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November 8, 2010

Local Government Energy Program
Energy Audit Final Report

City of Orange Township

City Hall
29 North Day Street
Orange, NJ 07050

Project Number: LGEA68

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EXECUTIVE SUMMARY

The City of Orange Township City Hall is a four-story building comprising a total conditioned floor area of 28,777 square feet. The original structure was built in 1913 with a major expansion in 1978. The following chart provides an overview of current energy usage in the building based on the analysis period of June 2009 through May 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	301,760	17,192	NA	$76,885	96.0	2,749
Proposed	246,965	17,192	NA	$44,489	89.5	2,562
Savings	54,795	0	NA	$32,396*	6.5	187
% Savings	18%	0%	NA	42%	7%	7%

*Cost savings include reduced energy use as well as reduced operation and maintenance costs

There may be energy procurement opportunities for the City of Orange Township City Hall to reduce annual utility costs, which are a total of $11,165 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the City Hall in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. The City Hall is categorized as an "Office" space type. The resulting Energy Star Rating is 66, which is better than the comparable building by 66%.

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	$5,268	3.4	$18,169	29,395
5-10 Year	$27,128	7.1	$192,700	68,717
Total	$32,396	6.5	$210,869	98,111

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 8 cars from the roads each year or planting 239 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 City Hall further explore the following:

- Capital Improvements
  - Install NEMA premium motors when replacements are required
  - Replace roof finish and insulate (R-30 min.)
  - Replace all original, single-glazed windows

- Operations and Maintenance
  - Efflorescence-coated brick and masonry materials need to dry out
  - Remove burnt-out steam boiler from mechanical room
  - Re-point deteriorated mortar
  - Overgrown ground vegetation should be removed
  - Apply water sealer to moldy/leaking, below-grade slab
  - Openings around window air-conditioning units need airtight gaskets/sealants
  - Install and maintain weather-stripping around all exterior doors and roof hatches
  - Repair insulation on all steam, water, and gas piping in mechanical room as per code
  - Provide water-efficient fixtures and controls
  - SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances
  - Use smart power electric strips
  - 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 $1,453.00.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that City of Orange Township can take to achieve greater energy efficiency and reduce operating expenses. It includes the amount in dollars that 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 City Hall

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install Vending Misers	Direct Install
Lighting Upgrades	SmartStart, Direct Install
Motor Replacements	SmartStart, Direct Install
Install 30 kW Solar PV	Renewable Energy Incentive Program, SRECs

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 City Hall, and contingent upon available funding, SWA recommends the following incentive programs:

Direct Install 2010 Program: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades.

Smart Start: Majority of energy saving equipment and design measures have moderate incentives under this program.

Renewable Energy Incentive Program: Receive up to $0.75/Watt toward installation cost for PV panels upon available funding.

AND

For each 1,000 kWh generated by renewable energy, receive a credit between $475 and $600.

Energy Efficiency and Conservation Block Grant Rebate Program: Provides up to $20,000 per local government toward energy saving measures.

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 City Hall at 29 North Day St. Orange, NJ. The process of the audit included facility visits on March 19, 2010 and April 22, 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 City of Orange Township to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the City Hall.

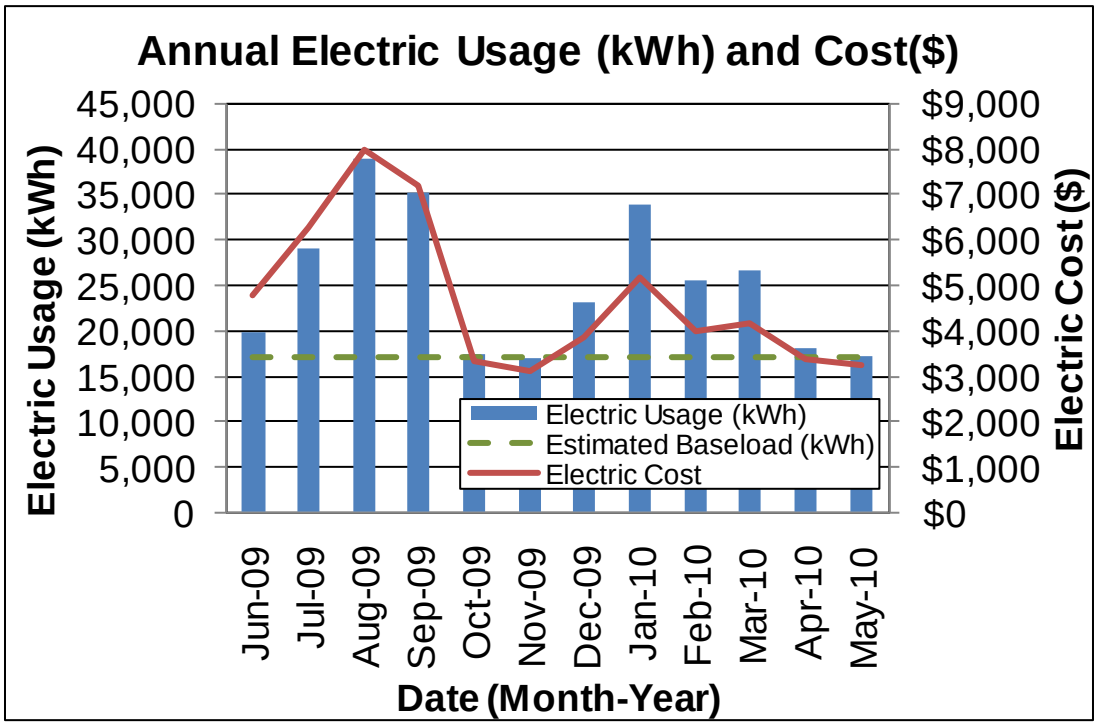
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

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

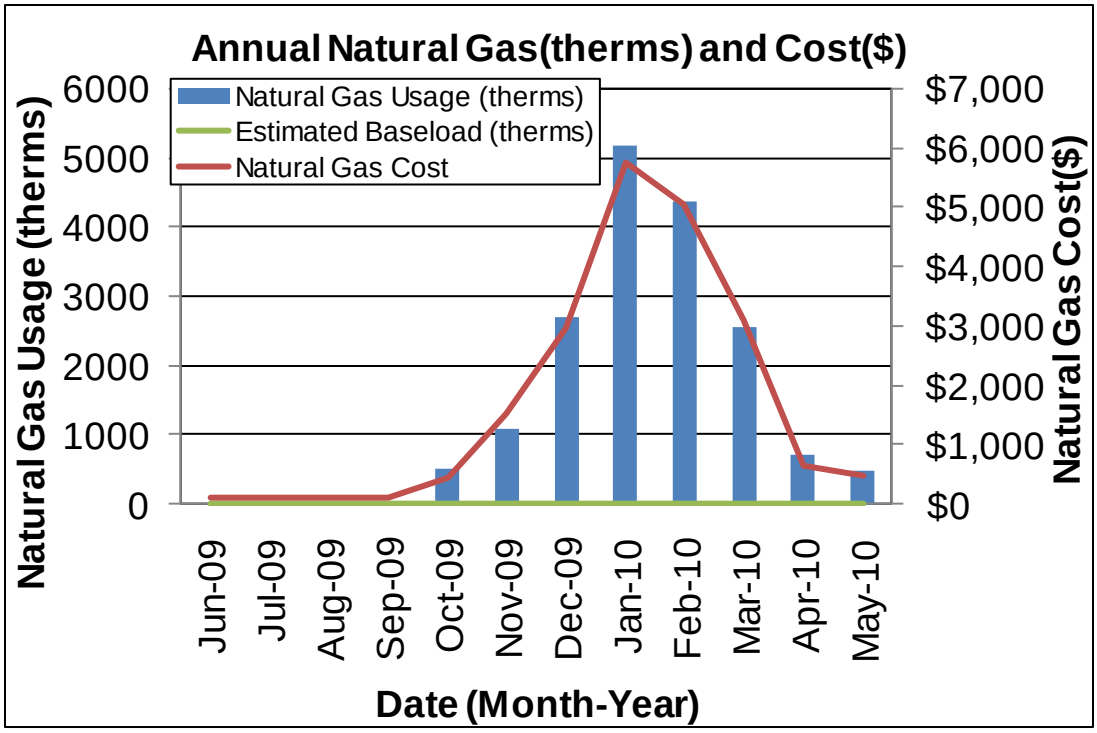
Electricity - The City Hall is currently served by one electric meter. The City Hall currently buys electricity from PSE&G at **an average aggregated rate of $0.187/kWh**. The City Hall purchased **approximately 301,760 kWh, or $56,548 worth of electricity,** in the previous year. The average monthly demand was 110.0 kW and the annual peak demand was 134.4 kW.

