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Local Government Energy Program
Energy Audit Final Report

Borough of Park Ridge

Utility Garage
15 Sulak Lane
Park Ridge, NJ 07656

Project Number: LGEA62

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EXECUTIVE SUMMARY

The Borough of Park Ridge Utility Garage is a partial two-story building comprising a total conditioned floor area of 15,000 square feet. The original structure was built in the 1950's and in 1993 the second floor was added. The following chart provides an overview of current and proposed 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	260,081	4,115	$44,967	93.0	1299
Proposed	93,005	9,260	$24,889	87.4	1243
Savings	167,076	-5,145[1]	20,078	5.6	56
% Savings	64%	-125.0%	45%	6%	4%

There may be energy procurement opportunities for the Borough of Park Ridge Utility Garage to reduce annual utility costs.

SWA has also entered energy information about the Utility Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This mixed use garage and office facility is comprised of non-eligible ("Other") space type. The resulting score is 93.0 kBtu/ft^2-yr which is better than the average comparable building by 9.0%.

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	21,133	1.3	28,033	238,010
5-10 Year	213	7.1	1,525	2,466
>10 year	168	16.5	2,770	924
Total	21,515	1.5	32,328	241,399

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 20 cars from the roads each year or avoiding the need of 580 trees to absorb the annual CO_2 generated.

[1] The negative gas savings here relates to ECM #1 which recommends changing a large amount of the heating equipment energy from electric to natural gas, which produces significant savings in cost as well as pounds of CO2.

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

Further Recommendations:

SWA recommends that the Utility Garage further explore the following:

- Capital Improvements
  - Install CO sensors to control operation of the existing MUA-1 and MUA-2
  - Install premium motors when replacements are required
  - Inspect structural integrity of the building
  - Add insulation and tightly pack in between attic wood rafters with R-13 minimum
  - Replace damaged 2nd floor bay window with a low-E, thermal barrier, double glazed
  - Connect attic fan to electric power
  - Replace missing eave vent panels

- Operations and Maintenance
  - Replace all filters on HVAC equipment as per manufacturer's recommendations
  - Ensure that all outside air penetrations are free and clear of debris or any other blockage
  - Re-point deteriorated mortar joints soon to prevent possible water/moisture penetration into cavity walls
  - Maintain gutters, downspouts and downspout deflectors
  - Maintain sealants at all windows for airtight performance
  - Maintain roofs
  - Provide weather-stripping/air-sealing
  - Provide water-efficient fixtures and controls.
  - SWA recommends that the building considers purchasing ENERGY STAR® labeled appliances when equipment is installed or replaced. 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 will subsidize up to 100% of the cost of the audit with the expectation that 25% of the audit cost will be spent in energy saving measures within a year. 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 Utility Garage at 15 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 Utility Garage.

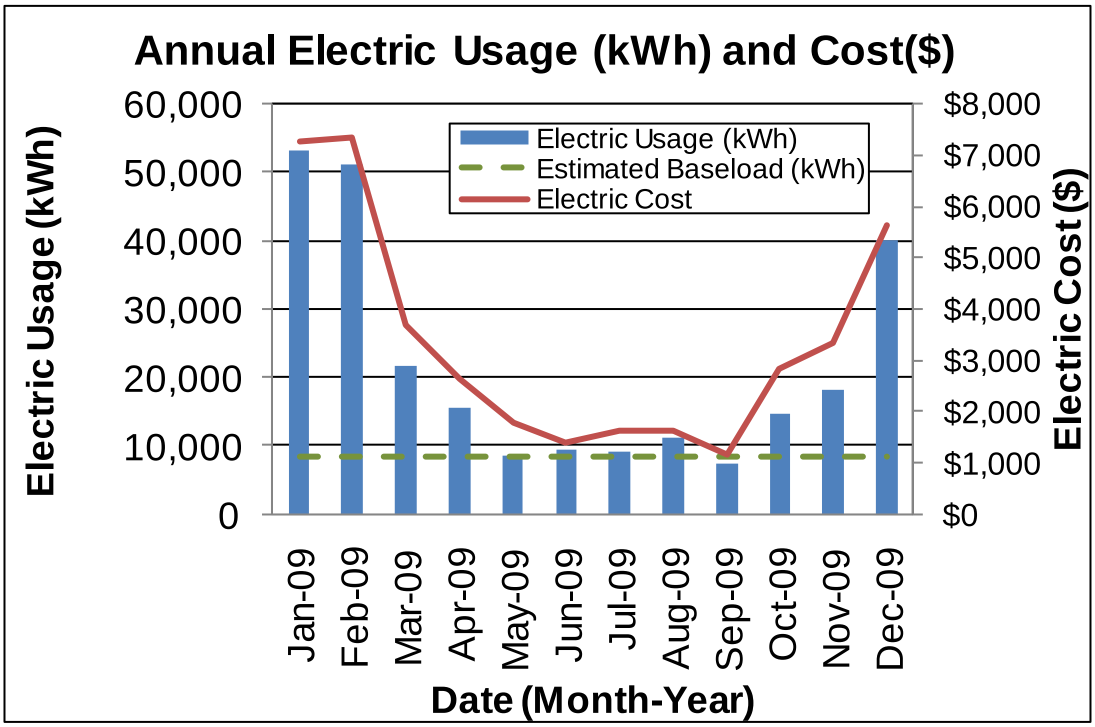
HISTORICAL ENERGY CONSUMPTION

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 Utility 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.

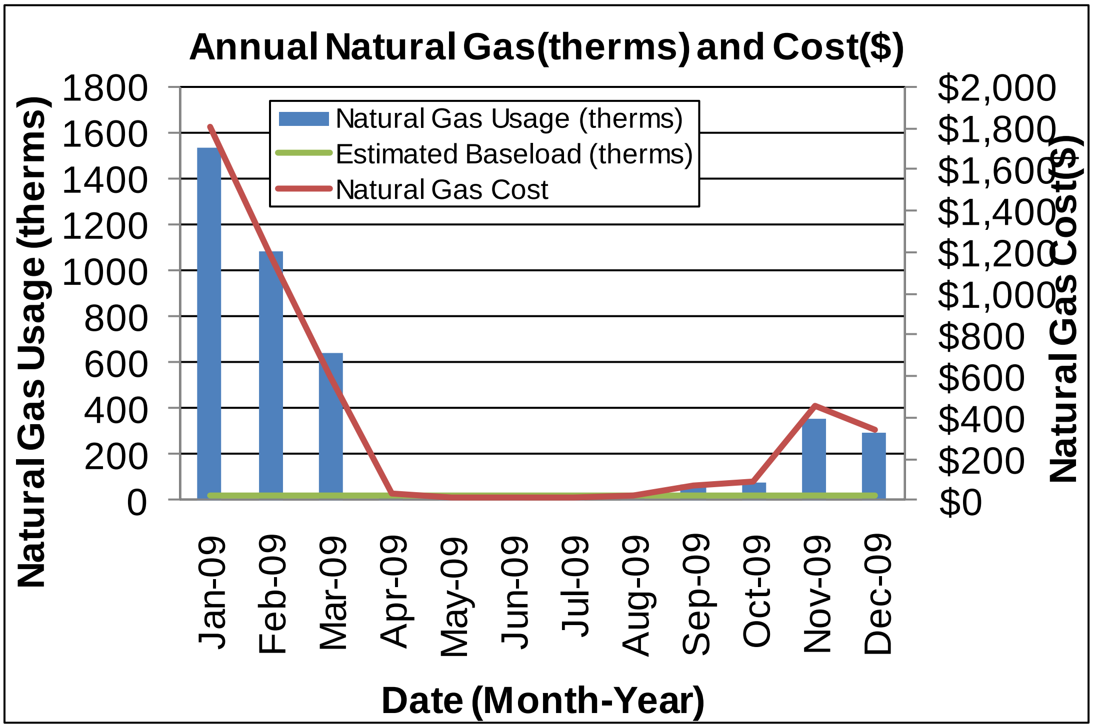
Electricity - The Utility Garage is currently served by two electric meters. The Utility Garage currently buys electricity from Park Ridge Electric at **an average aggregated rate of $0.155/kWh**. The Utility Garage purchased **approximately 260,181 kWh, or $40,315 worth of electricity,** in the previous year.

