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November 8, 2010

Local Government Energy Program
Energy Audit Final Report

City of Orange Township

Brook Alley Garage
24 South Center St.
Orange, NJ 07050

Project Number: LGEA68

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EXECUTIVE SUMMARY

The City of Orange Township Brook Alley Garage is a single-story building comprising a total conditioned floor area of 8,000 square feet. The original structure was built in 1939, with a mezzanine added in 1990's. The following chart provides an overview of current energy usage in the building based on the analysis period of March 2009 through February 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Other fuel usage, gal/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	40,564	15,663	0	25,592	363	1,560
Proposed	27,524	15,529	0	23,134	357	1,529
Savings	13,040	-134	0	2,458	5.6	31.1
% Savings	32%	-1%	---	10%	2%	2%

There may be energy procurement opportunities for the City of Orange to reduce annual utility costs, which are $2,028 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Brook Alley Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This vehicle service facility is comprised of non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Municipal Complex is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 363 kBtu/ft^2-yr compared to the national average of a vehicle service space type building consuming 150 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

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	2,548	3.6	9,171	11,261
5-10 Year	832	7.9	6,592	5,035
Total	3,380	4.7	15,763	16,296

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 40 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 Brook Alley Garage further explore the following:

- Capital Improvements
    - Install a premium motor replacement for the hydraulic car lift motor
    - Install a premium motor replacement for the hydraulic compressor motor
    - Apply water sealer to moldy/leaking, below-grade stone foundation walls.
    - Replace broken/deteriorated bricks and re-point cracked mortar joints.
    - Apply appropriate air-sealing strategies around all exterior wall penetrations (including electrical, plumbing and HVAC).
    - Openings around window air-conditioning units need airtight gaskets/sealants for optimal all year performance.
- Operations and Maintenance
    - Inspect and replace cracked/ineffective caulk.
    - Repair and maintain roof trim and moldings.
    - Install/ repair and maintain roof flashing.
    - Maintain/ inspect all roof surfaces on a regular basis.
    - Install/replace and 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 the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced.
    - 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

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for City of Orange Township. Based on the requirements of the LGEA program, City of Orange Township must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $629.00.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that the City of Orange Township can take to achieve greater energy efficiency and reduce operating expenses. It includes the amount in dollars that the City of Orange Township is required to spend per building according to the LGEA program guidelines. It is important to note that the required 25% expenditure is per building and after the other implementation incentive amounts.

Table 3: Next Steps for the Brook Alley Garage

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Retrofit Existing Vending Machine with VendingMiser™ Device	*NJ Clean Energy – Direct Install*
Install (6) new T5 Fluorescent Fixtures	*NJ Clean Energy – Smart Start, Direct Install*
Install (52) new T8 Fluorescent Fixtures	*NJ Clean Energy – Smart Start, Direct Install*
Replace garage's electric DHW heater with a gas-fired unit	*NJ Clean Energy – Smart Start, Direct Install*
Replace traffic building's electric DHW heater with a gas-fired unit	*NJ Clean Energy – Smart Start, Direct Install*
Install (1) new Pulse Start Metal Halide Fixtures	*NJ Clean Energy – Smart Start, Direct Install*

There are various incentive programs that the City of Orange Township could apply for that could help lower the cost of installing the ECMs. For the Brook Alley Garage, and contingent upon available funding, SWA recommends the following incentive programs:

New Jersey Clean Energy Direct Install: A majority of the recommended measures can be implemented through the Direct Install program. The Direct Install program is capable of funding up to 60% of the installed cost of approved measures.

New Jersey Clean Energy SmartStart: Majority of energy saving equipment and design measures have moderate incentives under this program.

Please refer to Appendix F for further 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. 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 Brook Alley Garage at 24 South Center St., Orange, NJ. The process of the audit included facility visits on March 19 and April 22, 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 City of Orange Township to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Brook Alley Garage.

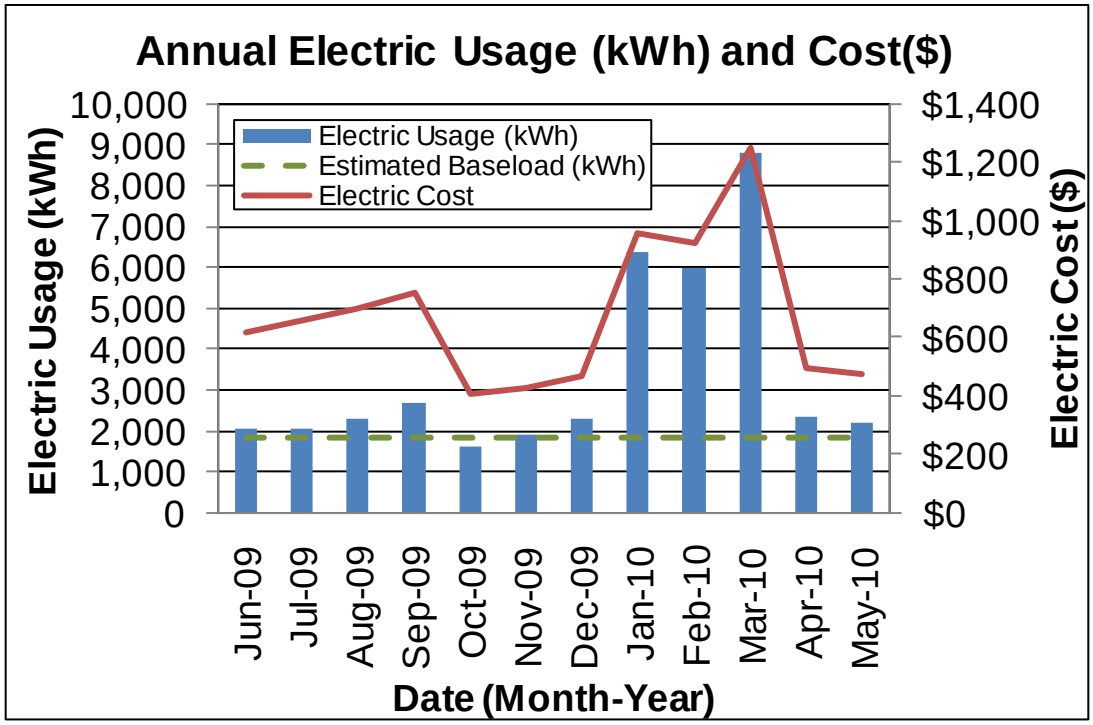
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