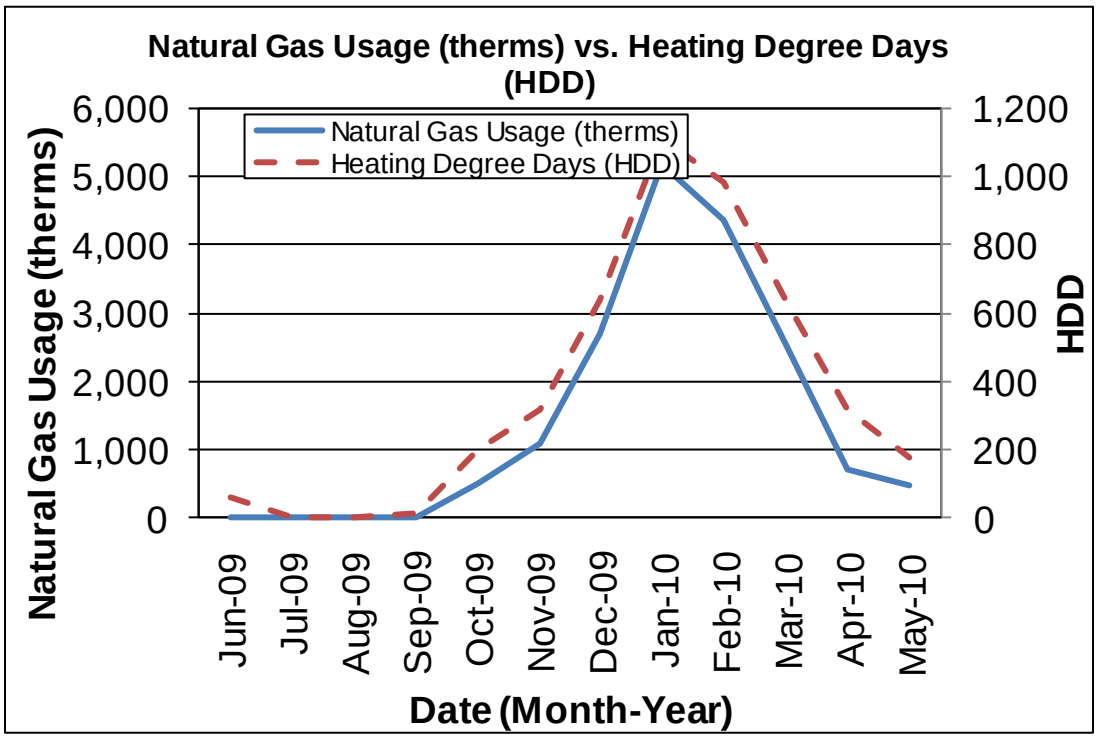
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the City Hall.



Natural gas - The City Hall is currently served by one meter for natural gas. The City Hall currently buys natural gas from PSE&G at **an average aggregated rate of $1.183/therm**. The City Hall purchased **approximately 17,192 therms, or $20,337 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 City Hall.

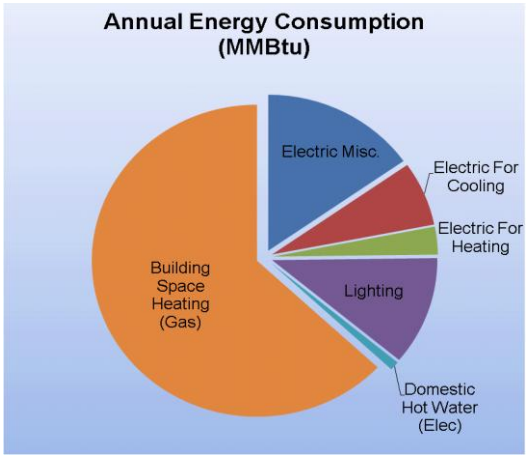


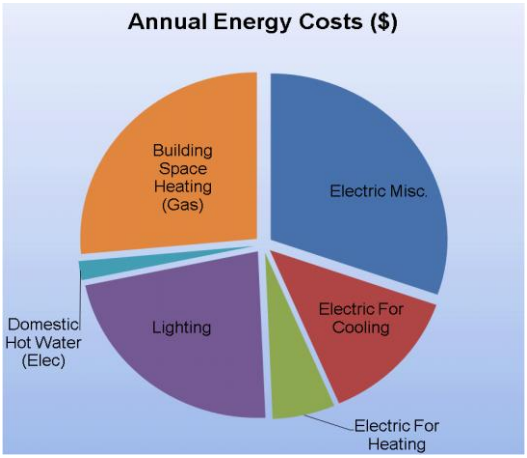


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the City Hall building based on utility bills for the 12 month period. Note: electrical cost at $55/MMBtu of energy is over 4 times as expensive as natural gas at $12/MMBtu

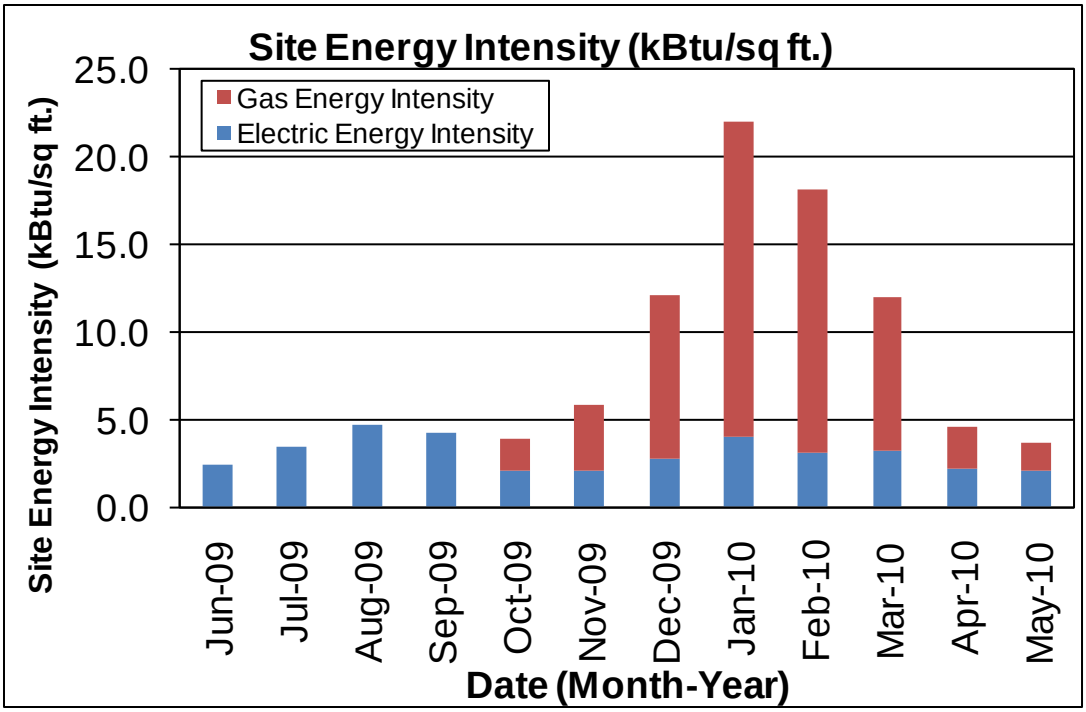
Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	425	15%	$23,326	30%	55
Electric For Cooling	185	7%	$10,184	13%	55
Electric For Heating	80	3%	$4,408	6%	55
Lighting	313	11%	$17,210	22%	55
Domestic Hot Water (Elec)	26	1%	$1,418	2%	55
Building Space Heating	1,719	63%	$20,340	26%	12
Totals	2,749	100%	$76,885	100%	
Total Electric Usage	1,030	37%	$56,548	74%	55
Total Gas Usage	1,719	63%	$20,337	26%	12
Totals	2,749	100%	$76,885	100%	





Energy benchmarking

SWA has entered energy information about the City Hall in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This office facility is categorized as an "Office" space type, which is eligible for an Energy Star Rating. The Site Energy Use Intensity is 96.0 kBtu/ft^2-yr compared to the national average of an Office building consuming 115.0 kBtu/ft^2-yr. The building has an Energy Star rating of 66, meaning that it performs better than 66% of the buildings in the Energy Star database. The building must obtain a rating of 75 or better to qualify for Energy Star Certification.



Per the LGEA program requirements, SWA has assisted the City of Orange Township to create an *ENERGY STAR® Portfolio Manager* account and share the City Hall 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 (user name of "CityOrangeTwp" with a password of "CityOrangeTwp") 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.