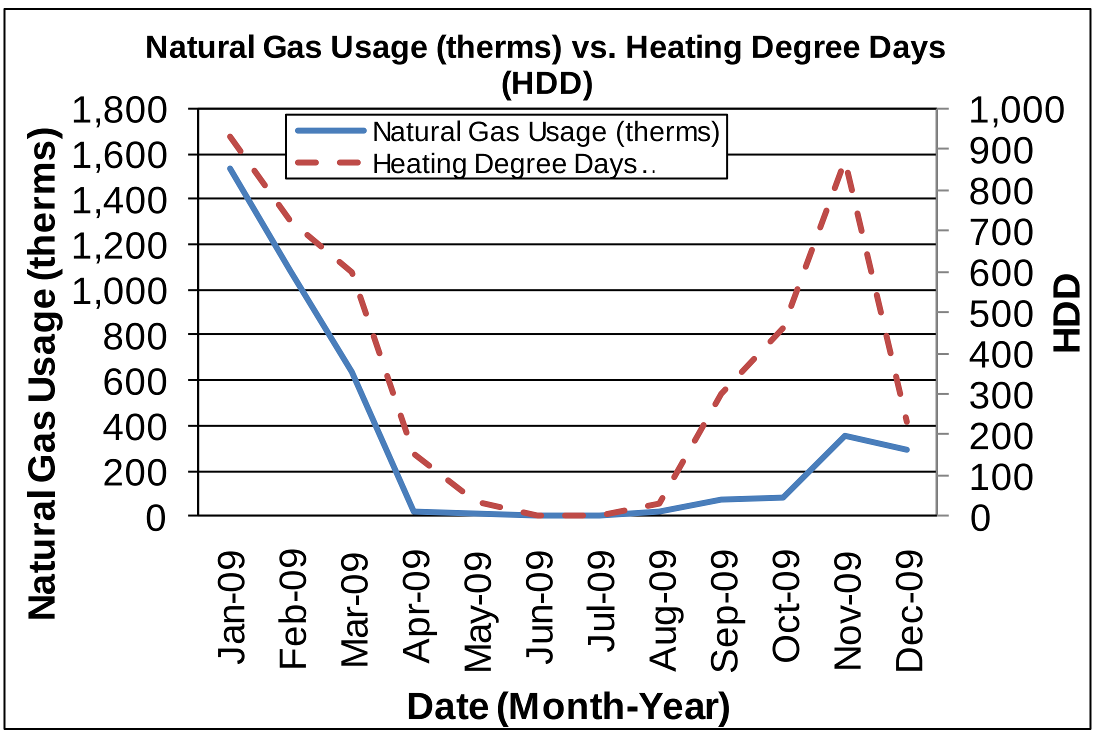
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Utility Garage. Since the majority of the space is only heated, it's expected that the electric usage is very low during the summer months.



Natural gas - The Utility Garage is currently served by one meter for natural gas. The Utility Garage currently buys natural gas from PSE&G at **an average aggregated rate of $1.131/therm**. The Utility Garage purchased **approximately 4,115 therms, or $4,654 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 Utility Garage. As expected, the cost for natural gas is highest in the winter months for furnaces and increased domestic hot water use.

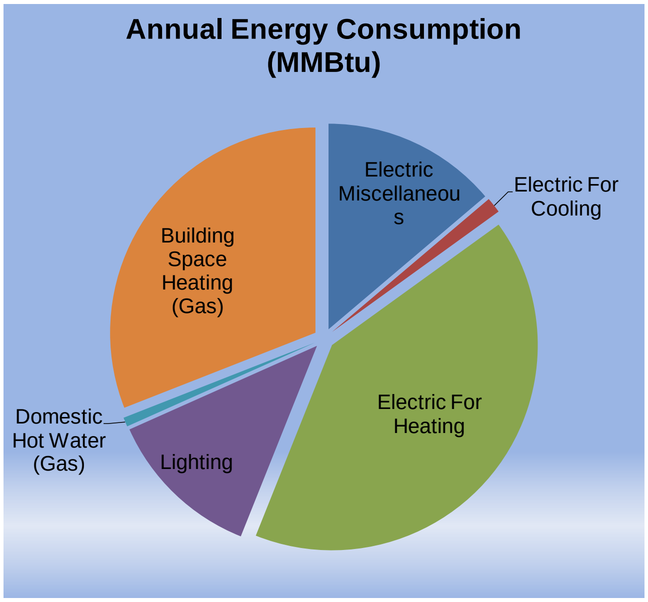


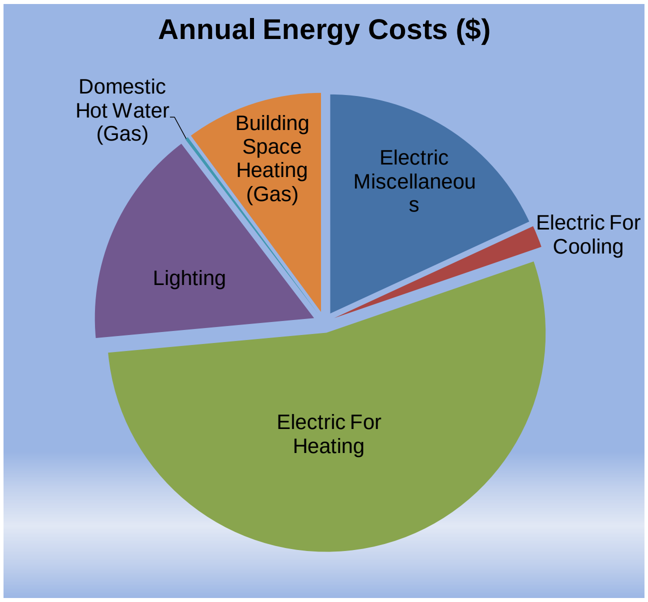


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Because most of the garage space heating is electric, the natural gas usage alone does not following the HDD curve in the winter. Heating degree days is the difference of the average daily temperature and a 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 Utility Garage based on utility bills for the 12 month period. Note: electrical cost at $45/MMBtu of energy is four times as expensive as natural gas at $11/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	179	14%	$8,143	18%	45
Electric For Cooling	16	1%	$727	2%	45
Electric For Heating	533	41%	$24,205	54%	45
Lighting	159	12%	$7,240	16%	45
Domestic Hot Water (Gas)	9	1%	$106	0%	11
Building Space Heating (Gas)	402	31%	$4,548	10%	11
Totals	1,299	100%	$44,970	100%	
Total Electric Usage	887	68%	$40,316	90%	45
Total Gas Usage	412	32%	$4,654	10%	11
Totals	1,299	100%	$44,970	100%	