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

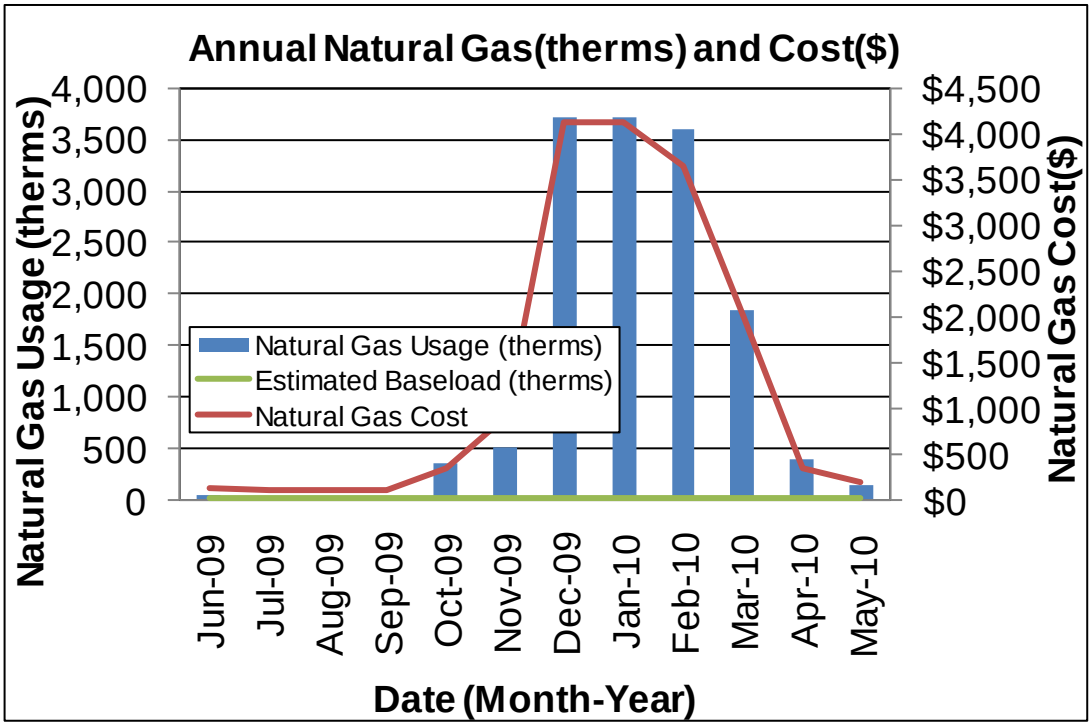
Electricity - The Brook Alley Garage is currently served by two electric meters. The Brook Alley Garage currently buys electricity from PSE&G at **an average aggregated rate of $0.200/kWh**. The Brook Alley Garage purchased **approximately 40,564 kWh, or $8,127 worth of electricity,** in the previous year. The average monthly demand was 19.5 kW and the annual peak demand was 21.4 kW.

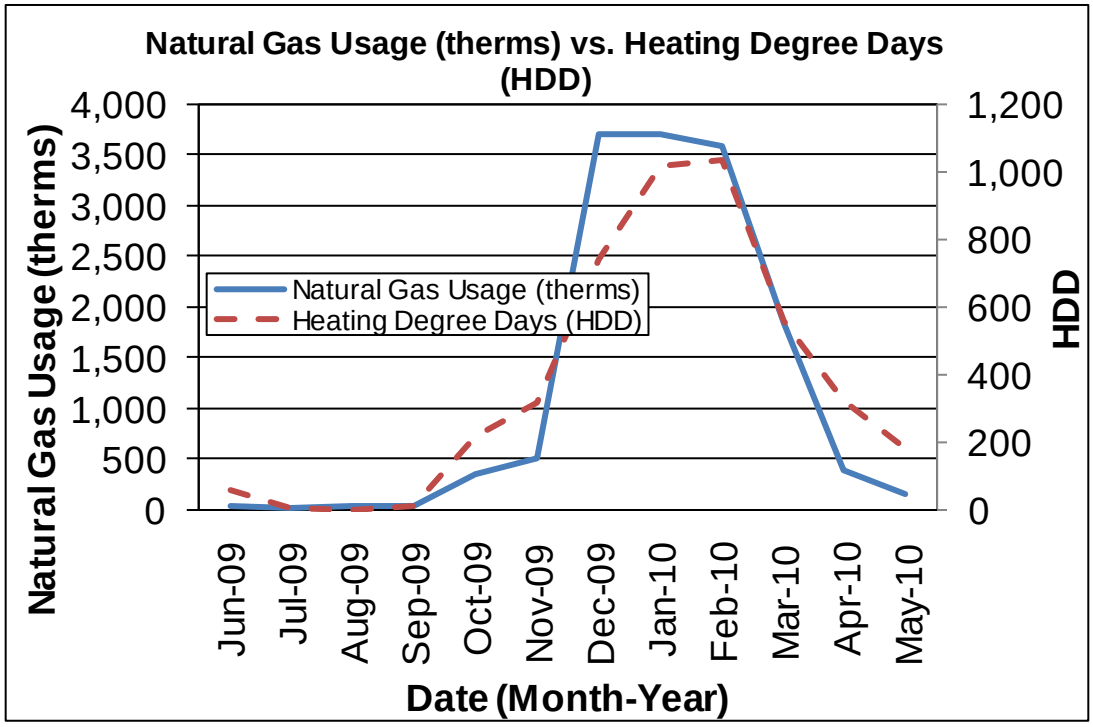
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Brook Alley Garage.



Natural gas - The Brook Alley Garage is currently served by one meter for natural gas. The Brook Alley Garage currently buys natural gas from PSE&G at **an average aggregated rate of $1.115/therm**. The Brook Alley Garage purchased **approximately 15,663 therms, or $17,465 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 Brook Alley Garage.

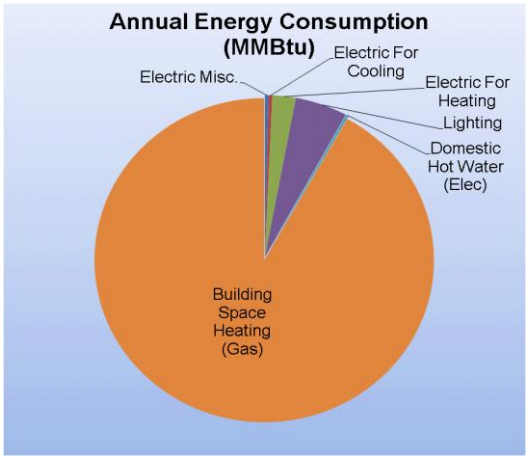


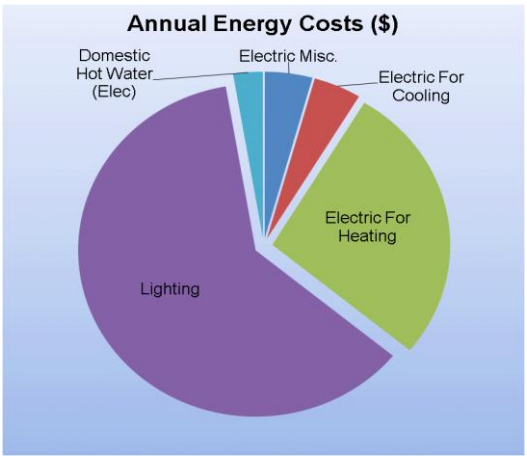


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the Brook Alley Garage based on utility bills for the 12 month period. Note: electrical cost at $59/MMBtu of energy is more than 5 times as expensive as natural gas at $11/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	6	0%	$352	1%	59
Electric For Cooling	6	0%	$352	1%	59
Electric For Heating	38	2%	$2,217	9%	58
Lighting	85	5%	$4,987	19%	59
Domestic Hot Water (Elec)	4	0%	$219	1%	59
Building Space Heating (Gas)	1,566	92%	$17,465	68%	11
Totals	1,705	100%	$25,592	100%	
Total Electric Usage	138	8%	$8,127	32%	59
Total Gas Usage	1,566	92%	$17,465	68%	11
Totals	1,705	100%	$25,592	100%	