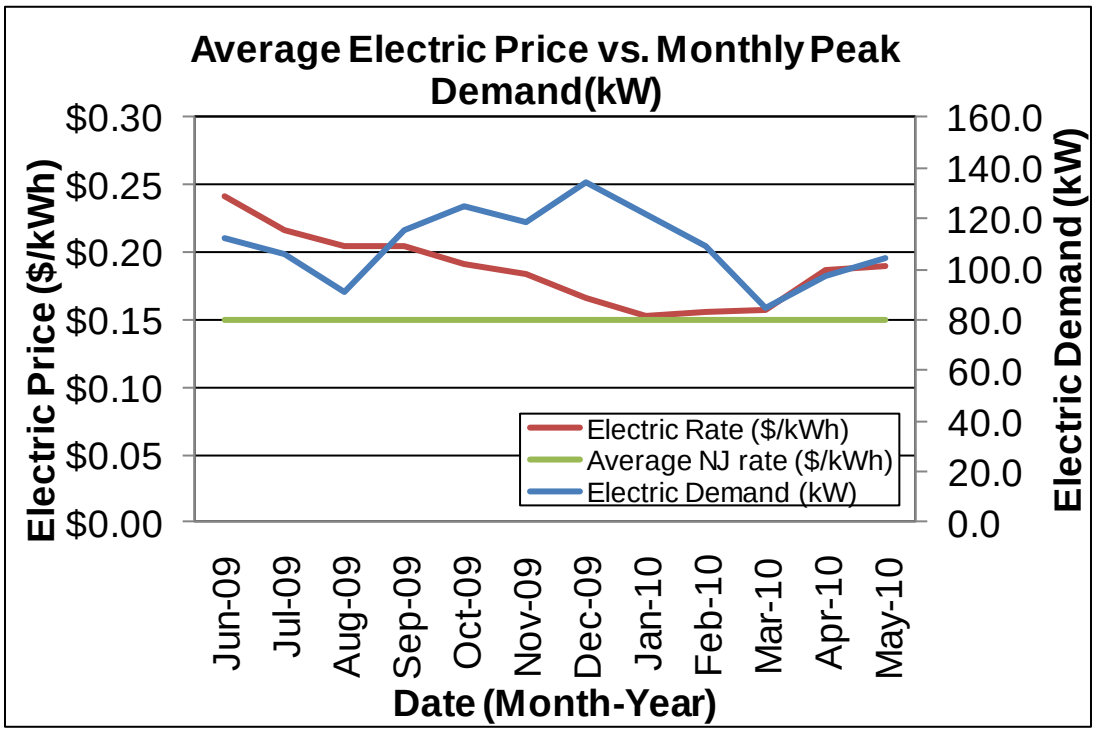
Tariff analysis is performed to determine if the rate that a City of Orange Township is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural 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. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

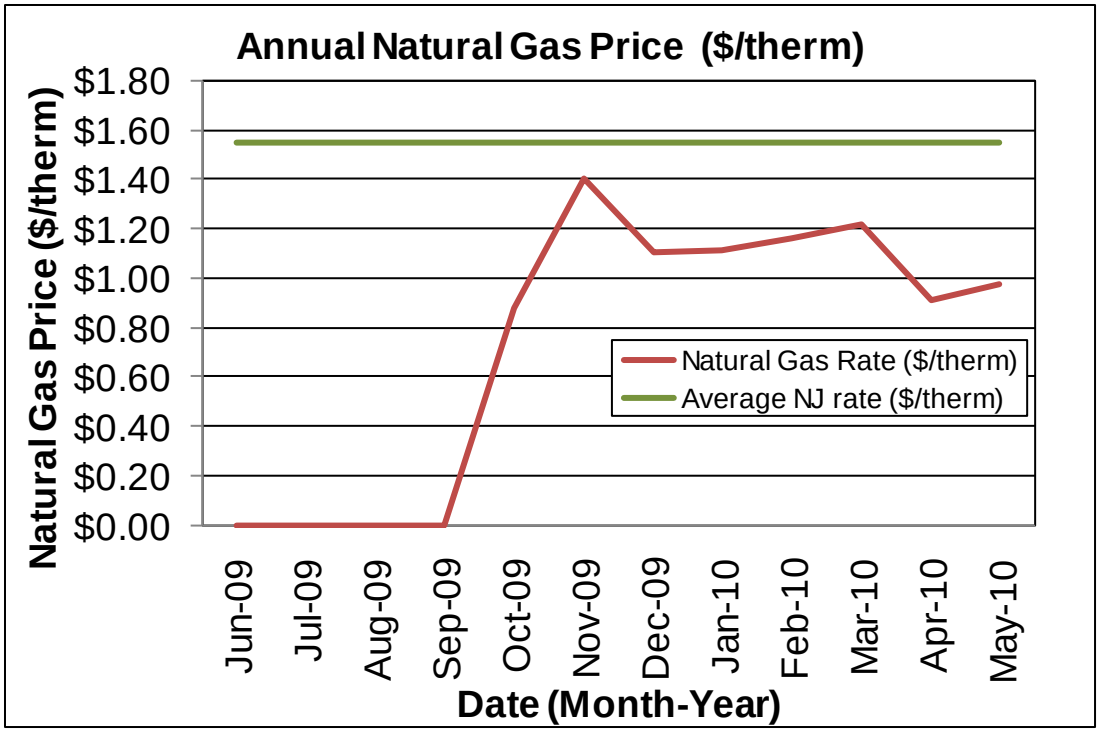
Energy Procurement strategies

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 City Hall pays a rate of $0.187/kWh. The City Hall annual electric utility costs are $11,165 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 35% over the most recent 12 month period. The electric demand is high in winter months since over a third of the building heating equipment is electric.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while City Hall pays a competitive rate of $1.183/therm. Natural gas bill analysis shows fluctuations up to 37% over the most recent 12 month period. There is no gas cost during summer months since the domestic hot water equipment is electric, and no gas equipment is needed.



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 City Hall 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 City Hall. 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 March 19 and April 22, 2010, the following data was collected and analyzed.

Building Characteristics

The four-story, (slab on grade), 28,777 square feet City Hall Building was originally constructed in 1913 with additions/alterations completed in 1978. It houses open office areas, administrative offices, an attorney's office, a court room, recreation offices, etc.

Front Façade

Right Side Façade

Right Side Façade

Rear Façade

Left Side Façade

1978 addition in the North West of building with visibly distinct roof

Building Occupancy Profiles

The building is occupied by approximately 70 staff and 100 visitors daily from 8:30am to 4:30pm. The court is open twice a month for four hours.

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.

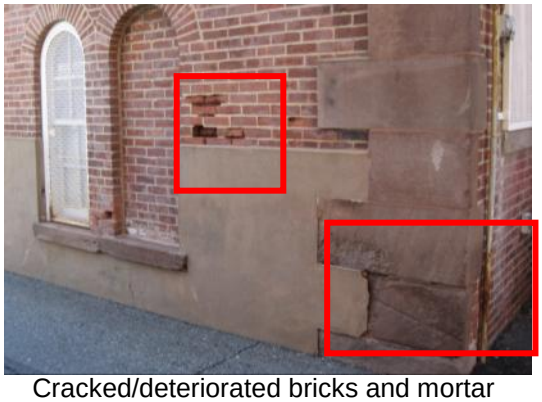
Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer and some natural stone veneer accents, over concrete block with no of detectable insulation.

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

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

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


Cracked/deteriorated bricks and mortar joints


Efflorescence on brick and masonry walls indicate moisture presence within the wall cavity.

Damaged exterior wall finishes

Cracked/deteriorated bricks and mortar joints

Overgrown ground vegetation touching/blocking exterior wall surfaces

Roof

The building's roof is predominantly a flat and attached mansard parapet type over steel decking, with a built-up asphalt finish and reflective coating. It was replaced at least 7 years ago. No detectable attic/ceiling insulation, and no roof insulation were recorded. The 1978 addition's roof is predominantly a flat and parapet type over steel decking, with a built-up asphalt finish. It was replaced at least 7 years ago

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

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall 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:

Delaminating roof membrane/patches

Damaged gutters

Signs of mold/water damage on interior finishes

Base

The building's base is composed of a slab-on-grade floor with a perimeter foundation and no detectable 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 acceptable condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues detected in some areas inside.

The following specific base problem spots were identified:

Water/moisture seepage through cracks detected in the slab

Windows

The building contains basically two different types of windows:

1. Over 50 double-hung type windows with wood frames, clear single glazing and interior roller blinds. The windows are located throughout the building and are original.

2. Over six fixed type half-circle windows with wood frames, clear single glazing and no interior or exterior shading devices. The windows are located on the main floor and are original.

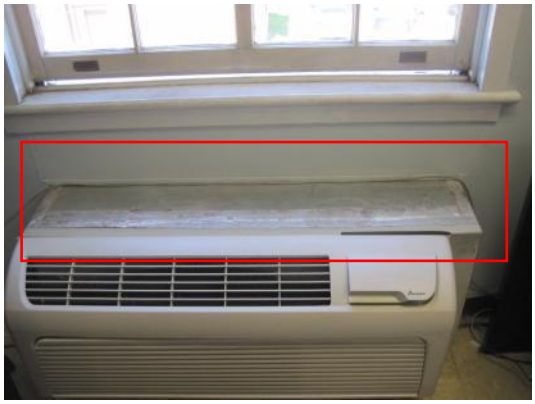
Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in poor condition with numerous signs of uncontrolled moisture, air-leakage and/or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

The following specific window problem spots were identified:

Damaged/aged window frame

Damaged/aged window frame

Single-glazed window with ineffective frame



Air-leakage at sleeved window/wall air-conditioning units

Single-glazed window with ineffective frame

Air-leakage at sleeved window / wall air-conditioning units

Exterior doors

The building contains two different types of exterior doors:

1. Approximately six aluminum type exterior doors. They are located throughout the building and are original.

2. Approximately two glass with wood frame type exterior doors. They are located in the front of the building and are original.