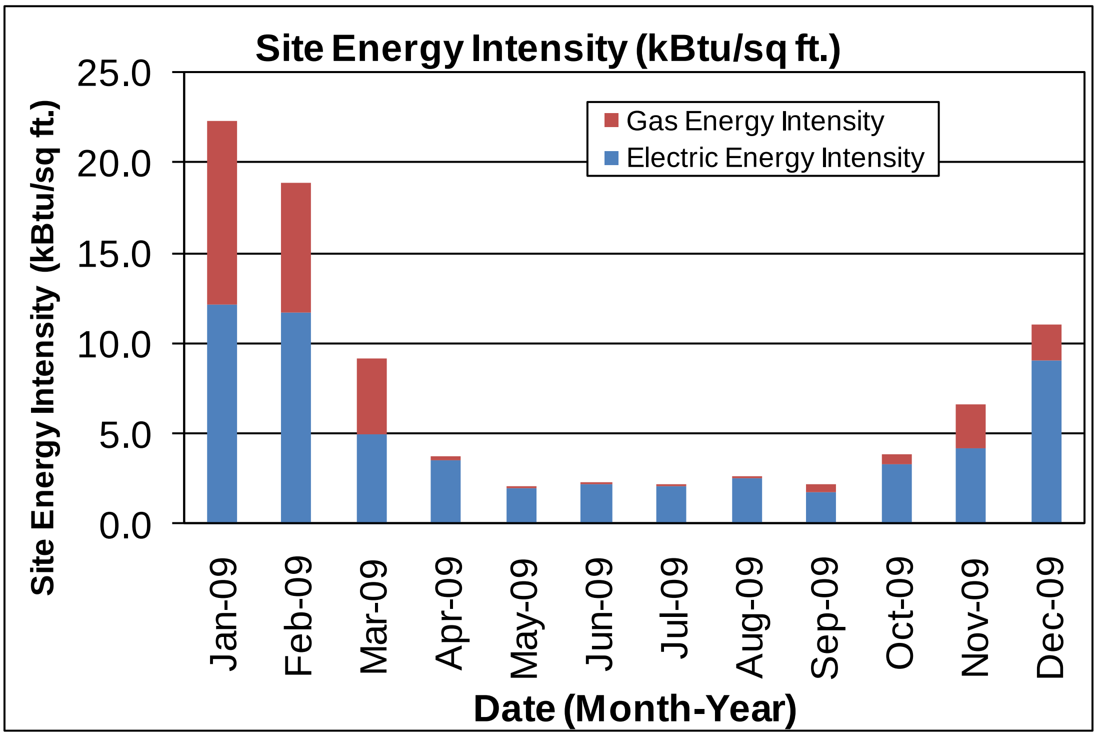


Energy benchmarking

SWA has entered energy information about the Utility Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system.

This garage and office facility is categorized as a non-eligible (“Other”) space type. Because it is an “Other” space type, there is no rating available. Consequently, the Utility Garage is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 93.0 kBtu/ft^2-yr compared to the national average of a mixed use building consuming 104.0 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 Utility 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.

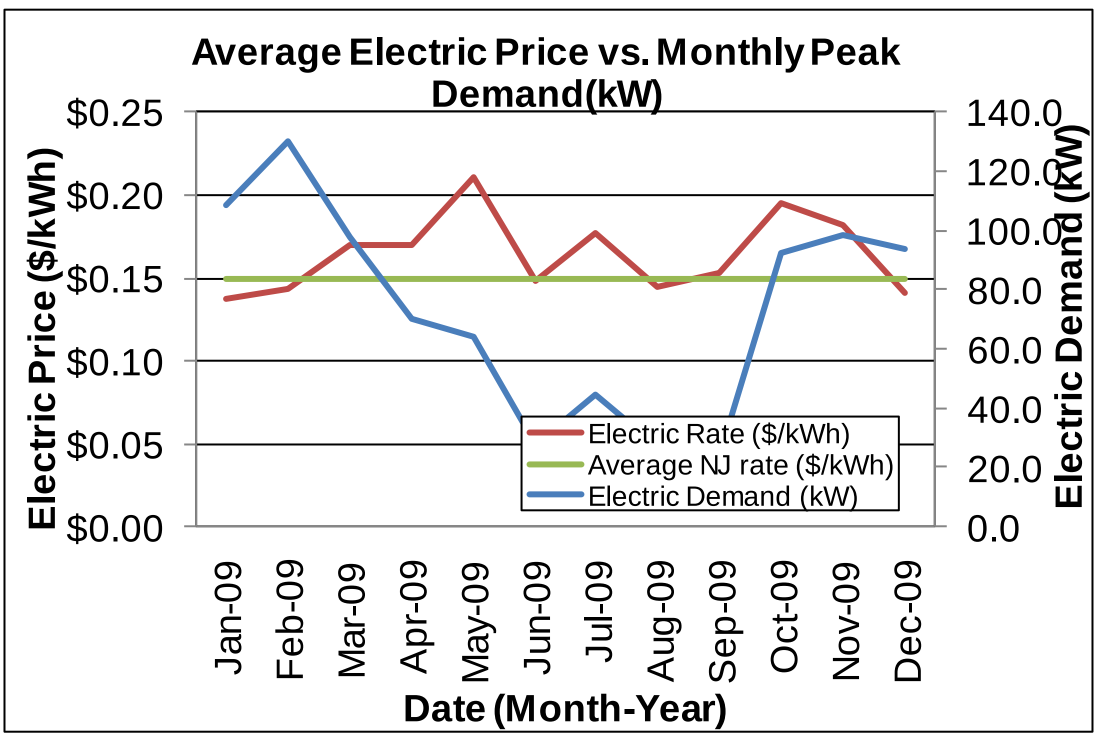
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used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

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.

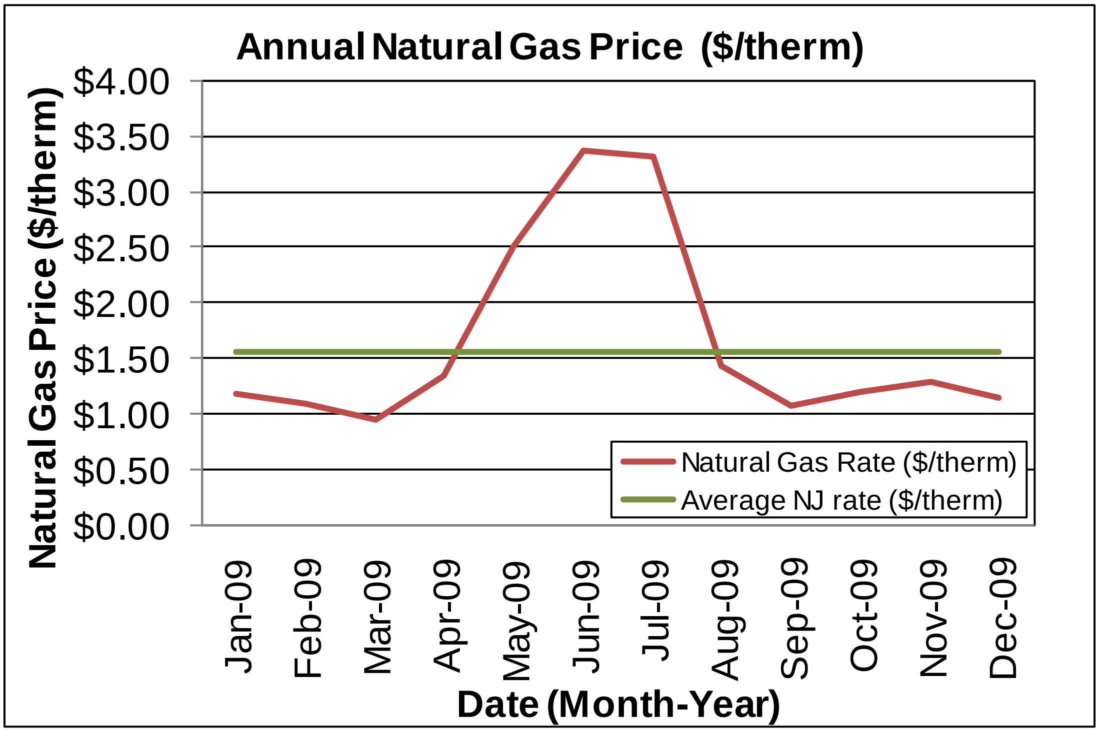
Energy Procurement strategies

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 overall electric rate for the Utility Garage is $0.155/kWh which is more than the average estimated NJ commercial utility rates for electric of $0.150/kWh. Therefore the Borough is paying $1,300 more per year than average for the Utility Garage electric costs. Electric bill analysis shows fluctuations up to 32% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Utility Garage pays a rate of $1.131/therm. Natural gas bill analysis shows fluctuations up to 72% 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.