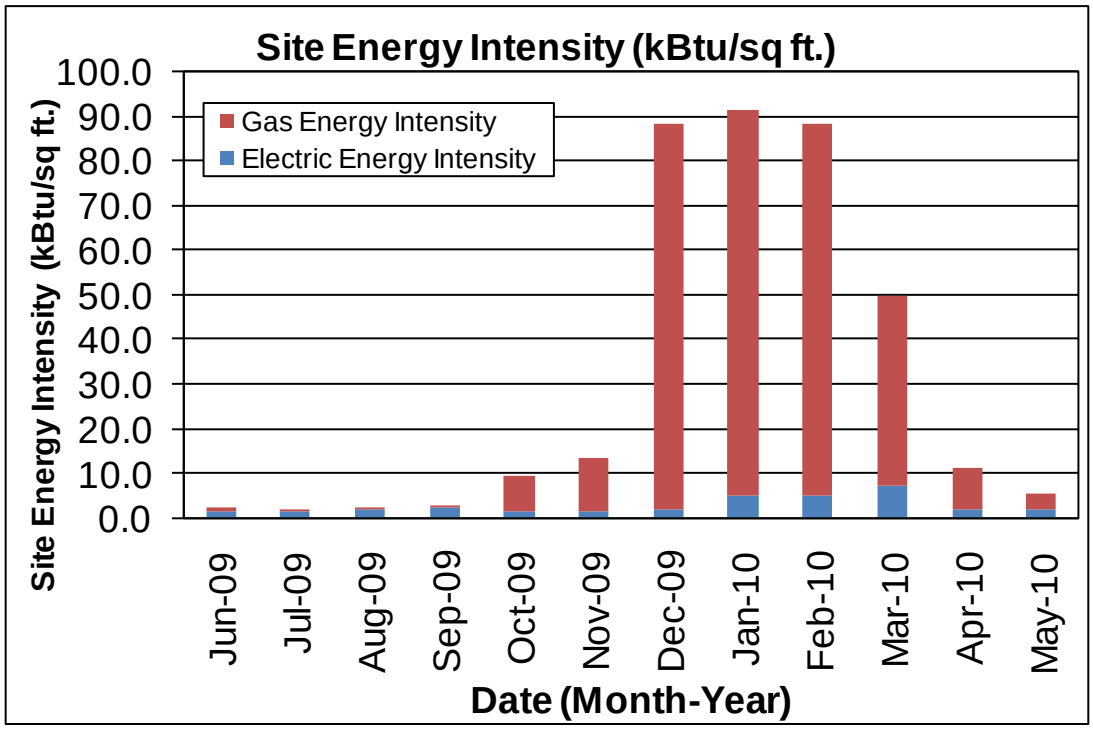




Energy benchmarking

SWA has also entered energy information about the Brook Alley Garage in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This vehicle service facility is comprised of non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Municipal Complex is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 363 kBtu/ft^2-yr compared to the national average of a vehicle service space type building consuming 150 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 City of Orange Township 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 City of Orange Township to create an *ENERGY STAR® Portfolio Manager* account and share the Brook Alley 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 City of Orange Township [redacted]

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.

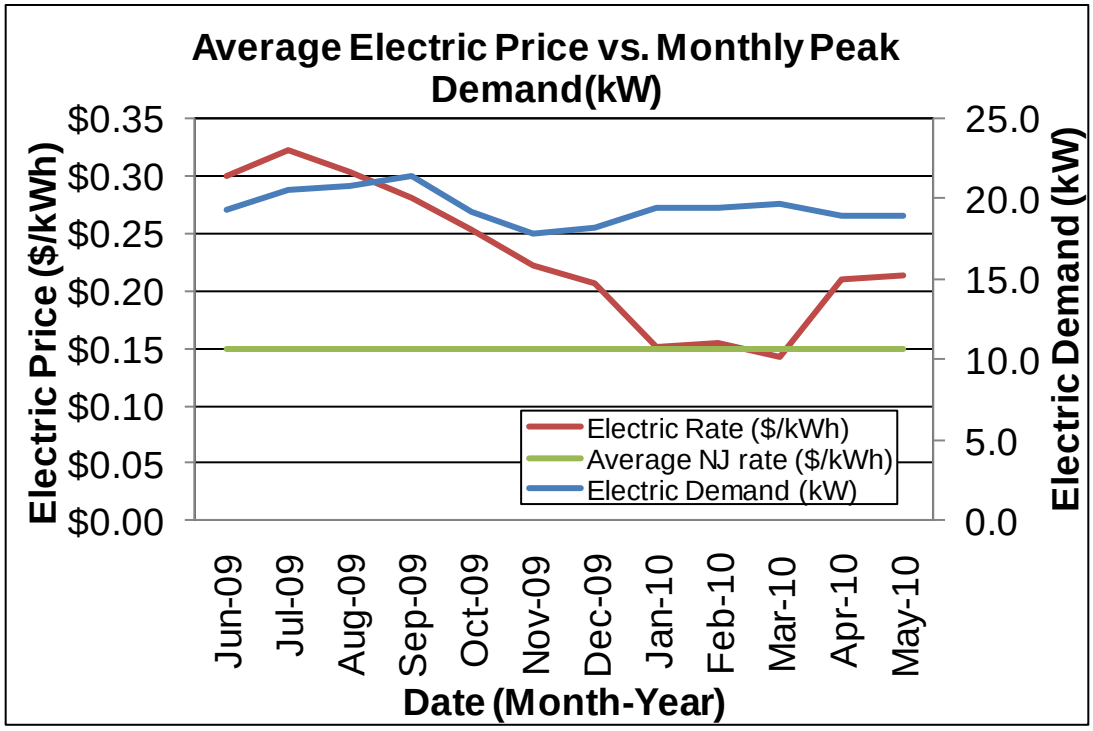
Tariff analysis is performed to determine if the rate that a City of Orange Township is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural 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 and air handlers.

