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Local Government Energy Program
Energy Audit Final Report

Borough of West Cape May

Municipal Hall
732 Broadway
West Cape May, 08204

Project Number: LGEA75

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EXECUTIVE SUMMARY

The West Cape May Municipal Hall is a single-story building comprising a total conditioned floor area of 11,125 square feet. The original structure was built in 1977, and renovated for ADA compliance in 2007. 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	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	97,390	3,105	N/A	$21,274	57.8	643
Proposed	71,052	2,480	N/A	$11,710	44.0	490
Savings	26,337	625	N/A	$9,563*	13.7	152
% Savings	27%	20%	N/A	45%	24%	24%
Renewables	51,278	Includes SRECs		$29,929	15.7	175
*Includes operation and maintenance savings						

There may be energy procurement opportunities for the West Cape May Municipal Hall to reduce annual utility costs, which are $1,853 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Municipal Hall in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. The resulting Site Energy Use Intensity is 58.0kBtu/sq ft yr, which is better than the average comparable building by 19%.

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	$7,822	1.3	$10,531	45,547
5-10 Year	$1,741	7.1	$12,297	8,499
Total	$9,563	2.4	$22,828	54,046
Renewables	$29,929	6.9	$196,692	91,812

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 4 cars from the roads each year or the equivalent of planting 132 trees to offset the annual CO2 emissions generated.

Further Recommendations: Other recommendations to increase building efficiency pertaining to capital improvements and operations and maintenance are (with additional information in the Proposed Further Recommendations section):

- Capital Improvements
  - Install NEMA Premium motors when replacements are required
  - Consider replacing the emergency generator when it has become unreliable
  - Replace storage and bathroom exhaust fans
- Operations and Maintenance
  - Thoroughly and evenly insulate space above the ceiling tiles and plug all ceiling penetration

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly
- Provide weather-stripping/air-sealing
- Remove insect nesting from around the building soffits to prevent infestation and for occupant safety
- Provide water-efficient fixtures and control
- Change filters on rooftop package units monthly to ensure efficient operation

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for West Cape May. Based on the requirements of the LGEA program, West Cape May 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 $1,856 (or 25% of $7,424).

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that the Borough of West Cape May can take to achieve greater energy efficiency and reduce operating expenses.

Table 3: Next Steps for the Municipal Hall

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Upgrade Space Temperature Control with (6) Programmable Thermostats	N/A
Install (2) Beverage Vending Machine Energy Misers	Direct Install
Replace (10) Incandescent Exit Signs with LED Type	Smart Start, Direct Install
Replace (37) Incandescent Bulbs with CFL Type	N/A
Install (4) Demand-Controlled Ventilation Systems	N/A

There are various incentive programs that the West Cape May could apply for that could help lower the cost of installing the ECMs. For the Municipal Hall, and contingent upon available funding, SWA recommends the following incentive programs:

There are various incentive programs that the Borough of West Cape May could apply to lower the installed ECM costs. SWA recommends the following programs, contingent upon available funding:

- **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**: Most of energy savings 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. For each 1,000 kWh generated by PV renewable energy, receive a credit between $475 and $600. Also, receive up to $3.20/kWh toward installation cost for a Wind System.
- **Utility Sponsored Programs**: See available programs with South Jersey Gas http://www.southjerseygas.com/108/energy_efficiency_residential.html and Atlantic City Electric http://www.atlanticcityelectric.com/energy/blueprint/
- **Energy Efficiency and Conservation Block Grant Rebate Program**: Provides up to $20,000 per local government toward energy saving measures; http://njcleanenergy.com/EECBG

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, West Cape May 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 Municipal Hall at 732 Broadway, West Cape May, 08204. The process of the audit included a facility visit on July 19, 2010, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Borough of West Cape May to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Municipal Hall.

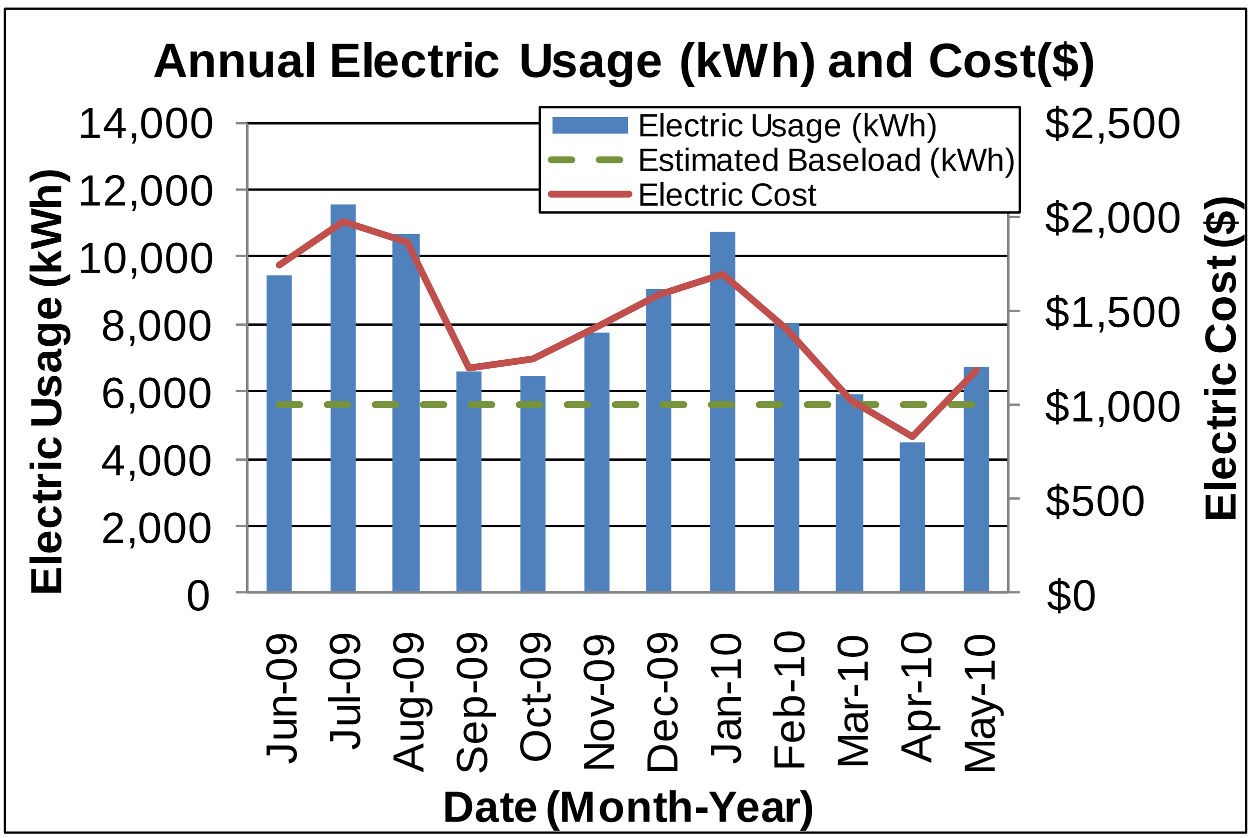
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from June 2008 through May 2010 that were received from the utility companies supplying the Municipal 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 Municipal Hall is currently served by one electric meter. This meter also serves the Public Works building without sub-meters for each building. Therefore, the usage of each building was estimated based on square footage compared to the total usage. Also, the renewable PV system contribution of approximately 7.4% is included. Using this method, the Municipal Hall currently buys electricity from Atlantic City Electric at **an average aggregated rate of $0.176/kWh**. The Municipal Hall purchased **approximately 97,390 kWh, or $17,138 worth of electricity,** in the previous year. The average monthly demand was 40.0 kW and the annual peak demand was 53.6 kW.

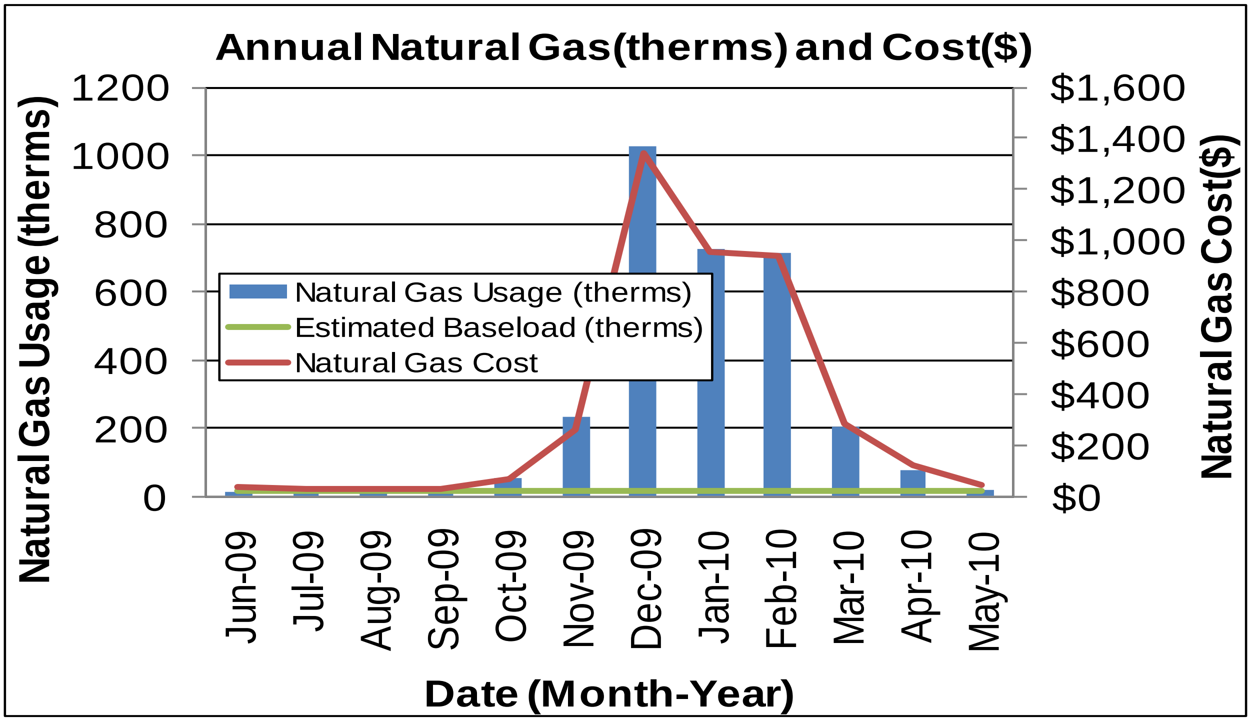
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate base-load or minimum electric usage required to operate the Municipal Hall. The Municipal Hall is billed net usage after accounting for PV contribution which represents approximately 10%.

