envelope is mostly constructed of stucco and some brick veneer accents, over concrete block with an unconfirmed level of insulation. The attic exterior walls are constructed of fiber cement clapboard siding. The interior is mostly painted CMU (Concrete Masonry Unit).

Note: Wall insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall acceptable, age-appropriate condition with some signs of uncontrolled moisture, air-leakage and other energy-compromising issues detected on all facades.

The following specific exterior wall problem spots and areas were identified:

Cracks between cement blocks on interior wall indicating potential structural damage

Cracks between cement blocks on interior wall indicating potential structural damage

Missing/deteriorating siding on garage door header

Cracked stucco showing signs of water or moisture damage

Damaged exterior wall finishes

Roof

The building's roof is predominantly a medium-pitch gable type over a wood structure, with an asphalt shingle finish. It was constructed in 1978. Eight inches of fiberglass batt attic/ceiling insulation, and no detectable roof insulation were recorded.
Note: Roof insulation levels could visually be verified in the field by non-destructive methods.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable condition, with some signs of uncontrolled moisture, air-leakage and other energy-compromising issues located mostly on the interior.

The following specific roof problem spots were identified:

Missing panels on eave

Sagging/damaged ceiling tiles in many areas

Missing gypsum wallboard visible in the interior

Uninsulated attic above drop ceiling open to occupied space due to missing gypsum wallboard and damaged ceiling tiles

Base

The building's base is composed of a slab-on-grade floor with a perimeter foundation and no detectable slab edge/perimeter insulation.

Slab/perimeter insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

Windows

The building contains several different types of windows.

1. Most double-hung type windows with a non-insulated aluminum frame, clear double glazing and no interior or exterior shading devices. The windows are located throughout the building and are original.
2. A few hopper type windows with a non-insulated aluminum frame, clear single glazing and no interior or exterior shading devices. The windows are located on the rear of the building and are original.
3. Office areas have double-hung type windows with a non-insulated aluminum frame, clear double glazing and interior roller blinds.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in acceptable condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:

Exterior mold/water damage signs on areas around windows

Single-glazed window with ineffective frame

Exterior doors

The building contains two different types of exterior doors:

1. Most metal type exterior doors. They are located throughout the building.
2. Seven metal with light glass type exterior doors for truck garage bays.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in good condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:

Damaged/aged door frame on rear truck garage door

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight with only a few areas of suggested improvements, as described in more detail earlier in this chapter.

The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating Ventilation Air Conditioning

The majority of the Road Department Garage is only provided heating and ventilation. The Vehicle Repair shop, offices and break room have heating, cooling and ventilation. There were no major comfort issues in the space.

Equipment

The garage can be divided into five main areas separated by interior walls: The Break Room, Main Road Garage, Landscape Area, Reserve Area and Vehicle Repair. These areas are all heated with ceiling hung natural gas heaters of various manufacturers. Each heater has a furnace section which produces heat by the combustion of natural gas with a small fan to disperse the heat to the garages. Most of these unit heaters are beyond their useful life. The generator room has a small 2.2kW electric unit heater.

Typical Natural Gas Unit Heater with flue piped to roof

The Vehicle Repair garage has a donated Carrier Weatherman rooftop unit installed outside on the ground level. Based on visual inspection, the unit appears to be beyond its useful operating life. The rooftop unit is only used for cooling the Vehicle Repair garage and therefore during the winter the air intake louver is blocked since cold air enters through the duct penetration.

Vehicle Repair Garage RTU for cooling (left) and boarded up air intake (right)

There are two Fredrick AC units in the break room and a Hunter exhaust fan, all manually operated, which exhaust into the garage space to cool the room. It is generally not good practice to exhaust air into occupied space even if it is a garage area. There is also a Cozy direct vented natural gas furnace for heating in the break room.

Break Room AC units and exhaust fan (left), Furnace (right)

There are several exhaust fans installed for ventilation in the garage areas. The Main Road Garage has three exhaust fans through the wall with a damper. During the field visit it was noted that when the exhaust fan was off, as wind passes, the damper lifts open. The Landscape Area and Reserve Area combined have three rooftop exhaust fans.