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 City of Orange Township is paying a general service rate for natural gas. Demand is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. The building is direct metered and currently purchases electricity at a general service rate for usage with an additional charge for electrical demand factored into each monthly bill. There general service rate for electric charges are market-rate based on use. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

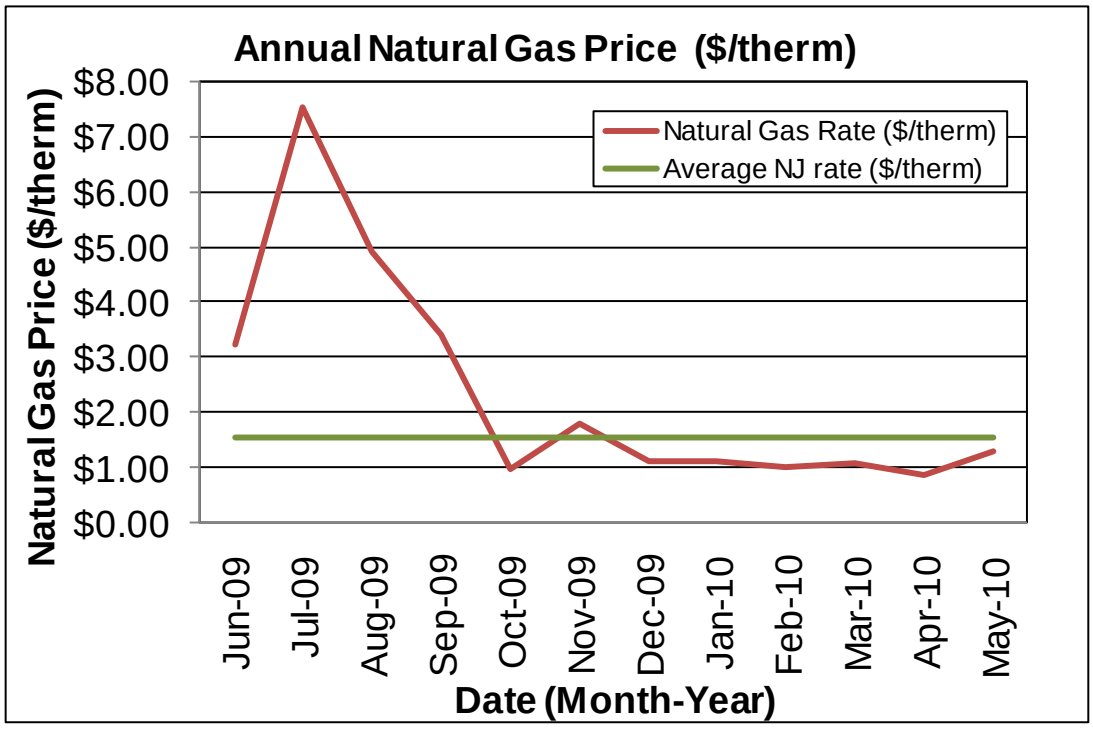
Energy Procurement strategies

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

The average estimated NJ commercial utility rates for electric are $0.150/kWh, while Brook Alley Garage pays a rate of $0.200/kWh. The Brook Alley Garage annual electric utility costs are $2,028 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 56% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Brook Alley Garage pays a rate of $1.115/therm. Natural gas bill analysis shows fluctuations up to 89% 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 Brook Alley Garage further explore opportunities of purchasing both natural gas and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Brook Alley Garage. Appendix C contains a complete list of third-party energy suppliers for the City of Orange Township 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 April 22, 2010, the following data was collected and analyzed.

Building Characteristics

The single-story, (slab on grade), 8,000 square feet Brook Alley Garage Building was originally constructed in 1939 with a mezzanine added in the 1990's. It houses 10 garage bays, offices, bathrooms, salt storage and a mechanic shop area.

Front Façade

Side Façade (typ.)

Traffic Maintenance Building

Building Occupancy Profiles

Its occupancy is approximately 15 employees daily from 7:00am to 3:30pm weekdays only.

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.

General Note: All findings and recommendations on the exterior envelope (base, walls, roofs, doors and windows) are based on the energy auditors' experience and expertise, on construction document reviews (if available) and on detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

Exterior Walls

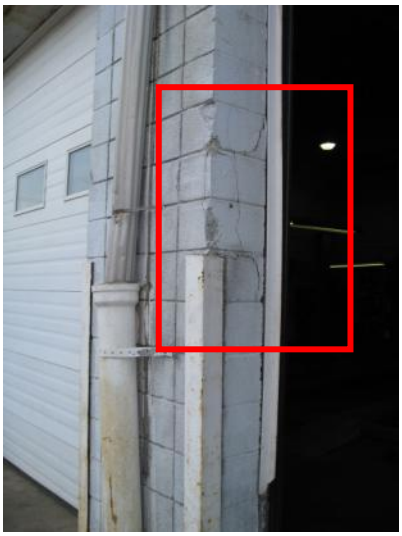
The exterior wall envelope is mostly constructed of concrete block with gravel, smooth finish and painted accents, over concrete block with no insulation. The interior is mostly painted CMU (Concrete Masonry Unit).

Note: Wall insulation levels could visually be verified in the field by non-destructive methods.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall age-appropriate condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

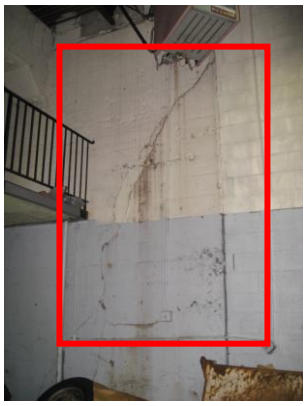
The following specific exterior wall problem spots and areas were identified:

Severely damaged exterior wall trim/moldings



Substantial structural damage visible on exterior walls caused by water/ice build-up inside the envelope assembly

Poorly sealed exterior wall penetrations



Substantial structural damage visible on walls caused by water/ice build-up inside the envelope assembly

Roof

The building's roof is predominantly a flat, no parapet type over steel decking, with a built-up asphalt finish. It was replaced approximately 12 years ago. There was no visible ceiling insulation, and two inches of assumed foam-board roof insulation.

Note: Roof insulation levels could not be verified in the field, and are based on reports from building management.

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

The following specific roof problem spots were identified:

Membrane delamination, especially on lower section of roof.

Delaminating roof membrane/patches.

Signs of structural damage caused by water infiltration into roof cavity

Base

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

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

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in age appropriate condition with some signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific base problem spots were identified:

Deterioration at base of slab near salt storage area

Deterioration at base of exterior slab

Windows

The building contains basically three different types of windows:

1. Two awning type windows with a non-insulated aluminum frame clear single glazing and interior drapes. The windows are located on the main floor and are original.

2. Two fixed type windows with a non-insulated aluminum frame, single pane, wire mesh safety glazing and interior drapes. The windows are located on the main floor are original.

3. One slider type window with a non-insulated aluminum frame, clear single glazing and no interior or exterior shading devices. The windows are located on the second 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 poor condition with numerous signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:

Severely cracked or aged caulk around frame/sill on the exterior

Exterior doors

The building contains two different types of exterior doors:

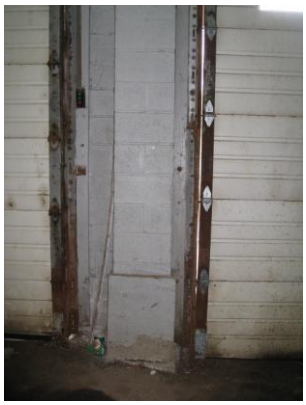
1. Ten aluminum overhead paneled type garage doors. They are located on the main floor and have never been replaced.

2. One aluminum type exterior doors. It is located on the main floor and has never been replaced.

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 poor condition with many signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:

Missing/worn weather-stripping



Missing/worn weather-stripping

Typical door &
Missing/worn weather-stripping

Building air-tightness

Overall the field auditors found the building to be not adequately air-tight with numerous areas of suggested improvements, as described in more detail earlier in this chapter.

