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Local Government Energy Program
Energy Audit Final Report

City of Brigantine

Links at Brigantine Beach Golf Course Clubhouse
1075 North Shore Drive
Brigantine, NJ 08203

Project Number: LGEA67

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EXECUTIVE SUMMARY

The Links at Brigantine Beach Golf Course Clubhouse is a single-story building comprising a total conditioned floor area of 5,360 square feet. The original structure was built in 1989, and there was a major expansion in 1999. The following chart provides a comparison of the current building energy usage based on the period from March 2009 through February 2010 with the proposed energy usage resulting from the installation of recommended Energy Conservation Measures (ECMs) excluding any renewable energy:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr	CO_2 Emissions, lbs/yr
Current	197,591	6,679	43,960	250.4	1,342	427,405
Proposed	170,543	6,731	39,208	234.2	1,255	379,549
Savings	27,048	-52	4,752	16.2	87	47,856
% Savings	14	-1	11	6	6	11

*Annual cost savings includes operational and maintenance savings in addition to the reduction of energy consumption

SWA has entered energy information about the clubhouse into the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager Energy Benchmarking system. In its current state, the building uses 30% less than a comparable U.S. Commercial building.

The Links at Brigantine Beach Golf Course Clubhouse is a small building that is used all year round; however occupancy varies seasonally based on the weather. The building is just 20 years old and therefore much of the equipment is still functioning but reaching the end of its useful lifetime.

Recommendations

Based on the current state of the building and its energy use, SWA recommends implementing the following Energy Conservation Measures:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	4,397	0.4	2,683	44,084
5-10 Year	240	6.4	1,536	2,167
>10 year	115	12.5	1,438	1,606
Total	4,752	1.2	5,657	47,856

In addition to these ECMs, SWA recommends (see Proposed Further Recommendations at the end of the Proposed Energy Conservation Measures section):

- Operation and Maintenance (O&M) measures that would contribute to reducing energy usage at low cost – not cost.
- Capital Investment opportunities – measures that would contribute to reducing energy usage but require significant capital resources as well as long-term financial planning.

There may be energy procurement opportunities for the clubhouse to reduce annual utility costs, which are $3,969 higher, when compared to the average estimated NJ commercial utility rates. SWA recommends further negotiation with energy suppliers, listed in *Appendix C*.

Environmental benefits

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 3 cars from the roads each year or is equivalent of planting 116 trees to absorb CO_2 from the atmosphere.

Priorities and suggestions for recommended measures implementation

Based on the requirements of the Local Government Energy Audit (LGEA) program, the City of Brigantine 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 $1,147.25.

SWA recommends that the City of Brigantine implement the following Energy Conservation Measures in order to reduce the current annual energy-related consumption and costs and meet the 25% minimum cost of the audit per building:

- Convert the electric domestic hot water heater to natural gas
- All lighting and Vending Miser recommendations should be addressed at the same time in order to reduce labor costs.

All of these measures will have an impact on the building operations and will also address other issues such as complaints about thermal comfort. *Appendix H* contains an Energy Conservation Measures table that orders each ECM in order of the Simple Payback.

SWA recommends that the City of Brigantine enroll in the following incentive programs through the NJ Office of Clean Energy in order to reduce the installation costs of most measures:

- Direct Install
- SmartStart

The building would be eligible for the Direct Install program since monthly demand does not exceed 200kW. The building is also not eligible for the Pay-for-Performance program at this time, without intensive Capital Improvement planning since the energy audit report does not show a minimum of 15% energy savings, without Capital Improvement measures.
Please refer to Appendix F for further details.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for the clubhouse at 1075 North Shore Drive in Brigantine, New Jersey. The process of the audit included facility visits on May 5, 2010; benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the City of Brigantine to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the clubhouse.

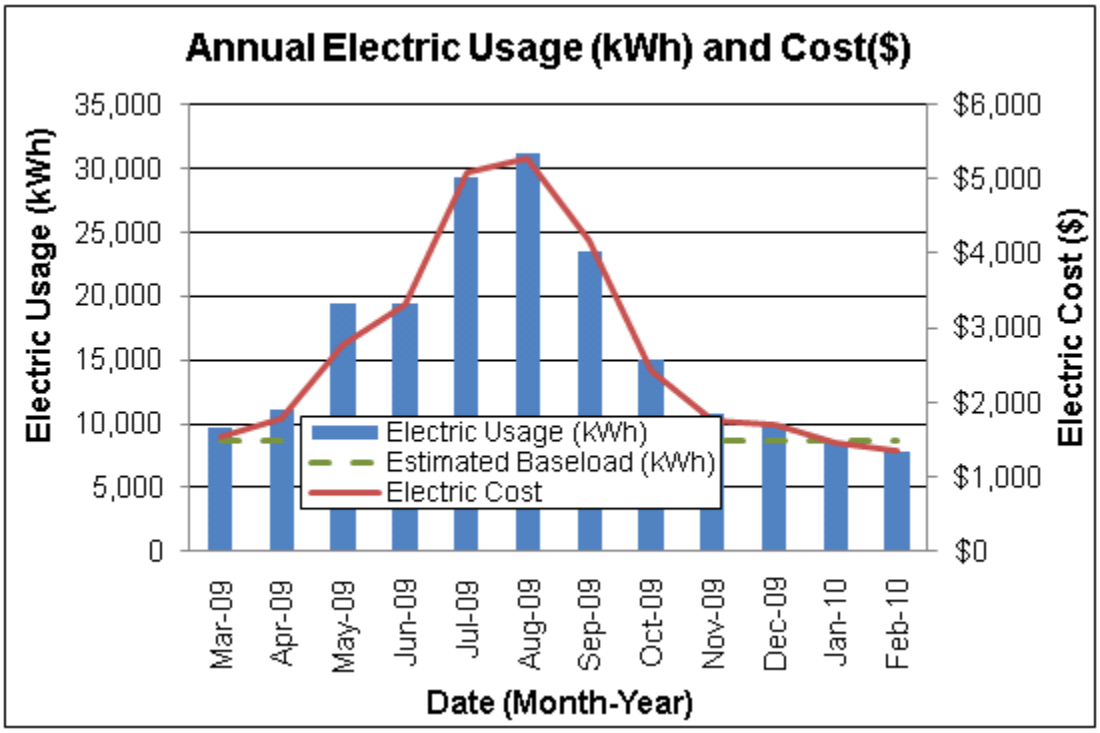
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