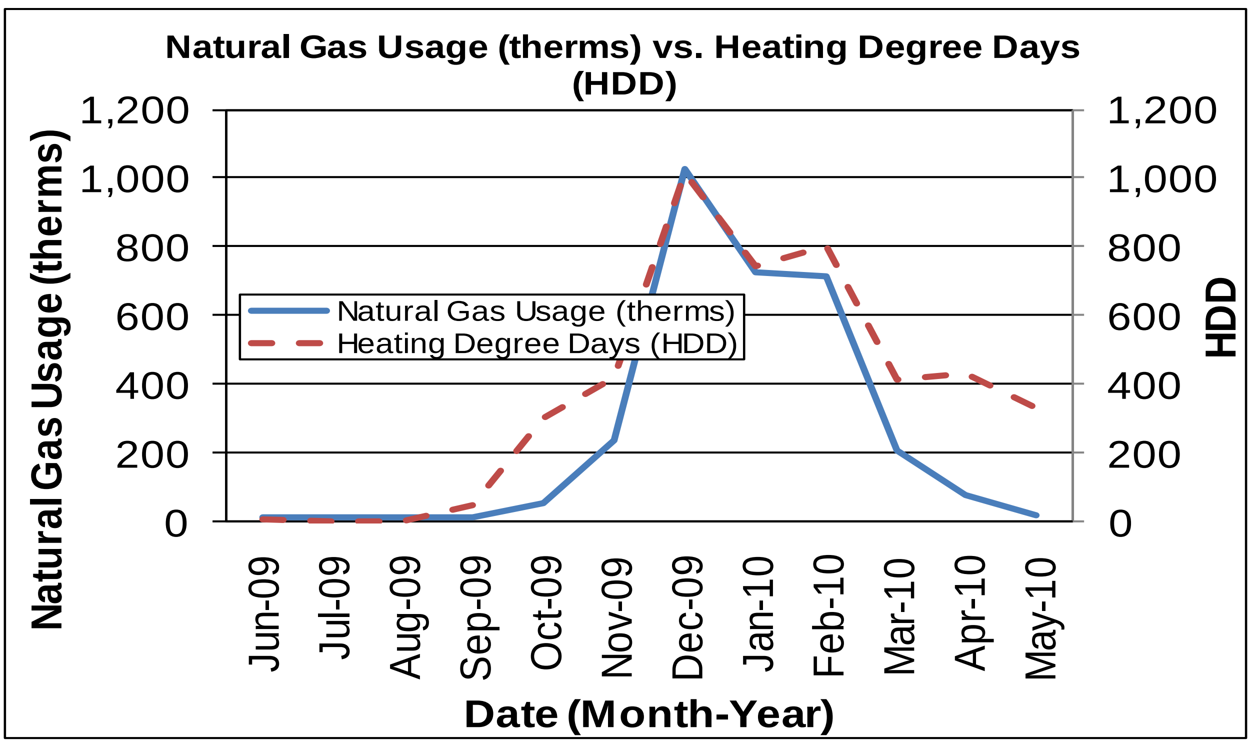


Natural gas - The Municipal Hall is currently served by one meter for natural gas. The Municipal Hall currently buys natural gas through the county cooperative purchasing contract from South

Jersey Gas (who transports the natural gas, while Woodruff Energy is the commodity supplier) at **an average aggregated rate of $1.332/therm**. The Municipal Hall purchased **approximately 3,105 therms, or $4,136 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 base-load or minimum natural gas usage required to operate the Municipal Hall.

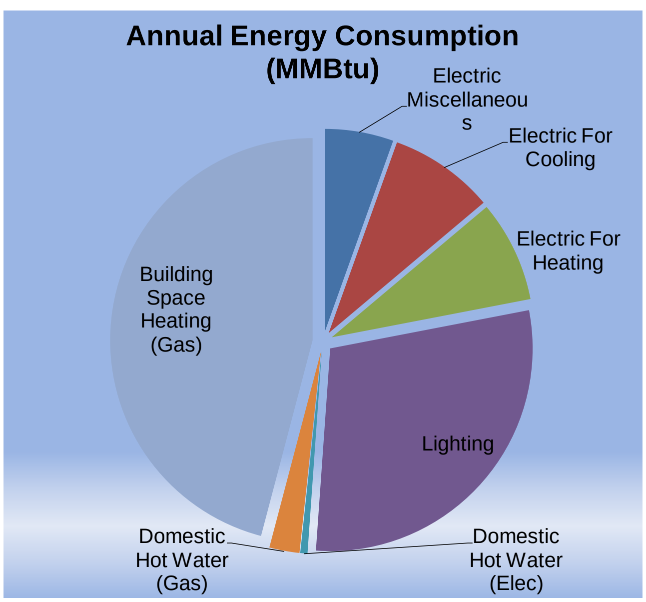


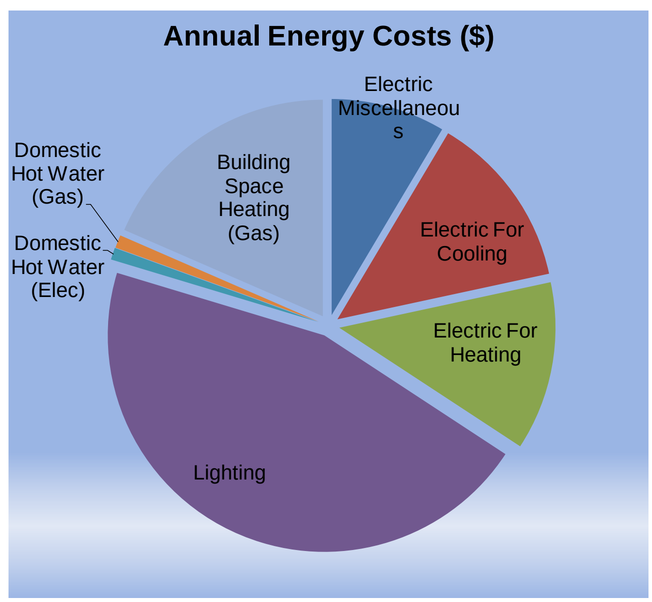


The previous chart shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the 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 Municipal Hall based on utility bills for the 12 month period. Note: electrical cost at $52/MMBtu of energy is 4 times as expensive as natural gas at $13/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	35	5%	$1,817	9%	52
Electric For Cooling	54	8%	$2,783	13%	52
Electric For Heating	52	8%	$2,685	13%	52
Lighting	187	29%	$9,663	45%	52
Domestic Hot Water (Elec)	4	1%	$190	1%	52
Domestic Hot Water (Gas)	15	2%	$206	1%	13
Building Space Heating	295	46%	$3,930	18%	13
Totals	643	100%	$21,274	100%	
Total Electric Usage	332	52%	$17,138	81%	52
Total Gas Usage	310	48%	$4,136	19%	13
Totals	643	100%	$21,274	100%	