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

Traffic Maintenance Building

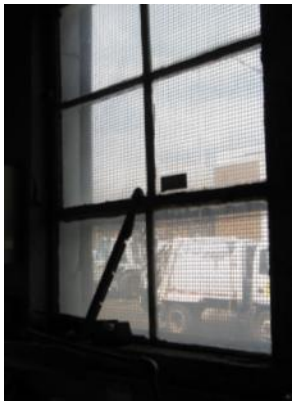
Another small building East of the garage is the Traffic Maintenance Building which has a small office area and storage space, and is not normally occupied. The building has several energy related issues with severe exterior water damage, inadequate windows, and deteriorated roof. The following photos highlights these major energy-related envelop issues.

Structural cracks and deterioration at base of slab

Severe damage to exterior wall due to uncontrolled water run-off

Severe roof deterioration

Damaged/deteriorated ceiling insulation and interior ceiling finish



Single-glazed window with ineffective frame

Mechanical Systems

Heating Ventilation Air Conditioning

The Brook Alley Garage is heated by six gas fired unit heaters and cooled by four window air conditioning units. The traffic maintenance building is heated by two unit heaters and is

not cooled or mechanically ventilated. A comprehensive Equipment List can be found in Appendix A.

Equipment

Space heating for the garage is supplied by two Carrier manufactured gas-fired unit heaters, controlled by a non-programmable dial thermostat set to 72^{o}F and four Reznor manufactured gas-fired unit heaters, controlled by a non-programmable thermostat. While they are both in working condition all of the unit heaters have exceeded their estimated useful remaining life. There is also electric baseboard heating in two of the offices and the bathroom.

Carrier Gas Fired Unit Heaters

Space heating for the traffic building is supplied by two Bryant manufactured gas-fired unit heaters, controlled by a non-programmable thermostat. While they are both in working condition all of the unit heaters have exceeded their estimated useful remaining life.

Bryant Gas Fired Unit Heaters

Cooling for the garage is provided by four window air conditioning units. The units are manufactured by Kenmore, Hotpoint, GE, and Carrier. None of the units are ENERGY STAR® labeled and they are all older inefficient models that have exceeded their estimated remaining useful life.

GE Manufactured (L.) and Carrier Manufactured (R.) Air Conditioning Units

Most of the spaces of the building are naturally ventilated, however, some spaces are supplied with air from the window air conditioners. Additionally there are exhaust fans located on the roof which serve the bathroom, and two emergency exhaust fans installed at opposite ends of the garage, however, one of these fans are obstructed by a lofted office and break room.

Rooftop bathroom exhaust fans

Distribution Systems

All conditioned air is supplied by unit heaters or air conditioners with their own individual fans. Of those units only the air conditioners supply treated fresh outdoor air.

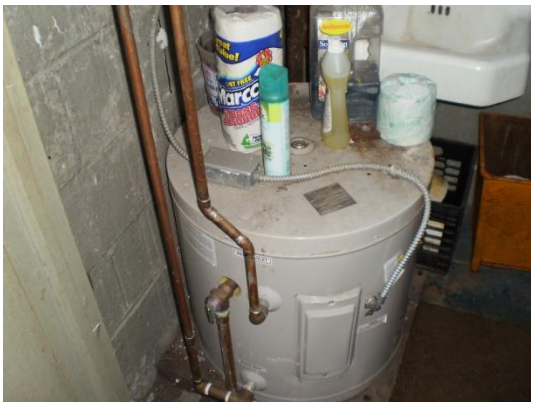
Controls

The heating and cooling equipment is controlled by manual thermostats. The two Carrier manufactured gas-fired unit heaters are controlled by non-programmable dial thermostats set to 72^{o}F while the four Reznor manufactured units are controlled by manual non-programmable thermostats. None of the air conditioners have thermostats installed, they are all controlled by manually operated knobs and switches. The Bryant manufactured gas-fired unit heaters in the traffic building are also controlled by manual non-programmable thermostats. There is no Building Management System (BMS), centralized control system or room based thermostats.

Domestic Hot Water

The domestic hot water (DHW) for the Brook Alley Garage is provided by an electric heated AO Smith Energy Saver model water heater with 30 gallons of storage capacity and two electric coil heating elements each rated at 4,500 kW with a maximum element of 4,500 kW. This heater was installed in 1992 and has 0% estimated useful operating life remaining and appears in acceptable age appropriate condition.

The domestic hot water (DHW) for the Brook Alley Garage Traffic Building is provided by an electric heated AO Smith ProMax model water heater with 19 gallons of storage capacity and one electric coil heating element rated at 2,500 kW. This heater has 0% estimated useful operating life remaining and appears in acceptable age appropriate condition.



AO Smith ProMax Water Heater

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.

As of **July 1, 2010** magnetic ballasts most commonly used for the operation of T12 lamps will no longer be produced for commercial and industrial applications. Also, many T12 lamps will be phased out of production starting July 2012.

Interior Lighting - The Brook Alley Garage currently contains mostly inefficient magnetically ballasted fixtures with T12 lamps as well as some incandescent and metal halide fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.

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 HPS (High Pressure Sodium) and incandescent fixtures. Exterior lighting is controlled by photocells.

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.

Installed at the garage in the break room, is a full sized residential, older model, non ENERGY STAR® refrigerator, manufactured by Electrolux that uses approximately 443 kWh per year. In the traffic building there is a full sized residential, older model, non ENERGY STAR® refrigerator, manufactured by Hotpoint that uses approximately 479 kWh per year. They both should be replaced with in kind ENERGY STAR® labeled units. There is also an older model; non ENERGY STAR® refrigerated vending machine that should be replaced with an Energy Star labeled refrigerated vending machine or at a minimum have a VendingMiser device installed to limit the electricity used by the machine.

Refrigerated Vending Machine

Elevators

The Brook Alley Garage does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Brook Alley Garage.

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 Brook Alley Garage is not a good candidate for a Solar Panel installation. There is insufficient roof space for panels to reasonably supplement the power consumption of the building.

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.

Wind

The Brook Alley Garage is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The Brook Alley Garage is not a good candidate for geothermal installation based on the minimum heating requirements of the building and proximity of the garage to NJ Transit train tracks.

Combined Heat and Power

The Brook Alley 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#	Description of Highly Recommended 0-5 Year Payback ECMs
1	***Install (8) new CFL fixtures***
2	***Retrofit Existing Vending Machine with VendingMiser™ Device***
3	***Install (6) new T5 Fluorescent Fixtures***
4	***Install (52) new T8 Fluorescent Fixtures***
	Description of Recommended 5-10 Year Payback ECMs
5	***Replace garages electric DHW heaters with gas-fired units***
6	***Replace traffic buildings electric DHW heaters with gas-fired units***
7	***Replace Existing Air Conditioners with an Energy Star Model***
8	***Install (1) new Pulse Start Metal Halide Fixtures***
9	***Replace Two (2) large refrigerators with a 17 cu. Ft. ENERGY STAR model***

In order to clearly present the overall energy opportunities for the building and ease the decision of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential overlaps between some of the listed ECMs (i.e. lighting change influence on heating/cooling.

ECM#1: Install (8) new CFL fixtures

On the day of the site visit, SWA completed a lighting inventory of the City of Orange Township Brook Alley Garage (see Appendix B). The existing lighting inventory contained 8 inefficient incandescent lamps. SWA recommends that each incandescent lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power.