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

The following specific door problem spots were identified:

Damaged/warped/aged door frame

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.

Mechanical Systems

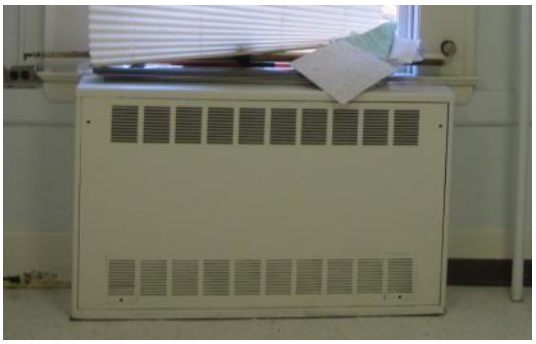
Heating Ventilation Air Conditioning

The Orange City Hall building has cooling and heating throughout the building. The original building has steam heat and window AC units, and the 1978 addition has electric heating and cooling. There were thermal comfort issues usually related to the lack of control.

Equipment

The original sections of the building are heated by a Weil McLain Natural Gas Steam Boiler with 2,396 MBH capacity and 80% thermal efficiency. Adjacent to the boiler is another steam boiler which has burnt out completely and is inoperable. The steam is sent to radiators throughout the original sections of the building which disperse heat to the surrounding air in the relevant space. The boiler has 30% useful life remaining and appears in good condition.


Operating Steam Boiler (left); Burnt Steam Boiler (right)




Steam radiator with enclosure (left); Exposed steam radiator below window AC (right)

There is an electric rooftop unit installed on the roof of the 1978 addition which provides cooling for the first two floors of the original building. Cool air from the unit is supplied through ductwork to four separate zones on each floor. The unit is operating beyond its useful life. There is also supplemental cooling with through-the-window air conditioning units. There are approximately nine window units of various manufacturers with approximately 0.5 ton cooling capacity and efficiencies between 9 and 10 SEER. At least four of these units are beyond their useful life based on visual inspection.

Aged Window AC Units in original section of building

The 1978 addition, which is at least a third of the building, does not have steam radiators for heating. These areas are heated and cooled with Package Terminal Air Conditioner (PTAC) units, which provide electric heating and cooling. The units are installed through the wall underneath windows and draw in outside air which passes through the cooling coil or heating element and a fan blows the conditioned air into the space.


Wall mounted PTAC, typical

The 1st floor break room is heated and cooled by an electric Sanyo split DX unit with an outside condenser which was installed in 2005.

The various spaces of the building are provided ventilation by direct outside air intake through each window unit or PTAC. There is a Greenheck exhaust fan in the mechanical

room which draws air out of the space. There are also exhaust fans for bathrooms which are ducted to the roof.

There are currently design drawings being developed to upgrade the HVAC system for the building. The existing rooftop air conditioning unit (RTU-2) is slated to be replaced in kind with 28 tons of cooling capacity to serve 8 new VAV boxes; 4 on the first floor and 4 on the second floor. A new rooftop unit, RTU-1 will also be added to provide cooling for the third floor along with 5 new split air conditioning units. The rooftop units are designed to operate in economizer mode, which allows the unit to optimize outside air intake and reduce compressor energy use when air conditions are appropriate.

The new design will also replace the PTAC units in the 1978 addition area in kind. These upgrades are intended to improve the efficiency of the heating and cooling system and allow for all supplemental AC units to be removed. Construction is planned to start by January 2011. The upgrade is expected to improve energy performance and occupant comfort. The upgrade should reduce the energy usage of the building as well as HVAC maintenance cost.

Distribution Systems

The majority of the building spaces have independent radiators, AC units or PTAC units for each space, with fans to distribute air to a small region. The first and second floors of the original building have a ducted air conditioning system. There is also a Sanyo Split AC unit which is mounted on the wall and provides heating and cooling for the 1st floor break room area. The air supply is ducted to diffusers on the floor.

Sanyo wall mounted unit (left); Supply air diffusers (right)

Controls

There are dial controls for the steam radiators which are faulty in many cases. Users explained that often the heating is too strong and causes them to open windows in the winter to compensate.

The window AC units and unit ventilators have dial controls on the units for the amount of heating or cooling and fan strength.

Steam radiator control dial (left); PTAC dial controls (right)

Domestic Hot Water

The domestic hot water (DHW) for the City Hall is provided by an electric AO Smith 4,500 kW heater with 40 gal storage.

Domestic Hot Water heater

This heater has 30% estimated useful operating life remaining and appears in good condition.

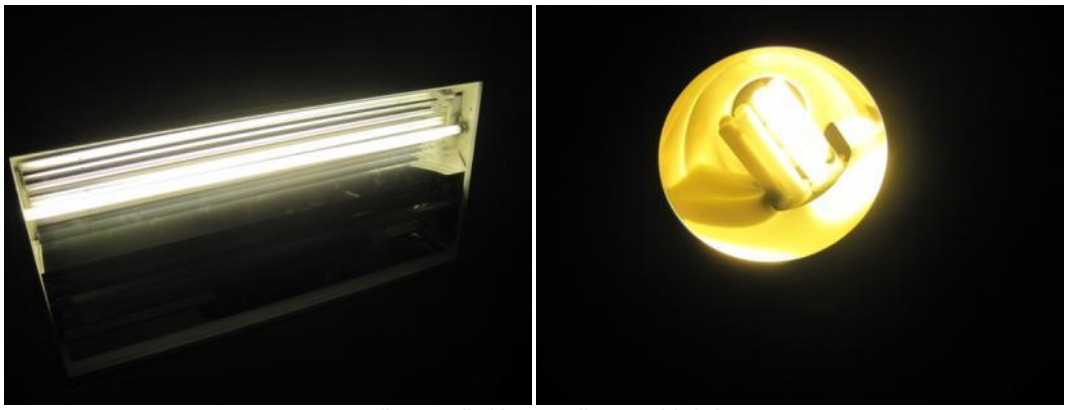
Electrical systems

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.

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 City Hall currently contains a combination of T12 and T8 fixtures, chandelier lights, CFL's and incandescent lights. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.



T8 fixture (left) CFL fixture (right)

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

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

Metal Halide Fixture

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as "plug-load" equipment, since they are not

inherent to the building's systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building that is hard to separate out from the rest of the building's energy usage based on utility analysis.

Elevators

The City Hall has an elevator for the four-story building. The elevator is powered by a 25 HP Imperial hydraulic motor, which is at the end of its useful life.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the City Hall.

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 City Hall is a good candidate for a 30kW Solar Panel installation. There is sufficient 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.

Geothermal

The City Hall 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 90% remaining useful life.

Combined Heat and Power

The City Hall 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 Vending Misers
2	Lighting Upgrades: Upgrade 32 incandescent fixtures to CFLs
3	Lighting Upgrades: 5 Metal Halide (MH) fixtures to pulse start MH
	Description of Recommended 5-10 Year Payback ECMs
4	Lighting Upgrades: Upgrade 94 T12 fixtures and # of other fixtures to T8 fixtures
5	Replace 1 std eff. motor for Hydraulic Pump with Premium eff
6	Install 30 kW Solar Photovoltaic system
7	Lighting Upgrades: Install 26 occupancy sensors

ECM#1: *Install Vending Misers*

There is one drink vending machine and one snack machine in the 1st floor break room.

Vending miser devices are now available for conserving energy used by beverage vending machines and coolers. When equipped with the vending miser devices, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the vending machine. Vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

Snack vending miser devices can be used on snack vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snack vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up. There is a snack machine and drink vending machine in the first floor break room which can operate more efficiently by using this low cost device.

Installation cost:

Estimated installed cost: $258 (includes $28 of labor)
Source of cost estimate: Source of cost estimate: www.usatech.com and established costs

Economics:

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	258	none at this time	258	2,536	1	0	0	0	464	12	5,569	0.6	2,059	4,541

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA assumes energy savings based on modeling calculator found at www.usatech.com or
http://www.usatech.com/energy_management/energy_calculator.php

Rebates/financial incentives:

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

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Building Lighting Upgrade: Replace 32 Inc with CFL*

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting also contains 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 when compared to incandescent, halogen and Metal Halide fixtures. CFL bulbs produce the same lumen output with less wattage than incandescent bulbs and last up to five times longer. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:
Estimated installed cost: $1,057 (includes $300 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	1,057	none at this time	1,057	3,691	1	0	0	1,106	1,782	5	8,909	0.6	743	6,608

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

Rebates/financial incentives:

- *None at this time*

Please see Appendix F for more information on Incentive Programs.