Rooftop Exhaust fans visible from outside (left);
Typical through the wall garage exhaust fan (right)

The Vehicle Repair Garage has a robust ventilation system which was installed in 2000. The system consists of a Warren 100% outside air supply fan with a 77kW electric heater and a separate exhaust fan mounted through the wall. Since there is a separate electric meter for this system, it is clear from the utility bill demand readings that the unit operates the most during winter months when the garage is used more often and the garage doors are closed to keep out the cold.


Outside Air Ventilation System exhaust fan (left);
Outside air supply ducts (right)

Distribution Systems

Since the HVAC equipment is all stand alone heating units, the only distribution is the small fans for unit heaters which disperse heat to the surrounding areas.

Controls

The unit heaters in the garage areas each have manual dial thermostats which activate the heaters until the desired air temperature is reached.

The ventilation system for the Vehicle Repair Garage is controlled by CO sensor. When the sensor reading exceeds 35 PPM of CO, the outside air fan draws in outside air which passes through the electric heater and enters the space, while the exhaust fan at the far end of the garage also activates to purge the air outside. The electric duct heater operates to maintain a supply air temperature in the space. Based on electric meter readings for this system, the duct heater is used consistently during winter months and generates significant electric usage.

Carbon Monoxide Controller for Ventilation System

The original wall mounted exhaust fan for the Vehicle Repair Garage is still powered and is manually controlled. Most of the other exhaust fans are all controlled by dial manual timers so that they do not operate more than an hour and then automatically shut off.

Domestic Hot Water

The main domestic hot water heater for the garages is a Bradford White natural gas heater with 40,000 Btu/hr heating capacity and 40 gallons storage. The vehicle repair garage has a small Bradford White 5 Gallon electric heater. Both heaters have 50% remaining useful life.

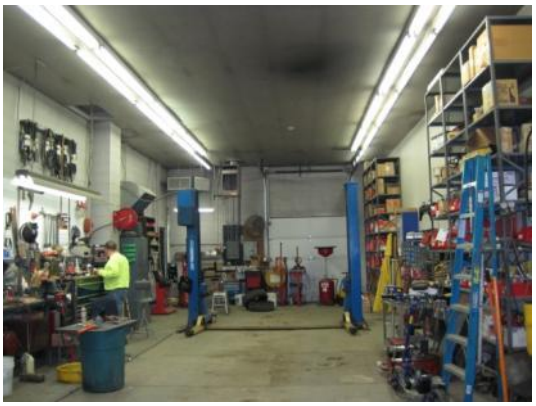
Bradford White Domestic Hot Heaters

Electrical systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

Interior Lighting - The Road Department Garage currently contains mostly recessed T12 fixtures with various arrangements as seen in the photos below. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.



Exit Lights - Exit signs were found to be photo luminescent type, as seen below, which does not require an energy input.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamps, halogens and CFL fixtures. Exterior lighting is controlled by automatic timers.

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as “plug-load” equipment, since they are not inherent to the building’s systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building

that is hard to separate out from the rest of the building's energy usage based on utility analysis.

Elevators

The Road Department Garage does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Road Department Garage other than a Kohler 313 kVA diesel emergency generator with a GE glycol cooling system using a 10 HP motor. According to building staff, the generator and cooling system are exercised once a month for one hour. The power from the generator is distributed by a manual transfer switch which feeds an emergency panel.

GE cooling system for generator

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Based on utility analysis and a study of roof conditions, the Road Department Garage is a good candidate for a 15 kW Solar Panel installation. See ECM# 6 for details.

Solar Thermal Collectors

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

Geothermal

The Road Department Garage is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 50% and 90% remaining useful life.