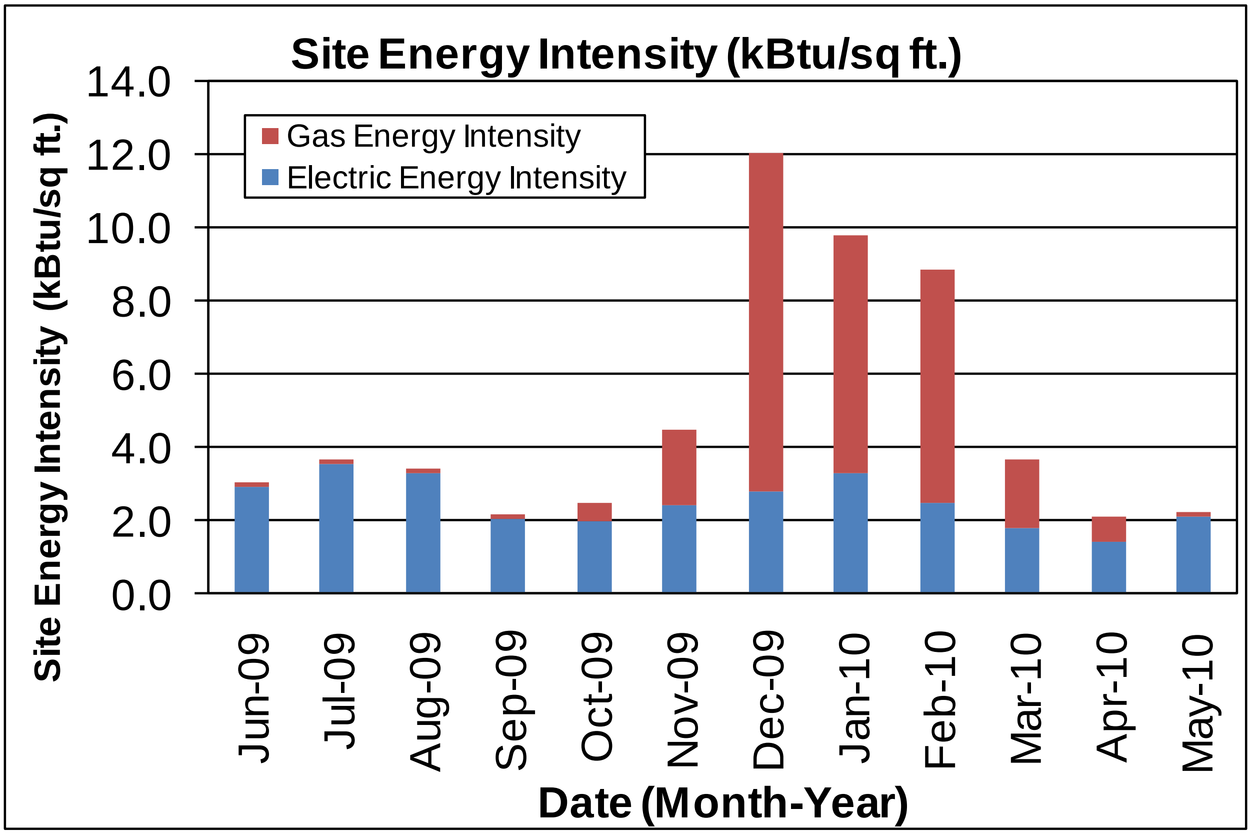


Energy benchmarking

SWA has entered energy information about the Municipal Hall in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. This facility is categorized as mainly an "Office" space type and its rating is 68. The Site Energy Use Intensity is 58.0kBtu/sq ft yr compared to the national average of an office building consuming 71.0kBtu/sq ft yr. See ECM section for guidance on how to improve the building's rating.

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

Buildings achieving an Energy Star rating of 75 or higher and professionally verified to meet current indoor environmental standards are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance to taxpayers and employees. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification to the United States Green Building Council (USGBC).



Per the LGEA program requirements, SWA has assisted the Borough of West Cape May to create an ENERGY STAR® Portfolio Manager account and share the Municipal 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 Borough of West Cape May (user name of “westcapemay” with a password of “westcapemay”) 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.

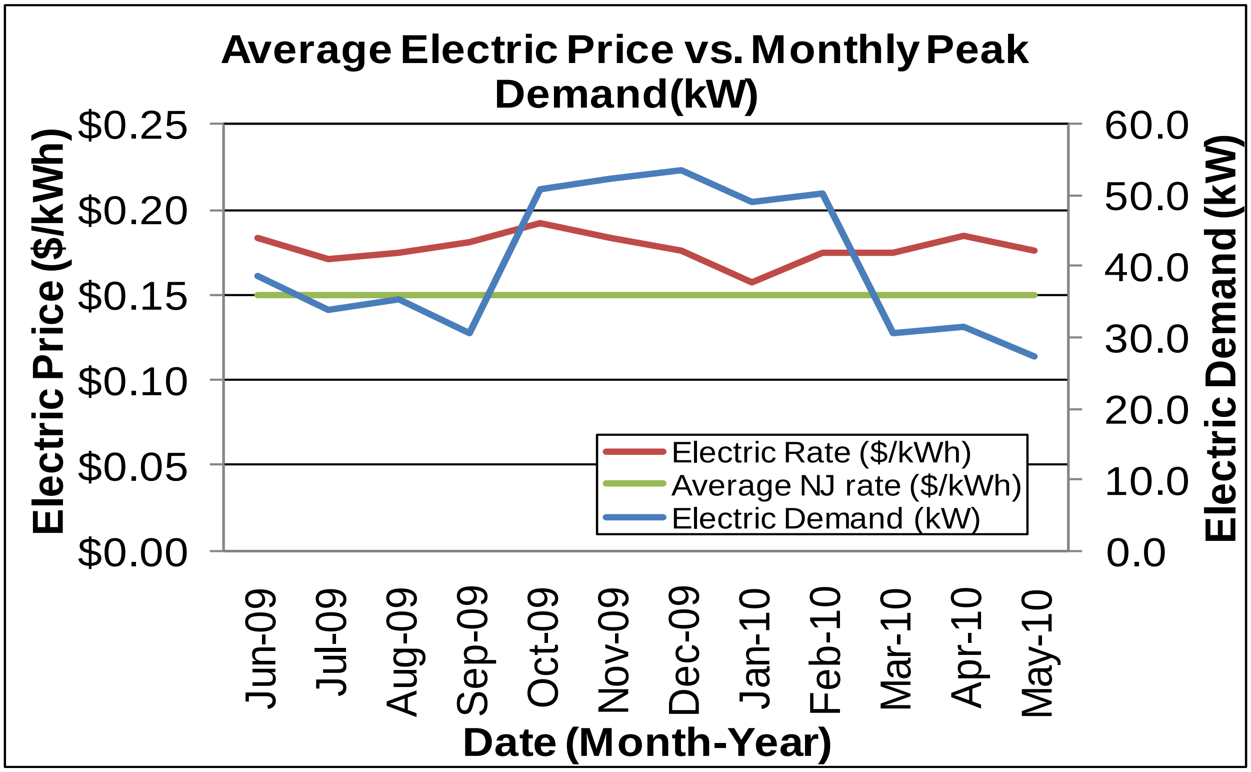
Tariff analysis is performed to determine if the rate that a building is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the furnace 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 building is paying a general service rate for natural gas. Demand is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. The building is direct metered and currently purchases electricity at a general service rate for usage with an additional charge for electrical demand factored into each monthly bill. The general service rate for electric charges is market-rate based on usage and demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

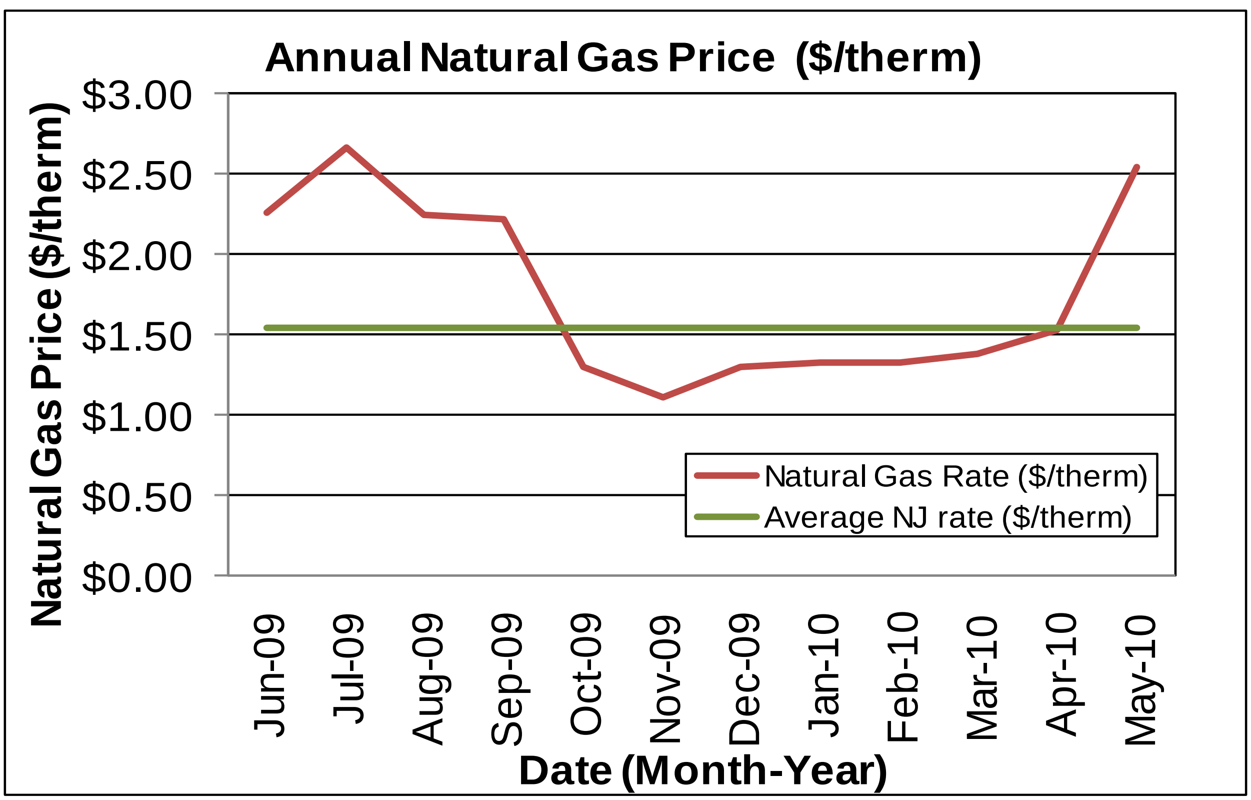
Energy Procurement strategies

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 Municipal Hall pays a rate of $0.176/kWh. The Municipal Hall annual electric utility costs are $2,530 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 18% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Municipal Hall pays a competitive rate of $1.332/therm. Natural gas bill analysis shows fluctuations up to 62% over the most recent 12 month period.



Utility rate fluctuations may have been caused by adjustments between estimated and actual meter readings; others may be due to unusual high and recent escalating energy costs.

SWA recommends that the Municipal 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 Municipal Hall. Appendix C contains a complete list of third-party energy suppliers for the Borough of West Cape May 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 the visit from SWA on Monday, July 19, 2010, the following data was collected and analyzed.

Building Characteristics

The single-story, 11,125 square foot West Cape May Municipal Hall was originally built in 1977. The building was renovated for ADA compliance in 2007. It houses the municipal offices, storage spaces, a boiler room, the municipal court/multipurpose room, a police substation, meeting rooms, public exhibits, the City Clerk, the Finance Department, the Water Department and Tax/Planning/Zoning offices.