ECM#3: *Building Lighting Upgrade: Replace 5 MH with PSMH*

During the field audit, SWA completed a building interior as well as exterior lighting inventory (see Appendix B). The exterior lighting contains standard probe start Metal Halide (MH) and High Pressure Sodium (HPS) lamps. SWA recommends replacing the higher wattage MH and HPS fixtures with pulse start MH lamps which offer the advantages of standard probe start MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:
Estimated installed cost: $3,060 (includes $1,000 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	3,185	125	3,060	1,298	0	0	0	489	726	15	10,893	4.2	256	2,324

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

Rebates/financial incentives:

- *NJ Clean Energy - Metal Halide with pulse start ($25 per fixture) - Maximum incentive amount is $125.*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Building Lighting Upgrade: Replace 94 T12 with T8*

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting contains inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing over 90 existing T12 fixtures with high efficiency, 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 T12 fixtures with magnetic ballasts. T8 fixtures also provide better lumens for less wattage when compared to incandescent, halogen and Metal Halide fixtures. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:
Estimated installed cost: $11,924 (includes $3,000 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
4	13,334	1,410	11,924	7,199	2	0	1	668	1,986	15	29,784	6.0	150	12,891

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 – T12 to T8 ($15 per fixture) - Maximum incentive amount is $1,410.*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Install NEMA Premium Efficiency Motor on Hydraulic Pump*

During the field audit, SWA completed the building equipment inventory and observed standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings.

Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs.

The elevator hydraulic motor is standard efficiency, rated at 25 HP and is beyond its useful life. The motor can be replaced with a premium efficiency motor operating at 93.6% efficiency. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:
Estimated installed cost: $1,870 (includes $500 of labor)
Source of cost estimate: *RS Means, Published and established costs, NJ Clean Energy Program, Similar projects, MotorMaster+ International*

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	2,000	130	1,870	1,693	1	0	0	0	310	20	6,196	6.0	231	3,031

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html . SWA estimated 500 hrs of annual motor operation based on mode of operation and a current efficiency of 80%.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors – 25HP - $130/motor*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Install 30 kW PV System*

Currently, the building does not use any renewable energy systems. Renewable energy systems such as photovoltaic (PV) panels can be mounted on the building roof facing south which can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, electric demand at a power station is high, due to the amount of air conditioners, lights, and other equipment being used within the region. Demand charges increase to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems offset the amount of electricity used by a building and help to reduce the building's electric demand, resulting in a higher cost savings. Installing a PV system will offset electric demand and reduce annual electric consumption, while utilizing available state incentives. PV systems are modular and readily allow for future expansions.

The size of the system was determined considering the available roof surface area, without compromising service space for roof equipment and safety, as well as the facilities' annual base load and mode of operation. A PV system could be installed on the west wing of the building since there is over 3,000 sqft of open space and easily accessible. A commercial multi-crystalline 123 watt panel has 10.5 square feet of surface area. A 30 kW system needs approximately 244 panels which would take up 2,609 square feet.

A PV system would reduce the building's electric load and allow more capacity for surrounding buildings as well as serve as an example of energy efficiency for the community. The building is not eligible for a residential 30% federal tax credit. The building owner may want to consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. Typically, a major utility provides the ability to buy SREC's at $600/MWh or best market offer. Please see below for more information. Calculation details and annual cost savings breakdown is provided in Appendix D.

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that the City of Orange contract with a structural engineer to determine if additional building structure is required to support the recommended system and what costs would be associated with incorporating the additional supports prior to system installation. Should additional costs be identified, they should be included in the financial analysis of the project.

Installation cost:
Estimated installed cost: $187,500 (includes $120,000 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
6	210,000	22500	187,500	35,400	30	0	0	0	26,583	25	664,579	7.0	254	63,384

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 30,000 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 $0.75/watt Solar PV application for systems 30.0 kW or less. Incentive amount for this application is $22,500 for the City of Orange.*
  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 $21,000/year, based on $600/SREC, has been incorporated in the above costs for a period of 15 years; however it requires proof of performance, application approval and negotiations with the utility.*

Please see Appendix F for more information on Incentive Programs.

ECM#7: *Building Lighting Upgrade: Install 26 Occupancy Sensors*

During the field audit, SWA completed a building lighting inventory (see Appendix B). SWA observed that the existing lighting has minimal to no control via occupancy sensors. SWA identified over 20 areas, mostly bathrooms that could benefit from the installation of occupancy sensors. SWA recommends installing occupancy sensors in areas that are occupied only part of the day and the payback on savings is justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advance microphonic lighting sensors include sound detection as a means to control lighting operation. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:
Estimated installed cost: $5,200 (includes $1,800 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	5,720	520	5,200	2,978	1	0	0	0	545	15	8,176	9.5	57	5,333

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:

- *NJ Clean Energy - Wall Mounted occupancy sensors ($20 per control) - Maximum incentive amount is $520.*

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 City Hall:

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.
- Replace roof finish and insulate (R-30 min.)
- Replace all original, single-glazed windows and frames with historically and architecturally accurate low-E, double glazed type.

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.

- Efflorescence-coated brick and masonry materials need to dry out, and possible cause of water infiltration into wall cavities should be investigated.
- Remove burnt-out steam boiler from mechanical room.
- Apply water sealer to moldy/leaking, below-grade slab.
- Re-point deteriorated mortar joints soon to prevent possible water/moisture penetration into cavity walls.
- Overgrown ground vegetation should be removed to not touch or block exterior wall surfaces from access, ventilation and sunlight.
- 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.
- Install and maintain weather-stripping around all exterior doors and roof hatches.
- Repair insulation on all steam, water, and gas piping in mechanical room as per code requirements. It was noted during the field audit that the mechanical room piping was damaged in several locations and piping was not properly insulated. Insulation ensures minimal heat loss of process fluids as well as protection from burning.

- 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 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 $1,453.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Location	Make/ Model	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	Nine Window AC units, such as Haier Window AC Unit, 6600 Btuh, 10.0 EER R-22	Offices, Typ.	Haier Model# HW-07CB12	Electric	Offices, Typ.	1980's to 2000	varies
Cooling	Condenser, Sanyo Split Type AC Unit, Outdoor Unit CH3672R, Refrigerant 410A	Outside Break room	Sanyo Model # CH3672R, SN# 0027193	Electric	Break Room	2005	80%
Cooling	*RTU-1, Rooftop Air Conditioner 3200 CFM, 800 CFM Outside Air, 2.0 HP fan motor, 108 MBH Cooling*	*New Section Roof*	*Carrier M#50PG-CO9*	*Electric*	*Third Floor*	*2010*	*100%*
Cooling	*RTU-2, Rooftop Air Conditioner 12,000 CFM, 3600 CFM Outside Air, 10.0 HP fan motor, 336 MBH Cooling*	*New Section Roof*	*Nesbitt RSV-300*	*Electric*	*First and Second Floor*	*2010*	*100%*
Heating	Weil-McLain, Steam Boiler, Gas Mbh 2,396 Input, 1,904 MBH Output, 80% Eff., Steam 1,477 MBH, Relief Valve Cap: 1,904 lb/hr; Steam Boiler Burner Motor, Dayton Industrial Motor, 3450 RPM, 1 HP	Mechanical Room	Weil McLain, Model #888, Burner Model# CR2-60-2CA SN#119573332; Dayton Model# 6k197E, Mtr. Ref# R069687E 63016	Natural Gas	All Areas	1995	30%
Heating/ cooling	Sanyo Split Type AC Unit, 33,500 Btu/hr, 2.8 Tons 16.0 SEER, 3,700 W input	Break Room	Sanyo/Model# KHS3672R, SN# 0061493	Electric	Break Room	2005	80%
Heating/ cooling	Approximately 18 PTAC units of various manufacturer, 10 to 11 EER, 0.5 to 1.5 tons cooling, 2 to 5 kW Heating, typical	1978 Addition Offices	Amana, Fredrick, etc.	Electric	1978 Addition	1978, varies	varies
DHW	A.O. Smith Water Products, Phase 1, 40.0 Capacity US Gal, 4500 kW	Mechanical Room	AO Smith, Model #ECS 40 200, SN# F07A053723, Item ID/Part # 9241224008	Electric	All Areas	1995	30%
Elevator	Elevator Motor: Imperial Motor, Type FKB80, 1755 RPM, 25 HP	Mechanical Room	Imperial Model #1423990	Electric	Elev Machine Rm	1990	0%

Building System	Description	Location	Make/ Model	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	Greenheck Fan, EF 10	Mechanical Room	Greenheck Model # SQD 13 B, SN# 491220	Electric	Mechanical Rm	1995	30%
Lighting	See Appendix A	-	-	-	-	-	-