SWA recommends that the Utility Garage further explore opportunities of purchasing natural gas from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Utility Garage. Appendix C contains a complete list of third-party energy suppliers for the Borough of Park Ridge service area.

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 two-story, (slab on grade), 15,000 square feet Utility Garage Building was originally constructed in the 1950's with additions/alterations completed in 1933 and 2009. It houses five garage bays, storage areas on the mezzanine level and administrative offices on the second floor.

Front Façade


West Façade


West Façade


Rear Façade

Building Occupancy Profiles

The occupancy of the garage is approximately 10 to 15 employees daily from 6:30 am to 3:30 pm.

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

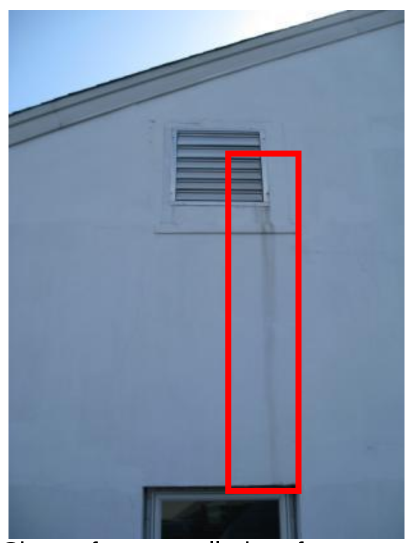
The exterior wall envelope is mostly constructed of stucco and some brick veneer accents, over concrete block with no detectable insulation. The second floor is constructed of fiber cement clapboard siding, over concrete block with no of detectable insulation. The interior is painted CMU (Concrete Masonry Unit) on the first floor and painted gypsum wallboard on the second floor.

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 condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

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

Cracked/deteriorated mortar joints on brick veneer, near base



Signs of uncontrolled roof water runoff on walls due to missing/defective roof flashing

Potential structural damage visible on exterior walls caused by water/ice build-up inside the envelope assembly or building settling

Roof

The building's roof is predominantly a medium-pitch gable type over wood rafters, with asphalt shingles on felt with Douglas fur plywood. It was replaced recently. Four inches of loose-fill fiberglass attic/ceiling insulation, and eight inches of fiberglass batt roof insulation in between pitched rafters were observed from the interior space. The second floor roof has a similar construction.

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

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall good condition, with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

The following specific roof problem spots were identified:

Missing eave vent panels on second floor

Uneven attic insulation found

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 and are based on reports from building management.

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 only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

The following specific base problem spots were identified:

Potential water/moisture seepage through vegetation growth detected at the slab

Windows

The building contains several different types of windows.

1. Several fixed type windows with an aluminum clad frame, tinted/gas-filled, double glazing and no interior or exterior shading devices. The windows are located on the front of the building and are original.
2. Many double-hung type windows with a non-insulated aluminum frame, clear double glazing and no interior or exterior shading devices. The windows are located on the front of the building and are original.
3. Several casement type windows with an aluminum clad frame, clear double glazing and no interior or exterior shading devices. The windows are located on the main floor and are original.

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 good 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

Water damage within window air gap on second floor fixed window

Exterior doors

The building contains two different types of exterior doors..

1. Several hollow metal type exterior doors. They are located throughout the building and are original.
2. Five aluminum garage doors with glass light. They are located in the front of the building and are original.

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 no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, 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 1st floor garage areas are only provided heat and ventilation. The break room and second floor addition have heating, cooling and ventilation. The majority of the HVAC equipment is electric powered with a few natural gas units. There are no major comfort concerns in the building except for an air quality issue for the 2nd floor offices, as explained further in the sections below. A comprehensive Equipment List can be found in Appendix A.

Equipment

The Utility Garage 1st floor, right side garage is heated by three electric ceiling hung unit heaters which generate heat and a fan disperses the heat to the space. The left side garage is also heated by three electric unit heaters.

Qmark and Dayton Electric Unit Heaters in Garage

The second floor office area is heated/cooled by a Lennox condensing furnace in the attic which supplies conditioned are to eight diffusers. There are also supplemental electric baseboards throughout the second floor office area to recovery envelope heat loss.

Lennox Condensing Furnace and Electric Baseboard Heaters

The recently installed break room has its own Luxaire condensing furnace for heating and cooling.

Break Room Condensing Furnace

The furnaces contain a natural gas burner for heating and a split direct expansion (DX) system for cooling, made up of an evaporator and refrigerant loop. The condenser is a separate unit located outside. The burner provides heat to the passing air through the combustion of natural gas; for cooling the R-22 refrigerant absorbs heat from the passing air in the evaporator coil and transfers the heat to the atmosphere in the condenser.

Outside condensing unit to disperse heat to atmosphere

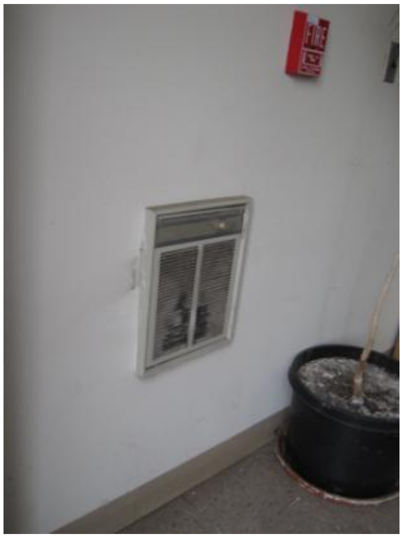
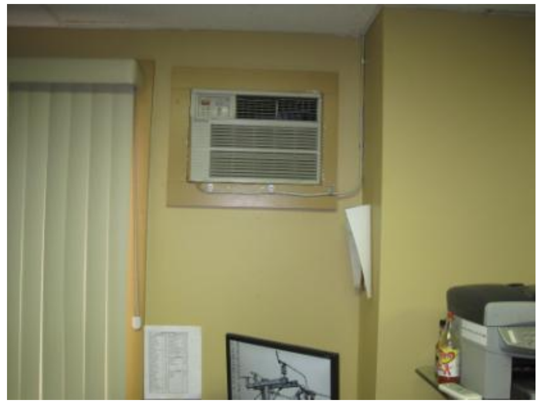
Each side of the building has a Reznor 100% Outside Air Ventilation unit suspended from the ceiling above a catwalk on the mezzanine level. Each unit provides 5,000 CFM of tempered outside air to the garage areas for ventilation through several supply diffusers. A natural gas burner within the units preheats the air before entering the garage space. The OA damper is controlled by a motorized 2-way valve. When the Reznor units operate, two 1 HP exhaust fans EF-1 and EF-2 are initiated to draw the ventilation air out of the space.

Reznor 100% Outside Air Ventilation Unit

Three wall-mounted manual exhaust fans, EF-3, 4 and 5 serve bathrooms and general exhaust for the garage. There are three roof exhaust fans, EF-7, 8 and 9, to ventilate the second floor; two for bathrooms and one for general exhaust. Two manual exhaust fans are installed in the attic for attic ventilation but only one is powered. Not all fans were accessible during the field visit and were recorded based on a recent air balancing report provided by building staff. In general, the building exhaust fans have an estimated 20% useful operating life left.