Combined Heat and Power

The Road Department Garage is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. CHP is best suited for buildings with a high electrical baseload to accommodate the electricity generated, and for central heating and cooling plants. The building uses stand alone HVAC systems.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Lighting Upgrades: Replace halogen and incandescent with CFL
2	Install Energy Misers on vending equipment
3	Replace one (1) 125,000 Btu/hr Natural Gas Unit Heater
4	Replace four (4) 165,000 Btu/hr Natural Gas Unit Heaters
	Description of Recommended 5-10 Year Payback ECMs
5	Lighting Upgrades: Replace T12 Fixtures with T8
6	Install a 15 kW Solar PV System
	> 10 Year Payback (End of Life)
7	Replace Break Room AC Units and Furnace with Single Zone Heat Pump

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%
Note: A 0.0 electrical demand reduction/month indicates that it is very low/negligible

ECM#1: *Lighting Upgrades: Replace halogen and Incandescent with CFL*

On the days of the site visits, SWA completed a lighting inventory of the Park Ridge Road Department Garage (see Appendix B). The exterior lighting is partially Halogen and Incandescent lights. SWA recommends replacing incandescent and halogen lamps with CFL lamps. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems.

Installation cost: Estimated installed cost: $122 (includes $75 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	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	annual return on investment, %	CO_2 reduced, lbs/yr
1	122	0	122	549	0.11	0	0.1	50	130	5	650.19	0.9	127	983

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 1.5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives: None at this time
Please see Appendix F for more information on Incentive Programs.

ECM#2: *Install Energy Miser on Beverage Vending Machine*

The Utility Garage building has one beverage vending machine located in the Main Road Garage. Energy vending miser devices are now available for conserving energy with these vending machines and coolers. There is not a need to purchase new machines to reduce operating costs and greenhouse gas emissions. When equipped with the vending miser devices, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the vending machine. Vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

Installation cost:
Estimated installed cost: $279
Source of cost estimate: www.usatech.com *and established costs*

ECM #	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	annual return on investment, %	CO_2 reduced, lbs/yr
2	279	0	279	2,219	0.02	0	0.1	0	324	15	4,860	0.9	109	3,973

Assumptions: SWA assumes energy savings based 40 hours a day of occupancy and the modeling calculator found at www.usatech.com.

Rebates/financial incentives: None at this time

ECM# 3, 4: *Replace Unit Heaters with High Efficiency Unit Heaters*

The Road Department Garage areas have several natural gas unit heater; four are Reznor 165,000Btu/hr unit heaters with 80% thermal efficiency, and one Modine 125,000 Btu/hr heater with 80% thermal efficiency. These units were estimated to be installed in the 1980's and are approaching the end of their useful life. SWA recommends replacing the five heaters with heaters of similar capacity but increased thermal efficiency such as the Reznor UEAS heaters with a rated thermal efficiency between 91% and 93%, or similar. The Borough of Park Ridge may choose to have their in-house staff purchase and install the equipment for a slightly reduce labor rate.

Installation cost: Estimated installed cost: $9,425, (including $3,000 for labor)
Source of cost estimate: RS *Means; Published and established costs; Similar projects*

Economics (without incentives):

ECM #	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	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
3: Replace 125,00Btu/hr Heater	1,725	300	1,425	0	0.00	511	3.8	574	20	11,489	2.5	35	5,634
4: Replace four 165,000 Btu/hr Heaters	9,200	1,200	8,000	0	0.00	2334	17.3	2,623	20	52,459	3.1	28	25,723
Total	**10,925**	**1,500**	**9,425**	**0**	**0**	**2,845**	**21**	**3,197**	**20**	**63,948**	**2.9**		

Assumptions: SWA assumes thermal savings based on heating loads calculated by conducting the billing analysis as well as annual full load hours during cooling and heating seasons for Newark, NJ published by the EPA.
Rebates/financial incentives: *Furnace 92% Efficiency or Greater - $300/furnace - $1500 Total*

ECM#5: *Lighting Upgrades: Replace 98 T12's to T8's*

On the days of the site visits, SWA completed a lighting inventory of the Utility Garage (see Appendix B). The existing lighting consists of mostly T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing 98 of the T12 fixtures with T8 lamps and electronic ballasts. The electronic ballast has higher efficiency and the lamps have a longer operating light for fewer replacements. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Borough of Park Ridge 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.