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	Council Room	Recessed Parabolic	E	4'T8 U-Shaped	50	2	32	Sw	8	260	5	3,450	7,176	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	50	2	32	8	260	5	3450	7176	0	0	0
2	1	Council Room	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
3	1	Records	Recessed Parabolic	M	4'T12	1	4	40	Sw	8	260	12	172	358	T8	Recessed Parabolic	4'T8	E	Sw	1	4	32	8	260	5	133	277	81	0	81
4	1	Chamber	Recessed Parabolic	M	4'T12	2	4	40	Sw	9	260	12	344	805	T8	Recessed Parabolic	4'T8	E	Sw	2	4	32	9	260	5	266	622	183	0	183
5	1	Bathroom	Ceiling Mounted	S	Inc	4	1	60	Sw	9	260	0	240	562	CFL	Ceiling Mounted	CFL	S	Sw	4	1	20	9	260	0	80	187	374	0	374
6	1	Server Rooms	Recessed Parabolic	M	4'T12	6	4	40	Sw	16	260	12	1,032	4,293	T8	Recessed Parabolic	4'T8	E	Sw	6	4	32	16	260	5	798	3320	973	0	973
7	1	Studio	Recessed Parabolic	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
8	4	Hallway	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
9	4	Bathroom Women	Recessed Parabolic	E	4'T8 U-Shaped	2	2	32	Sw	9	260	5	138	323	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	2	2	32	7	260	5	138	242	0	81	81
10	4	Bathroom Women	Recessed Parabolic	M	4'T8	1	1	32	Sw	9	260	5	37	87	C	Recessed Parabolic	4'T8	M	OS	1	1	32	7	260	5	37	65	0	22	22
11	4	Council Conference	Recessed Parabolic	E	4'T8	5	4	32	Sw	8	260	5	665	1,383	N/A	Recessed Parabolic	4'T8	E	Sw	5	4	32	8	260	5	665	1383	0	0	0
12	4	Council Office	Recessed Parabolic	M	2'T12	7	4	20	Sw	8	260	6	602	1,252	T8	Recessed Parabolic	2'T8	E	Sw	7	4	17	8	260	2	490	1019	233	0	233
13	4	Hallway	Recessed Parabolic	E	4'T8 U-Shaped	11	2	32	Sw	16	260	5	759	3,157	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	11	2	32	16	260	5	759	3157	0	0	0
14	4	Bathroom Men	Recessed Parabolic	E	4'T8 U-Shaped	3	2	32	Sw	9	260	5	207	484	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	3	2	32	7	260	5	207	363	0	121	121
15	4	Bathroom Men	Recessed Parabolic	E	4'T8	1	2	32	Sw	9	260	5	69	161	C	Recessed Parabolic	4'T8	E	OS	1	2	32	7	260	5	69	121	0	40	40
16	4	Stair 1	Recessed Parabolic	E	4'T8 U-Shaped	1	2	32	Sw	9	260	5	69	161	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	1	2	32	9	260	5	69	161	0	0	0
17	4	Stair 1	Recessed Parabolic	M	4'T12	3	4	40	Sw	9	260	12	516	1,207	T8	Recessed Parabolic	4'T8	E	Sw	3	4	32	9	260	5	399	934	274	0	274
18	4	Stair 1	Recessed Parabolic	M	4'T12	1	2	40	Sw	9	260	12	92	215	T8	Recessed Parabolic	4'T8	E	Sw	1	2	32	9	260	5	69	161	54	0	54
19	3	Health Office	Recessed Parabolic	M	4'T12	16	4	40	Sw	9	260	12	2,752	6,440	T8	Recessed Parabolic	4'T8	E	Sw	16	4	32	9	260	5	2128	4980	1460	0	1460
20	3	Office	Recessed Parabolic	M	4'T12	4	4	40	Sw	9	260	12	688	1,610	T8	Recessed Parabolic	4'T8	E	Sw	4	4	32	9	260	5	532	1245	365	0	365
21	3	Office	Recessed Parabolic	E	4'T8 U-Shaped	2	2	32	Sw	9	260	5	138	323	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	260	5	138	323	0	0	0
22	3	Bathroom	Recessed Parabolic	M	4'T12	1	2	40	Sw	9	260	12	92	215	T8	Recessed Parabolic	4'T8	E	OS	1	2	32	7	260	5	69	121	54	40	94
23	3	Clerks Office	Recessed Parabolic	M	4'T12	16	4	40	Sw	9	260	12	2,752	6,440	T8	Recessed Parabolic	4'T8	E	Sw	16	4	32	9	260	5	2128	4980	1460	0	1460
24	3	Hall	Recessed Parabolic	M	4'T8	10	2	32	Sw	9	260	5	690	1,615	N/A	Recessed Parabolic	4'T8	M	Sw	10	2	32	9	260	5	690	1615	0	0	0
25	3	Hall	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
26	3	Storage	Recessed Parabolic	E	4'T8	1	2	32	Sw	2	260	5	69	36	N/A	Recessed Parabolic	4'T8	E	Sw	1	2	32	2	260	5	69	36	0	0	0
27	3	Public Works	Recessed Parabolic	E	4'T8	8	2	32	Sw	8	260	5	552	1,148	N/A	Recessed Parabolic	4'T8	E	Sw	8	2	32	8	260	5	552	1148	0	0	0

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)
28	3	Office 1	Recessed Parabolic	E	4'T8	4	4	32	Sw	9	260	5	532	1,245	C	Recessed Parabolic	4'T8	E	OS	4	4	32	7	260	5	532	934	0	311	311
29	3	Office 2	Recessed Parabolic	E	4'T8	4	2	32	Sw	9	260	5	276	646	C	Recessed Parabolic	4'T8	E	OS	4	2	32	7	260	5	276	484	0	161	161
30	3	Plan Room	Recessed Parabolic	E	4'T8	8	2	32	Sw	8	260	5	552	1,148	N/A	Recessed Parabolic	4'T8	E	Sw	8	2	32	8	260	5	552	1148	0	0	0
31	3	Tax Office	Recessed Parabolic	E	4'T8	11	2	32	Sw	8	260	5	759	1,579	N/A	Recessed Parabolic	4'T8	E	Sw	11	2	32	8	260	5	759	1579	0	0	0
32	3	Rear Stair	Recessed Parabolic	M	4'T12 U-Shaped	2	2	40	Sw	8	260	12	184	383	T8	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	8	260	5	138	287	96	0	96
33	3	Bathroom Women	Recessed Parabolic	M	4'T12	1	4	40	Sw	9	260	12	172	402	T8	Recessed Parabolic	4'T8	E	OS	1	4	32	7	260	5	133	233	91	78	169
34	3	Bathroom Men	Recessed Parabolic	M	4'T12	1	4	40	Sw	9	260	12	172	402	T8	Recessed Parabolic	4'T8	E	OS	1	4	32	7	260	5	133	233	91	78	169
35	3	Code Enforcement	Recessed Parabolic	E	4'T8	4	2	32	Sw	9	260	5	276	646	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	9	260	5	276	646	0	0	0
36	3	Planning	Recessed Parabolic	E	4'T8	12	2	32	Sw	8	260	5	828	1,722	N/A	Recessed Parabolic	4'T8	E	Sw	12	2	32	8	260	5	828	1722	0	0	0
37	3	Planning	Recessed Parabolic	M	2'T12	2	4	20	Sw	8	260	6	172	358	T8	Recessed Parabolic	2'T8	E	Sw	2	4	17	8	260	2	140	291	67	0	67
38	3	Planning	Recessed Parabolic	M	4'T12 U-Shaped	1	2	40	Sw	8	260	12	92	191	T8	Recessed Parabolic	4'T8 U-Shaped	E	Sw	1	2	32	8	260	5	69	144	48	0	48
39	3	Office	Recessed Parabolic	E	4'T8	4	2	32	Sw	9	260	5	276	646	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	9	260	5	276	646	0	0	0
40	3	Office	Recessed Parabolic	M	4'T12	3	2	40	Sw	9	260	12	276	646	T8	Recessed Parabolic	4'T8	E	OS	3	2	32	7	260	5	207	363	161	121	283
41	3	Office 2	Recessed Parabolic	E	4'T8	4	2	32	Sw	9	260	5	276	646	C	Recessed Parabolic	4'T8	E	OS	4	2	32	7	260	5	276	484	0	161	161
42	3	Office 3	Recessed Parabolic	E	4'T8	4	2	32	Sw	9	260	5	276	646	C	Recessed Parabolic	4'T8	E	OS	4	2	32	7	260	5	276	484	0	161	161
43	3	Stair	Recessed Parabolic	E	4'T8	2	2	32	Sw	16	260	5	138	574	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	16	260	5	138	574	0	0	0
44	2	Finance	Recessed Parabolic	E	4'T8	4	2	32	Sw	8	260	5	276	574	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	8	260	5	276	574	0	0	0
45	2	Finance	Recessed Parabolic	E	4'T8	14	2	32	Sw	8	260	5	966	2,009	N/A	Recessed Parabolic	4'T8	E	Sw	14	2	32	8	260	5	966	2009	0	0	0
46	2	Storage	Recessed Parabolic	E	4'T8	4	2	32	Sw	2	260	5	276	144	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	2	260	5	276	144	0	0	0
47	2	Bathroom Men	Recessed Parabolic	E	4'T8	1	2	32	Sw	9	260	5	69	161	C	Recessed Parabolic	4'T8	E	OS	1	2	32	7	260	5	69	121	0	40	40
48	2	Bathroom Women	Recessed Parabolic	E	4'T8	1	2	32	Sw	9	260	5	69	161	C	Recessed Parabolic	4'T8	E	OS	1	2	32	7	260	5	69	121	0	40	40
49	2	Office	Recessed Parabolic	E	4'T8	6	2	32	Sw	9	260	5	414	969	N/A	Recessed Parabolic	4'T8	E	Sw	6	2	32	9	260	5	414	969	0	0	0
50	2	Hallway	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Exit Sign	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
51	2	Hallway	Recessed Parabolic	E	4'T8	11	2	32	Sw	9	260	5	759	1,776	N/A	Recessed Parabolic	4'T8	E	Sw	11	2	32	9	260	5	759	1776	0	0	0
52	2	Hallway	Recessed Parabolic	M	4'T12 U-Shaped	2	2	40	Sw	9	260	12	184	431	T8	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	260	5	138	323	108	0	108
53	2	Hallway	Ceiling Mounted	S	CFL	3	1	13	Sw	9	260	0	39	91	N/A	Ceiling Mounted	CFL	S	Sw	3	1	13	9	260	0	39	91	0	0	0
54	2	Attorney Office	Ceiling Mounted	E	4'T8	13	2	32	Sw	9	260	5	897	2,099	N/A	Ceiling Mounted	4'T8	E	Sw	13	2	32	9	260	5	897	2099	0	0	0