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

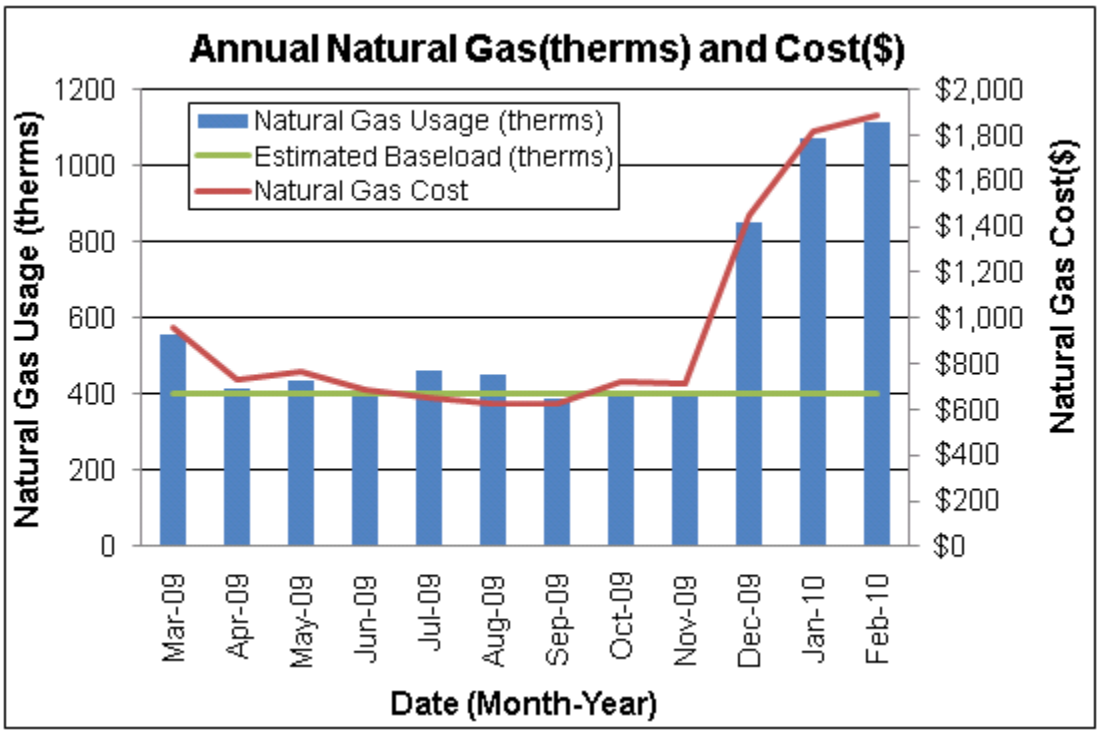
Electricity - The clubhouse is currently served by two electric meters. The clubhouse currently buys electricity from Atlantic City Electric at **an average aggregated rate of $0.166/kWh**. The clubhouse purchased **approximately 197,591 kWh, or $32,800 worth of electricity,** in the previous year. The average monthly demand was 87.0 kW and the annual peak demand was 134.0 kW.

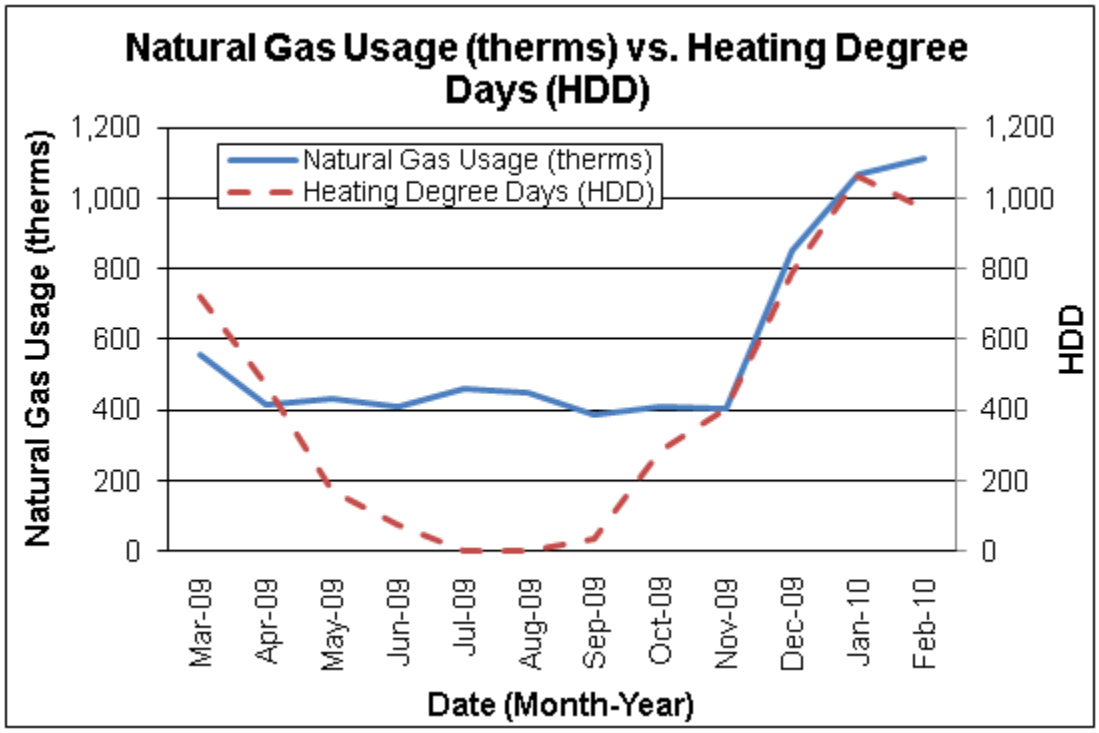
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the clubhouse.



Natural gas - The clubhouse is currently served by one meter for natural gas. The clubhouse currently buys natural gas from South Jersey Gas Company at **an average aggregated rate of $1.671/therm**. The clubhouse purchased **approximately 6,679 therms, or $11,160 worth of natural gas,** in the previous year.

The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the clubhouse.