Installed but disconnected attic exhaust fan

Several supplemental air conditioners and electric unit heaters are also installed in offices and vestibules.

Lobby electric unit heater (left); second floor office AC unit (right)

Distribution Systems

A typical furnace draws in fresh air and brings it into a mixing box, where it is combined with return air from the occupied space. A small portion of the return air is purged outside prior to entering the mixing box. The mixed air inside the air handler is sent through a filter before passing through the evaporator or direct expansion (DX) coil. The air handler fan then pushes the air through the furnace section before the conditioned air is distributed into the building spaces. The furnace is only active in the heating season and the DX system is only active in the cooling season. In between these seasons, occasionally the temperature conditions are such that neither the heating nor cooling cycles will operate; only the blower will be active to provide fresh air to the building.

The second floor Lennox unit serves the 2nd floor offices heating and cooling, with a fully ducted return air system. Both the supply and return ductwork is internally and externally insulated.

Insulated round ductwork for second floor office supply air

There is an air quality issue in the 2nd floor office area. Despite the outside air ventilation for the garage area system, occupants express concern that the garage air is contaminating the office areas above. Also, visible soot and debris was coming out of one of the supply grills serving the 2nd floor office area. This may be due to the filter on the Lennox furnace being clogged or due to particles from the internal duct insulation. The supply diffuser was covered with a filter to temporarily alleviate the issue, as seen in the photo below.

Air Supply grill covered with filter in 2nd Floor Office

The Utility Garage has a constant volume air system with manual volume dampers.

Controls

The electric unit heaters are controlled by manual dial thermostats which also provide a temperature reading.

Unit heater manual thermostats

There are programmable thermostats for each of the two condensing furnaces. The Reznor ventilation fans MUA-1 and 2 are manually initiated. The bathroom exhaust fans operate with bathroom lights. All other exhaust fans are manually controlled.

Domestic Hot Water

The domestic hot water (DHW) for the Utility Garage is provided by two heaters with storage. The 1st floor has an AO Smith 50 Gal natural gas heater with 43,000 Btu/hr capacity and an automatic flue damper. The second floor has a small electric heater with 2,000 Btu/hr capacity and 20 gallon storage.

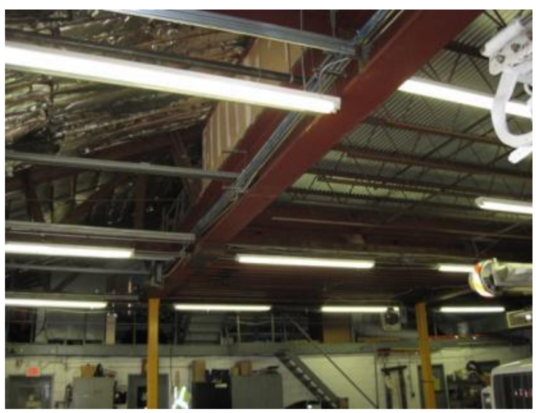
AO Smith heater automatic flue damper

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 Utility Garage currently contains mostly T12 fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.



Ceiling Suspended T12 fixtures

Exit Lights - Exit signs were found to be LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp and Halogen fixtures. Exterior lighting is controlled by timers.

Exterior Metal Halide Fixture

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 Utility Garage has an Otis elevator with a 20 HP hydraulic pump installed in 1993 with the second floor addition.

Elevator in lobby

Other electrical systems

There are two other energy-impacting electrical systems installed at the Utility Garage; a Kohler 313 kVa diesel Emergency Generator installed in 2007 and a Westinghouse 75 kVa transformer. The diesel emergency generator serves the Utility Garage through an Automatic Transfer Switch, ATS, to an emergency panel.

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, but there is a pending design for a 30kW Solar Photo Voltaic system to be installed on the roof.

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.

A design for a 30kW solar panel installation is in progress for the Utility Garage. The drawings were issued in November 2009.

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 Utility 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 20% and 90% remaining useful life.

Combined Heat and Power

The Utility Garage is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical baseload to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

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#	0-5 Year Payback ECMs
1	Replace all Electric Unit Heaters with Natural Gas Infrared Heater
2	Lighting: Replace 5 Inc with CFL
3	Install Energy Miser on Vending Machine and Snack Machine
4	Lighting: Replace 117 T12 fixtures with T8 fixtures
	5-10 Year Payback ECMs
5	Replace one 20 HP Motors with Premium Eff.
	>10 Year Payback ECMs
6	Replace two 3 HP Motors for Reznor Unit with Premium Eff.
7	Replace two 1.5 HP Motors for Furnace with Premium Eff.
8	Replace two 1 HP Motors for Exhaust Fan with Premium Eff.
9	Replace Manual thermostats with Programmable

ECM#1*: Replace all Electric Unit Heaters with Natural Gas Type*

SWA conducted a complete HVAC equipment inspection and compiled an inventory in Appendix A. All of the heating for the garage areas is provided by electric powered unit heaters. There are eight 15 kW electric heaters, five 5 kW heaters and two vestibule heaters, assumed to be 3kW. Although electric unit heaters typically operate at a rated efficiency of 98% to 100%, electric energy costs nearly four times as much as natural gas for the same heat output. Therefore, savings can be realized by replacing this equipment with natural gas type heaters.

Infrared tube heaters are designed for garage applications and have a linear flue which acts as a diffuser so that a fan is not necessary, and is available in all heat ranges. SWA recommends replacing all electric unit heaters with Infrared linear diffuser heaters sized for each garage space. Also, in an effort for further optimize this system, the manual thermostats for the heaters should be replaced with programmable type thermostats. See ECM #9 for details.

Estimated installed cost: $13,900 (includes $4,500 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	13,900	0	13,900	150,800	0.00	-5145	2.2	0	17,555	20	351093	0.8	121	213,291

Assumptions: SWA calculated the savings for this measure using the latest electric usage for the building and published full load heating hours in New Jersey established by the EPA.

Rebates/financial incentives: None at this time

Please see Appendix F for more information on Incentive Programs.

ECM#2*: Lighting: Replace Inc with CFL*

On the days of the site visits, SWA completed a lighting inventory of the Utility Garage (see Appendix B). There are five incandescent lights which can be replaced with compact fluorescent lights for a third wattage reduction for the same lumen output. CFL bulbs have a longer lifespan as well. 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: $174 (includes $50 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	174	0	174	670	0.14	0	0.2	99	202	5	1012.4	0.9	153	1,199

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 3 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#3: *Install Vending and Snack Misers*

The Utility Garage building has one beverage and one Snack vending machine located in the lobby. 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.

Snacks vending miser devices can be used on Snacks vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snacks vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up.

Installation cost:
Estimated installed cost: $358
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	358	0	358	1,442	0.02	0	0.1	0	224	15	3,353	1.6	56	2,582

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

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Lighting: Replace 117 T12 fixtures with T8*

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 117 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, to obtain savings.

Installation cost:
Estimated installed cost: $17,111 (includes $4,000 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
3	17,111	3,510	13,601	11,694	2.44	0	2.7	1,340	3,153	15	47,292	4.3	26	20,938

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

Rebates/financial incentives:

- *NJ Clean Energy – T12 to T8 - $30 - $3,510 Total*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Replace 20 HP Hydraulic Motor for Elevator with Premium Efficiency*

Description:

The Otis elevator used a 20 HP hydraulic pump to operate. The pump has a nameplate efficiency of 76%. There are premium efficiency motors currently available with an efficiency of 93.5%. SWA recommends replacing the hydraulic pump motor with a 20 HP premium efficiency motor. Below is the cost breakdown of replacing the existing motor, which has 20% remaining useful life, with a standard motor and the incremental cost of replacing it with a premium efficiency motor.