Installation cost:
Estimated installed cost: $9,218 (includes $5,000 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	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	annual return on investment, %	CO_2 reduced, lbs/yr
5	12,158	2,940	9,218	8,605	1.79	0	2.2	558	1,814	15	27,216	5.1	19	15,407

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 16 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

NJ Clean Energy – T12 to T8 - $30 - $2,940 Total

ECM #6: *Install 15 kW Solar PV System*

SWA presents below the economics, and recommends at this time that Borough of Park Ridge further review installing a 15 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. As an electricity supplier, reducing the Borough's electric load allows for more capacity for the town and also serves as an example of energy efficiency for the community.

The size of the system was determined using the amount of roof surface area as a limiting factor, as well as the facilities annual base load. A PV system could be installed on a portion of the sloped roof that faces South or West. A commercial multi-crystalline 123 watt panel (17.2 volts, 7.16 amps) has 10.7 square feet of surface area (11.51 watts per square foot). A 15 kW system needs approximately 122 panels, which would take up 1,300 square feet, nearly 10% of the current roof area.

Installation cost: Estimated installed cost: $90,000 (includes $30,000 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	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	annual return on investment, %	CO_2 reduced, lbs/yr
6	105,000	15,000	90,000	17,700	15.00	0	4.5	0	12,784	25	217,605	7.0	567	31,692

25 Year Cash flow Breakdown													
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Sub total	-90,000	12,784	12,784	12,784	12,784	12,784	12,784	12,784	12,784	12,784	12,784	12,784	12,784
Year	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Sub total	12,784	12,784	12,784	2,584	2,584	2,584	2,584	2,584	2,584	2,584	2,584	2,584	2,584

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 (123 Watts, Model ND-123UJF). PV systems are sized based on 15,000 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 10 kW or less. Incentive amount for this application is $15,000 for the Park Ridge Road Department Garage*

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 1,000kWh (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 $10,200/year, based on $600/SREC, has been incorporated in the above costs for a period of 15 years; however it requires proof of performance, application approval and negotiations with the utility.*

ECM# 7: *Replace Break Room Heating and Cooling Equipment with Heat Pump*

The Road Department Garage Break Room was installed in 1987 and the heating and cooling system was added in stages and is not comprehensive. The room contains two small Frederick window units with approximately 2 Tons cooling capacity and a small Cozy furnace with 125,000 Btu/hr heating capacity. The window units expel heat to the garage area. The window units and furnace are beyond their useful life. SWA recommends removing the window units and furnace and patching the spaces, and installing a single zone heat pump rated at 18.0 SEER and 10 HSPF with 2 tons cooling and 125,000 Btu/hr heating capacity. Although the heating component would be electric powered instead of natural gas, which is a more expensive fuel source, the energy savings still makes it less expensive to operate. Also, this would eliminate purging excess heat to the garage area. The heat pump would have a separate condensing unit outside to expel heat.

Installation cost: Estimated installed cost: $2,000 (including $500 for labor)
Source of cost estimate: RS *Means; Published and established costs; Similar projects*

Economics (without incentives):

ECM #	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	annual return on investment, %	CO_2 reduced, lbs/yr
7	2,000	184	1,816	591	0.00	49.9	0.0	0	142	20	2,847	12.8	3	1,608

Assumptions: SWA assumes thermal savings based on heating loads calculated by conducting the billing analysis as well as annual full load hours during cooling and heating seasons for Newark, NJ published by the EPA.

Rebates/financial incentives:

- *Heat Pump 14.0 SEER or Greater - $92/ton- $184 Total*

PROPOSED FURTHER RECOMMENDATIONS

Capital Improvements

Capital Improvements are recommendations for the building that may not be cost-effective at the current time, but that could yield a significant long-term payback. These recommendations should typically be considered as part of a long-term capital improvement plan. Capital improvements should be considered if additional funds are made available, or if the installed costs can be shared with other improvements, such as major building renovations. SWA recommends the following capital improvements for the Road Department Garage:

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

- Add insulation, at least R-13, above drop ceiling and tightly pack existing insulation. Replace all sagging, damaged, insulated ceiling tiles. Plug all ceiling penetrations. There should be a thermal barrier between the garage space and the attic space.

- SWA recommends that the interior crack in the cement block be inspected by a licensed professional.

- Replace sagging acoustic ceiling insulation.

- Replace shingle roof installed in 1978. Based on similar projects, roof replacement typically has a payback in excess of 20 years.