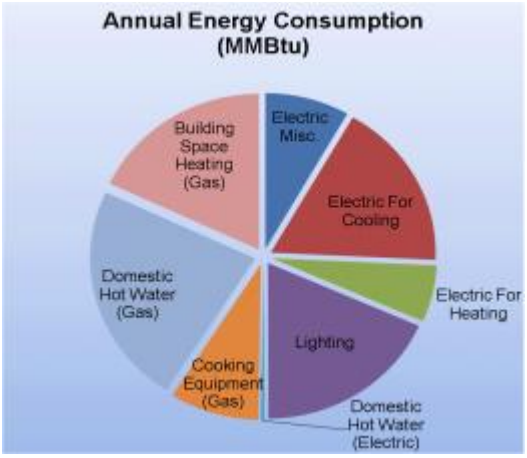
*Natural gas usage during the summer represents the domestic hot water load associated with the commercial kitchen

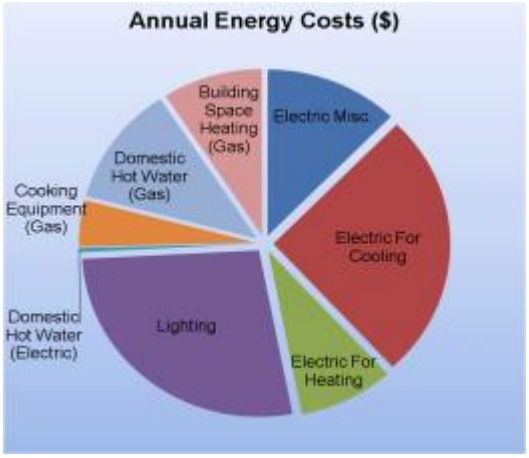
The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the

average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following graphs, pie charts, and table show energy use for the Clubhouse based on utility bills for the 12 month period. Note: electrical cost at $49/MMBtu of energy is more than 2.5 times as expensive as natural gas at $17/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	111	8%	$5,402	12%	49
Electric For Cooling	235	17%	$11,403	26%	49
Electric For Heating	79	6%	$3,839	9%	49
Lighting	246	18%	$11,962	27%	49
Domestic Hot Water	4	0%	$195	0%	49
Cooking Equipment (Gas)	118	9%	$1,971	4%	17
Domestic Hot Water (Gas)	308	23%	$5,146	12%	17
Building Space Heating	242	18%	$4,043	9%	17
Totals	1,342	100%	$43,960	100%	
Total Electric Usage	674	50%	$32,800	75%	49
Total Gas Usage	668	50%	$11,160	25%	17
Totals	1,342	100%	$43,960	100%	

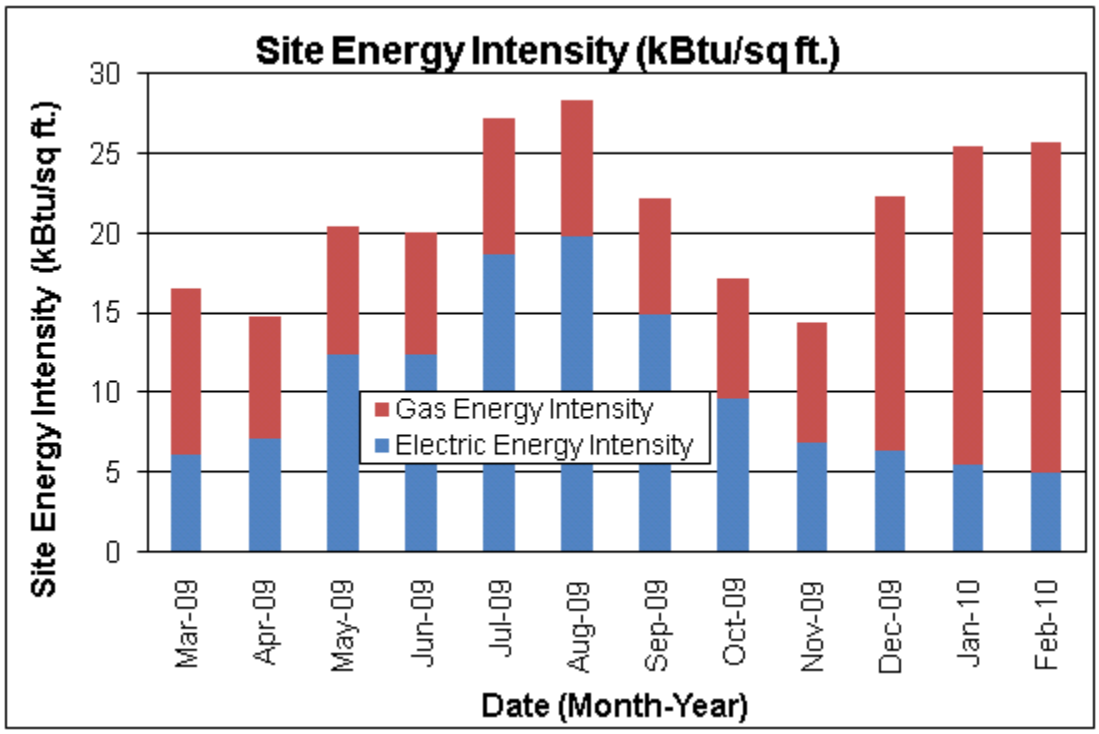




Energy benchmarking

SWA has entered energy information about the clubhouse in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This clubhouse facility is categorized as a non-eligible ("Food Service") space type since at least 50% of the building is used by the bar and grille portion of the building. Because it is a "Food Service" space type, there is no rating available. Consequently, the clubhouse is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 250 kBtu/ft^2-yr compared to the national average of a commercial food service building consuming 351 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

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



Per the LGEA program requirements, SWA has assisted the City of Brigantine to create an *ENERGY STAR® Portfolio Manager* account and share the clubhouse facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager account information with the City of Brigantine (user name of "cityofbrigantine" with a password of *"brigantine")* and TRC Energy Services (user name of "TRC-LGEA").