Southeast Façade and Main Entrance


Northeast Façade


Northwest Façade and Rear Entrance


Southwest Facing Façade

Building Occupancy Profiles

There are approximately 15 occupants (6-8 in the Municipal section and 4-10 in the Police Station) in the building at any one time. The Municipal Administration works Monday through Friday 8:00am to 3:00pm. A Zoning official works a couple of hours Saturday morning. The Police Station has 22 officers and it is a 24 hrs/7 day operation. One Police employee may be in the building at any one time during the night shift and weekends. Police Dispatch is shared with Cape May and Cape May Point and operating out of a different location. Court is in session the 1st and 3rd Thursday of every month during the morning hours: 9:00am to 12:00pm and averages 20 visitors. The multipurpose/Court room is used on the average one day/week, mainly during the summer or 10 weeks a year for activities such as: the Farmers' Market, Summer Camp and Blood Drive. Another three days a month it is used for Planning Board and other evening meetings.

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 cedar wood siding accents, over concrete block with 1¾ inch of rigid insulation. The interior is mostly painted CMU (Concrete Masonry Unit).

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

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

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

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

Efflorescence on brick and masonry walls indicate moisture presence within the wall cavity (Up close picture of image on left)

Insect nesting in exterior wall cracks and cavities

Insect nesting in exterior wall cracks and cavities

Roof

The building's roof is predominantly a flat, no parapet type over steel decking, with a dark-colored EPDM Firestone rubber finish. It was replaced approximately 10 years ago. Three and two tenths inches of rigid attic/ceiling insulation was recorded.

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

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

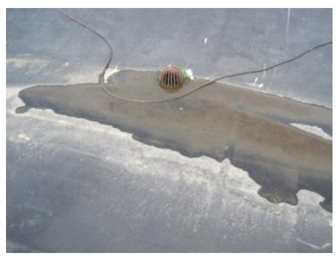
The following specific roof problem spots were identified:


Cap removed from drainage pipe


Vegetation growth on roof and standing water


Cap removed from drainage pipe


Rusted and broken exhaust pipe can damage rubber roof finish


Vegetation growth on roof and puddles


No drainage route for condensate pipe

Base

The building's base is composed of a slab-on-grade floor with a perimeter footing with poured concrete foundation walls and slab edge/perimeter insulation.

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

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues neither visible on the interior nor exterior.

Windows

The building contains basically one type of window:

- 29 casement type windows with an aluminum clad frame, tinted low-E/gas-filled, double glazing and interior mini blinds. The windows are located throughout the building and are original/have never been replaced.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in good condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

The following specific window problem spots were identified:

Window obstructed from totally closing

Exterior doors

The building contains two different types of exterior doors:

- Two French metal type exterior doors. They are located in the front of the building, on the west façade and the south façade, and are original/have never been replaced.

- Three metal type exterior doors. They are located on the south façade and west façade, and are original/have never been replaced

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in acceptable/ age appropriate 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:

Missing/worn weather-stripping

Building air-tightness

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

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

Mechanical Systems

Heating Ventilation Air Conditioning

The Municipal Hall is heated/cooled by four rooftop package units and associated distributive ducts. One cast iron sectional boiler and associated hydronic terminal units serve as back-up. A comprehensive Equipment List can be found in Appendix A.

Equipment

The Municipal Hall is heated/cooled by four rooftop package units (RTU). Three are capable of providing 7.5 tons of refrigeration each, with the multipurpose/Court room unit having a 20 ton refrigeration capacity.

The multipurpose/Court room unit uses an electric heater to heat the air, has a 9.7 EER condenser, is in satisfactory condition and has an estimated 50% remaining service life. Of the three other units, one serves the right side of the building, mirrored by a similar unit serving the left side of the building and another unit serving the police station in the rear of the building. The package units are in satisfactory condition with no significant complaints from the building occupants. The three smaller units have 80-82% efficient gas fired furnaces and a 8.9-11.0 EER condensers, with an estimated 40% remaining service life.

Each of the three smaller rooftop units contain a natural gas burner for heating and a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. The burner provides heat to the passing air through the combustion of natural gas; for cooling the R-22 refrigerant absorbs heat from the passing air in the evaporator coil and transfers the heat to the atmosphere in the condenser.

One of three smaller RTUs

The multipurpose/Court room unit

A Weil-McLain 480MBtu/hr cast iron sectional boiler, original to the building, provides hot water to several radiant heaters along the perimeter of the building and convectors. It has been mothballed and designated for back-up for the last couple of years. In 1980 it was converted to a natural gas fired boiler from an oil fired boiler. The boiler is now beyond its expected service life however SWA does not recommend replacement since it serves only as backup.

The Weil-McLain 480MBtu/hr cast iron sectional boiler

Several electric cabinet heaters and unit heaters serve to heat vestibules and mechanical/storage spaces. They are operating beyond their expected service lives.

Perimeter hydronic heater (not in use)

Electric cabinet heater

The various spaces of the building are provided ventilation by outside air intake louvers on the rooftop units. The outside air louvers are motorized to allow economizer efficient operation when the outside air conditions are favorable. Bathroom exhaust fans also help ventilate the building. They are operating beyond their expected service lives.

Distribution Systems

A typical rooftop unit arrangement draws in fresh air and brings it into a mixing box, where it is combined with return air from the building. A small portion of the return air is purged and vented outside prior to entering the mixing box. The mixed air inside the air handler is sent through a filter before passing through the evaporator or direct expansion (DX) coil. The air handler fan then pushes the air through the furnace (or electric heater coil in case of the multipurpose/Court room unit) section before the conditioned air is distributed into the building spaces. The furnace (or heating coil) is only active in the heating season and the DX system is only active in the cooling season. In between these seasons neither system may operate and only the blower will be active to provide fresh air to the building.

The Municipal Hall has a Variable Air Volume (VAV) system, using VAV boxes throughout the ductwork system. A VAV box has a modulating damper within the ductwork to adjust the amount of supply air to satisfy the temperature settings of the room/rooms that it serves. The VAVs are direct digital control. The ducts are insulated on the inside for heat and noise abatement.

Controls

The heating and cooling equipment is controlled by manual and programmable thermostats. The programmable thermostats are not optimized to the building schedules and setbacks.

Manual and programmable in the building

Domestic Hot Water

The domestic hot water (DHW) for the Municipal Hall office area is provided by an electric heated A O Smith Permaglas III, PEC 52 gal storage with 2 electric coil heating elements, each 4500 Watts. It has an estimated Energy Factor efficiency of 0.83. This DHW Heater appears in satisfactory condition however it is operating beyond its expected service life.

Gas fired 75 gal DHW Heater serving the police station (to the right)

Electric heated 52 gal DHW Heater serving the municipal office area (below)

The DHW for the police station is provided by a natural gas heated Bradford White, Hydrojet MI75 S6BN12 with 75 gal storage. It has an estimated Energy Factor efficiency of 0.61. This DHW Heater appears in satisfactory condition and has a remaining estimated 70% service life.

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 Municipal Hall currently contains T12, T8 fixtures and ceiling mounted incandescent. Approximately 50% of fluorescent fixtures have been converted to electronic ballasts. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas. There are some concerns with both interior and exterior visibility in a few places.

Compact Fluorescent and Incandescent bulbs on bathroom fixture

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

Typical incandescent Exit Signs seen throughout the building

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp and CFL fixtures. Exterior lighting is controlled by timers. Electric power to parking lights is compromised with some out of operation since underground cables were not run in conduits and have deteriorated.

Wall Mounted Metal Halide Exterior and Parking lot lights


Landscape lighting with CFLs

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 Municipal Hall does not have an installed elevator.

Other electrical systems

There are not currently any significant energy-impacting electrical systems installed at the Municipal Hall, except for an Onan 30 kW/37.5 kVA emergency generator backup operated on propane. The Municipal Hall purchased $173 worth of propane last year from Modern Gas. The generator appears in satisfactory condition however it is operating beyond its expected service life. Also, the incoming power main transformer owned/maintained by Atlantic City Electric appears in satisfactory condition.

Incoming power main transformer

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 is a 7.5 kW rooftop PV renewable energy system with a SunPower solar inverter installed in the building. The SunPower Solar Electric System consists of 36 panels, each 210 Watts/panel and a SPR-3300x Inverter. The system was installed by Energy Enterprises in mid 2008, has a remaining estimated 90% service life and is administered through the State energy credit program.

SunPower PV Solar Monitor

Rooftop mounted 7.5 kW PV system

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 Municipal Hall is a good candidate for a 30 kW Solar Panel installation. See ECM# 9 for details.

Solar Thermal Collectors

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

Wind

The Municipal Hall is a good candidate for wind power generation due to favorable wind conditions in this area of New Jersey.

The Municipal Hall may be a potential candidate for wind power generation due to favorable general wind conditions in this area of New Jersey and available roof space. Wind energy can contribute up to 14.7% of the current annual electric usage based on a 7.5 kW Wind turbine installation. See ECM# 5 for details.

Geothermal

The Municipal 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 40% to 50% remaining useful lives.