- Replace all single-glazed windows with a low-E, double glazed type.

- Replace all Exit Signs with LED type once Photo Luminescent exit signs reach the end of their useful life.

- Install AirMation air cleaning system, or similar, in Road Garage, Landscape Garage and Reserve Area and control with a CO sensor. This will reduce the operation of the installed exhaust fans which are approaching the end of their useful life. The exhaust fans purge the air to remove toxins, which wastes the energy used to heat the air. An air cleaning system does not remove air from the space and therefore saves energy.

    - OR replace all exhaust fans that have reached the end of their useful life with highest efficiency available. Economic analysis shows that the replacing fans with fractional horsepower have a payback in excess of 15 years.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Lower the Vehicle Repair ventilation system heater temperature set point to 45˚F; The electric heater is sized for 77kW, and based on electric meter readings, the heater is operating consistently throughout the winter. The air for the ventilation system is rapidly removed from the space and does not need to be heated to space conditions. The drop in space temperature can be made up by the natural gas unit heater in the space.

- Replace damaged/missing finishes on exterior stucco walls and siding.

- Replace missing eave vent panels.

- Install pan or strip flashing and drip edge detail at exterior window sills.

- Replace damaged rear garage door frame.

- Maintain roofs and downspouts and cap flashing - SWA recommends regular maintenance to verify water is draining correctly. SWA recommends round downspout elbows to minimize clogging.

- Provide weather-stripping/air-sealing - 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 installing weep holes, installing proper flashing and correct masonry efflorescence, and sealing wall cracks and 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 reduce energy consumption for water heating, while also decreasing water/sewer bills.

- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. More information can be found in the “Products” section of the ENERGY STAR® website at: http://www.energystar.gov.

- 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 energy use. The U.S. 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/.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Cooling	**Two Window AC Units, exhausting to garage**	**Break rm**	**Fredrick**	**Electric**	**Break Rm**	**1980**	**0%**
Cooling	**Cooling RTU, 8.5 Tons, 11.8 EER; Air Intake blocked with cardboard to avoid, infiltration of OA air**	**Outside Back of Vehicle Repair**	**Carrier Weathermaker I; 50LJ-009---511ZA; 3993G02300**	**Natural Gas**	**Vehicle Repair**	**1990**	**0%**
Domestic Hot Water	Small DHW heater with 5 gallon storage	Vehicle Repair	Bradford White	Electric	Vehicle Repair	2000	50%
Domestic Hot Water	Domestic Hot Water Heater, 40 Gallon, 40,000 Btu/hr	Main Road Garage	Bradford White; M1403T10EN12; TH6364989	Natural Gas	All Areas	2000	50%
Heating	Unit Heaters, Electric 2.2 kW	Generator Rm	Dayton Unit Heaters; 2YU58	Electric	Generator Rm	2007	90%
Heating	Two Lennox Unit Heater, 143,750 Btu/hr, 80% Eff.,	Main Road Garage	Lennox, LF24-145A-5, 5606408079	Natural Gas	Main Road Garage	2000	50%
Heating	**Vestibule Dial Operated Unit Heaters**	**DPW Entrance**	**NA**	**Electric**	**DPW Vestibule**	**1978**	**0%**
Heating	**Direct Vent Furnace, 25,000 Btu/hr In, 70.5% Eff.**	**Break rm**	**Cozy, CDV255B-D; 05104926**	**Natural Gas**	**Break rm**	**1978**	**0%**
Heating	**Modine Unit Heater, 125,000 Btu/hr, 80% Eff.**	**Main Road Garage**	**Modine, PD125AA011, 05011021597-4303**	**Natural Gas**	**Main Road Garage**	**1950**	**0%**
Heating	**Reznor Ceiling Hung Unit Heater, 165,000 Btu/hr, 80% Eff., 1/20 HP fan**	**Main Road Garage**	**Reznor, F165, A0A66M4H81349**	**Natural Gas**	**Main Road Garage**	**1980**	**0%**
Heating	**Reznor Ceiling Hung Unit Heater, 165,000 Btu/hr, 80% Eff., 1/20 HP fan**	**Landscape Area**	**Reznor, F165, A0A66M4H81349**	**Natural Gas**	**Landscape Area**	**1980**	**0%**
Heating	**Reznor Ceiling Hung Unit Heater, 165,000 Btu/hr, 80% Eff., 1/20 HP fan**	**Reserve Area**	**Reznor, F165, A0A66M4H81349**	**Natural Gas**	**Reserve Area**	**1980**	**0%**

Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating	**Reznor Ceiling Hung Unit Heater, 165,000 Btu/hr, 80% Eff., 1/20 HP fan**	**Vehicle Repair**	**Reznor, F165, A0A66M4H81349**	**Natural Gas**	**Vehicle Repair**	**1980**	**0%**
Ventilation/ Heating	OA intake System with Electric Duct Heater , 77 kW, Activates when CO levels above 35 PPM,	Vehicle Repair Mech Rm	Warren; CBK; 177091-001	Natural Gas	Vehicle Repair Mech Rm	2000	50%
Ventilation	**Exhaust Fan, Manual Control - used intermittently - replaced with new ventilation system**	**Vehicle Repair**	**NA**	**Electric**	**Vehicle Repair**	**1987**	**0%**
Ventilation	**Exhaust Fan, Manual Timer Controlled**	**Roof**	**NA**	**Electric**	**Reserve Area**	**1980**	**0%**
Ventilation	**Two (2) Exhaust Fans, Manual Timer Controlled**	**Roof**	**NA**	**Electric**	**Landscape Area**	**1980**	**0%**
Ventilation	**Three (3) Exhaust Fans, Manual Timer Controlled, OA damper lifts due to wind when fan is not running**	**Road Garage**	**M-27159, Cat#22159-005**	**Electric**	**Road Garage**	**1980**	**0%**
Ventilation	**Wall exhaust fan from Break room into Garage Space**	**Break Rm**	**Hunter**	**Electric**	**Break Rm**	**1978**	**0%**
Ventilation	Generator OA Exhaust fan - automatically activates when generator is on	Generator Rm	NA	Electric	Generator Rm	2007	90%
Generator	Emergency Generator, 1800 RPM, 313 kVA, with Cooling System installed outside - 1755 RPM, 10HP Motor, exercised 1 hours per week, OA Damper through wall, opens when generator activates	DPW Generator Rm	Kohler, 250REOZJD; 2152521/ GE Coolant Motor: 5KEZ15BCZ-5C	Diesel / Electric	DPW & Utility Garage Emergency Power	2007	90%
Lighting	T12's	All Area	See Appendix B	Electric	All Areas		na

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.

