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Local Government Energy Program
Energy Audit Final Report

Borough of Park Ridge

Fire Department
53 Park Avenue
Park Ridge, NJ 07656

Project Number: LGEA62

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EXECUTIVE SUMMARY

The Borough of Park Ridge Fire Department is a two-story building with no basement comprising a total conditioned floor area of 14,000 square feet. The original structure was built in 1985, with upgrades in 2005 and 2010. 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	100,080	3,643	$17,451	47.0	706
Proposed	69,824	3,311	$13,074	37.3	572
Savings	30,256	332	4,377	10	134
% Savings	30%	9.1%	25%	21%	19%

The Borough of Park Ridge Fire Department has highly competitive energy cost rates compared to the average estimated NJ commercial utility rates, and should maintain the current rates.

SWA has also entered energy information about the Fire Department in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Station/Police Station is comprised of non-eligible ("Other") space type. The resulting score is 47.0, which is better than the average comparable building by 78.0.

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	1,970	0.7	1,452	8,326
5-10 Year	17,250	7.1	122,598	3,649
>10 year	504	12.9	6,490	9
Total	19,724	6.6	130,540	11,983

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 20 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 Fire Department further explore the following:

Capital Improvements

- Install premium motors when replacements are required
- Install Premium efficiency electric unit heaters with programmable thermostats when replacements are required
- Any T12 fixtures not included in Lighting Analysis Appendix B should be replaced with T8 fixtures as T12 lamps burn out

Operations and Maintenance

- Replace broken/deteriorated bricks and re-point cracked mortar joints
- Slope roof surface to drain effectively at time of reroofing. SWA recommends regular maintenance to verify water is draining correctly
- Maintain sealants at all windows for airtight performance
- Thoroughly and evenly insulate space above the ceiling tiles and plug all ceiling penetration. All missing ceiling tiles should be put back in place.
- Maintain downspouts and cap flashing
- Provide weather-stripping/air-sealing
- Repair/seal wall cracks and penetrations
- SWA recommends that the building considers purchasing the most energy-efficient equipment, including Energy Star labeled appliances
- Use smart power electric strips

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. 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 as long as the facility spends 25% 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 Fire Department at 53 Park Avenue, 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 Fire Department.

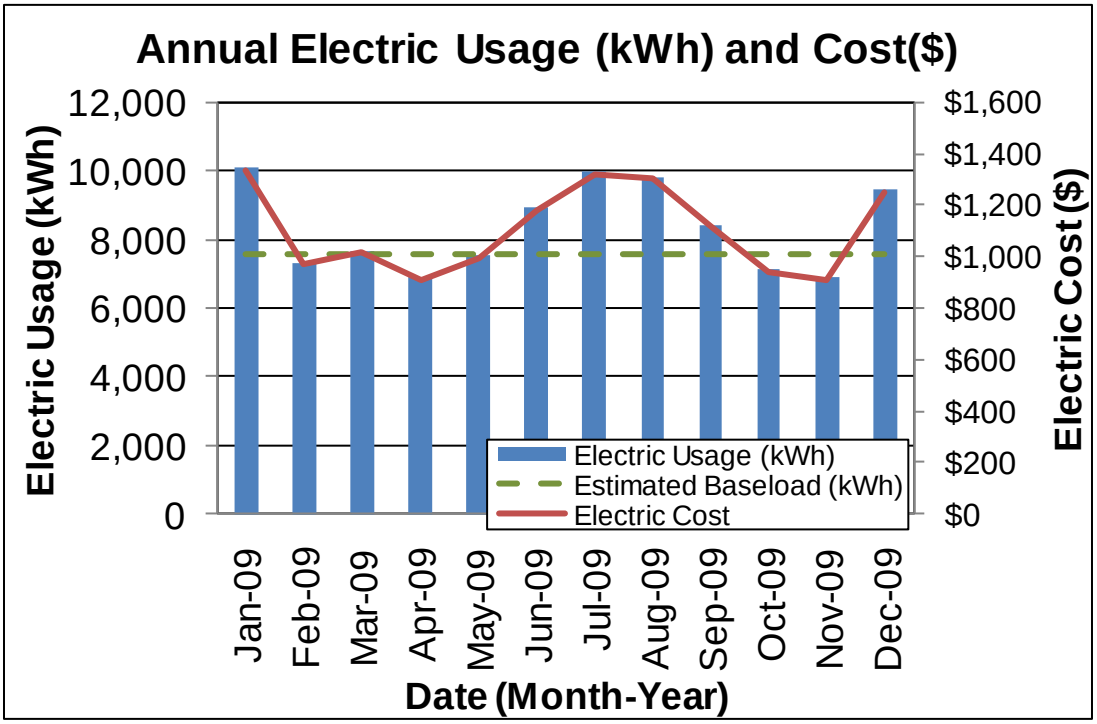
HISTORICAL ENERGY CONSUMPTION

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 Fire Department 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.

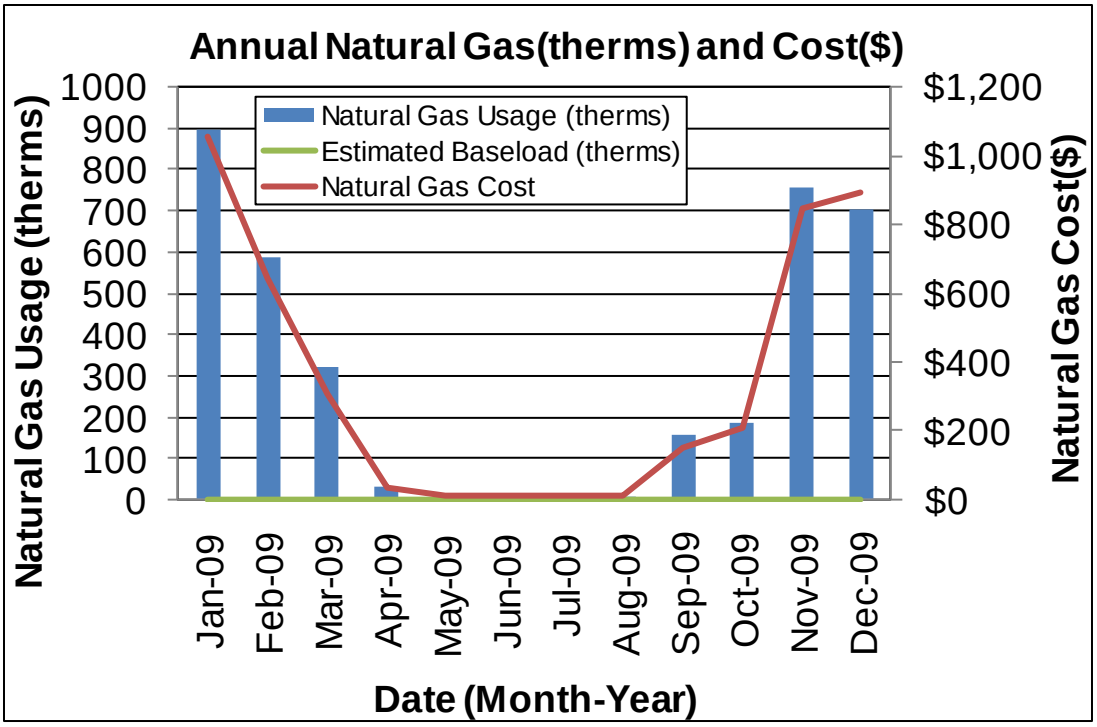
Electricity - The Fire Department is currently served by one electric meter. The Fire Department currently buys electricity from Park Ridge Electric at **an average aggregated rate of $0.132/kWh**. The Fire Department purchased **approximately 100,080 kWh, or $13,253 worth of electricity,** in the previous year. The average monthly demand was 33.0 kW and the annual peak demand was 40.4 kW.