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)
55	2	Office	Ceiling Mounted	E	4'T8	4	2	32	Sw	9	260	5	276	646	C	Ceiling Mounted	4'T8	E	OS	4	2	32	7	260	5	276	484	0	161	161
56	2	Tax Collector	Ceiling Mounted	E	4'T8	17	2	32	Sw	8	260	5	1,173	2,440	N/A	Ceiling Mounted	4'T8	E	Sw	17	2	32	8	260	5	1173	2440	0	0	0
57	2	Business Office	Recessed Parabolic	E	4'T8	4	2	32	Sw	8	260	5	276	574	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	8	260	5	276	574	0	0	0
58	2	Bathroom	Recessed Parabolic	M	4'T12 U-Shaped	1	2	40	Sw	9	260	12	92	215	T8	Recessed Parabolic	4'T8 U-Shaped	E	OS	1	2	32	7	260	5	69	121	54	40	94
59	2	Bathroom	Recessed Parabolic	E	4'T8 U-Shaped	7	2	32	Sw	9	260	5	483	1,130	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	7	2	32	7	260	5	483	848	0	283	283
60	2	Mayor's Office	Recessed Parabolic	M	4'T12 U-Shaped	2	2	40	Sw	9	260	12	184	431	T8	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	260	5	138	323	108	0	108
61	2	Mayor's Office	Ceiling Mounted	S	Inc	4	1	60	Sw	9	260	0	240	562	CFL	Ceiling Mounted	CFL	S	Sw	4	1	20	9	260	0	80	187	374	0	374
62	2	Mayor's Office	Recessed Parabolic	M	4'T12	6	2	40	Sw	9	260	12	552	1,292	T8	Recessed Parabolic	4'T8	E	Sw	6	2	32	9	260	5	414	969	323	0	323
63	2	Office	Recessed Parabolic	M	4'T12	4	2	40	Sw	9	260	12	368	861	T8	Recessed Parabolic	4'T8	E	Sw	4	2	32	9	260	5	276	646	215	0	215
64	2	Office	Ceiling Mounted	S	Inc	3	1	50	Sw	9	260	0	150	351	CFL	Ceiling Mounted	CFL	S	Sw	3	1	15	9	260	0	45	105	246	0	246
65	2	Bathroom	Ceiling Mounted	S	Inc	3	1	40	Sw	9	260	0	120	281	CFL	Ceiling Mounted	CFL	S	OS	3	1	15	7	260	0	45	79	176	26	202
66	2	Mayor Office	Chandelier	S	Inc	1	11	10	Sw	9	260	0	110	257	CFL	Chandelier	CFL	S	Sw	1	11	5	9	260	0	55	129	129	0	129
67	2	Mayor Office	Spotlight	S	inc	3	1	60	Sw	9	260	0	180	421	CFL	Spotlight	CFL	S	Sw	3	1	20	9	260	0	60	140	281	0	281
68	2	Mayor Office Exit	Recessed Parabolic	M	4'T12 U-Shaped	2	2	40	Sw	9	260	12	184	431	T8	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	260	5	138	323	108	0	108
69	2	Mayor Office Exit	Ceiling Mounted	S	Inc	2	1	60	Sw	9	260	0	120	281	CFL	Ceiling Mounted	CFL	S	Sw	2	1	20	9	260	0	40	94	187	0	187
70	2	Mayor Office Exit	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
71	1	Stair	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
72	1	Stair	Recessed Parabolic	E	4'T8	1	2	32	PC	9	260	5	69	161	N/A	Recessed Parabolic	4'T8	E	PC	1	2	32	9	260	5	69	161	0	0	0
73	1	Lobby	Exit Sign	S	LED	11	1	5	N	24	365	1	61	530	N/A	Exit Sign	LED	S	N	11	1	5	24	365	1	61	530	0	0	0
74	1	Lobby	Recessed Parabolic	E	4'T8	2	2	32	Sw	8	260	5	138	287	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	8	260	5	138	287	0	0	0
75	1	Lobby	Ceiling Mounted	S	CFL	12	2	15	Sw	8	260	0	360	749	N/A	Ceiling Mounted	CFL	S	Sw	12	2	15	8	260	0	360	749	0	0	0
76	1	Older Adults	Recessed Parabolic	E	4'T8	6	2	32	Sw	9	260	5	414	969	N/A	Recessed Parabolic	4'T8	E	Sw	6	2	32	9	260	5	414	969	0	0	0
77	1	Older Adults	Recessed Parabolic	E	2'T8	4	4	17	Sw	9	260	2	280	655	N/A	Recessed Parabolic	2'T8	E	Sw	4	4	17	9	260	2	280	655	0	0	0
78	1	Office	Recessed Parabolic	E	4'T8	2	2	32	Sw	9	260	5	138	323	C	Recessed Parabolic	4'T8	E	OS	2	2	32	7	260	5	138	242	0	81	81
79	1	Office	Recessed Parabolic	M	4'T12 U-Shaped	2	2	40	Sw	9	260	12	184	431	T8	Recessed Parabolic	4'T8 U-Shaped	E	OS	2	2	32	7	260	5	138	242	108	81	188
80	1	Bathroom	Ceiling Mounted	S	Inc	1	1	60	Sw	9	260	0	60	140	CFL	Ceiling Mounted	CFL	S	OS	1	1	20	7	260	0	20	35	94	12	105
81	1	Storage	Recessed Parabolic	E	4'T8	4	2	32	Sw	2	260	5	276	144	N/A	Recessed Parabolic	4'T8	E	Sw	4	2	32	2	260	5	276	144	0	0	0