Appendix B: 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	1	Storage Rm (R)	Recessed	M	8'T12	2	1	80	Sw	2	260	20	200	104	T8	Recessed	8'T8	E	Sw	2	1	59	2	260	7	132	69	35	0	35
2	1	Garage	Recessed	M	8'T12	10	2	80	Sw	9	260	20	1,800	4,212	T8	Recessed	8'T8	E	Sw	10	2	59	9	260	7	1250	2925	1287	0	1287
3	1	Garage	Recessed	M	4'T12	19	4	40	Sw	9	260	12	3,268	7,647	T8	Recessed	4'T8	E	Sw	19	4	32	9	260	5	2527	5913	1734	0	1734
4	1	Lunch Rm	Recessed	M	4'T12	4	2	40	Sw	9	260	12	368	861	T8	Recessed	4'T8	E	Sw	4	2	32	9	260	5	276	646	215	0	215
5	1	Office	Recessed	M	4'T12	1	4	40	Sw	9	260	12	172	402	T8	Recessed	4'T8	E	Sw	1	4	32	9	260	5	133	311	91	0	91
6	1	Storage Rm	Recessed	M	4'T12	1	4	40	Sw	2	260	12	172	89	T8	Recessed	4'T8	E	Sw	1	4	32	2	260	5	133	69	20	0	20
7	1	Office	Recessed	M	4'T12	2	4	40	Sw	9	260	12	344	805	T8	Recessed	4'T8	E	Sw	2	4	32	9	260	5	266	622	183	0	183
8	1	Office	Recessed	M	4'T12	2	4	40	Sw	9	260	12	344	805	T8	Recessed	4'T8	E	Sw	2	4	32	9	260	5	266	622	183	0	183
9	1	Landscape Garage	Recessed	M	8'T12	21	1	80	Sw	9	260	20	2,100	4,914	T8	Recessed	8'T8	E	Sw	21	1	59	9	260	7	1386	3243	1671	0	1671
10	1	Vestibule	Recessed	M	8'T12	9	1	80	Sw	9	260	20	900	2,106	T8	Recessed	8'T8	E	Sw	9	1	59	9	260	7	594	1390	716	0	716
11	1	Vehicle Repair	Recessed	M	8'T12	14	1	80	Sw	9	260	20	1,400	3,276	T8	Recessed	8'T8	E	Sw	14	1	59	9	260	7	924	2162	1114	0	1114
12	1	Vehicle Repair	Recessed	M	8'T12	10	2	80	Sw	9	260	20	1,800	4,212	T8	Recessed	8'T8	E	Sw	10	2	59	9	260	7	1250	2925	1287	0	1287
13	1	Mech Rm	Recessed	M	8'T12	2	2	80	Sw	2	260	20	360	187	T8	Recessed	8'T8	E	Sw	2	2	59	2	260	7	250	130	57	0	57
14	1	Mech Rm	Recessed	M	4'T12	1	2	40	Sw	2	260	12	92	48	T8	Recessed	4'T8	E	Sw	1	2	32	2	260	5	69	36	12	0	12
15	Ext	Exterior	ceiling Mounted	N	MH	1	1	75	T	16	260	21	96	399	NA	Ceiling Mounted	MH	N	T	1	1	75	16	260	21	96	399	0	0	0
16	Ext	Exterior	ceiling Mounted	N	INC	1	1	60	T	16	260	0	60	250	CFL	Ceiling Mounted	CFL	N	T	1	1	20	16	260	0	20	83	166	0	166
17	Ext	Exterior	ceiling Mounted	N	Hal	2	1	50	T	16	260	11	122	508	CFL	Ceiling Mounted	CFL	N	T	2	1	15	16	260	0	30	125	383	0	383
Totals:						**102**	**37**	**1,025**				**256**	**13,598**	**30,826**						**102**	**37**				**105**	**9,602**	**21,672**	**9,154**	**0**	**9,154**
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																														

Proposed Lighting Summary Table			
Total Surface Area (SF)	13,500		
Average Power Cost ($/kWh)	0.1460		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,156	607	**549**
Exterior Power (watts)	278	146	**132**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	29,669	21,064	**8,605**
Lighting Power (watts)	13,320	9,456	**3,864**
Lighting Power Density (watts/SF)	0.99	0.70	**0.29**
Estimated Cost of Fixture Replacement ($)	9,340		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**1,944**		

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 C: THIRD PARTY ENERGY SUPPLIERS

http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Dominion Retail, Inc. 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 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 Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 www.hudsonenergyservices.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 www.systrumenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
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
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 www.stuyfuel.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measure (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Gas Rate and Electric Rate ($/therm and $/kWh): The gas rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly gas and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