Combined Heat and Power

The Municipal 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 base-load 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 Recommended 0-5 Year Payback ECMs
1	Upgrade Space Temperature Control with (6) Programmable Thermostats
2	Install (2) Beverage Vending Machine Energy Misers
3	Replace (10) Incandescent Exit Signs with LED Type
4	Install (37) New CFL Fixtures
5	Install 7.5 kW Wind Rooftop System
6	Install (4) Demand-Controlled Ventilation Systems
7	Install (5) Lighting Occupancy Sensors
ECM#	**Description of Recommended 5-10 Year Payback ECMs**
8	Install (3) New Pulse Start Metal Halide Fixtures
9	Install a 30 kW Solar Photovoltaic Rooftop System
10	Install (43) New T8 Fixtures
11	Replace (1) Electric DHW Heater with an ENERGY STAR® Natural Gas Condensing Model

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

ECM#1: Upgrade Space Temperature Control with (6) Programmable Thermostats

During the field audit, SWA completed a building HVAC controls analysis and observed spaces in the building where temperature is manually controlled without setbacks to reduce energy consumption during unoccupied periods of time, such as evenings and weekends. Programmable thermostats offer an easy way to save energy when correctly used. By turning the thermostat setback 10-15 degrees F for eight hours at a stretch (at night), the heating bill can be reduced substantially (by a minimum of 10% per year). In the summer, the cooling bill can be reduced by keeping the conditioned space warmer when unoccupied, and cooling it down only when using the space. The savings from using a programmable thermostat is greater in milder climates than in more extreme climates. Temperature settings and time periods should be checked and optimized for spaces that have already been retrofitted with programmable thermostats. 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: $1,002 (includes $451 of labor)
Source of cost estimate: RS Means; Published and established costs; Similar projects

Economics:

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 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
1,002	none at this time	1,002	4,248	0	295	4	1,167	2,307	12	27,685	0.4	2,663	222	230	21,018	10,857

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 40 min/wk to make manual adjustments vs. installed programmable thermostats. SWA assumed that temperatures would be setback based on the operation schedule of the building and used ENERGY STAR® site: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=TH , Excel spreadsheet for Savings Calculator as well as assumed a conservative 10% savings of heating/cooling loads when systems are operating per pre-agreed settings.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#2: Install (2) Beverage Vending Machine Energy Misers

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

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.

Installation cost:

Estimated installed cost: $508 (Includes $152 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
508	none at this time	508	3,200	0	0	1	0	633	12	7,597	0.8	1,396	116	125	5,542	5,730

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:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#3: Replace (10) Incandescent Exit Signs with LED Type

During the field audit, SWA completed a building lighting inventory (see Appendix B). SWA observed that the building contains a number of incandescent Exit signs. SWA recommends replacing these with LED type. Replacing existing Exit signs with LED Exit signs can result in lower kilowatt-hour consumption, as well as lower maintenance costs. Since Exit signs operate 24 hours per day, they can consume large amounts of energy. In addition, older Exit signs require frequent maintenance due to the short life span of the lamps that light them. LED Exit sign last at least 5 years. In addition, LED Exit signs offer better fire code compliance because they are maintenance free in excess of 10 years. LED Exit signs are usually brighter than comparable incandescent or fluorescent signs, and have a greater contrast with their background due to the monochromatic nature of the light that LEDs emit. 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: $1,305 (Includes $848 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
1,505	200	1,305	3,022	1	0	1	893	1,425	15	21,375	0.9	1,538	103	109	14,984	5,411

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 8 hr/yr to replace aging burnt out lamps/ballasts vs. newly installed and included this with the annual savings.

Rebates/financial incentives:

- NJ Clean Energy - LED Exit Signs ($20 per fixture) - Maximum incentive amount is $200.

Please see Appendix F for more information on Incentive Programs.

ECM#4: Install (37) New CFL Fixtures

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: $1,916 (Includes $1,437 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
1,916	none at this time	1,916	3,847	1	0	1	1,121	1,798	5	8,990	1.1	369	74	90	6,077	6,888

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 30 hrs/yr to replace aging burnt out lamps/fixtures vs. newly installed.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#5: Install 7.5 kW Wind Rooftop System

Wind power production may be applicable for the Municipal Hall location, because of the thermal winds generated in the area. Currently, the Municipal Hall does not use any renewable energy systems. Updated renewable energy systems such as “magnetic” vertical axis wind turbines (MVAWT) can be mounted on building roofs 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, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility’s cost to provide enough electricity at that given time. Wind systems not only offset the amount of electricity use by a building, but also reduce the building’s electrical demand, resulting in a higher cost savings as well. SWA presents below the economics of installing a 7.5 kW Wind system to offset electrical demand for the building and reduce the annual net electric consumption for the building, however there are insufficient guaranteed incentives for NJ rebates at this time for this investment. The Municipal Hall is not eligible for a 30% federal tax credit. The Municipal Hall may consider applying for a grant and/or engage a Wind Power generator/leaser who would install the Wind system and then sell the power at a reduced rate.

There are many possible locations for a 7.5kW Wind system installation on top of the building ample roof area. The supplier would need to first determine via recorded analysis at the proposed location(s) consistency and wind speeds available. Area winds of 10 mph will run turbines smoothly and capture the needed power. This is a roof-mounted wind turbine (used for generating electricity) that spins around a vertical axis like a merry-go-round instead of like a windmill, as do more traditional horizontal axis wind turbines (HAWTs). A typical 7.5 kW MVAWT wind system has a 20 ft diameter turbine by 10 ft tall.

The installation of a renewable Wind power generating system could serve as a good educational tool and exhibit for the community. **It is very important that Wind measurements and recordings are taken at the chosen location for at least a couple of months to assure that sufficient wind and speed is available for proper operation and to meet incentive requirements. Also, roof structural support should be checked by a structural engineer to ensure that it is adequate for a Wind System installation.**

Installation cost:

Estimated installed cost: $9,192 (includes $15,000 of labor)
Source of cost estimate: Similar projects

Economics (with incentives):

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 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
60,000	50,808	9,192	15,878	7.5	0	4.9	0	2,699	25	67,479	3.4	634	25	29	35,638	28,429

Assumptions: SWA estimated the cost and savings of the system based on past wind projects. SWA projected physical dimensions based on a 7.5 kW-Enviro Energies turbine system. **SWA assumes that the relatively low height (~43 ft) compared to the taller horizontal axis turbines is acceptable to the NJ BPU as long as the average documented annual wind speed is 11 mph at the hub.**

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive at this time only for vertically spinning high altitude turbines
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Wind Upfront Incentive Program, Expected performance buy-down (EPBB) is modeled on an annual kWh production of 1-16,000 kWh for a $3.20/kWh upfront incentive level. This has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#6: Install (4) Demand-Controlled Ventilation Systems

On the day of the site visit, SWA observed that there were not any air flow controls based on occupancy. SWA recommends that carbon dioxide sensors be installed (in return air ducts) to sense occupancy and improve Indoor Air Quality (IAQ). Signals from these sensors need to be taken back to the HVAC air flow controls for programming to regulate the amount of cooling and heating for these spaces and vary air flows according to occupancy. Thus, many a time when these spaces are sparsely occupied, savings will be realized in the heating and cooling of these spaces, by bringing into the spaces the right amount of fresh air (rather than too much unconditioned air).

Demand controlled ventilation (DCV) is the process of automatically modulating the rate of outdoor air supply (i.e., rate of ventilation) as the "demand" or need for ventilation varies. The objective is to keep ventilation rates at or above design specifications and code requirements and also to save energy by avoiding excessive ventilation rates, as energy is normally required to heat, cool, and dehumidify the ventilation air supplied to buildings. The need for ventilation is increased when the rate of air pollutant generation from indoor sources is high. People and their activities are among the important indoor pollutant sources and in many indoor spaces occupant density is highly variable. Thus, DCV is most often implemented in spaces with sometimes high and temporally variable occupant density, for example meeting rooms and theatres. In the usual application of DCV, ventilation rates are automatically modulated based on measured indoor concentrations of carbon dioxide (CO_2), as CO_2 is emitted by people as a metabolic by product and more easily measured than other air pollutants resulting from occupancy. When the indoor occupant density is increased, the indoor concentration of CO_2 increases, unless the ventilation rate also increases. Carbon dioxide is not generally considered a directly harmful air pollutant at the concentrations found indoors - rather the concentration of CO_2 is considered a proxy for the concentration of a variety of other odorous or potentially harmful pollutants emitted by people or their activities. A typical DCV system is designed to modulate ventilation rates over time so that indoor carbon dioxide concentrations do not exceed a set point, or target, value. The set point CO_2 concentration is typically between 800 and 1,000 parts per million with outside CO_2 levels typically at low concentrations of around 400 to 450 ppm. SWA considered DCV opportunities for all package units.

Building codes require that a minimum amount of fresh air be provided to ensure adequate air quality. To comply, ventilation systems often operate at a fixed rate based on an assumed occupancy (e.g., 15 cfm per person multiplied by the maximum design occupancy). The result is there often is much more fresh air coming into buildings than is necessary. That air must be conditioned, resulting in higher energy consumption and costs than is necessary with appropriate ventilation. ANSI/ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality, sets minimum ventilation rates and other requirements for commercial and institutional buildings, besides state and local building codes.

Installation cost:

Estimated installed cost: $4,800 (includes $1,440 of labor)
Source of cost estimate: RS Means; Published and established costs; Similar projects

Economics:

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 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
4,800	none at this time	4,800	5,084	1.1	380	5.0	0	1,377	12	16,527	3.5	244	20	27	8,476	13,292

Assumptions: SWA assumed thermal savings based on heating and cooling loads calculated using the billing analysis. In order to estimate savings for this measure, SWA calculated energy reductions equivalent to the ratio of the energy saved to the total heating and cooling used by the size of the space(s), occupancy and utilization according to known schedules (in view that some of the spaces are rarely used at the full designed capacity) and compared it to 10% heating/cooling reduction and used the more conservative estimate.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#7: Install (5) Lighting 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 a number of areas 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 micro-phonic 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: $1,000 (Includes $600 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
1,100	100	1,000	1,882	0	0	1	0	282	15	4,230	3.5	323	22	27	2,246	3,370

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis.