Installation cost:

Estimated installed cost: $244 (includes $196 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	244	867	0.2	0	0.4	253	426	5	2,131	0.6	772	154	173	1,697	1,188

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Retrofit Existing Vending Machine with VendingMiser™ Device*

A simple plug and play device the VendingMiser™ device is compatible with refrigerated vending machines. It utilizes Passive Infrared Sensors (PIR) to help the vending machine save power. This unit is to be installed on the existing refrigerated vending machine and regular vending machine.

Installation cost:

Estimated installed cost: $199 (Includes $20 of labor)
Source of cost estimate: *Manufacturers info*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
2	199	555	0.1	N/A	0.2	0	111	5	555	1.8	179	36	48	306	760

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Average weekly operating hours = 40.

Rebates/financial incentives:

- *NJ Clean Energy – Direct Install Program (60% of installed cost)*

Please see Appendix F for more information on Incentive Programs.

ECM#3: *Install (6) new T5 Fluorescent Fixtures*

On the day of the site visit, SWA completed a lighting inventory of the City of Orange Township Brook Alley Garage (see Appendix B). The existing lighting inventory contained some inefficient high bay metal halide fixtures. SWA recommends replacing each existing fixture with more efficient, high bay T5 fluorescent fixtures with electronic ballasts. At the observed wattage, each metal halide lamp is equivalent to four T5 lamps in order to produce an equal amount of light output while reducing energy consumption.

Installation cost:

Estimated installed cost: $814 (includes $325 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
3	814	948	0.2	0	0.4	204	394	15	5,905	2.1	625	42	48	3,819	1,299

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 – Smart Start – T5 fixtures with electronic ballasts ($16 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Install (52) new T8 Fluorescent Fixtures*

On the day of the site visit, SWA completed a lighting inventory of the City of Orange Township Brook Alley Garage (see Appendix B). The existing lighting inventory contained mostly inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each existing fixture with more efficient, T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast.

Installation cost:

Estimated installed cost: $7,914 (includes $2,097 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
4	7,914	5,849	1.2	0	2.5	447	1,617	15	24,249	4.9	206	14	19	11,109	8,014

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 – Smart Start – T8 fixtures with electronic ballasts ($15 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Replace garage's electric DHW heater with a gas-fired unit*

On the day of the site visit, SWA observed that the domestic hot water (DHW) loads of the garage were met by an electric, 30 gallon DHW heater. Electric DHW heaters consume electricity constantly in order to keep stored hot water at a set temperature. SWA recommends that this unit is replaced with a gas-fired unit. Upgrading this unit will not result in energy savings but will result in cost savings by switching to a less expensive fuel.

Installation cost:
Estimated installed cost: $2,004 (includes $440 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
5	2,004	2,036.3	0.4	-82	0.9	0	315	15	4,730	6.4	136	9	13	1,707	1,830

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumed cost savings based on average utility costs calculated for the DPW complex.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Gas Water Heaters <50 gallons ($50 per unit)*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Replace traffic building's electric DHW heater with a gas-fired unit*

On the day of the site visit, SWA observed that the domestic hot water (DHW) loads of the traffic building were met by an electric, 19 gallon DHW heater. Electric DHW heaters consume electricity constantly in order to keep stored hot water at a set temperature. SWA recommends that this unit is replaced with a gas-fired unit. Upgrading this unit will not result in energy savings but will result in cost savings by switching to a less expensive fuel.

Installation cost:
Estimated installed cost: $1,693 (includes $370 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
6	1,693	1,289.6	0.3	-52	0.6	0	200	15	2,994	8.5	77	5	8	656	1,158

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumed cost savings based on average utility costs calculated for the DPW complex.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Gas Water Heaters <50 gallons ($50 per unit)*

Please see Appendix F for more information on Incentive Programs.

ECM#7: *Replace Existing Air Conditioners with an Energy Star Model*

Description:

On the day of the site visit, SWA observed that there were four old air conditioners in the building, which were not Energy Star rated. Appliances, such as air conditioners, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. Besides saving energy through the efficiency of the units they also come equipped with more accurate controls and will reduce infiltration losses if installed properly as compared to the current installations which are substandard. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings and more information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

Installation cost:

Estimated installed cost: $1,220 (includes $160 of labor)
Source of cost estimate: *Manufacturer and Store established costs*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
7	1,220	720	0.2	N/A	0.3	0	144	15	2,160	8.5	77	5	8	474	986

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis.

Rebates/financial incentives:

- *NJ Clean Energy - There aren't any incentives at this time offered*

Please see Appendix F for more information on Incentive Programs.

ECM#8: *Install (1) new Pulse Start Metal Halide Fixtures*

On the day of the site visit, SWA completed a lighting inventory of the City of Orange Township Brook Alley Garage (see Appendix B). The existing lighting inventory contained inefficient metal high pressure sodium fixtures. SWA recommends replacing them with more efficient, Pulse Start Metal Halide fixtures with electronic ballasts. Pulse Start Metal Halide fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to metal halide or high pressure sodium fixtures. .

Installation cost:

Estimated installed cost: $675 (includes $270 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
8	675	263	0.1	N/A	0.1	18	71	15	1,060	9.5	57	4	6	157	360

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 – Smart Start – Pulse Start Metal Halide Fixtures ($25 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#9: *Replace Two (2) large refrigerators with 17 cu. Ft. ENERGY STAR models*

On the day of the site visit, SWA observed that there were two older refrigerators, both 17 cu. ft. models in the building which were not Energy Star rated (using approximately 443 and 479 kWh/year). Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. SWA recommends the replacement of the existing refrigerators with a 17 cu. ft. top freezer ENERGY STAR® refrigerator. Besides saving energy, the replacement will also keep their surroundings cooler. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings. Look for the Energy Star label when replacing appliances and equipment, including: window air conditioners, refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

Installation cost:
Estimated installed cost: $1000 (Includes $100 in labor cost)
Source of cost estimate: *Manufacturer and Store established costs*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
9	1,000	512	0.1	N/A	0.2	0	102	12	1,229	9.8	23	2	6	205	701

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis aggregate utility rate.

Rebates/financial incentives:

- *None*

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 Brook Alley Garage:

- Install premium motor replacements for the hydraulic car lift motor - Select a NEMA Premium motor replacement for the hydraulic car lift motor
- Install premium motor replacements for the hydraulic compressor motor - Select a NEMA Premium motor replacement for the hydraulic compressor motor
- Apply water sealer to moldy/leaking, below-grade stone foundation walls.
- Replace broken/deteriorated bricks and re-point cracked mortar joints.
- Apply appropriate air-sealing strategies around all exterior wall penetrations (including electrical, plumbing and HVAC).
- Openings around window air-conditioning units need airtight gaskets/sealants for optimal all year performance. Insulated hoods should be installed during winter months if removing the units is not an option.

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.

- Inspect and replace cracked/ineffective caulk.
- Repair and maintain roof trim and moldings.
- Install/ repair and maintain roof flashing.
- Maintain/ inspect all roof surfaces on a regular basis.
- Install/replace and maintain sealants at all windows for airtight performance.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
- 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.
- 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/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the City of Orange Township. Based on the requirements of the LGEA program, City of Orange Township must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $629.