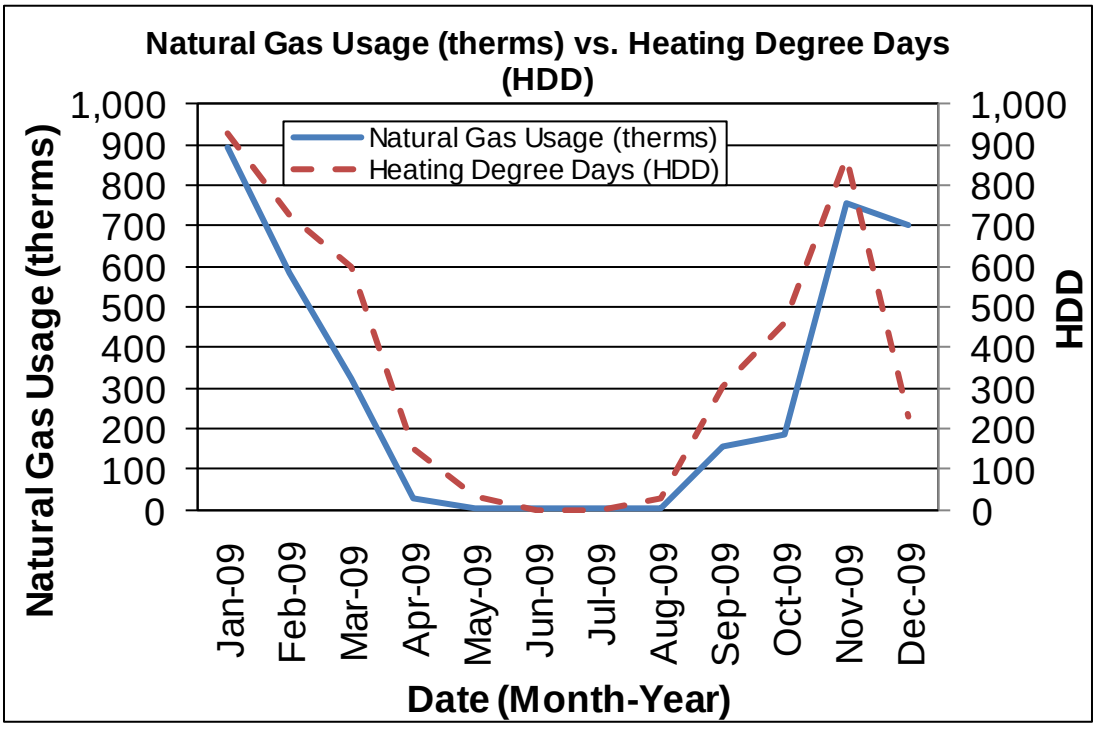
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Fire Department.



Natural gas - The Fire Department is currently served by one meter for natural gas. The Fire Department currently buys natural gas from PSE&G at **an average aggregated rate of $1.152/therm**. The Fire Department purchased **approximately 3,643 therms, or $4,197 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 Fire Department.

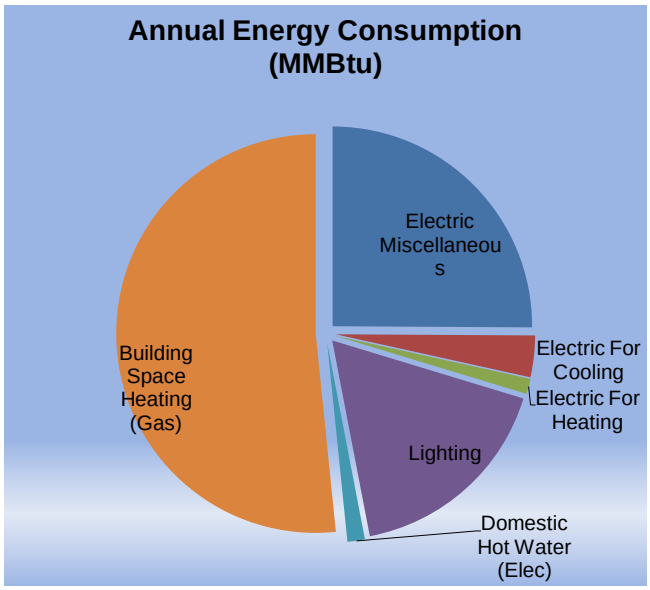


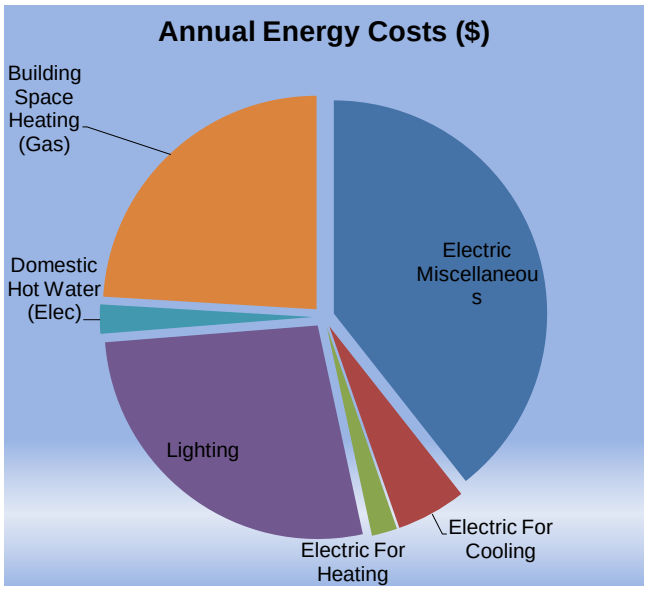


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following graphs, pie charts, and table show energy use for the Fire Department based on utility bills for the 12 month period. Note: electrical cost at $39/MMBtu of energy is almost four times as expensive as natural gas at $12/MMBtu