Rebates/financial incentives:

- NJ Clean Energy - Occupancy sensors, wall mounted ($20 per control) - Maximum incentive amount is $100.

Please see Appendix F for more information on Incentive Programs.

ECM#8: Install (3) New Pulse Start Metal Halide Fixtures

During the field audit, SWA completed a building interior as well as exterior lighting inventory (see Appendix B). The existing lighting contains standard probe start Metal Halide (MH) lamps. SWA recommends replacing the higher wattage MH 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: $2,050 (Includes $1,536 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
2,125	75	2,050	841	0	0	0	223	349	15	5,235	5.9	155	10	15	1,993	1,506

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 3 hrs/yr to replace aging burnt out lamps/ballasts vs. newly installed.

Rebates/financial incentives:

- NJ Clean Energy - Pulse Start Metal Halide ($25 per control) - Maximum incentive amount is $75.

Please see Appendix F for more information on Incentive Programs.

ECM#9: Install a 30 kW Solar Photovoltaic Rooftop System

Currently, the building does have an installed 7.5 kW photovoltaic (PV) rooftop system. SWA recommends augmenting the existing system with an additional 30 kW PV system. Renewable energy systems such as 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 a portion of the roof with panels facing south. A commercial multi-crystalline 230 watt panel has 17.5 square feet of surface area (providing 13.1 watts per square foot). A 30 kW system needs approximately 130 panels which would take up 2,280 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. However, this option is not available from the local utility. Please see below for more information.

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 Borough of West Cape May 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, the Borough of West Cape May should include these costs in the financial analysis of the project.

Installation cost:

Estimated installed cost: $187,500 (includes $120,000 of labor)
Source of cost estimate: Similar projects

Economics (with incentives):

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 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
210,000	22,500	187,500	35,400	30	0	11	0	27,229	25	680,736	6.9	263	11	12	160,566	63,384

Cash flow:

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	$6,229
2	35,400		$21,000	$6,229
3	35,400		$21,000	$6,229
4	35,400		$21,000	$6,229
5	35,400		$21,000	$6,229
6	35,400		$21,000	$6,229
7	35,400		$21,000	$6,229
8	35,400		$21,000	$6,229
9	35,400		$21,000	$6,229
10	35,400		$21,000	$6,229
11	35,400		$21,000	$6,229
12	35,400		$21,000	$6,229
13	35,400		$21,000	$6,229
14	35,400		$21,000	$6,229
15	35,400		$21,000	$6,229
16	35,400		$0	$6,229
17	35,400		$0	$6,229
18	35,400		$0	$6,229
19	35,400		$0	$6,229
20	35,400		$0	$6,229
21	35,400		$0	$6,229
22	35,400		$0	$6,229
23	35,400		$0	$6,229
24	35,400		$0	$6,229
25	35,400		$0	$6,229
	kWh	Cost	Saving	
Lifetime Total	**885,000**	**($210,000)**	**$337,500**	**$155,736**

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 (230 Watts, model #ND-U230C1). PV systems are sized based on 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 kW or less. Incentive amount for this application is $22,500 for the proposed option. 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 annual SREC credit of $21,000 has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#10: Install (43) New T8 Fixtures

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 each existing fixture with more efficient, T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to 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: $8,247 (Includes $5,773 of labor)
Source of cost estimate: Manufacturers information

Economics:

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 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
8,892	645	8,247	2,674	1	0	1	769	1,170	15	17,550	7.0	113	8	11	5,349	4,788

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 19hrs/yr to replace aging burnt out lamps/ballasts vs. newly installed.

Rebates/financial incentives:

- NJ Clean Energy - Retrofit T12 with T8 fixtures with electronic ballasts ($15 per control) - Maximum incentive amount is $645.

Please see Appendix F for more information on Incentive Programs.

ECM#11: Replace (1) Electric DHW Heater with an ENERGY STAR® Natural Gas Condensing Model

During the field audit, SWA inspected the existing Domestic Hot Water (DHW) heaters. There is one electric heater in the Municipal section of the building that produces DHW for the entire year. The water heater utilizes an external storage tank. The expected service life of a DHW heater is 10-13 years. Consideration should be given to replace the existing heater, which is operating beyond its expected service life, with an efficient ENERGY STAR® natural gas condensing type as part of a capital improvement plan.

The most efficient DHW systems available are generally gas-fired. The estimated Energy Factor (a measure of overall efficiency) for the existing heater is 0.83.

The capacity of a water heater is an important consideration. The water heater should provide enough hot water at the busiest time of the day. For a storage water heater, this capacity is indicated by its "first hour rating" (found on Energy Guide label alongside efficiency rating) which accounts for the effects of tank size and the speed by which cold water is heated.

DHW heaters range in size from 20 to 80 gallons (or larger) and fueled by electricity, natural gas, propane, or oil, storage water heaters transfer heat from a burner or coil to water in an insulated tank. Because heat is lost through the flue (except in electric models) and through the walls of the storage tank, energy is consumed even when no hot water is being used.

New energy-efficient gas-fired storage water heaters are a good, cost-effective replacement option for old water heaters. They have higher levels of insulation around the tank and one-way valves where pipes connect to the tank, substantially reducing standby heat loss. Newer super-efficient "condensing" and "near-condensing" gas water heaters save much more energy compared to traditional models. For safety as well as energy efficiency, fuel-burning water heaters should be installed with sealed combustion ("direct-vented" or "power-vented). Sealed combustion means that outside air is brought in directly to the water heater and exhaust gases are vented directly outside, keeping combustion totally separate from the house air.

Installation cost:

Estimated installed cost: $2,000 (includes $668 of labor)
Source of cost estimate: Manufacturer and Store established costs, NJ Clean Energy Program, Similar Projects

Economics (with incentives):

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 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
Replace (1) Existing Electric DHW Heater in Kind																
650	0	650	73	0.0	0	0.0	18	30	13	395	21.4	-39	-3	-6	-321	131
Incremental Difference to Replace (1) Electric DHW Heater with ENERGY STAR® Natural Gas Condensing Type																
1,500	150	1,350	1,466	0.1	-50	0.0	0	191	13	2,488	7.1	84	6	10	639	2,074
Replace (1) Electric DHW Heater with ENERGY STAR® Natural Gas Condensing Type																
2,150	**150**	**2,000**	**1,540**	**0.1**	**-50**	**0**	**18**	**222**	**13**	**2,883**	**9.0**	**44**	**3**	**5**	**216**	**2,205**

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA assumed annual labor and parts insurance for existing DHW heater. The estimated overall efficiency of the existing DHW is in the 83% range (estimating 5% degradation), and a new high efficiency DHW heater would operate with an overall efficiency of approximately 90%.

Rebates/financial incentives:

- NJ Clean Energy - SmartStart - Gas Water Heaters >50 gal - <300 MBH, Minimum 85% AFUE ($2.00 per MBH but not less than $50/unit) - Maximum incentive amount is $150

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 Municipal 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.

- Consider replacing the emergency generator when it has become unreliable, since it is operating beyond its expected service life.

- Replace storage and bathroom exhaust fans - this equipment is operating beyond its expected service life, run by fractional horsepower motors and the run hours are not significant, so the replacements cannot be justified by energy savings alone and there are no NJ Clean Energy rebates available. However, due to the age of the equipment, replacement is recommended.

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.

- Thoroughly and evenly insulate space above the ceiling tiles and plug all ceiling penetration. All missing ceiling tiles should be put back in place. Implementing this will reduce energy consumed to condition approximately 6 foot high space between the roof metal deck and the drop ceiling.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly, drains are cleaned and sharp objects removed from puncturing the rubber roof membrane.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.

- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Repair/seal wall cracks and penetrations - SWA recommends as part of the maintenance program installing weep holes, installing proper flashing and correct masonry efflorescence, and sealing wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.

- Remove insect nesting from around the building soffits to prevent infestation and for occupant safety.

- Provide water-efficient fixtures and controls - Already a few bathrooms have motion activated flushes on urinals, motion activated faucets on sinks and aerators on sink taps. 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/.

- Change filters on rooftop package units monthly to ensure efficient operation of the blowers and ensure adequate air delivery to the spaces.

- Tighten belts on exhaust fans and blowers every three to six months - Tightening belts on belt-driven fans/blowers can maximize the overall efficiency of the equipment.

- Inspect rooftop package units' coils for dirt buildup three to six months. These conditions should be rectified if found because they will cause inefficient operation and possibly damage to the equipment.

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for West Cape May. Based on the requirements of the LGEA program, West Cape May 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 $1,856 (or 25% of $7,424).