APPENDIX A: EQUIPMENT LIST

Inventory

Heating	2 Carrier gas-fired unit heaters, no nameplate info, controlled by non-programmable dial thermostat set to 72F	Left-side Garage	Carrier, Model #NA, Serial #NA	N. Gas	Left-side Garage	-	0%
Heating	4 Reznor gas-fired unit heaters, no nameplate info, controlled by non-programmable thermostat	Right-side Garage	Reznor, Model #NA, Serial #NA	N. Gas	Right-side Garage	-	0%
Cooling	Hotpoint window AC unit, no nameplate info	Office in Large garage area	Hotpoint, Model #NA, Serial #NA	Electricity	Office in Large garage area	-	0%
Cooling	GE window AC unit, no nameplate info	Office in lofted area	GE, Model #NA, Serial #NA	Electricity	Lofted Office	-	0%
Cooling	Carrier window AC unit, no nameplate	Deputy Director's Office	Carrier, Model #NA, Serial #NA	Electricity	Deputy Director's Office	-	0%
Cooling	Kenmore window AC unit, no nameplate	Supervisor's Office	Kenmore, Model #NA, Serial #NA	Electricity	Supervisor's Office	-	0%
Ventilation	2 emergency exhaust fans built on either end of the garage, lofted break area space built above offices blocks one exhaust fan now	Ends of building	No nameplate info	Electricity	All Areas	-	0%
Appliances	Dayton motor on Quincy compressor for hydraulic car lift, 5HP, 1,740 RPM, 1ph	Lofted area in larger garage	Dayton, Model #5K676L, Serial #NA	Electricity	Hydraulic Car Lift	-	50%
Appliances	Baldor motor on hydraulic car lift, 3 HP, 3,450 RPM, 1ph, 76% NEMA nom. Efficiency	Large Garage area	Baldor, Spec. #35N621T903, Serial #F697	Electricity	Hydraulic Car Lift	-	50%
Appliances	Electrolux refrigerator, 443 kWh/year, not energy star	Break Area	Electrolux, Model #WRT5B1EW4, Serial #BA70819183	Electricity	Break Area	-	20%
Domestic Hot Water	AO Smith electric water heater, 30 gallons, upper element 4,500W, lower element 4,500W, max. element 4,500W	Mechanical closet near bathroom	AO Smith Energy Saver water heater, Model #EES 30 917, Serial #MB99-0073331-917	Electricity	All Areas	1992	0%
Lighting	See Appendix A	-	-	-	-	-	-
Heating	Bryant gas unit heater, old, no nameplate info	Traffic out-building, office area	Bryant, Model #NA, Serial #NA	N. Gas	Traffic out-building, office area	-	0%
Heating	Bryant gas unit heater, old, no nameplate info	Traffic out-building, garage area	Bryant, Model #NA, Serial #NA	N. Gas	Traffic out-building, garage area	-	0%
Domestic Hot Water	AO Smith electric water heater, 19 gallons, 2,500W storage, older	Traffic out-building, bathroom	AO Smith, ProMax, Model #ELSC 20917, Serial #B07J033531	Electricity	Traffic out-building, bathroom	-	0%
Appliances	Hotpoint refrigerator, 479 kWh/year, not energy star	Traffic out-building, office area	Hotpoint, Model #CTX14CYXKRWH, Serial #SM745550	Electricity	Traffic out-building, office area	-	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	1	Office	Recessed Parabolic	M	4'T12	2	2	40	Sw	8	260	12	184	383	T8	Recessed Parabolic	4'T8	E	Sw	2	2	32	8	260	5	138	287	96	0	96
2	1	Bathroom	Recessed Parabolic	M	4'T12	1	4	40	Sw	4	260	12	172	179	T8	Recessed Parabolic	4'T8	E	Sw	1	4	32	4	260	5	133	138	41	0	41
3	1	Bathroom	Ceiling Mounted	S	Inc	4	1	60	Sw	4	260	0	240	250	CFL	Ceiling Mounted	CFL	S	Sw	4	1	20	4	260	0	80	83	166	0	166
4	1	Hallway	Parabolic Ceiling Suspended	M	4'T12	1	4	40	Sw	8	260	12	172	358	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	8	260	5	133	277	81	0	81
5	1	Office	Recessed Parabolic	M	8'T12	1	4	80	Sw	8	260	20	340	707	T8	Recessed Parabolic	8'T8	E	Sw	1	4	59	8	260	7	243	505	202	0	202
6	1	Truck Bay	Parabolic Ceiling Suspended	M	8'T12	6	4	80	Sw	8	260	20	2,040	4,243	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	6	4	59	8	260	7	1458	3033	1211	0	1211
7	1	Truck Bay	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	1	Storage Rm	Parabolic Ceiling Suspended	M	4'T12	1	4	40	Sw	2	260	12	172	89	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	2	260	5	133	69	20	0	20
9	2	Meeting Rm	Parabolic Ceiling Suspended	M	4'T12	1	2	40	Sw	4	260	12	92	96	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	2	32	4	260	5	69	72	24	0	24
10	2	Meeting Rm	Parabolic Ceiling Suspended	M	8'T12	2	4	80	Sw	4	260	20	680	707	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	2	4	59	4	260	7	486	505	202	0	202
11	2	Storage Rm	Parabolic Ceiling Suspended	M	4'T12	1	4	40	Sw	2	260	12	172	89	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	2	260	5	133	69	20	0	20
12	2	Nine Truck Bay	Parabolic Ceiling Suspended	E	4'T12	5	4	40	Sw	8	260	12	860	1,789	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	5	4	32	8	260	5	665	1383	406	0	406
13	2	Nine Truck Bay	Parabolic Ceiling Suspended	M	8'T12	3	4	80	Sw	8	260	20	1,020	2,122	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	3	4	59	8	260	7	729	1516	605	0	605
14	2	Nine Truck Bay	Parabolic Ceiling Suspended	M	8'T12	22	2	80	Sw	8	260	20	3,960	8,237	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	22	2	59	8	260	7	2750	5720	2517	0	2517
15	2	Nine Truck Bay	Parabolic Ceiling Suspended	M	4'T12	1	4	40	Sw	8	260	12	172	358	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	8	260	5	133	277	81	0	81
16	2	Nine Truck Bay	Parabolic Ceiling Suspended	S	MH	6	1	150	Sw	8	260	42	1,152	2,396	T5	Parabolic Ceiling Suspended	4'T5	E	Sw	6	4	28	8	260	4	696	1448	948	0	948
17	2	Mechanics Office	Parabolic Ceiling Suspended	M	4'T12	4	4	40	Sw	8	260	12	688	1,431	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	4	4	32	8	260	5	532	1107	324	0	324
18	2	Storage Rm	Parabolic Ceiling Suspended	M	4'T12	1	4	40	Sw	2	260	12	172	89	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	2	260	5	133	69	20	0	20
19	Ext	Exterior	Wall Mounted	S	Inc	4	1	60	PC	12	365	0	240	1,051	CFL	Wall Mounted	CFL	S	PC	4	1	20	12	365	0	80	350	701	0	701
20	Ext	Exterior	Wall Mounted	S	HPS	1	1	150	PC	12	365	30	180	788	PSMH	Wall Mounted	PSMH	S	PC	1	1	100	12	365	20	120	526	263	0	263
Totals:						**69**	**59**	**1,225**				**293**	**12,719**	**25,459**						**69**	**62**	**788**			**110**	**8,855**	**17,531**	**7,928**	**0**	**7,928**
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																														

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	8,000		
Average Power Cost ($/kWh)	0.2000		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,840	876	**964**
Exterior Power (watts)	420	200	**220**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	23,619	16,655	**6,964**
Lighting Power (watts)	12,299	8,655	**3,644**
Lighting Power Density (watts/SF)	1.54	1.08	**0.46**
Estimated Cost of Fixture Replacement ($)	9,647		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**2,507**		

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				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc.	(800) 363-7499

112 Main St. Lebanon, NJ 08833	www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

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	(877) 483-7669

545 Route 17 South Ridgewood, NJ 07450	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
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.