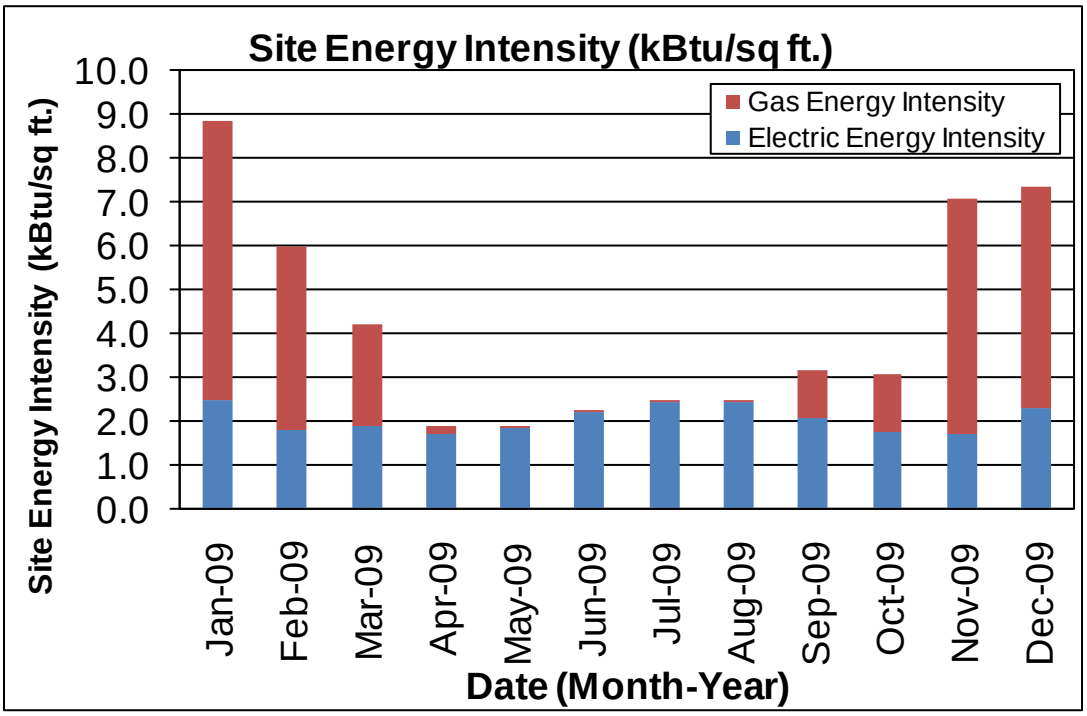
Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	177	25%	$6,873	39%	39
Electric For Cooling	24	3%	$923	5%	39
Electric For Heating	9	1%	$337	2%	39
Lighting	122	17%	$4,735	27%	39
Domestic Hot Water (Elec)	10	1%	$385	2%	39
Building Space Heating (Gas)	364	52%	$4,197	24%	12
Totals	706	100%	$17,451	100%	
Total Electric Usage	342	48%	$13,254	76%	39
Total Gas Usage	364	52%	$4,197	24%	12
Totals	706	100%	$17,451	100%	





Energy benchmarking

SWA has entered energy information about the Fire Department in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This "Station/Police Station" facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Fire Department is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 47.0 kBtu/ft^2-yr compared to the national average of a Station/Police Station building consuming 78.0 kBtu/ft^2-yr. This indicates a high level of performance, however, 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. There is always room for improvement in energy efficiency.



Per the LGEA program requirements, SWA has assisted the Borough of Park Ridge to create an *ENERGY STAR® Portfolio Manager* account and share the Fire Department 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 rooftop units

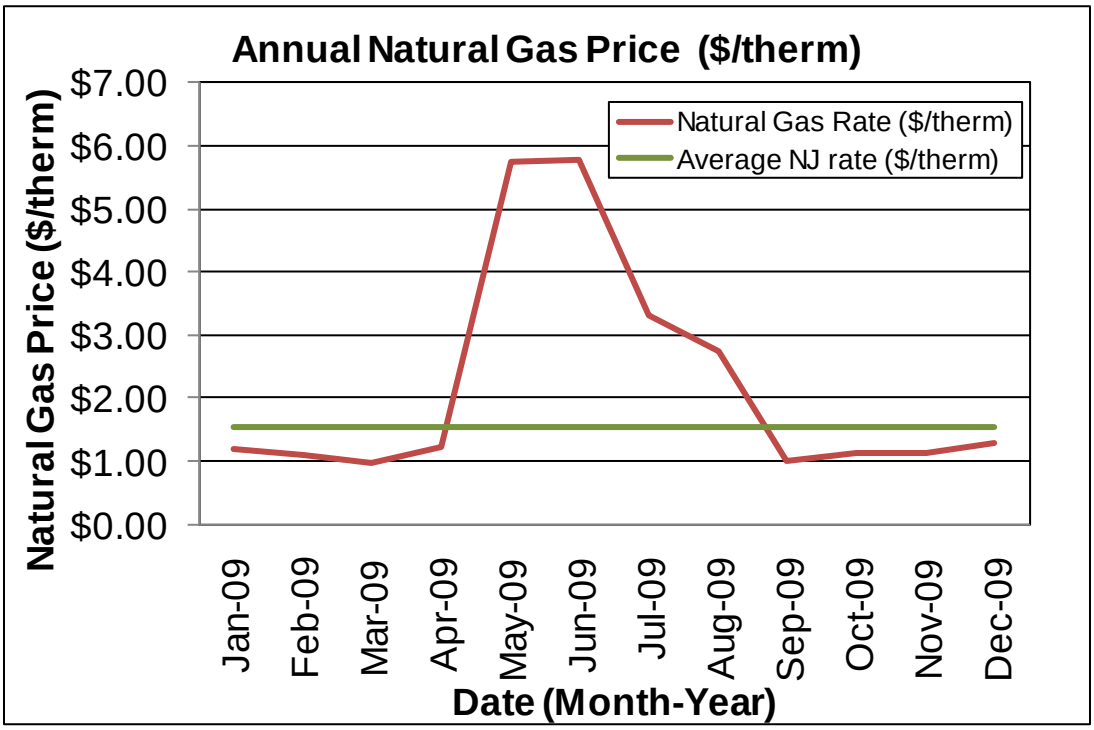
Currently, the Borough of Park Ridge is its own electric supplier and therefore is exempt from regional and demand service charges. The building is direct metered and is charged a constant rate throughout the year, with no fluctuations due to season or usage.