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description, % eff	Model # / Serial #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Renewable	7.5 kW rooftop PV system with Sunpower solar inverter	SunPower Solar Electric System 36 panels X 210 Watts/panel; SPR-3300x Inverter	Electric generation	Rooftop	Municipal Bldg	2008	90%
Heating/ Cooling	RTU package unit, 7.5 ton refrigeration, 11.0 EER; 180kBtu/hr input, 147.6kBtu/hr input, 82% furnace eff	Carrier Weather-master 48HJE008_E541; Serial # 2403620451	Natural Gas/ Electric	Rooftop	Finance/ Court office/ bathrooms	2001	40%
Heating/ Cooling	RTU package unit, 7.5 ton refrigeration, 11.0 EER; 180kBtu/hr input, 147.6kBtu/hr input, 82% furnace eff	Carrier Weather-master 48HJE008_E541; Serial # 2403620450	Natural Gas/ Electric	Rooftop	Police Station	2001	40%
Heating/ Cooling	RTU #2 package unit, 7.5 ton refrigeration, 8.9 EER; 180kBtu/hr input, 144kBtu/hr input, 80% furnace eff	BDP Bryant 580DPV090180ACAA; Serial # 0799G30211	Natural Gas/ Electric	Rooftop	Clerk/ Mail Rm	2001	40%
Heating/ Cooling	RTU package unit, 2 x 10 ton refrigeration, 9.7 EER; electric heater - 232 MBtuh capacity	American Standard TCD240B30AHA; Serial # 242100474D	Electric	Rooftop	Multi-purpose/ Court Rm	2003	50%
Heating	Back-up boiler (out of operation since 2008) - 480 MBH water heating capacity – converted from oil to gas fired; 80% est eff	Weil-McLain cast iron sectional BL-876-S-W; Serial # CP169706; American Burner OE-C – ¼ HP blower motor	Natural Gas	Boiler Rm	Municipal Bldg	1977 (burner - 1980)	0%

continued on the next page

Building System	Description, % eff	Model # / Serial #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	C-1 & 2 Convectors (not used in the last 2 years)	Airtherm (missing nametags)	N/A	Janitor closet, locker rm	Janitor closet, locker rm	1977	0%
Heating	CH-1, 2 & 3 Cabinet Heaters (not used in the last 2 years)	Airtherm (missing nametags)	Electric	Vestibules	Vestibules	1977	0%
Heating	UH-1 Unit Heater, 19.2 MBH electric heater	Airtherm (illegible nametag)	Electric	Boiler Rm	Boiler Rm	1977	0%
Domestic Hot Water (DHW) Heating	52 gal storage, electric heaters - 4500 Watts upper and 4500 Watts lower); Energy Factor is 0.83	A O Smith Permaglas III, PEC 52; Serial # 820E-K-77-66055	Electric	Mechanical Rm	Municipal Bldg (excludes Police)	1977	0%
Domestic Hot Water (DHW) Heating	75 gal storage; 75,000 Btu/hr capacity; Energy Factor is 0.61	Bradford White, Hydrojet MI75 S6BN12; Serial # ZM4073700	Natural Gas	Mech/ Storage Rm - Police Station	Police Station	2006	70%
Ventilation	Exhaust PE-1, 2 & 3 - 1/6 to ¼ HP motors	Greenheck CBE 14 4; Serial # 485288, 485289 & 485290	Electric	Rooftop	Bathrooms	1977	0%
Generator	30 kW, 37.5 kVA	ONAN 30.OEK-15R/11413J; Serial # L770283758	Propane	Boiler Rm	Muni Bldg	1977	0%
Lighting	See details - Appendix B	See details - Appendix B	Electric	Fire Station	Fire Station	varies	Avg - 15%

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	Hallway	Recessed Parabolic	M	4'T12	5	4	34	Sw	24	365	10	731	6,404	T8	Recessed Parabolic	4'T8	E	Sw	5	4	32	24	365	5	665	5825	578	0	578
2	1	Evidence	Wall Mounted	S	Inc	2	1	60	Sw	2	365	0	120	88	CFL	Wall Mounted	CFL	S	Sw	2	1	20	2	365	0	40	29	58	0	58
3	1	Hallway	Ceiling Mounted	S	Inc	4	1	60	Sw	1	365	0	240	88	CFL	Ceiling Mounted	CFL	S	Sw	4	1	20	1	365	0	80	29	58	0	58
4	1	Hallway	Exit Sign	S	Inc	3	2	20	N	24	365	0	120	1,051	LEDex	Exit Sign	LED	S	N	3	1	5	24	365	1	17	145	907	0	907
5	1	Processing room	Recessed Parabolic	E	4'T8	2	4	32	Sw	1	365	5	266	97	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	1	365	5	266	97	0	0	0
6	1	Lunch Rm	Recessed Parabolic	M	4'T12	4	4	34	Sw	16	365	10	585	3,415	T8	Recessed Parabolic	4'T8	E	OS	4	4	32	12	365	5	532	2330	308	777	1085
7	1	Locker Room	Recessed Parabolic	M	4'T12	4	4	34	Sw	16	365	10	585	3,415	T8	Recessed Parabolic	4'T8	E	OS	4	4	32	12	365	5	532	2330	308	777	1085
8	1	Detective Division	Recessed Parabolic	M	4'T12	5	4	34	Sw	12	365	10	731	3,202	T8	Recessed Parabolic	4'T8	E	Sw	5	4	32	12	365	5	665	2913	289	0	289
9	1	Radio Room	Recessed Parabolic	M	4'T12	6	4	34	Sw	24	365	10	877	7,684	T8	Recessed Parabolic	4'T8	E	Sw	6	4	32	24	365	5	798	6990	694	0	694
10	1	Radio equipment Room	Recessed Parabolic	M	4'T12	3	4	34	Sw	1	365	10	439	160	T8	Recessed Parabolic	4'T8	E	OS	3	4	32	1	365	5	399	109	14	36	51
11	1	Janitor's Closet	Ceiling Mounted	S	Inc	1	2	60	Sw	1	365	0	120	44	CFL	Ceiling Mounted	CFL	S	Sw	1	2	20	1	365	0	40	15	29	0	29
12	1	Bathroom	Wall Mounted	S	Inc	1	3	60	Sw	9	365	0	180	591	CFL	Wall Mounted	CFL	S	OS	1	3	20	7	365	0	60	148	394	49	443
13	1	Bathroom	Wall Mounted	S	CFL	1	1	13	Sw	9	365	0	13	43	N/A	Wall Mounted	CFL	S	Sw	1	1	13	9	365	0	13	43	0	0	0
14	1	Office	Recessed Parabolic	M	4'T12	2	4	34	Sw	8	365	10	292	854	T8	Recessed Parabolic	4'T8	E	Sw	2	4	32	8	365	5	266	777	77	0	77
15	1	Hallway	Recessed	S	CFL	2	1	26	Sw	24	365	0	52	456	N/A	Recessed	CFL	S	Sw	2	1	26	24	365	0	52	456	0	0	0
16	1	Interview Room	Recessed Parabolic	M	4'T12	2	4	34	Sw	2	365	10	292	213	T8	Recessed Parabolic	4'T8	E	Sw	2	4	32	2	365	5	266	194	19	0	19
17	1	Hallway	Recessed Parabolic	M	4'T12	3	4	34	Sw	8	261	10	439	916	T8	Recessed Parabolic	4'T8	E	Sw	3	4	32	8	261	5	399	833	83	0	83
18	1	Hallway	Recessed	S	Inc	5	1	60	Sw	8	261	0	300	626	CFL	Recessed	CFL	S	Sw	5	1	20	8	261	0	100	209	418	0	418
19	1	Hallway	Exit Sign	S	Inc	1	2	20	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
20	1	Lobby	Recessed Parabolic	E	4'T8	8	4	32	Sw	10	261	5	1,064	2,777	N/A	Recessed Parabolic	4'T8	E	Sw	8	4	32	10	261	5	1064	2777	0	0	0
21	1	Lobby	Exit Sign	S	Inc	1	2	20	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
22	1	Lobby	Recessed	S	Inc	5	1	60	Sw	8	261	0	300	626	CFL	Recessed	CFL	S	Sw	5	1	20	8	261	0	100	209	418	0	418
23	1	Lobby	Recessed	S	Inc	3	1	60	Sw	8	261	0	180	376	CFL	Recessed	CFL	S	Sw	3	1	20	8	261	0	60	125	251	0	251
24	1	Tax Collector	Recessed Parabolic	E	4'T8	7	4	32	Sw	7	261	5	931	1,701	N/A	Recessed Parabolic	4'T8	E	Sw	7	4	32	7	261	5	931	1701	0	0	0
25	1	Hallway	Recessed Parabolic	M	4'T12	5	4	34	Sw	12	261	10	731	2,289	T8	Recessed Parabolic	4'T8	E	Sw	5	4	32	12	261	5	665	2083	207	0	207
26	1	Hallway	Ceiling Mounted	S	Inc	4	4	60	Sw	12	261	0	960	3,007	CFL	Ceiling Mounted	CFL	S	Sw	4	4	20	12	261	0	320	1002	2004	0	2004
27	1	Municipal court office	Recessed Parabolic	E	4'T8	6	4	32	Sw	7	261	5	798	1,458	N/A	Recessed Parabolic	4'T8	E	Sw	6	4	32	7	261	5	798	1458	0	0	0
28	1	Caucus Room	Recessed Parabolic	E	4'T8	6	4	32	Sw	12	261	5	798	2,499	N/A	Recessed Parabolic	4'T8	E	Sw	6	4	32	12	261	5	798	2499	0	0	0
29	1	Mechanical/ Storage Room	Recessed Parabolic	E	4'T8	2	4	32	Sw	12	261	5	266	833	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	12	261	5	266	833	0	0	0
30	1	Janitor's Closet	Ceiling Mounted	S	Inc	1	2	60	Sw	2	261	0	120	63	CFL	Ceiling Mounted	CFL	S	Sw	1	2	20	2	261	0	40	21	42	0	42
31	1	Lunch Rm	Recessed Parabolic	M	4'T12	4	4	34	Sw	7	261	10	585	1,068	T8	Recessed Parabolic	4'T8	E	OS	4	4	32	5	261	5	532	729	96	243	339
32	1	Bathroom Men	Recessed Parabolic	E	4'T8	2	4	32	Sw	7	261	5	266	486	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	7	261	5	266	486	0	0	0
33	1	Bathroom Men	Recessed Parabolic	E	4'T8	1	2	32	Sw	7	261	5	69	126	N/A	Recessed Parabolic	4'T8	E	Sw	1	2	32	7	261	5	69	126	0	0	0
34	1	Mayor office	Recessed Parabolic	E	4'T8	6	4	32	Sw	7	261	5	798	1,458	N/A	Recessed Parabolic	4'T8	E	Sw	6	4	32	7	261	5	798	1458	0	0	0
35	1	Bathroom Women	Recessed Parabolic	E	4'T8	2	4	32	Sw	7	261	5	266	486	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	7	261	5	266	486	0	0	0
36	1	Bathroom Women	Recessed Parabolic	E	4'T8	1	2	32	Sw	7	261	5	69	126	N/A	Recessed Parabolic	4'T8	E	Sw	1	2	32	7	261	5	69	126	0	0	0
37	1	Meeting Rm	Recessed Parabolic	E	4'T8	8	8	32	Sw	7	52	5	2,088	760	N/A	Recessed Parabolic	4'T8	E	Sw	8	8	32	7	52	5	2088	760	0	0	0
38	1	Meeting Rm	Exit Sign	S	Inc	4	2	20	N	24	365	0	160	1,402	LEDex	Exit Sign	LED	S	N	4	1	5	24	365	1	22	193	1209	0	1209
39	1	Meeting Rm	Recessed	S	Hal	3	1	75	Sw	7	52	17	275	100	CFL	Recessed	CFL	S	Sw	3	1	25	7	52	0	75	27	73	0	73
40	1	Meeting Rm	Track	S	Inc	8	1	50	Sw	7	52	0	400	146	CFL	Track	CFL	S	Sw	8	1	15	7	52	0	120	44	102	0	102
41	1	Hallway	Exit Sign	S	Inc	1	2	20	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
42	1	Boiler Room	Low Bay	S	CFL	4	1	13	Sw	2	261	0	52	27	N/A	Low Bay	CFL	S	Sw	4	1	13	2	261	0	52	27	0	0	0
43	Ext	Exterior	Wall Mounted	S	HPS	1	1	150	PC	12	365	30	180	788	PSMH	Wall Mounted	PSMH	S	PC	1	1	100	12	365	20	120	526	263	0	263
44	Ext	Exterior	Flood	S	HPS	1	1	150	PC	12	365	30	180	788	PSMH	Flood	PSMH	S	PC	1	1	100	12	365	20	120	526	263	0	263
45	Ext	Exterior	Wall Mounted	S	MH	1	1	150	PC	12	365	42	192	841	PSMH	Wall Mounted	PSMH	S	PC	1	1	100	12	365	20	120	526	315	0	315
46	Ext	Exterior	Landscape	S	CFL	5	1	13	PC	12	365	0	65	285	N/A	Landscape	CFL	S	PC	5	1	13	12	365	0	65	285	0	0	0
47	1	Meeting Rm	Recessed Parabolic	E	4'T12	8	8	34	Sw	7	52	10	2,258	822	T8	Recessed Parabolic	4'T8	E	Sw	8	8	32	7	52	5	2088	760	62	0	62
48	Ext	Parking Lot Lights	Pole Mounted	S	MH	15	1	150	T	0	365	42	2,880	0	MH	Pole Mounted	MH	S	T	15	1	150	0	365	42	2880	0	0	0	0
Totals:						**156**	**127**	**2,038**				**291**	**18,294**	**54,914**						**156**	**122**	**1,346**			**178**	**15,030**	**42,648**	**10,384**	**1,882**	**12,266**