Installation cost:

Estimated installed cost: $1,525
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics (with incentives):

ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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
Replace 76% Eff. one 20 HP Motors with Standard Eff., 89.3%	1,400	0	1400	1,099	0	0.25	0.0	170.3	20	3406.9	8.2	7	1968
Incremental cost to replace one 20 HP motor with Premium Eff., 93.5%	250	125	125	278	0	0.06	0.0	43.09	20	861.8	2.9	29	498
Replace one 20 HP Motors with Premium Eff., 93.5%	**1,650**	**125**	**1,525**	**1,377**	**0**	**0.3**	**0**	**213.4**	**20**	**4,269**	**7.1**	**9**	**2466**

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The DOE Motor Master International selection and calculator was used with the assumption the pump operates for approximately 500 hours per year.

Rebates/financial incentives:

- *NJ Clean Energy – Premium three-phase motors ($45-$700 per motor) Maximum: $125 for a 20 HP motor.*

Please see Appendix F for more information on Incentive Programs.

ECM# 6, 7, 8: *Replace HVAC Equipment Standard Motor for with Premium Efficiency*

Description:

The garage ventilation system uses a total of two 3 HP pumps and two 1 HP pumps to ventilate the space. Also the 2nd floor condensing furnace uses a 1.5HP motor for the supply air fan. All the current motors have a standard efficiency between 75% and 81%. Premium pumps are readily available with operating efficiencies of 86.5% to 90%. SWA recommends replacing these five motors with premium efficiency when they reach the end of useful life. Below is the payback analysis and expected savings for each.

Installation cost:

Estimated installed cost: $2,770

Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics (with incentives):

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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: Replace 3 HP Motors on Reznor Units MUA-1 and MUA-2 with Premium Eff.	1,200	120	1,080	516	0.15	0.1	0	80	20	1,600	13.5	924	120
6: Replace one 1.5 HP Motor on HP-1 Furnace with Premium Eff.	920	50	870	324	0.09	0.1	0	50	20	1,004	17.3	580	870
7: Replace 1 HP Motors on EF-1 and EF-2 with Premium Eff.	920	100	820	244	0.07	0.1	0	38	20	756	21.7	437	100
TOTALS	**3,040**	**270**	**2,770**	**1,084**	**0.3**	**0.2**	**0**	**168**		**3,360**	**16.5**	**-**	**924**

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The DOE Motor Master International selection and calculator was used with the assumption the pump operates for approximately 1000 hours per year.

Rebates/financial incentives:

- *NJ Clean Energy – Premium three-phase motors ($45-$700 per motor) Maximum: $270*

Please see Appendix F for more information on Incentive Programs.

ECM#9: *Replace Manual Thermostats with Programmable*

It was noted during the field inspections that all of the garage unit heaters are controlled by manual dial thermostats. This method of control is highly inaccurate and ineffective for responding to temperature fluctuations. As a compliment to ECM #1, replacing all the unit heaters with natural gas type, SWA recommends replacing all manual thermostats with programmable. The programmable thermostats allow for evening setbacks of heating equipment based on hours of operation and season.

The following economic analysis shows a relatively long payback for the measure mostly because the garage space is usually maintained at 60 deg F in the winter and has no cooling at all. The investment in programmable thermostats is marginal however when considering the enhanced confidence in the operation of the heating system. This is especially important for areas of the garage that are used for storage and not frequently monitored; the existing heating equipment is likely cycling on and off when the space is not occupied.

Installation cost:
Estimated installed cost: $900 (includes $150 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
9	900	0	900	10	0.00	0.53	0.01	50	52	15	781	17.3	5	23

Assumptions: SWA calculated the savings for this measure based on Energy Star Programmable thermostat calculator

Rebates/financial incentives: None at this time

Please see Appendix F for more information on Incentive Programs.

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 Utility Garage:

- Install CO sensors to control operation of the existing MUA-1 and MUA-2, 100% Outside Air ventilation units and associated exhaust fans EF-1 and EF-2.
  - Once MUA-1 and 2 reach the end of their useful life, approximately by 2013, replace with an air cleaning system based on CO sensor. EF-1 and EF-2 can remain as backup. Air cleaners remove toxins using multiple filters and re-circulate space air to avoid expelling conditioned air to the atmosphere as waste.
  - Ensure proper maintenance of HP-1 furnace.
  - If air quality issues in the 2nd floor do not improve after implementing the above recommendations, SWA recommends installing an electric portable HEPA filter with an airflow range of 200 to 500 CFM in the 2nd floor office area.

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

- SWA recommends having the structural integrity of the building inspected due to exterior wall cracks in several locations.

- Add insulation and tightly pack in between attic wood rafters with R-13 minimum.

- Replace damaged 2nd floor front window with a low-E, thermal barrier, double glazed type.

- Replace missing eave vent panels.

- Connect the unwired attic exhaust fan to power.

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.

- Replace all filters on HVAC equipment as per manufacturer's recommendations.

- Ensure that all outside air penetrations are free and clear of debris or any other blockage.

- Re-point deteriorated mortar joints soon to prevent possible water/moisture penetration into cavity walls.

- Maintain gutters, downspouts and downspout deflectors to minimize uncontrolled water run-off causing exterior wall damage.

- Maintain sealants at all windows for airtight performance.

- Maintain roofs, downspouts and cap flashing - SWA recommends regular maintenance to verify water is draining correctly. Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.

- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. 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	AC Window Unit	2nd Fl Office Area	Friedrich	Electric	2nd Fl Office Area	1993	20%
Cooling	Condenser; R-22, 2 Tons	Outside Back of Building	Luxaire TCGD24S41S1A; W0L8370466	Electric	Break Room	2009	100%
Cooling	Condenser: R-22, 7.5 Tons	Outside Back of Building	Armstrong LSA090P-1Y; 5699G 12385	Electric	2nd Fl Office Area	1993	20%
Domestic Hot Water	DHW Heater, 43,000 MBH, 50 Gal, 80% Eff., with automatic flue damper	1st Floor	AO Smith; MF93-0082486-224	Natural Gas	1st Floor	1990	0%
Domestic Hot Water	DHW Heater 2,000 Btu/hr, 20 gal,	2nd Floor	Rheem; RH0200317131; 81VP20S	Electric	2nd Floor	1993	20%
Heating	Two Electric Unit Heaters, 1/8 HP Motor, 15 Watts	Left Side Garage	Q Mark, MUH158	Electric	Left Side Garage	2000	50%
Heating	Electric Baseboard Perimeter Heating	2nd Fl	NA	electric	2nd Fl. Offices	1993	20%
Heating	Two (2) Dayton Electric Unit Heater	Right Side Garage	Dayton Heaters	Electric	Right Side Garage	1993	20%
Heating	One (1) Qmark ceiling hung unit heater, 15KW	Right Side Garage	QMark Heaters	Electric	Right Side Garage	1993	20%
Heating	Three (3) small electric unit heaters	Server Rm	NA	Electric	Server Rm	1993	20%
Heating	Three (3) Q mark electric Unit Heaters - Old -15 kW manual thermostat control	Left Side Garage	Qmark; Older: MUH-15-8, 09932691	Electric	Left Side Garage	1980	0%
Heating	Two (2) Q mark electric Unit Heaters - 5 kW manual thermostat control	Left Side Garage Storage Area	Qmark, MUH0581MG	Electric	Left Side Garage Storage Area	2006	80%
Heating	Electric Baseboard Perimeter Heating	2nd Fl. Office Areas	NA	Electric	2nd Fl. Office Areas	1993	40%
Heating	Two Electric Vestibule heaters	Entrance vestibule	Q Mark	Electric	Entrance vestibule	1980	0%
Heating / Cooling	HP-1, Condensing Furnace , 1.5 HP, 1745 RPM, 2400CFM, (600 CFM OA), Serving 8 Supply Diffusers	Attic	Lennox HP17-953V-1-SPD	Natural Gas/ Electric	2nd Fl Offices	1993	20%

Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating / Cooling	Condensing Furnace, 40,000 Btu/hr In, 95% Eff., Energy Star Rated	Above kitchen/break rm	Luxaire, TG9S040A08MP11A, W0A9527904	Natural Gas/ Electric	Kitchen/Break Rm	2009	100%
Transformer	75 kVa transformer	1st Fll	Westinghouse DT-3; J93J0774	Electric	All Areas	1980	0%
Elevators	Otis hydraulic elevator, Hydraulic Pump, 20 HP, 5455 RPM, 76% Eff.	All Areas	Leroy Somer, LMH,	Electric	All Areas	1993	20%
Air Compressor	Air Compressor	Garage Area	4ME97; L8/13/08-00039	Electric	Garage	2008	90%
Ventilation	EF-1, 1HP, 5500 CFM, works with Reznor Unit	Roof	Penn, BBK24	electric	1st Fl	1993	20%
Ventilation	EF-2, 1HP, 5500 CFM, works with Reznor Unit	Roof	Penn, BBK24	electric	1st Fl	1993	20%
Ventilation	EF-3, 1/10 HP, 365 CFM	1st Floor	Penn, Z10L	electric	1st Fl	1993	20%
Ventilation	EF-4, 1/10 HP 365 CFM	1st Floor	Penn, Z10L	electric	1st Fl	1993	20%
Ventilation	EF-5, 0.06 HP 295 CFM	1st Floor	Penn, Z81	electric	1st Fl	1993	20%
Ventilation	EF-7, 0.05 HP, 165 CFM, 1035 RPM	Roof	Penn, Z8L	electric	2nd Fl	1993	20%
Ventilation	EF-8, 0.05 HP, 165 CFM, 1035 RPM	Roof	Penn, Z8L	electric	2nd Fl	1993	20%
Ventilation	EF-9, 0.05 HP, 165 CFM, 1035 RPM	Roof	Penn, Z8L	electric	2nd Fl	1993	20%
Ventilation	MUA-1 100% OA Ventilation Air Supply Fan with NG Heater, 5,000 CFM OA, 3 HP, 3450 RPM, serving 3 grills	2nd Floor Mezz.	Reznor, HCXE-400	Natural Gas/ Electric	1st Floor Garages	1993	20%
Ventilation	MUA-2 100% OA Ventilation Air Supply Fan with NG Heater, 5,000 CFM OA, 3 HP, 3450 RPM, serving 2 grills	2nd Floor Mezz.	Reznor, HCXE-499	Natural Gas/ Electric	1st Floor Garages	1993	20%
Ventilation	Two (2) exhaust fans in attic not tied into power system	Attic	NA	Electric	Attic	2009	100%
Ventilation	Attic Mounted Exhaust Fan - switch operated	Attic	NA	Electric	Attic	1993	20%
Generator	Emergency Generator, 1800 RPM, 313 kVA	DPW Generator Rm	Kohler, 250REOZJD; 2152521	Diesel	DPW & Utility Garage Emergency Power	2007	90%
Renewable solar system	30 kW - SREC's NJ Clean Energy Program and Rebate - Phister- Currently in design phase, -	Roof	N/A	N/A	All Areas	Pending	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	2	Meeting Rm (1)	Recessed	M	4'T12	4	4	40	Sw	8	260	12	688	1,431	T8	Recessed	4'T8	E	Sw	4	4	32	8	260	5	532	1107	324	0	324
2	2	Office (2)	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
3	2	Kitchen (3)	Recessed	M	4'T12	1	1	40	Sw	9	260	12	52	122	T8	Recessed	4'T8	E	Sw	1	1	32	9	260	5	37	87	35	0	35
4	2	Office Area (4)	Recessed	M	4'T12	10	4	40	Sw	9	260	12	1,720	4,025	T8	Recessed	4'T8	E	Sw	10	4	32	9	260	5	1330	3112	913	0	913
5	2	Office Area (4)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
6	2	Hallway	Recessed	M	4'T12	8	4	40	Sw	16	260	12	1,376	5,724	T8	Recessed	4'T8	E	Sw	8	4	32	16	260	5	1064	4426	1298	0	1298
7	2	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
8	2	Science Room / Laboratory	Recessed	M	4'T12	4	4	40	Sw	8	260	12	688	1,431	T8	Recessed	4'T8	E	Sw	4	4	32	8	260	5	532	1107	324	0	324
9	2	Bathroom Women	Recessed	M	4'T12 U-shaped	1	2	40	Sw	9	260	12	92	215	T8	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	9	260	5	69	161	54	0	54
10	2	Bathroom Men	Recessed	M	4'T12 U-shaped	1	2	40	Sw	9	260	12	92	215	T8	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	9	260	5	69	161	54	0	54
11	2	Storage Rm	Recessed	M	4'T12	12	4	40	Sw	2	260	12	2,064	1,073	T8	Recessed	4'T8	E	Sw	12	4	32	2	260	5	1596	830	243	0	243
12	2	Storage Rm	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
13	2	Storage Rm (2A)	Recessed	M	4'T12	4	2	40	Sw	2	260	12	368	191	T8	Recessed	4'T8	E	Sw	4	2	32	2	260	5	276	144	48	0	48
14	2	Storage Rm (2B)	Recessed	M	4'T12	2	2	40	Sw	2	260	12	184	96	T8	Recessed	4'T8	E	Sw	2	2	32	2	260	5	138	72	24	0	24
15	2	Storage Rm (2C)	Recessed	M	8'T12	2	2	68	Sw	2	260	17	306	159	T8	Recessed	8'T8	E	Sw	2	2	59	2	260	7	250	130	29	0	29
16	1	Electrical Rm	Parabolic Ceiling Suspended	M	8'T12	1	2	80	Sw	2	260	20	180	94	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	1	2	59	2	260	7	125	65	29	0	29
17	1	Office Area	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
18	1	Storage Rm	Recessed	M	8'T12	1	2	80	Sw	2	260	20	180	94	T8	Recessed	8'T8	E	Sw	1	2	59	2	260	7	125	65	29	0	29
19	1	Truck Bay (S)	Parabolic Ceiling Suspended	M	8'T12	4	2	80	Sw	12	260	20	720	2,246	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	4	2	59	12	260	7	500	1560	686	0	686
20	1	Truck Bay (S)	Parabolic Ceiling Suspended	M	4'T12	1	2	40	Sw	2	260	12	92	48	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	2	32	2	260	5	69	36	12	0	12
21	1	Truck Bay (L)	Parabolic Ceiling Suspended	M	8'T12	14	2	80	Sw	12	260	20	2,520	7,862	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	14	2	59	12	260	7	1750	5460	2402	0	2402
22	1	Men's Locker Room	Recessed	M	4'T12	2	2	40	Sw	8	260	12	184	383	T8	Recessed	4'T8	E	Sw	2	2	32	8	260	5	138	287	96	0	96
23	1	Truck Bay (R)	Parabolic Ceiling Suspended	M	8'T12	15	2	80	Sw	12	260	20	2,700	8,424	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	15	2	59	12	260	7	1875	5850	2574	0	2574
24	1	Storage Rm (R1)	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
25	1	Truck Bay (R)	Exit Sign	S	LED	1	1	5	N	34	365	1	6	68	N/A	Exit Sign	LED	S	N	1	1	5	34	365	1	6	68	0	0	0
26	1	Office (R2)	Recessed	M	4'T12	3	4	40	Sw	9	260	12	516	1,207	T8	Recessed	4'T8	E	Sw	3	4	32	9	260	5	399	934	274	0	274
27	2	Storage Rm (R3)	Recessed	M	8'T12	4	2	80	Sw	9	260	20	720	1,685	T8	Recessed	8'T8	E	Sw	4	2	59	9	260	7	500	1170	515	0	515
28	2	Storage Rm (R3)	Recessed	M	4'T12	1	2	40	Sw	9	260	12	92	215	T8	Recessed	4'T8	E	Sw	1	2	32	9	260	5	69	161	54	0	54
29	2	Office Area (R4)	Recessed	M	4'T12	1	2	40	Sw	9	260	12	92	215	T8	Recessed	4'T8	E	Sw	1	2	32	9	260	5	69	161	54	0	54
30	1	Lunch Rm	Recessed	M	4'T12	8	4	40	Sw	8	260	12	1,376	2,862	T8	Recessed	4'T8	E	Sw	8	4	32	8	260	5	1064	2213	649	0	649
31	1	Bathroom	Recessed	M	4'T12	2	4	40	T	2	260	12	344	179	T8	Recessed	4'T8	E	T	2	4	32	2	260	5	266	138	41	0	41
32	1	Lunch Rm	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
33	1	Lobby	ceiling mounted	S	Inc	4	1	60	Sw	8	260	0	240	499	CFL	Ceiling Mounted	CFL	S	Sw	4	1	20	8	260	0	80	166	333	0	333
34	1	Lobby	Recessed	M	4'T12	1	4	40	Sw	8	260	12	172	358	T8	Recessed	4'T8	E	Sw	1	4	32	8	260	5	133	277	81	0	81
35	1	Elevator	Recessed	M	4'T12	1	2	40	N	24	365	12	92	806	T8	Recessed	4'T8	E	N	1	2	32	24	365	5	69	604	201	0	201
36	1	Lobby	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
37	1	Line Dept. Office	Recessed	M	4'T12	2	4	40	Sw	8	260	12	344	716	T8	Recessed	4'T8	E	Sw	2	4	32	8	260	5	266	553	162	0	162
38	Ext	Exterior	ceiling mounted	S	hal	1	2	50	T	16	260	11	111	462	CFL	Ceiling Mounted	CFL	S	T	1	2	15	16	260	0	30	125	337	0	337
39	Ext	Exterior	ceiling mounted	S	MH	3	1	75	T	16	260	21	288	1,198	N/A	Ceiling Mounted	MH	S	T	3	1	75	16	260	21	288	1198	0	0	0
Totals:						**133**	**93**	**1,683**				**448**	**19,521**	**46,709**						**133**	**93**				**188**	**14,427**	**34,346**	**12,364**	**0**	**12,364**
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																														