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)
82	1	Nurse	Recessed Parabolic	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
83	1	Hallway	Recessed Parabolic	M	2'T12	1	4	20	Sw	16	260	6	86	358	T8	Recessed Parabolic	2'T8	E	Sw	1	4	17	16	260	2	70	291	67	0	67
84	1	Hallway	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
85	1	Bathroom Men	Recessed Parabolic	E	4'T8	1	4	32	Sw	9	260	5	133	311	C	Recessed Parabolic	4'T8	E	OS	1	4	32	7	260	5	133	233	0	78	78
86	1	Bathroom Women	Recessed Parabolic	E	4'T8	1	4	32	Sw	9	260	5	133	311	C	Recessed Parabolic	4'T8	E	OS	1	4	32	7	260	5	133	233	0	78	78
87	1	Purchasing	Recessed Parabolic	E	4'T8	5	4	32	Sw	9	260	5	665	1,556	N/A	Recessed Parabolic	4'T8	E	Sw	5	4	32	9	260	5	665	1556	0	0	0
88	1	Purchasing	Recessed Parabolic	M	4'T12	1	2	40	Sw	8	260	12	92	191	T8	Recessed Parabolic	4'T8	E	Sw	1	2	32	8	260	5	69	144	48	0	48
89	1	IT Room	Recessed Parabolic	M	4'T12	1	4	40	Sw	8	260	12	172	358	T8	Recessed Parabolic	4'T8	E	Sw	1	4	32	8	260	5	133	277	81	0	81
90	1	IT Room	Recessed Parabolic	M	2'T12	1	4	20	Sw	8	260	6	86	179	T8	Recessed Parabolic	2'T8	E	Sw	1	4	17	8	260	2	70	146	33	0	33
91	1	Rec Office	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	260	5	621	1,292	C	Recessed Parabolic	4'T8	E	OS	9	2	32	6	260	5	621	969	0	323	323
92	1	Rec Office	Recessed Parabolic	E	4'T8	4	2	32	Sw	8	260	5	276	574	C	Recessed Parabolic	4'T8	E	OS	4	2	32	6	260	5	276	431	0	144	144
93	1	Lounge/Kitchen	Recessed Parabolic	E	4'T8	6	2	32	Sw	8	260	5	414	861	C	Recessed Parabolic	4'T8	E	OS	6	2	32	6	260	5	414	646	0	215	215
94	1	Nurse	Recessed Parabolic	E	4'T8	3	2	32	Sw	9	260	5	207	484	N/A	Recessed Parabolic	4'T8	E	Sw	3	2	32	9	260	5	207	484	0	0	0
95	1	Stair	Recessed Parabolic	M	4'T12	2	2	40	Sw	16	260	12	184	765	T8	Recessed Parabolic	4'T8	E	Sw	2	2	32	16	260	5	138	574	191	0	191
96	1	Nurse	Recessed Parabolic	E	4'T8	8	2	32	Sw	9	260	5	552	1,292	N/A	Recessed Parabolic	4'T8	E	Sw	8	2	32	9	260	5	552	1292	0	0	0
97	1	Nurse	Recessed Parabolic	E	4'T8 U-Shaped	2	2	32	Sw	9	260	5	138	323	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	260	5	138	323	0	0	0
98	1	Elevator Room	Recessed Parabolic	M	4'T12	1	2	40	Sw	2	260	12	92	48	T8	Recessed Parabolic	4'T8	E	Sw	1	2	32	2	260	5	69	36	12	0	12
99	1	Boiler Room	Recessed Parabolic	E	4'T8	10	2	32	Sw	2	260	5	690	359	N/A	Recessed Parabolic	4'T8	E	Sw	10	2	32	2	260	5	690	359	0	0	0
100	1	Records	Recessed Parabolic	E	4'T8	8	2	32	Sw	2	260	5	552	287	N/A	Recessed Parabolic	4'T8	E	Sw	8	2	32	2	260	5	552	287	0	0	0
101	1	Back Hallway	Recessed Parabolic	M	4'T12	1	2	40	Sw	9	260	12	92	215	T8	Recessed Parabolic	4'T8	E	Sw	1	2	32	9	260	5	69	161	54	0	54
102	Ext	Right Side	Wall Mounted	S	Inc	3	1	60	PC	16	260	0	180	749	CFL	Wall Mounted	CFL	S	PC	3	1	20	16	260	0	60	250	499	0	499
103	Ext	Right Side	Wall Mounted	S	HPS	2	1	150	T	16	260	30	360	1,498	PSMH	Wall Mounted	PSMH	S	T	2	1	100	16	260	20	240	998	499	0	499
104	Ext	Back	Wall Mounted	S	HPS	1	1	150	T	16	260	30	180	749	PSMH	Wall Mounted	PSMH	S	T	1	1	100	16	260	20	120	499	250	0	250
105	Ext	Left	Wall Mounted	S	HPS	1	1	150	T	16	260	30	180	749	PSMH	Wall Mounted	PSMH	S	T	1	1	100	16	260	20	120	499	250	0	250
106	Ext	Front	Wall Mounted	S	MH	1	1	150	T	16	260	42	192	799	PSMH	Wall Mounted	PSMH	S	T	1	1	100	16	260	20	120	499	300	0	300
107	Ext	Front	Wall Mounted	S	Inc	6	1	60	T	16	260	0	360	1,498	CFL	Wall Mounted	CFL	S	T	6	1	20	16	260	0	120	499	998	0	998
108	Ext	Front	Wall Mounted	S	Inc	2	1	60	T	16	260	0	120	499	CFL	Wall Mounted	CFL	S	T	2	1	20	16	260	0	40	166	333	0	333
Totals:						487	241	4,049				734	38,918	91,836						487	241				484	34,470	76,669	12,188	2,978	15,166

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

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	28,777		
Average Power Cost ($/kWh)	0.1830		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	6,540	3,411	**3,128**
Exterior Power (watts)	1,572	820	**752**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	85,296	73,258	**12,038**
Lighting Power (watts)	37,346	33,650	**3,696**
Lighting Power Density (watts/SF)	1.30	1.17	**0.13**
Estimated Cost of Fixture Replacement ($)	16,041		
Estimated Cost of Controls Improvements ($)	5,200		
Total Consumption Cost Savings ($)	**5,039**		

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 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

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
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

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
Con Edison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation New Energy, 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

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
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. 112 Main St. 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
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

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.

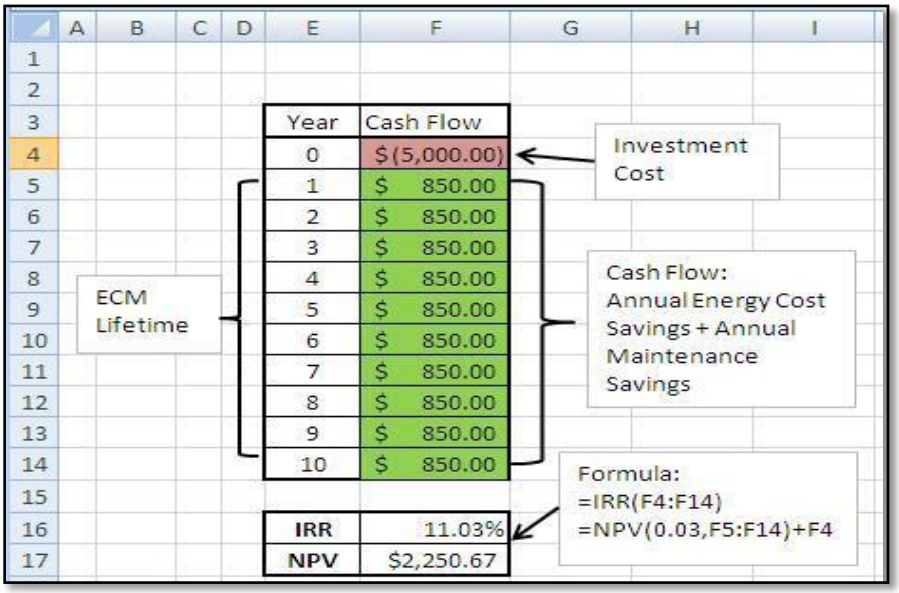
Calculation References

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.

Annual Solar PV Cost Savings Breakdown				
Rated Capacity (kW)	30.0			
Rated Capacity (kWh)	35,400			
Annual Capacity Loss	0%			
Year	kWh Capacity	Installed Cost	Incentives	Electric Savings ($)
0		$210,000	$22,500	
1	35,400		$21,000	$5,583
2	35,400		$21,000	$5,583
3	35,400		$21,000	$5,583
4	35,400		$21,000	$5,583
5	35,400		$21,000	$5,583
6	35,400		$21,000	$5,583
7	35,400		$21,000	$5,583
8	35,400		$21,000	$5,583
9	35,400		$21,000	$5,583
10	35,400		$21,000	$5,583
11	35,400		$21,000	$5,583
12	35,400		$21,000	$5,583
13	35,400		$21,000	$5,583
14	35,400		$21,000	$5,583
15	35,400		$21,000	$5,583
16	35,400		$0	$5,583
17	35,400		$0	$5,583
18	35,400		$0	$5,583
19	35,400		$0	$5,583
20	35,400		$0	$5,583
21	35,400		$0	$5,583
22	35,400		$0	$5,583
23	35,400		$0	$5,583
24	35,400		$0	$5,583
25	35,400		$0	$5,583
	kWh	Cost	Saving	
Lifetime Total	**885,000**	**($210,000)**	**$337,500**	**$139,579**

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 - City Hall

Building ID: 2289063
For 12-month Period Ending: April 30, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 07, 2010

Facility
City of Orange Township - City Hall
29 North Day Street
Orange, NJ 07050

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1913
Gross Floor Area (ft²): 28,777

Energy Performance Rating[2] (1-100) 66

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,024,142
Natural Gas (kBtu)[4]	1,729,007
Total Energy (kBtu)	2,753,149

Energy Intensity[5]

Site (kBtu/ft²/yr)	96
Source (kBtu/ft²/yr)	182

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	248

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	115
National Average Source EUI	219
% Difference from National Average Source EUI	-17%
Building Type	Office

Stamp of Certifying Professional

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
N/A

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

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** 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: 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 one beverage and one Snacks vending machine energy miser in Break Room	none at this time	258	2,536	1	0	0	0	464	12	5,569	0.6	2,059	172	180	4,173	4,541
	2	Upgrade 32 incandescent fixtures and # of other fixtures to CFLs	none at this time	1,057	3,691	1	0	0	1,106	1,782	5	8,909	0.6	743	149	167	6,838	6,608
	3	Upgrade 5 Metal Halide (MH) fixtures to pulse start MH	125	3,060	1,298	0	0	0	489	726	15	10,893	4.2	256	17	23	5,315	2,324

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
5-10 Year Payback	4	Upgrade 94 T12 fixtures and # of other fixtures to T8 fixtures	1,410	11,924	7,199	2	0	1	668	1,986	15	29,784	6.0	150	10	14	11,085	12,891
	5	Replace 1 std eff motor for Hydraulic Pump with Premium eff	130	1,870	1,693	1	0	0	0	310	20	6,196	6.0	231	12	16	2,573	3,031
	6	Install 30 kW Solar Photovoltaic system	22,500	187,500	35,400	30	0	0	0	26,583	25	664,579	7.0	254	10	12	149,900	63,384
	7	Install 26 occupancy sensors	520	5,200	2,978	1	0	0	0	545	15	8,176	9.5	57	4	6	1,176	5,333

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 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.