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

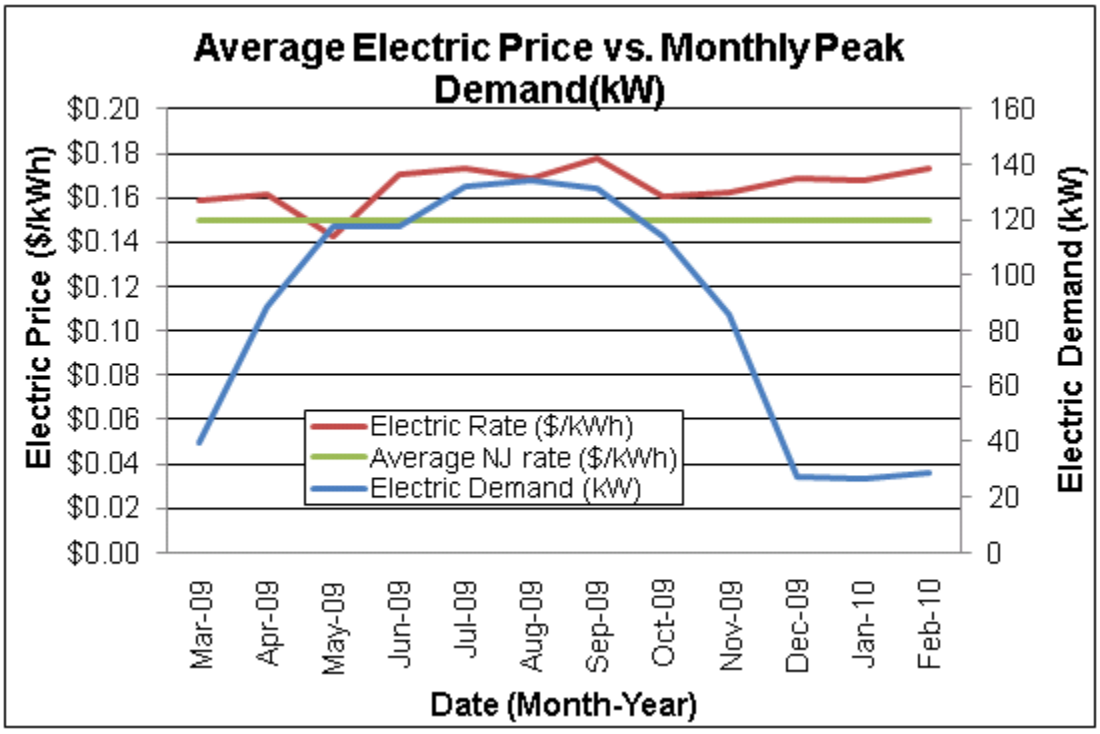
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. Some high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Typically, electricity prices also increase during the cooling months when electricity is used by the HVAC condensing units 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 Municipality 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.

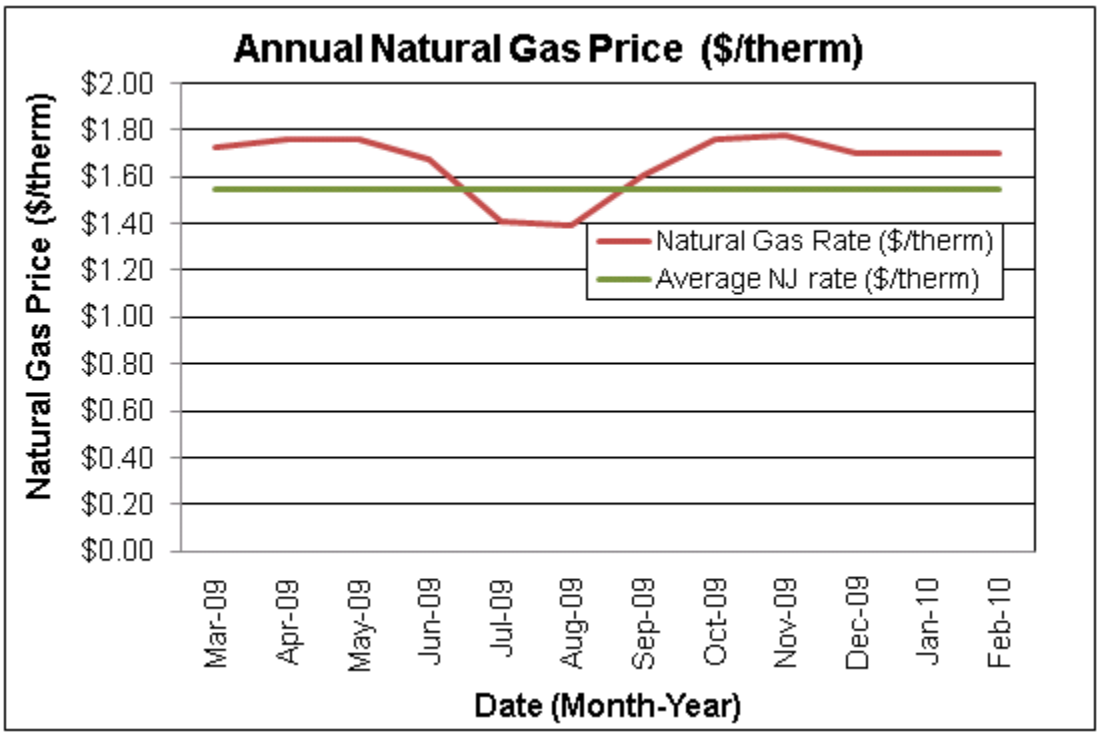
Energy Procurement strategies

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 the clubhouse pays a rate of $0.166/kWh. The clubhouse annual electric utility costs are $3,161 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 20% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while clubhouse pays a rate of $1.671/therm. The clubhouse annual natural gas utility costs are $808 higher, when compared to the average estimated NJ commercial utility rates. Natural gas bill analysis shows fluctuations up to 28% 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 City of Brigantine 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 clubhouse. Appendix C contains a complete list of third-party energy suppliers for the City of Brigantine service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on visits from SWA on Wednesday, May 05, 2010, the following data was collected and analyzed.

Building Characteristics

The single story, slab on grade including an attic, 5,360 square foot Clubhouse was originally constructed in 1989 with additions/alterations completed in 1999. It houses a bar and a grill, a men's and women's restroom, two exterior mechanical closets, a commercial kitchen, a pro shop, a concession stand and offices. The Clubhouse is primarily used as a Proshop for the golf course; however it does feature a bar area that serves light breakfast and lunch items for golfers. On occasion, the Clubhouse will be used to hold banquets.

North Façade

West Façade

Partial East Façade

Partial South Façade

Building Occupancy Profiles

The building's occupancy is approximately 10 employees daily from 6:00 AM to 10:00 PM and a varying number of customers during the course of the day. There are typically 2 proshop employees and 8 bar staff in the building at any given time. The majority of patrons in the bar and grille are golfers that grab drinks and a small meal after playing their round of golf; however, the building occasionally holds banquets. Since bar and grille patrons are golfers that visit the course, the number of daily patrons relies heavily on weather conditions and is estimated to be between 60-80 persons per day. Banquets that occur at the building are mainly social events that occupy the bar area. The banquets occur occasionally mostly during the summer and

occur within the operating hours of the building. The maximum occupancy of patrons in the building at any given time is 100 persons.