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.

Since the Borough of Park Ridge is its own electricity provider, the electric rate for the Fire Department is highly competitive at $0.132/kWh, which is less than the average estimated NJ commercial electric rate of $0.150/kWh. There are no electric cost fluctuations.

The average estimated NJ commercial utility rates for gas are $1.550/therm, while the Fire Department pays a rate of $1.152/therm. Natural gas bill analysis shows fluctuations up to 65% over the most recent 12 month period.



The rate spikes in the summer due to fixed meter costs even though there is very low gas usage. 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 Fire Department 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 Fire Department. 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 25, 2010, the following data was collected and analyzed.

Building Characteristics

The two-story, (slab on grade), 14,000 square feet Fire Department Building was originally constructed in 1985 with exterior upgrades completed in 2010. It houses two large truck bays, utility rooms, generator room, locker rooms, large meeting room, bar area, kitchen, lounge area, bathrooms and office area.

Front Façade

Rear Façade

Front and Side Façade

Building Occupancy Profiles

The building is occupied by approximately three to five volunteer firemen for 10 to 20 hours per week.

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 vinyl clapboard siding accents, over a steel frame with 3-1/2 inches of foil faced blanket insulation. The interior is mostly painted CMU (Concrete Masonry Unit) and painted 5/8" gypsum wallboard.

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 good condition with no signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

Roof

The building's roof is predominantly a flat, no parapet type over steel decking, with a built-up asphalt finish and reflective coating. It was replaced in 2005. It is assumed that there is at least two inches of insulation in the roof construction since there is no visible ceiling insulation. The perimeter of the roof is an asphalt finish mansard shaped roof on felt with ¾" plywood and was also replaced in 2005.

Note: Roof insulation levels could not be verified in the field, and are based on available construction plans.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall good condition, with no signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

Base

The building's base is composed of a six inch slab-on-grade floor with a perimeter foundation and high density foam insulation.

Slab/perimeter insulation levels could not be verified in the field and are based on available construction plans.

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 basically one type of window:

1. Approximately nine double-hung type windows with an insulated aluminum frame clear double glazing and no interior or exterior shading devices. The windows are located on the second floor and were replaced approximately 23 years ago.

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

Exterior doors

The building contains several different types of exterior doors:

1. One glass with aluminum frame type exterior door located at the entrance and is original.

2. Three steel garage bay doors, motor operated, with vision panels located on the front facade 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

The truck bay areas are only heated and ventilated. The 2nd floor offices and lounges are provided heating, cooling and ventilation. There are not any major comfort issues in either area.

Equipment

The Fire Department is heated/cooled by four rooftop packaged units, several unit heaters and electric perimeter baseboards. A comprehensive Equipment List can be found in Appendix A.

The rooftop units contain a natural gas burner for heating and a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. 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.

The unit heaters heat the air using natural gas or electric and have a fan to disperse the air throughout the space. The larger unit heaters in the garage area use natural gas, and two smaller heaters for the exercise room and entrance lobby. The perimeter baseboard heaters are electric and installed in office areas and throughout the second floor.

Rooftop Unit

Electric Unit Heater

There are several exhaust fans in the building. The original exhaust system for the truck bays was provided by five manually operated exhaust fans. Within the past five years, a tail-pipe exhaust system was installed which directly attaches to each truck tail pipes to reduce truck exhaust inside the building. An exhaust fan on the roof draws exhaust from all the trucks and vents it to the outside. This is a far more effective method since the original exhaust system purged conditioned air out the building which is wasteful.

Tail-Pipe Exhaust System Fan

There are also manual exhaust dampers serving the second floor and each bathroom located on the roof. The break room and radio room each have an exhaust fan which draw air out to the garage areas. The kitchen hood has a manual exhaust fan as well.

Distribution Systems

The rooftop units draw in fresh air into a mixing box where it is combined with return air from the building. A small portion of the return air is purged and vented 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 neither system may operate and only the blower will be active to provide fresh air to the building.

The Fire Department has a ducted supply and partially ducted return air system, with attic return air plenums. Three of the four RTU's operate with exhaust fans EF-1, 2, and 3 and purges a portion of the air out of the system so it can be made up with outside air.

Controls

Three of the rooftop units serve heating and cooling for the 2nd floor general purpose room and are controlled by three independent adjustable manual thermostats located on the wall of the room. The fourth RTU is controlled by a manual thermostat in the Chief's office. All exhaust fans have manual control except for the tail-pipe exhaust system which operates based on CO sensor.

Three thermostat controls (top), three exhaust fan switches (middle) and speed control for each exhaust fan (bottom)

Domestic Hot Water

The domestic hot water (DHW) for the Fire Department is provided three heaters, two electric Bradford White heaters, and one natural gas Bradford White heater. Each has approximately 70 gallon storage.

Bradford White Natural Gas Heater

The heaters have 30% estimated useful operating life remaining and appear in good condition.

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 Fire Department currently contains a combination of T5, T12 and incandescent lights.

Ceiling suspended T5 fixtures in garage

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

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

Exterior MH 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 Fire Department does not have an installed elevator, but has a shaft prepared for a new elevator to be installed within the next few months.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Fire Department other than a Katolight Diesel Emergency Generator rated for 140 kW.

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 Fire Department is a good candidate for a 20 kW Solar Panel installation. See ECM#3 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 Fire Department 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 30% and 50% remaining useful life.