Legend								
Fixture Type		**Lamp Type**			**Control Type**	**Ballast Type**	**Retrofit Category**
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	Fl.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

Proposed Lighting Summary Table			
Total Surface Area (SF)	15,000		
Average Power Cost ($/kWh)	0.1550		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,660	1,323	**337**
Exterior Power (watts)	399	318	**81**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	45,050	33,023	**12,027**
Lighting Power (watts)	19,122	14,109	**5,013**
Lighting Power Density (watts/SF)	1.27	0.94	**0.33**
Estimated Cost of Fixture Replacement ($)	13,775		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**3,355**		

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.

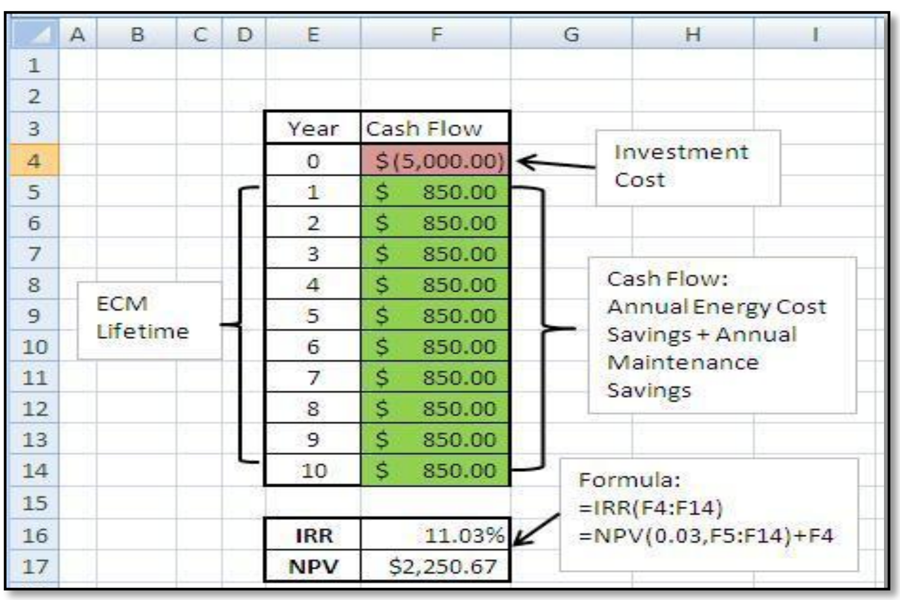
Calculation References

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 - Utility Garage

Building ID: 2253237
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 06, 2010

Facility
Borough of Park Ridge - Utility Garage
15 Sulak Lane
Park Ridge, NJ 07656

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1950
Gross Floor Area (ft²): 15,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	887,396
Natural Gas (kBtu)[4]	504,638
Total Energy (kBtu)	1,392,034
Energy Intensity[5]	
Site (kBtu/ft²/yr)	93
Source (kBtu/ft²/yr)	233
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	162
Electric Distribution Utility	
Borough of Park Ridge	
National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	9%
Building Type	Other

Stamp of Certifying Professional

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

Meets Industry Standards[6] for Indoor Environmental Conditions:

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

Certifying Professional
N/A

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

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

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. Theincentives 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	**Replace all Electric Unit Heaters with Infrared Natural Gas Heaters**	0	13,900	150,800	0.0	-5,145	2.2	0	17,555	20	351,093	0.8	2426	121	126	242,505	213,291
	2	**5 New CFL fixtures to be installed with incentives**	none at this time	174	670	0.1	0	0.2	99	202	5	1,012	0.9	763	153	113	748	1,199
	3	**Install Energy Miser on Vending Machine and Snack Machine**	0	358	1,442	0.0	0	0.1	0	224	15	3,353	1.6	836	56	62	2,272	2,582
	4	**117 New T8 fixtures to be installed with incentives**	3,510	13,601	11,694	2.4	0	2.7	1,340	3,153	15	47,292	4.3	396	26	21	23,498	20,938

	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	4	**Replace one 20 HP Motors with Premium Eff.**	125	1,525	1,377	0.4	0	0.3	0	213	20.0	4,269	7.1	180	9	9	1,592	2,466
<10 Year Payback (End of Life Measures)	6	**Replace two 3 HP Motors on Reznor Unit with Premium Eff.**	120	1,080	516	0.1	0	0.1	0	80	20.0	1,600	13.5	48	2	-2	88	924
	7	**Replace one 1.5 HP Motors with Premium Eff.**	50	870	324	0.1	0	0.1	0	50	20.0	1,004	17.3	15	1	-5	-136	580
	8	**Replace two 1 HP Motors with Premium Eff.**	100	820	244	0.1	0	0	0	38	20.0	756	22	-8	0	-8	-268	437
	9	**Replace six manual thermostats with Programmable**	0	900	10	0.0	1	0	50	52	15.0	781	17	70	5	-5	-287	23

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 Utility 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 Utility 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.