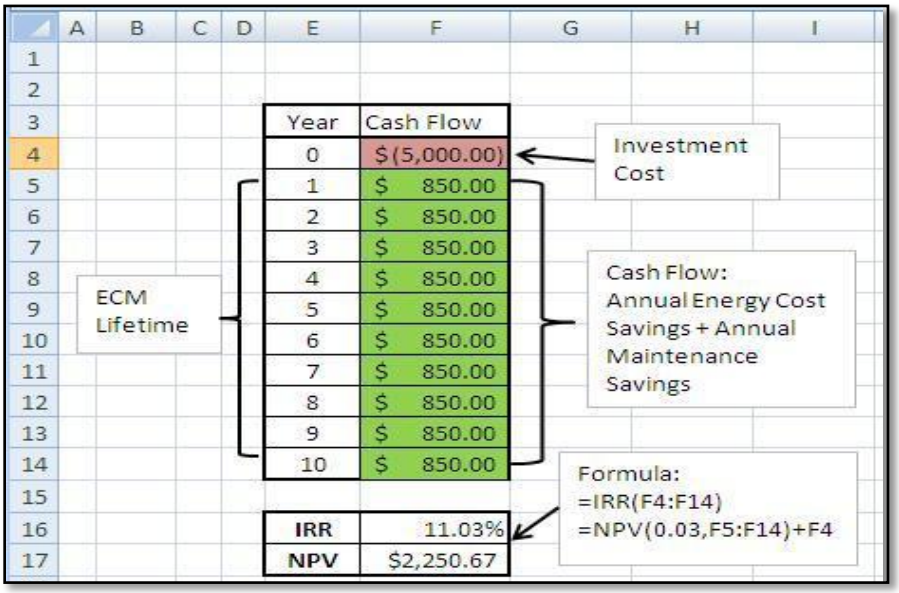
Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime Cost Savings
NPV	Net Present Value
IRR	Internal Rate of Return
DR	Discount Rate
Net ECM Cost	Total ECM Cost – Incentive
LECS	AECS X ECM Lifetime
AOCS	LOCS / ECM Lifetime
LCS	LOCS+LECS
Simple Payback	Net ECM Cost / (AECS + AOCS)
Lifetime ROI	(LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI	(Lifetime ROI / Lifetime) = [(AECS + OCS) / Net ECM Cost – (1 / Lifetime)]

* The lifetime operating cost savings are all avoided operating, maintenance, and/or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Excel NPV and IRR Calculation

In Excel, function =IRR (values) and =NPV(rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves $850 annually in energy and maintenance costs (over a 10 year lifetime) and takes $5,000 to purchase and install after incentives:



Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 50kW or less, $1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $600/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.

Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Borough of Park Ridge - Roads Department

Building ID: 2253092
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 20, 2010

Facility	Facility Owner	Primary Contact for this Facility
Borough of Park Ridge - Roads Department 18 Sulak Lane Park Ridge, NJ 07656	N/A	N/A

Year Built: 1940
Gross Floor Area (ft²): 13,500

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	207,480
Natural Gas (kBtu)[4]	616,921
Total Energy (kBtu)	824,401
Energy Intensity[5]	
Site (kBtu/ft²/yr)	61
Source (kBtu/ft²/yr)	99
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	64
Electric Distribution Utility	
Borough of Park Ridge	
National Average Comparison	
National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	-34%
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

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. The incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum 15%performance threshold savings has been achieved.

For further information, please see: http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings .

Direct Install 2010 Program

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 80%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.

APPENDIX G: ENERGY CONSERVATION MEASURES

	ECM #	ECM description	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 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
0-5 Year Payback	1	**3 New CFL fixtures to be installed with incentives**	0	122	549	0.1	0	0.1	50	130	5.0	650	0.9	635	127	103	470	983
	2	**Install Energy Miser on Vending Beverage Machine**	0	279	2,219	0.0	0	0.1	0	324	15.0	4,860	0.9	1642	109	116	3,533	3,973
	3	**Replace one 125,000 Btu/hr Unit Heaters with High Efficiency, 93%**	300	1,425	0	0.0	511	3.8	0	574	20.0	11,489	2.5	706	35	40	6,966	5,634
	4	**Replace four 165,000 Btu/hr Unit Heaters with High Efficiency, 93%**	1,200	8,000	0	0.0	2,334	17.3	0	2,623	20.0	52,459	3.1	556	28	32	30,311	25,723

	ECM #	ECM description	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 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
5-10 Year Payback	5	**98 New T8 fixtures to be installed with incentives**	2,940	9,218	8,605	1.8	0.0	2.2	558	1,814	15.0	27,216	5.1	286	19	17	12,133	15,407
	6	**Install 15 kW Solar Photovoltaic system**	15,000	90,000	17,700	15.0	0	4.5	0	12,784	25.0	217,605	7.0	142	567	9	74,036	31,692
<10 Year	7	**Replace existing AC Units and Furnace with single zone high performance heat pump**	184	1,816	591	0.0	50	0.0	0	142	20.0	2,847	12.8	57	3	-1	263	1,608

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%
Note: A 0.0 electrical demand reduction/month indicates that it is very low/negligible

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions
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

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 Road Department Garage 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 Road Department Garage(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.