Combined Heat and Power

The Fire Department 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#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Lighting Upgrades: Replace Incandescent with CFL
2	Lighting Upgrades: Replace Incandescent Exit Signs with LED
	Description of Recommended 5-10 Year Payback ECMs
3	Install 20 kW Solar PV System
4	Lighting Upgrades: Replace T12 fixtures with T8
	Description of Recommended > 10 Year Payback ECMs (End of Life)
5	Replace Four manual thermostats with Programmable
6	Replace three 95,900 Btu/hr Unit Heaters with High Efficiency Gas Unit Heater, 93% Eff.
7	Replace 10HP tail pipe exhaust fan motor with Premium Efficiency

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: *Building Lighting Upgrades- Replace 43 Inc with CFL*

SWA completed a lighting inventory of the Park Ridge Fire Department (see Appendix B). There are over 40 incandescent lights used throughout the building which can be replaced with compact fluorescent lights, which typically produce the same lumen output with a third of the power.

Installation cost:

Estimated installed cost: $1,191 (includes $200 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	1,191	0	1,191	4,046	0.84	0	1.0	1177.2	1,711	5	8556.1	0.7	222	7,244

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:

- *None currently*

See Appendix F for further Incentive and Rebate information.

ECM#2: *Building Lighting Upgrades- Replace Inc Exit Sign with LED*

SWA completed a lighting inventory of the Park Ridge Fire Department (see Appendix B). Several exit signs use incandescent lights, and due to the fact that the exit signs are always illuminated, there are energy savings in switching to LED type Exit Signs.

Installation cost: Estimated installed cost: $261 (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
2	301	40	261	604	0.13	0	0.1	178.6	258	15	3,876	1	161	1,082

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

Rebates/financial incentives:

- *NJ Clean Energy – Inc Exit with LED ($10 per fixture) - Maximum incentive amount is $40.*

ECM#3: Install 20 kW Solar PV System

SWA presents below the economics, and recommends at this time that Borough of Park Ridge further review installing a 20 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 20 kW system needs approximately 163 panels, which would take up 1740 square feet.

Installation cost: Estimated installed cost: $120,000 (includes $60,000 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	140,000	20,000	120,000	23,600	20.00	0	5.8	0	16,915	25	284,880	7.1	550	42,256

25 Year Cash flow Breakdown													
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Sub total	-120,000	16,915	16,915	16,915	16,915	16,915	16,915	16,915	16,915	16,915	16,915	16,915	16,915
Year	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Sub total	16,915	16,915	16,915	3,115	3,115	3,115	3,115	3,115	3,115	3,115	3,115	3,115	3,115

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 20,000 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 $20,000 for the Park Ridge Fire Department*
  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 $13,800/year, based on $600/SREC, has been incorporated in the above costs, however it requires proof of performance, application approval and negotiations with the utility.*

ECM#4: *Building Lighting Upgrades- Replace 22 T12 Fixtures with T8 Fixtures*

SWA completed a lighting inventory of the Park Ridge Fire Department (see Appendix B). With the exception of the garage area, most of the main lighting is provided by T12 lamps with Magnetic ballasts. SWA recommends replacing 22 of the T12 fixtures with T8 lamps and electronic ballasts, for spaces that use the lights for at least 5 hours a day. T8 lamps and electronic ballasts use less wattage for the same lumen output and do not degrade as quickly. Appendix B shows describes each location. 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: $2,598 (includes $750 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	3,258	660	2,598	1,464	0.31	0	0.4	141.76	335	15	5,025	7.8	12	2,621

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 per fixture) - Maximum incentive amount is $660.*

ECM#5: *Replace Four Manual Thermostats with Programmable*

The second floor area has a combination of offices and a large meeting room used for meetings and events. The uses of both areas are intermittent and neither is used overnight. The current controls for the space is through three manual thermostats for the large meeting room and one for the chiefs office, each controlling one rooftop heating and cooling unit. By replacing the thermostats with programmable, the thermostats can be set to raising/lower the temperature overnight depending on the season and use of the building. During unoccupied hours there is no need to maintain a comfortable temperature within the space.

Installation cost: Estimated installed cost: $540 (includes $125 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	540	0	540	2	0.00	0.53	0.0	50	50	15	763	10.6	12	9

Assumptions: SWA calculated the savings for this measure based on 8 unoccupied hours per day with a summer setback of 85 deg and winter setback of 60 degrees.

Rebates/financial incentives:

- *None at this time.*

ECM#6: *Replace Three Reznor Natural Gas Unit Heaters with High Efficiency Units*

SWA conducted a thorough mechanical equipment assessment and determined that the Natural Gas Unit heaters in the Truck Bay are beyond their useful life. The existing units have 1/20 HP fan motors, 95,900 Btu/hr capacity and rated at 80% thermal efficiency. There are similar sized units available for 90% efficiency. Below is the economic breakdown of the replacement of the three units.

Installation cost: Estimated installed cost: $4,800 (includes $1,200 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	4,800	0	4,800	0	0.00	331	2.4	0	382.305	20	7,646	12.6	3	3,649

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

Rebates/financial incentives:

- *None at this time.*

ECM#7: *Replace 10 HP Tail Pipe Exhaust Motor with Premium Efficiency Type*

The Tail Pipe Exhaust System is an excellent method of exhaust elimination, however can be enhanced by using premium efficiency motors. The current Baldor motor, with rated 90% efficiency used on the fan is beyond its useful life and should be replaced with a premium efficiency motor which can achieve efficiencies above 92%.

Installation cost: Estimated installed cost: $1,150 (includes $350 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
7	1,250	100	1,150	540	0.15	0	0.1	0	71.28	20	1,426	16.1	1	967

Assumptions: It was assumed that the full load operating hours of the fan is approximately 1500 hours.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Motor, 10 HP - $100*

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 Fire Department:

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

- Install Premium efficiency electric unit heaters with programmable thermostats when replacements are required.

- Any T12 fixtures not included in Lighting Analysis Appendix B should be replaced with T8 fixtures as T12 lamps burn out.

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 broken/deteriorated bricks and re-point cracked mortar joints.

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

- Maintain downspouts and cap flashing - 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 -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.