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

Proposed Lighting Summary Table			
Total Surface Area (SF)	11,125		
Average Power Cost ($/kWh)	0.176		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	2,702	1,862	**841**
Exterior Power (watts)	617	425	**192**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	52,212	40,786	**11,425**
Lighting Power (watts)	17,677	14,605	**3,072**
Lighting Power Density (watts/SF)	1.59	1.31	**0.28**
Estimated Cost of Fixture Replacement ($)	13,518		
Estimated Cost of Controls Improvements ($)	1,000		
Total Consumption Annual Cost Savings ($)	**5,164**		

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 (De-lamping)
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

Atlantic City Electric ELECTRICAL SERVICE TERRITORY Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com	**BOC Energy Services, Inc.** 1135 Mountain Avenue Murray Hill, NJ 011374 (800) 247-2644 www.boc.com	**Commerce Energy, Inc.** 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-84113 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com	**Direct Energy Services, LLC** 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com	**FirstEnergy Solutions Corp.** 300 Madison Avenue MorrisWest Cape May, NJ 0113113 (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	**Integrys Energy Services, Inc.** 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integrysenergy.com	**Strategic Energy, LLC** 55 Madison Avenue, Suite 400 MorrisWest Cape May, NJ 011360 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-31139 www.libertypowercorp.com	**Pepco Energy Services, Inc.** 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (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 The Mac-Cali Building 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) 800-756-3749 www.south jerseyenergy.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 MooresWest Cape May, NJ 080113 (856) 273-9995 www.ugienergyservices.com	**American Powernet Management, LP** 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com	**ConEdison Solutions** Cherry Tree, Corporate Center 1135 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com

Third Party Gas Suppliers for South Jersey Gas 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
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
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

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

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

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

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

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

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

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

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

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

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

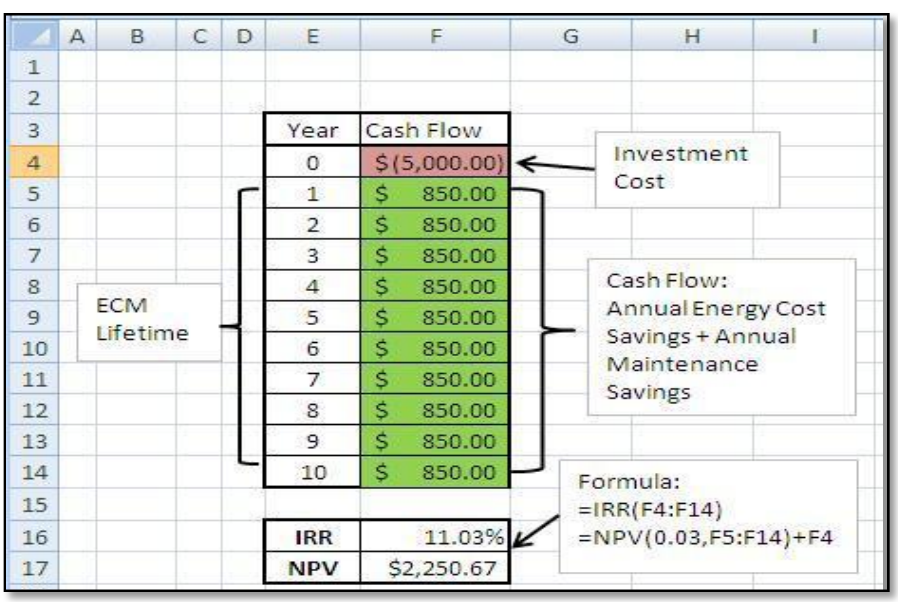
Calculation References

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

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

Excel NPV and IRR Calculation

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



Solar PV ECM Calculation

There are several components to the calculation:

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

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

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

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

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Borough of West Cape May - Municipal Hall

ENERGY STAR

Building ID: 2394173
For 12-month Period Ending: May 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 03, 2010

Facility
Borough of West Cape May - Municipal Hall
732 Broadway
West Cape May, NJ 08204

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1977
Gross Floor Area (ft²): 11,125

Energy Performance Rating[2] (1-100) 68

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	332,795
Natural Gas (kBtu)[4]	310,634
Total Energy (kBtu)	643,429

Energy Intensity[5]	
Site (kBtu/ft²/yr)	58
Source (kBtu/ft²/yr)	129

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	67

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison	
National Average Site EUI	71
National Average Source EUI	159
% Difference from National Average Source EUI	-19%
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.

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

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

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

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. 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. 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 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	Upgrade Space Temperature Control with (6) Programmable Thermostats	1,002	none at this time	1,002	4,248	0	295	4	1,167	2,307	12	27,685	0.4	2,663	222	230	21,018	10,857
	2	Install (2) Beverage Vending Machine Energy Misers	508	none at this time	508	3,200	0	0	1	70	633	12	7,597	0.8	1,396	116	125	5,542	5,730
	3	Replace (10) Incandescent Exit Signs with LED Type	1,505	200	1,305	3,022	1	0	1	893	1,425	15	21,375	0.9	1,538	103	109	14,984	5,411
	4	Install (37) New CFL Fixtures	1,916	none at this time	1,916	3,847	1	0	1	1,121	1,798	5	8,990	1.1	369	74	90	6,077	6,888
	5	Install 7.5 kW Wind Rooftop System	60,000	50,808	9,192	15,878	8	0	5	0	2,699	25	67,479	3.4	634	25	29	35,638	28,429

	ECM #	ECM description	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 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
	6	Install (4) Demand-Controlled Ventilation Systems	4,800	0	4,800	5,084	1	380	5	0	1,377	12	16,527	3.5	244	20	27	8,476	13,292
	7	Install (5) Lighting Occupancy Sensors	1,100	100	1,000	1,882	0	0	1	0	282	15	4,230	3.5	323	22	27	2,246	3,370
5-10 Year Payback	8	Install (3) New Pulse Start Metal Halide Fixtures	2,125	75	2,050	841	0	0	0	223	349	15	5,235	5.9	155	10	15	1,993	1,506
5-10 Year Payback	9	Install a 30 kW Solar Photovoltaic Rooftop System	210,000	22,500	187,500	35,400	30	0	11	0	27,229	25	680,736	6.9	263	11	12	160,566	63,384
5-10 Year Payback	10	Install (43) New T8 Fixtures	8,892	645	8,247	2,674	1	0	1	769	1,170	15	17,550	7.0	113	8	11	5,349	4,788
5-10 Year Payback	11	Replace (1) Electric DHW Heater with an ENERGY STAR® Natural Gas Condensing Model	2,150	150	2,000	1,540	0	-50	0	18	222	13	2,883	9.0	44	3	5	216	2,205

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

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

Disclaimer

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

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