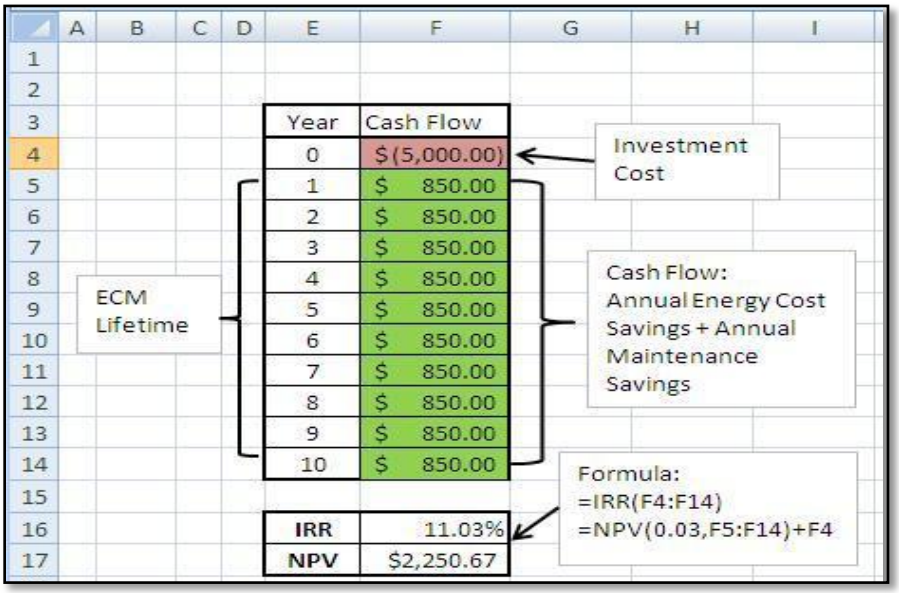
Calculation References

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
City of Orange Township - Brook Alley Garage

Building ID: 2342894
For 12-month Period Ending: April 30, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 18, 2010

Facility
City of Orange Township - Brook Alley Garage
24 South Center St.
Orange, NJ 07050

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1939
Gross Floor Area (ft²): 4,297

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	138,276
Natural Gas (kBtu)[4]	1,421,870
Total Energy (kBtu)	1,560,146

Energy Intensity[5]	
Site (kBtu/ft²/yr)	363
Source (kBtu/ft²/yr)	454

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	97

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison	
National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	203%
Building Type	Service (Vehicle Repair/Service, Postal Service)

Stamp of Certifying Professional

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

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

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

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.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to: http://njcleanenergy.com/EECBG

Other 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/.

*Subject to availability. Incentive program timelines might not be sufficient to meet the 25% in 12 months spending requirement outlined in the LGEA program.

APPENDIX G: VendingMiser™ Energy Savings Calculations

EnergyMisers

VendingMiser® CoolerMiser™ SnackMiser™ PlugMiser™ VM2iQ® CM2iQ®

Savings Calculator

Please replace the default values in the table below with your location's unique information and then click on the "calculate savings" button.
Note: To calculate for CoolerMiser, use the equivalent VendingMiser results. To calculate for PlugMiser, use the equivalent SnackMiser results.

Energy Costs ($0.000 per kWh)	0.2
Facility Occupied Hours per Week	40
Number of Cold Drink Vending Machines	1
Number of Non-refrigerated Snack Machines	0
Power Requirements of Cold Drink Machine (Watts; 400 typical)	100
Power Requirements of Snack Machine (Watts; 80 typical)	0
VendingMiser® Sale Price (for cold drink machines)	199
SnackMiser™ Sale Price (for snack machines)	0

Calculate Savings!

Results of your location's projected savings with VendingMiser® installed:

COLD DRINK MACHINES	Current	Projected	Total Savings	% Savings
kWh	874	319	555	63%
Cost of Operation	$174.72	$63.79	$110.93	63%

SNACK MACHINES	Current	Projected	Total Savings	% Savings
kWh	0	0	0	NaN%
Cost of Operation	$0	$0	$0	NaN%

Location's Total Annual Savings

	Current	Projected	Total Savings	% Savings
kWh	874	319	555	64%
Cost of Operation	$174.72	$63.79	$110.93	63%

Total Project Cost	Break Even (Months)
$199	21.53

Estimated Five Year Savings on ALL Machines = $554.67

APPENDIX H: 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	**Install (8) new CFL fixtures**	None at this time	244	867	0.2	0	0.4	253	426	5	2,131	0.6	772	154	173	1,697	1,188
	2	**Retrofit Existing Vending Machine with VendingMiser™ Device**	None at this time	199	555	0.1	N/A	0.2	0	111	5	555	1.8	179	36	48	306	760
	3	**Install (6) new T5 Fluorescent Fixtures**	96	814	948	0.2	0	0.4	204	394	15	5,905	2.1	625	42	48	3,819	1,299
	4	**Install (52) new T8 Fluorescent Fixtures**	780	7,914	5,849	1.2	0	2.5	447	1,617	15	24,249	4.9	206	14	19	11,109	8,014
5-10	5	**Replace garages electric DHW heaters with gas-fired units**	None at this time	2,004	2,036.3	0.4	-82	0.9	0	315	15	4,730	6.4	136	9	13	1,707	1,830

6	**Replace traffic buildings electric DHW heaters with gas-fired units**	None at this time	1,693	1,289.6	0.3	-52	0.6	0	200	15	2,994	8.5	77	5	8	656	1,158
7	**Replace Existing Air Conditioners with an Energy Star Model**	None at this time	1,220	720	0.2	N/A	0.3	0	144	15	2,160	8.5	77	5	8	474	986
8	**Install (1) new Pulse Start Metal Halide Fixtures**	25	675	263	0.1	N/A	0.1	18	71	15	1,060	9.5	57	4	6	157	360
9	**Replace Two (2) large refrigerators with a 17 cu. Ft. ENERGY STAR model**	None at this time	1,000	512	0.1	N/A	0.2	0	102	12	1,229	9.8	23	2	6	205	701

APPENDIX I: METHOD OF ANALYSIS

Assumptions and tools

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

Disclaimer

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

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