- 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.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Domestic Hot Water	DHW Heater 75 Gallons	Garage Area	Bradford White	natural	Garage Area	2000	30%
Domestic Hot Water	DHW Heater, 65 Gallons, 4.5 kW	2nd Fl Closet	Bradford White, MI65R6DS13, PM0666082	Electric	Mezz Bathrooms	2000	30%
Domestic Hot Water	DHW Heater, 65 Gallons, 4.5 kW	2nd Fl Bathroom	Bradford White, MI65R6DS13, PM0666084	Electric	2nd Fl	2000	30%
Heating	**Electric Perimeter Baseboard Heaters, 3 x 6" @ 750W, 10 x 48" @ 1,000 Watts, serves shop, radio room, offices, bathrooms, & all of perimeter on second floor**	**Mezz. Level Areas & second Fl**	**Orbit**	**Electric**	**Mezz. & 2nd Fl.**	**1988**	**0%**
Heating	Wall Electric heater	Radio Rm	Pic-a-Watt	Electric	N/A	NA	NA
Heating	**Three Ceiling Hung Reznor Unit Heaters, 95,900 Btu/hr, 80% Thermal Eff., 1/20 HP**	**Truck Bay Areas**	**Reznor - CEEXL105, ALA52J5 N04886**	**Natural Gas**	**Truck Bay Areas**	**1988**	**0%**
Heating	**Electric ceiling Unit Heater, 15 kW, based on manual thermostat**	**Exercise Room**	**Dayton, 3E347A,**	**Electric**	**Exercise Room**	**1988**	**0%**
Heating	**Qmark Electric Wall Mounted Heaters**	**Entrance Wall**	**Qmark**	**Electric**	**N/A**	**NA**	**0%**
Heating / Cooling	125,000 Btu/hr Heating 80% AFUE, 5 Tons Cooling 10 SEER, 3/4 HP, 1500 CFM	Roof	DHUC-T060N125A; NBMM014184	Natural Gas/Electric	2nd Fl General Purpose Room	2002	50%
Heating / Cooling	125,000 Btu/hr Heating 80% AFUE, 5 Tons Cooling 10 SEER, 3/4 HP, 1500 CFM	Roof	DHUC-T060N125A; NBMM014180	Natural Gas/Electric	2rd Fl General Purpose Room, Kitchen	2002	50%

Building System	Description	Location	Model #	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating / Cooling	125,000 Btu/hr Heating 80% AFUE, 5 Tons Cooling 10 SEER, 3/4 HP, 1500 CFM	Roof	DHUC-T060N125A; NBMM013756	Natural Gas/Electric	2th Fl Hallways and Offices	2002	50%
Heating / Cooling	125,000 Btu/hr Heating 80% AFUE, 5 Tons Cooling 10 SEER, 3/4 HP, 1500 CFM	Roof	DHUC-T060N125A; NHJM114696	Natural Gas/Electric	2nd Fl Perimeter Offices	2002	50%
Ventilation	**Exhaust fans with sensors - replaced with exhaust tail pipe air cleaners, 10 HP, 3500 RPM, 90% Eff.**	**Garage/Roof**	**Baldor; M3771T; 07C151W632H1**	**Electric**	**Truck Bay Areas**	**1990**	**0%**
Ventilation	**EF-1, 350 CFM, 1/40 HP, manual dial controls**	**Rooftop**	**Cook 10UC**	**Electric**	**2nd Fl general purpose room**	**1985**	**0%**
Ventilation	**EF-2, 350 CFM, 1/40 HP, manual dial controls**	**Rooftop**	**Cook 10UC**	**Electric**	**2nd Fl general purpose room**	**1985**	**0%**
Ventilation	**EF-3, 350 CFM, 1/40 HP, manual dial controls**	**Rooftop**	**Cook 10UC**	**Electric**	**2nd Fl general purpose room**	**1985**	**0%**
Ventilation	**EF-4, 1700 CFM, 1/2 HP**	**1st Floor thru Wall**	**Cook, Gemini**	**Electric**	**Truck Bays**	**1985**	**0%**
Ventilation	**EF-5, 1700 CFM, 1/2 HP**	**1st Floor thru Wall**	**Cook, Gemini**	**Electric**	**Truck Bays**	**1985**	**0%**
Ventilation	**EF-6, 1700 CFM, 1/2 HP**	**1st Floor thru Wall**	**Cook, Gemini**	**Electric**	**Truck Bays**	**1985**	**0%**
Ventilation	**EF-7, 1700 CFM, 1/2 HP**	**1st Floor thru Wall**	**Cook, Gemini**	**Electric**	**Truck Bays**	**1985**	**0%**
Ventilation	**EF-8A, 1700 CFM, 1/2 HP**	**Mezz Level Wall**	**Cook, Gemini**	**Electric**	**Truck Bays**	**1985**	**0%**
Ventilation	**EF-9, 150 CFM, 50 Watt, manual switch**	**Roof**	**Cook, Gemini**	**Electric**	**Women's Bathroom**	**1985**	**0%**
Ventilation	**EF-10, 225 CFM, 155 Watt, manual switch**	**Roof**	**Cook, Gemini**	**Electric**	**Men's Bathroom**	**1985**	**0%**
Ventilation	**EF-11, 380 CFM, through Shop wall to garage**	**1st Floor**	**Broan, 510**	**Electric**	**Shop**	**1985**	**0%**
Ventilation	**EF-12, 380 CFM, through wall to garage area**	**Radio Rm**		**Electric**	**Radio Rm**	**1985**	**0%**

Building System	Description	Location	Model #	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	**Several Outdoor air openings: 2 thru wall for toilets, OA intake on each RTU on roof**	**Rood**	**NA**	**Electric**	**General**	**1985**	**0%**
Ventilation	**Kitchen Hood Exhaust Fan**	**Roof**	**NA**	**Electric**	**Kitchen**	**1985**	**0%**
Ventilation	**2 large Exhaust fans**	**Roof**	**NA**	**Electric**	**General**	**1985**	**0%**
Generator	Emergency Generator 156/175 kVa, 125/140 kW	Cold Storage Area Firehouse	Katolight; D14OFP24;66466T-19834	Diesel	Emergency Power	1980	20%