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 vinyl clapboard siding, over 3-1/2" wood stud framing with 3-1/2 inches of fiberglass batt cavity insulation. There are some sections constructed of decorative vertical wood shingles over 3-1/2" wood stud framing with 3-1/2 inches of fiberglass batt cavity insulation. The interior is mostly painted gypsum wallboard.

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

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall acceptable, 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:

Examples of damaged and displaced wood siding and signs of mold and water damage

Roof

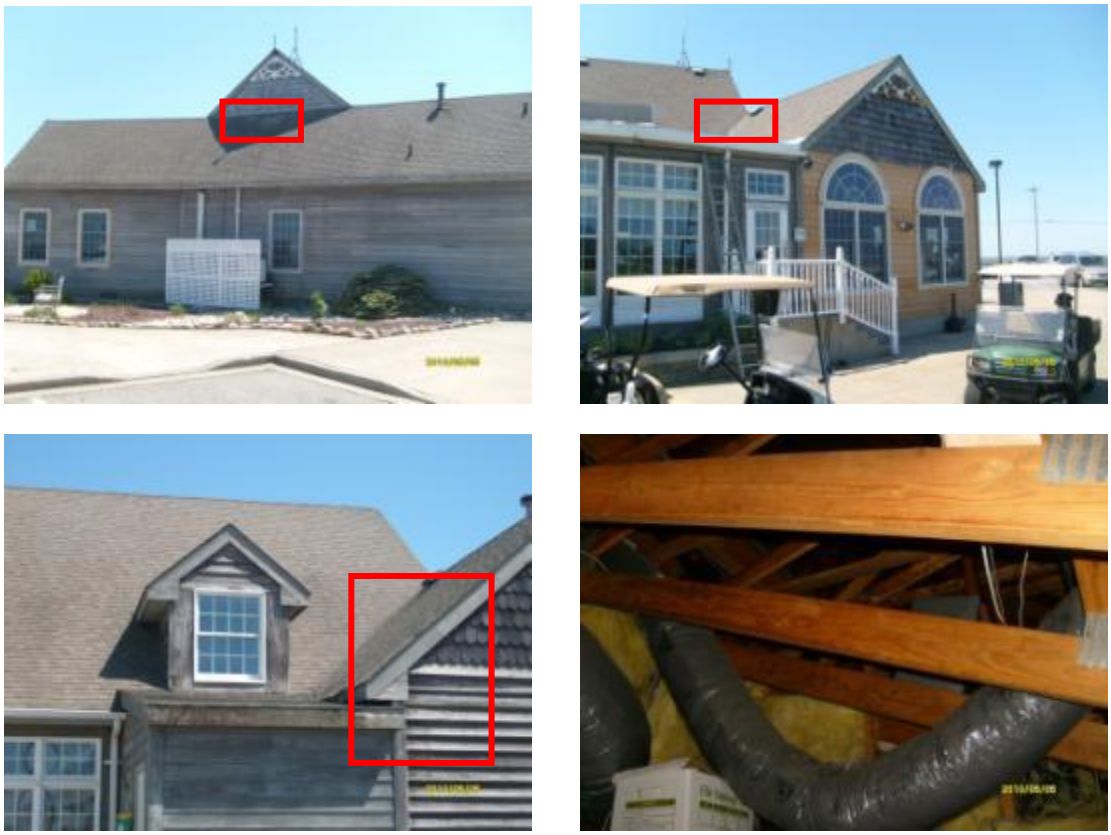
The building's roof is predominantly a steep-pitch gable type over a wood structure, with an asphalt shingle finish. It is original and contains six inches of fiberglass batt roof insulation and has never been replaced. Other parts of the building are also covered by a flat, no parapet type over wood decking with a built-up asphalt finish and reflective coating.

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

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable, age-appropriate condition, with only a few signs of

uncontrolled moisture, air-leakage or other energy-compromising issues detected on all roof areas.

The following specific roof problem spots were identified:



Examples of missing/ineffective flashing, damaged or displaced shingles, leaking/ineffective cap flashing seams, missing or damaged roof insulation.

Base

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

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

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues detected in some areas inside.

Windows

The building contains several different types of windows:

- Fixed type windows with an insulated aluminum frame, clear double glazing and interior roller blinds. The windows are located throughout the building.

- Fixed type windows with insulated aluminum frames, clear double glazing and interior mini blinds. The windows are located throughout the building.

- Double-hung type dormer windows with insulated aluminum frames, clear double glazing and interior mini blinds. The windows are located throughout the building.

- Transom type windows with insulated aluminum frames, clear double glazing and interior mini blinds. The windows are located throughout the building and are found above most of the exterior doors.

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 windows were identified:

Typical Window Installations

Exterior doors

The building contains three different types of exterior doors:

- Solid metal type exterior doors with panels for insect screens. They are located on the south facade.

- Solid metal type exterior doors with glass panels. They are located in the front of the building at the main entrance and in the rear by the entrance to the bar and grill and the entrance to the pro shop.

- Solid metal type exterior doors. They are located on the south facade.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in good/age appropriate condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

The following specific door problem spots were identified:

Typical Exterior Door Installations

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, as described in more detail earlier in this chapter.

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

Mechanical Systems

Heating Ventilation Air Conditioning

The Clubhouse is currently heated and cooled by a combination of two forced air gas-fired furnaces with cooling coils in the exterior mechanical rooms and a packaged rooftop gas heating unit that also provides DX cooling. These units are partnered with seven condensers. The building is ventilated by the fresh air supplied by the packaged rooftop system and furnaces in addition to two exhaust fans. Hot water is supplied from two hot water heaters, one electric and one gas fueled.

Equipment

The clubhouse is heated and cooled by one rooftop packaged unit and two forced air gas fired furnaces. A comprehensive Equipment List can be found in Appendix A.

The rooftop units contain a natural gas burner for heating and a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. The furnace units also contain a natural gas burner for heating and an evaporator section, but the condenser is a separate unit located outside/on the roof.

In both arrangements 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.