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

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	Ceiling Mounted	E	4'T5	28	4	28	Sw	8	260	4	3,248	6,756	N/A	Ceiling Mounted	4'T5	E	Sw	28	4	28	8	260	4	3248	6756	0	0	0
2	2	Meeting Rm	Parabolic ceiling Mounted	E	4'T5 U-Shaped	3	3	28	Sw	8	260	4	264	549	N/A	Parabolic Ceiling Mounted	4'T5 U-Shaped	E	Sw	3	3	28	8	260	4	264	549	0	0	0
3	2	Meeting Rm	Ceiling Mounted	S	Inc	20	1	60	Sw	8	260	0	1,200	2,496	CFL	Ceiling Mounted	CFL	S	Sw	20	1	20	8	260	0	400	832	1664	0	1664
4	2	bar area	Ceiling Mounted	S	Inc	7	1	65	Sw	8	260	0	455	946	CFL	Ceiling Mounted	CFL	S	Sw	7	1	20	8	260	0	140	291	655	0	655
5	2	display case	Ceiling Mounted	S	Inc	9	1	65	Sw	8	260	0	585	1,217	CFL	Ceiling Mounted	CFL	S	Sw	9	1	20	8	260	0	180	374	842	0	842
6	2	spotlights	Ceiling Mounted	S	Inc	2	1	65	Sw	8	260	0	130	270	CFL	Ceiling Mounted	CFL	S	Sw	2	1	20	8	260	0	40	83	187	0	187
7	2	Kitchen	Ceiling Mounted	E	4'T5	2	2	28	Sw	9	260	4	120	281	N/A	Ceiling Mounted	4'T5	E	Sw	2	2	28	9	260	4	120	281	0	0	0
8	2	Storage 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
9	2	Bathroom	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
10	2	Kitchen	Recessed	E	4'T5	8	2	28	Sw	9	260	4	480	1,123	N/A	Recessed	4'T5	E	Sw	8	2	28	9	260	4	480	1123	0	0	0
11	2	Kitchen	Parabolic ceiling Mounted	E	4'T5 U-Shaped	4	2	28	Sw	9	260	4	240	562	N/A	Parabolic Ceiling Mounted	4'T5 U-Shaped	E	Sw	4	2	28	9	260	4	240	562	0	0	0
12	2	Kitchen	Ceiling Mounted	S	Inc	3	1	60	Sw	9	260	0	180	421	CFL	Ceiling Mounted	CFL	S	Sw	3	1	20	9	260	0	60	140	281	0	281
13	2	Storage Rm	Ceiling Mounted	S	CFL	1	1	15	Sw	2	260	0	15	8	N/A	Ceiling Mounted	CFL	S	Sw	1	1	15	2	260	0	15	8	0	0	0
14	2	bar	Recessed	M	4'T12	3	1	40	Sw	2	260	12	156	81	N/A	Recessed	4'T12	M	Sw	3	1	40	2	260	12	156	81	0	0	0
15	2	bar	Recessed	M	2'T12	2	1	20	Sw	2	260	6	52	27	N/A	Recessed	2'T12	M	Sw	2	1	20	2	260	6	52	27	0	0	0
16	2	Meeting Rm	Ceiling Mounted	E	4'T5	4	3	28	Sw	8	260	4	352	732	N/A	Ceiling Mounted	4'T5	E	Sw	4	3	28	8	260	4	352	732	0	0	0
17	2	Capt office	Parabolic ceiling Mounted	E	4'T5 U-Shaped	4	2	28	Sw	8	260	4	240	499	N/A	Parabolic Ceiling Mounted	4'T5 U-Shaped	E	Sw	4	2	28	8	260	4	240	499	0	0	0
18	2	president	Parabolic ceiling Mounted	E	4'T5 U-Shaped	4	2	28	Sw	8	260	4	240	499	N/A	Parabolic Ceiling Mounted	4'T5 U-Shaped	E	Sw	4	2	28	8	260	4	240	499	0	0	0
19	2	fire chief	Ceiling Mounted	E	4'T5	4	3	28	Sw	8	260	4	352	732	N/A	Ceiling Mounted	4'T5	E	Sw	4	3	28	8	260	4	352	732	0	0	0
20	2	Office Area	Ceiling Mounted	E	4'T5	4	3	28	Sw	9	260	4	352	824	N/A	Ceiling Mounted	4'T5	E	Sw	4	3	28	9	260	4	352	824	0	0	0
21	2	Meeting 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
22	2	Utility 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
23	2	Office	Recessed	M	4'T12	2	2	40	Sw	9	260	12	184	431	T8	Recessed	4'T8	E	Sw	2	2	32	9	260	5	138	323	108	0	108
24	1	Lobby	Exit Sign	S	Inc	1	1	40	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
25	1	Lobby	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
26	1	Garage	Ceiling Mounted	E	4'T5	19	4	28	Sw	9	260	4	2,204	5,157	N/A	Ceiling Mounted	4'T5	E	Sw	19	4	28	9	260	4	2204	5157	0	0	0
27	1	Garage	Recessed	E	4'T5	2	2	28	Sw	9	260	4	120	281	N/A	Recessed	4'T5	E	Sw	2	2	28	9	260	4	120	281	0	0	0
28	1	Garage	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
29	1	Garage	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	260	12	92	48	N/A	Ceiling Mounted	4'T12	M	Sw	1	2	40	2	260	12	92	48	0	0	0
30	1	Storage Rm	Recessed	M	8'T12	2	2	80	Sw	2	260	20	360	187	N/A	Recessed	8'T12	M	Sw	2	2	80	2	260	20	360	187	0	0	0
31	1	Storage Rm	Recessed	E	4'T5	2	2	28	Sw	6	260	4	120	187	N/A	Recessed	4'T5	E	Sw	2	2	28	6	260	4	120	187	0	0	0
32	1	Excersize Rm	Recessed	E	4'T5	3	4	28	Sw	2	260	4	348	181	N/A	Recessed	4'T5	E	Sw	3	4	28	2	260	4	348	181	0	0	0
33	1	Generator Rm	Recessed	M	8'T12	1	2	80	Sw	2	260	20	180	94	N/A	Recessed	8'T12	M	Sw	1	2	80	2	260	20	180	94	0	0	0
34	1	Radio Rm	Ceiling Mounted	E	4'T5	2	3	28	Sw	9	260	4	176	412	N/A	Ceiling Mounted	4'T5	E	Sw	2	3	28	9	260	4	176	412	0	0	0
35	Ext	Exterior	Ceiling Mounted	S	INC	2	1	75	T	16	260	0	150	624	CFL	Ceiling Mounted	CFL	S	T	2	1	25	16	260	0	50	208	416	0	416
36	Ext	Exterior	Ceiling Mounted	S	MH	8	1	75	T	16	260	21	768	3,195	N/A	Ceiling Mounted	MH	S	T	8	1	75	16	260	21	768	3195	0	0	0
37	2	Bathroom Men	Recessed	M	8'T12	2	2	80	Sw	9	260	20	360	842	T8	Recessed	8'T8	E	Sw	2	2	59	9	260	7	250	585	257	0	257
38	2	Coat Rm	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
39	2	Stairwell	Recessed	M	4'T12	1	4	40	Sw	16	260	12	172	716	T8	Recessed	4'T8	E	Sw	1	4	32	16	260	5	133	553	162	0	162
40	2	Bathroom Women	Recessed	M	4'T12	3	2	40	Sw	9	260	12	276	646	T8	Recessed	4'T8	E	Sw	3	2	32	9	260	5	207	484	161	0	161
41	Mezz	Office	Recessed	M	2'T12	2	2	20	Sw	9	260	6	92	215	T8	Recessed	2'T8	E	Sw	2	2	17	9	260	2	72	168	47	0	47
42	Mezz	Office	Recessed	M	4'T12	4	4	40	Sw	9	260	12	688	1,610	T8	Recessed	4'T8	E	Sw	4	4	32	9	260	5	532	1245	365	0	365
43	Str	Back Stair	Recessed	M	4'T12	2	2	40	Sw	16	260	12	184	765	T8	Recessed	4'T8	E	Sw	2	2	32	16	260	5	138	574	191	0	191
44	Str	Back Stair	Recessed	E	4'T5	1	4	28	Sw	16	260	4	116	483	N/A	Recessed	4'T5	E	Sw	1	4	28	16	260	4	116	483	0	0	0
45	Str	Back Stair	Exit Sign	S	Inc	1	1	40	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
46	2	Storage Rm 2	Recessed	M	4'T12	3	2	40	Sw	2	260	12	276	144	N/A	Recessed	4'T12	M	Sw	3	2	40	2	260	12	276	144	0	0	0
Totals:						**185**	**95**	**1,858**				**322**	**16,264**	**35,753**						**185**	**95**				**230**	**13,709**	**29,639**	**6,114**	**0**	**6,114**

Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space

Proposed Lighting Summary Table			
Total Surface Area (SF)	14,000		
Average Power Cost ($/kWh)	0.1320		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	3,819	3,403	**416**
Exterior Power (watts)	918	818	**100**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	31,935	26,236	**5,698**
Lighting Power (watts)	15,346	12,891	**2,455**
Lighting Power Density (watts/SF)	1.10	0.92	**0.18**
Estimated Cost of Fixture Replacement ($)	4,050		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**2,305**		

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.

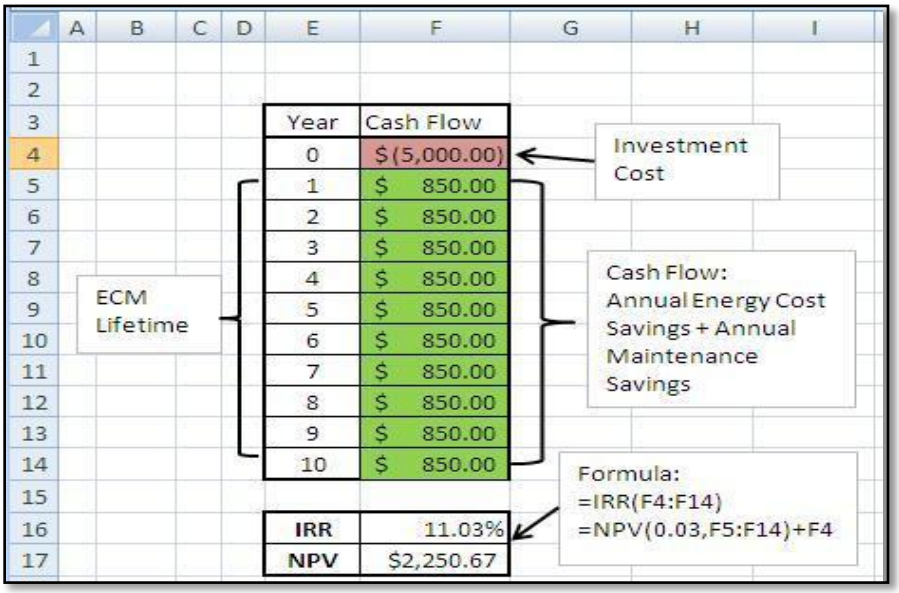
Calculation References

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 - Fire House

Building ID: 2253035
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 - Fire House 53 Park Avenue Park Ridge, NJ 07656	N/A	N/A

Year Built: 1988
Gross Floor Area (ft²): 14,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	341,473
Natural Gas (kBtu)[4]	317,674
Total Energy (kBtu)	659,147
Energy Intensity[5]	
Site (kBtu/ft²/yr)	47
Source (kBtu/ft²/yr)	105
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	69
Electric Distribution Utility	
Borough of Park Ridge	
National Average Comparison	
National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-33%
Building Type	Fire Station/Police Station

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

The Borough of Park Ridge has been awarded by the NJBPU to be eligible for NJ Clean Energy Incentives despite being their own energy provider. Funding is provided by the American Recovery and Reinvestment Act (ARRA), however, and applicants will be subject to special federal ARRA terms and conditions as described in the complete program application package.

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	**43 New CFL fixtures to be installed with incentives**	0	1,191	4,046	0.8	0	1	1,177	1,711	5.0	8,556	0.7	1112	222	142	6,601	7,244
0-5 Year Payback	2	**2 New LED exit sign fixtures to be installed with incentives**	40	261	604	0.1	0	0	179	258	15.0	3,876	1.0	2411	161	99	2,779	1,082
5-10 Year Payback	3	**Install 20 kW Solar Photovoltaic system**	20,000	120,000	23,600	20.0	0	6	0	16,915	25.0	284,880	7.1	137	550	9	95,442	42,256
5-10 Year Payback	4	**22 New T8 fixtures to be installed with incentives**	660	2,598	1,464	0.3	0	0	142	335	15.0	5,025	7.8	175	12	9	79,042	2,621
<10	5	**Replace Four manual thermostats with Programmable**	0	540	2	0.0	0.5	0	50	51	15.0	763	10.6	180	12	2	58	9

	6	**Replace three 95,900 Btu/hr Unit Heaters with High Efficiency Gas Unit Heater, 93% Eff.**	0	4,800	0	0.0	331	2	0	382	20.0	7,646	12.6	59	3	-1	784	3,649
	7	**Replace 10HP tail pipe exhaust fan motor with Premium Efficiency**	100	1,150	540	0.2	0	0	0	71	20.0	1,426	16.1	24	1	-4	-109	967

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 Fire Department 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 Fire Department(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.