Front and Back View of Packaged Rooftop Unit

There are a total of seven exterior condensing units located at ground level on the north and south facades of the building. Two of the units are manufactured by Carrier, one by EMI and four by Arcoaire. Six of the seven units were installed in 1989 or 1999 at the same time as their matching furnace or rooftop unit. One of the Arcoaire units was recently installed within the last two years.

Typical condenser units installed at the clubhouse

The building is ventilated by the fresh air supplied by the packaged rooftop system and furnaces as well as two exhaust fans. In general, the building exhaust fans have an estimated 20% useful operating life left as they are original and have never been replaced.

Rooftop exhaust fans serving the kitchen and dining room area

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 section before the conditioned air is distributed into the building spaces. The furnace is only active in the heating season and the DX system is only active in the cooling season. In between these seasons neither system may operate and only the blower will be active to provide fresh air to the building.

Conditioned air is distributed through a combination of exterior mounted rigid metal duct with a layer of insulated duct lining and un-insulated flex-duct and rigid metal duct with a layer of insulated duct lining in the building attic. Hot water is distributed by un-insulated copper piping.

Air distribution system at the buildings exterior and attic

Un-insulated hot water piping

Controls

The heating and cooling equipment is controlled by programmable thermostats. Several rooms have programmable thermostats with a temperature set point schedule based on season and occupancy with allowed overrides of 3-4 degrees. There is a 3˚F dead band

built into the thermostats which indicates that the heating and cooling equipment will not operate when the space is within that temperature range.

Typical thermostat

Domestic Hot Water

The domestic hot water (DHW) for the clubhouse is provided by two heaters both located in the exterior mechanical room along the southern façade of the building. One of the units is an electric heated, manufactured by State, that is part of their Censible 510E product line, model # PV 40 20RT8 F with 40 gal storage and two electric coil heating elements, an upper and lower that are both 4,500 Watts. The other unit is gas heated, also manufactured by State, that is part of their Turbo product line, model # SBT75 75 NET F with 75 gal storage and a 68.3 gal/hr recovery rating, and 75,100 Btuh rated input. The natural gas unit serves the kitchen and bar while the electric unit serves the bathrooms.

Hot water heaters installed in the exterior south mechanical room

Both heaters have exceeded their remaining useful operating life however they appear in good age appropriate condition.

Electrical systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

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

Interior Lighting - The clubhouse currently contains mostly inefficient fixtures with T12, Halogen and incandescent bulbs. However there are some efficient chandeliers and other fixtures with Compact Fluorescent Light bulbs (CFL's) and LED's. 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.

Exit Lights - Exit signs were found to be LED and fluorescent type. The fluorescent type exit signs should be replaced with LED exit signs.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Pulse Start Metal Halide, incandescent and CFL's. Exterior lighting is controlled by timers.

Parking Lighting – The parking lighting surveyed during the building audit was found to be high pressure sodium lighting controlled by timers.

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.

A large older model commercial refrigerated cooler was installed in the concession stand / exterior storage room. This unit should be retrofitted with a CoolerMiser™ device. See ECM # 2 for more details.

Elevators

The clubhouse does not have an installed elevator.

Other electrical systems

Commercial Kitchen Equipment

In the bar and grill portion of the clubhouse, a combination walk-in cooler and freezer unit was installed. This Arctic Commercial walk-in refrigerator with freezer section (Model #4C.8.8X10.4) was installed in 1989 and was observed to be in good working condition with proper temperature setpoints.

The kitchen area also includes a gas range top with four burners that is used to cook light breakfast dishes and grilled sandwich items. The gas range top included no model nameplate information but was observed to be in good working condition. Please see the equipment list in Appendix A for more details.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Based on utility analysis and a study of roof conditions, the clubhouse is not a good candidate for a Solar Panel installation. There is insufficient roof space for panels to reasonably supplement the power consumption of the building as a majority of the sloped roof is East-West facing and the little amount of South facing roof is subject to shading, mechanical penetrations and section breaks.

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 clubhouse is not a good candidate for wind power generation due to the required high installation cost relative to the electric use that would be offset within the building.

Geothermal

The clubhouse is not a good candidate for geothermal installation due to the inconsistent building heating load and since it would require replacement of the entire existing HVAC system, of which major components still have remaining useful life.

Combined Heat and Power

The clubhouse is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical baseload to accommodate the electricity generated, as well as a

means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install (74) new CFL lamps
2	Retrofit (1) existing refrigerated cooler with CoolingMiser™ device
3	Install (1) new LED exit sign
	Description of Recommended 5-10 Year Payback ECMs
4	Install (4) new T8 fluorescent fixtures
	Description of Recommended >10 Year Payback ECMs
5	Convert (1) electric domestic hot water heater to natural gas

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

ECM#1: Install (74) new CFL lamps

On the day of the site visit, SWA completed a lighting inventory of the City of Brigantine Clubhouse (see Appendix B). The existing lighting inventory contained a total of 74 inefficient incandescent and halogen lamps. SWA recommends that each incandescent and halogen lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power.

Installation cost:

Estimated installed cost: $2,353 (includes $920 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	2,353	23,786	5.0	0	15.1	304	4,252	5	21,262	0.6	8	2	2	17,011	42,589

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

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#2: Retrofit existing refrigerated cooler with CoolingMiser™ device

A simple plug and play device the CoolingMiser™ device is compatible with refrigerated coolers. It utilizes Passive Infrared Sensors (PIR) to help the cooler save power. This unit is to be installed on the existing refrigerated cooler in the exterior concession stand / storage room.

Installation cost:

Estimated installed cost: $199 (includes $30 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
2	199	607	0.1	0	0.4	0	101	5	504	2.0	2	0	0	260	1,087

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

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#3: Install (1) new LED exit sign

On the day of the site visit, SWA completed a lighting inventory of the City of Brigantine Clubhouse (see Appendix B). The existing lighting inventory contained 1 inefficient fluorescent exit sign. SWA recommends that these exit signs be replaced with a new, more efficient LED exit sign. LED exit signs can provide significant energy savings since they operate 24 hours per day.

Installation cost:

Estimated installed cost: $131 (includes $30 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
3	131	228	0.0	0	0.1	6	44	15	658	3.0	4	0	0	385	408

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

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – LED exit signs ($10 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#4: Install (4) new T8 fluorescent fixtures

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

Installation cost:

Estimated installed cost: $1,536 (includes $310 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
4	1,536	1,210	0.3	0	0.8	39	240	15	3,598	6.4	1	0	0	1,286	2,167

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

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – T8 fluorescent fixtures ($15 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#5: Convert electric domestic hot water heater to natural gas

On the day of the site visit, SWA completed a mechanical inventory of the City of Brigantine Clubhouse. The clubhouse contained two separated domestic hot water (DHW) heaters used to meet the hot water demands of the building. One DHW heater was natural gas-fired, while the other was an electric unit. SWA recommends replacing the electric unit with a natural-gas fired unit. This unit is already located in the same mechanical closet as a gas-fired furnace and therefore the gas line should be readily accessible. Converting to a natural gas water heater will actually slightly increase energy required from natural gas as opposed to electricity, however will ultimately result in a cost savings since natural gas is a cheaper form of fuel than electricity.

Installation cost:

Estimated installed cost: $1,438 (includes $220 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
5	1,438	1,217	0.2	-52	-0.2	0	115	15	1,729	12.5	0	0	0	-81	1,607

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes the electric DHW heater to use 1,217 kWh per year based on the Energy Guide sticker on the unit. The electric DHW unit was assumed to be 100% efficient while a new natural gas unit will be a minimum efficiency of 80%.

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Natural gas water heater ($50 per unit, <50 gallons)*

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 clubhouse:

- Replace walk-in freezer unit with a premium efficiency unit when the existing unit fails - SWA evaluated the possibility of replacing the existing unit, however the simple payback period was beyond 25 years. SWA recommends that when this unit begins to fail, that it is replaced with a more efficient unit that also utilizes R-410A refrigerant
- Replace compressors for walk-in freezer unit when compressor fails – SWA recommends that the compressor of the freezer unit is replaced with a more efficient compressor, if the compressor fails before the entire freezer unit fails. The compressor is responsible for providing coolant to the walk-in freezer in order to maintain low temperatures. SWA evaluated replacing the compressor at this time but found it was not cost-effective with a payback of greater than 15 years. SWA recommends that a compressor using R-410A refrigerant is installed if this option is implemented
- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives. This includes motors located within the commercial kitchen equipment as well as packaged rooftop units
- Repair and replace damaged and displaced wood siding.
- Repair and replace damaged or displaced shingles.
- Replace rusted condenser unit – SWA observed that the condensing unit located on the exterior portion of the building, closest to the kitchen is rusted and beginning to show signs of aging. At the time of the audit, this unit was still operational and would not be cost-effective to replace however, should be replaced with a high efficiency unit immediately upon failing or when capital expenditure allows.

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.

- Maintain range top burners – SWA recommends that the four burners on the range top are maintained and cleaned on a regular basis. Grease build-up can become an obstruction to the burner and can potentially become a fire and safety hazard as well as reduce the efficiency of the burner to transfer heat.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly. Inspect and maintain missing/ineffective flashing, damaged or displaced shingles, leaking/ineffective cap flashing seams, missing or damaged roof insulation.
- Repair and replace damaged and displaced wood siding.
- Repair and replace damaged or displaced shingles.

- 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.
- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.
- Install ENERGY STAR® Labeled appliances, when equipment is installed or replaced. More information can be found in the “Products” section of the ENERGY STAR® website at: http://www.energystar.gov.
- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.
- Create an energy educational program - that teaches how to minimize energy use. The U.S. Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: http://www1.eere.energy.gov/education/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the City of Brigantine. Based on the requirements of the LGEA program, the City of Brigantine 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 $1,147.25.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Location	Make/ Model	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating/ Cooling	F-1; HQCO furnace, atmospheric, 125,000 Btuh input, 80% thermal efficiency, with cooling coil from condensor	Exterior mechanical room, left side	HQCO, Model #NUGI125DK03867.762042, Serial #L903676310	Natural Gas	Lobby	1989	16%
Heating/ Cooling	F-2; Arcoaire furnace, atmospheric, 125,000 Btuh input, 80.0 AFUE, with cooling coil from condenser	Exterior mechanical room, right side	Arcoaire, Model #H8MPN125J20B1, Serial #A064744580	Natural Gas	Lobby	2000	60%
Heating/ Cooling	RTU-1; Carrier packaged rooftop unit, gas heating and DX coolng, 115,000 Btuh heating input, 92,000 Btuh heating output, 80% thermal efficiency, 33.7 kW cooling input, 27.0 kW cooling output	Exterior, roof-mounted, backside of building	Carrier, Model #48TJE006---311--, Serial #2500G21124	Natural Gas/ Electricity	Main area/ Dining	1994	36%
Cooling	EMI condensing unit, R-22 refrigerant	Exterior, left side	EMI, Model #SC836DE0000AA0A, Serial #1-96-E-0214-20	Electricity	Lobby	1989	16%
Cooling	Carrier condensing unit, R-22 refrigerant	Exterior, left side	Carrier, Model #38CKC042310, Serial #1200E14955	Electricity	Kitchen	1995	40%
Cooling	Carrier condensing unit, R-22 refrigerant	Exterior, left side	Carrier, Model #38CKC042310, Serial #1200E14952	Electricity	Office	1995	40%
Cooling	Arcoaire condensing unit, R-22 refrigerant	Exterior, right side, behind kitchen	Arcoaire, Twelve, Model #NAC26 0AKA5, Serial #E030626442	Electricity	Main Area	2000	60%
Cooling	No nameplate info, R-22	Exterior, right side, behind kitchen	No nameplate info	Electricity	Main Area	1989	0%
Cooling	Arcoaire condensing unit, R-22 refrigerant	Exterior, right side, behind kitchen	Arcoaire, Model #N2A324AKB200, Serial #E08175267	Electricity	Main Area	1989	16%
Cooling	Arcoaire condensing unit, R-22 refrigerant	Exterior, right side, behind kitchen	Arcoaire, Model #NAC060, Serial #E050935049	Electricity	Main Area	1989	16%
Ventilation	Typical mushroom cap-style exhaust fan, no nameplate info	Roof	No nameplate info	Electricity	General Area	1989	20%
Ventilation	Kitchen centrifugal exhaust fan, no nameplate info	Roof	No nameplate info	Electricity	Kitchen	1989	20%
Commercial Kitchen Equipment	Arctic Commercial walk-in refrigerator with freezer section, kept at 38F	Kitchen area	Arctic, Model #4C.8.8X10.4, Serial #50692	Electricity	End Use	1989	16%
Commercial Kitchen Equipment	Gas-fired range top with four burners used for cooking light breakfast and lunch menu items, no nameplate information was available, estimated to use 1,183 therms per year	Kitchen area	No nameplate info	Natural Gas	End Use	1989	16%
Domestic Hot Water	State domestic hot water heater, electric, 4500 upper element, 4500 lower element, 4500 max. element, 40 gallons storage	Exterior mechancial room, right side	State, Censible 510E, Model #PV 40 20RT8 F, Serial #J91729593	Electricity	Restrooms	1989	10%
Domestic Hot Water	State domestic hot water heater, atmospheric, 75 gallons storage, 68.3 gal/hr recovery, 75,100 Btuh input	Exterior mechancial room, right side	State, Turbo, Model #SBT75 75 NET F, Serial #G91555021	Natural Gas	Kitchen	1994	10%
Lighting	See Appendix B	-	-	-	-	-	-

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	GF	Pro Shop	Recessed	S	CFL	1	3	23	Sw	16	365	0	69	403	N/A	Recessed	CFL	S	Sw	1	3	23	16	365	0	69	403	0	0	0
2	GF	Pro Shop	Track	S	Inc	1	3	65	Sw	16	365	0	195	1,139	CFL	Track	CFL	S	Sw	1	3	20	16	365	0	60	350	788	0	788
3	GF	Pro Shop	Track	S	Inc	2	2	65	Sw	16	365	0	260	1,518	CFL	Track	CFL	S	Sw	2	2	20	16	365	0	80	467	1051	0	1051
4	GF	Pro Shop	Recessed	S	Inc	1	4	60	Sw	16	365	0	240	1,402	CFL	Recessed	CFL	S	Sw	1	4	20	16	365	0	80	467	934	0	934
5	GF	Pro Shop	Track	S	Inc	1	3	65	Sw	16	365	0	195	1,139	CFL	Track	CFL	S	Sw	1	3	20	16	365	0	60	350	788	0	788
6	GF	Pro Shop	Exit Sign	S	LED	1	1	5	Sw	24	365	1	6	48	N/A	Exit Sign	LED	S	Sw	1	1	5	24	365	1	6	48	0	0	0
7	GF	Pro Shop	Track	S	Hal	1	5	20	Sw	16	365	4	104	610	CFL	Track	CFL	S	Sw	1	5	5	16	365	0	25	146	464	0	464
8	GF	Kitchen	Ceiling Mounted	E	4'T12	3	4	40	Sw	16	365	12	516	3,013	T8	Ceiling Mounted	4'T8	E	Sw	3	4	32	16	365	5	399	2330	683	0	683
9	GF	Kitchen - Walk In Units	Wall Mounted	S	CFL	2	1	23	Ct	4	365	0	46	67	N/A	Wall Mounted	CFL	S	Ct	2	1	23	4	365	0	46	67	0	0	0
10	GF	Kitchen	Ceiling Mounted	E	4'T8	3	4	32	Sw	16	365	5	389	2,330	N/A	Ceiling Mounted	4'T8	E	Sw	3	4	32	16	365	5	389	2330	0	0	0
11	GF	Pantry	Ceiling Mounted	M	4'T12	2	2	40	Sw	16	365	12	184	1,075	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	16	365	5	138	806	269	0	269
12	GF	Main Entrance	Recessed	S	Inc	3	1	65	Sw	16	365	0	195	1,139	CFL	Recessed	CFL	S	Sw	3	1	20	16	365	0	60	350	788	0	788
13	GF	Main Entrance	Exit Sign	E	FI.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
14	Attic	Storage Rm	Ceiling Mounted	S	Inc	3	1	60	Sw	1	365	0	180	66	CFL	Ceiling Mounted	CFL	S	Sw	3	1	20	1	365	0	60	22	44	0	44
15	GF	Office - General Manager	Ceiling Mounted	M	4'T12	1	2	40	Sw	8	365	12	92	269	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	8	365	5	69	201	67	0	67
16	GF	Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	8	365	12	184	537	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	8	365	5	138	403	134	0	134
17	GF	Dining Room	Recessed	S	Inc	26	1	65	Sw	16	365	0	1,690	9,870	CFL	Recessed	CFL	S	Sw	26	1	20	16	365	0	520	3037	6833	0	6833
18	GF	Dining Room	Track	S	Inc	1	4	60	Sw	16	365	0	240	1,402	CFL	Track	CFL	S	Sw	1	4	20	16	365	0	80	467	934	0	934
19	GF	Dining Room	Recessed	S	Inc	24	1	65	Sw	16	365	0	1,560	9,110	CFL	Recessed	CFL	S	Sw	24	1	20	16	365	0	480	2803	6307	0	6307
20	GF	Bar	Recessed	S	Inc	3	1	65	Sw	16	365	0	195	1,139	CFL	Recessed	CFL	S	Sw	3	1	20	16	365	0	60	350	788	0	788
21	GF	Bar	Track	S	Inc	2	4	65	Sw	16	365	0	520	3,037	CFL	Track	CFL	S	Sw	2	4	20	16	365	0	160	934	2102	0	2102
22	GF	Bar	Recessed	S	LED	11	1	5	Sw	16	365	1	61	353	N/A	Recessed	LED	S	Sw	11	1	5	16	365	1	61	353	0	0	0
23	GF	Liquor Cabinet	Ceiling Mounted	S	Inc	1	1	60	Sw	4	365	0	60	88	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	4	365	0	20	29	58	0	58
24	GF	Bathroom Men	Chandelier	S	CFL	1	5	13	Sw	16	365	0	65	380	N/A	Chandelier	CFL	S	Sw	1	5	13	16	365	0	65	380	0	0	0
25	GF	Bathroom Women	Chandelier	S	CFL	1	5	13	Sw	16	365	0	65	380	N/A	Chandelier	CFL	S	Sw	1	5	13	16	365	0	65	380	0	0	0
26	Ext	Exterior	Recessed	S	Hal	1	5	75	Sw	12	365	17	392	1,715	CFL	Recessed	CFL	S	Sw	1	5	25	12	365	0	125	548	1167	0	1167
27	Ext	Utility Rm	Ceiling Mounted	S	Inc	1	1	65	Sw	2	365	0	65	47	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	365	0	20	15	33	0	33
28	Ext	Storage Rm	Ceiling Mounted	M	4'T12	1	4	40	Sw	2	365	12	172	126	T8	Ceiling Mounted	4'T8	E	Sw	1	4	32	2	365	5	133	97	28	0	28
29	Ext	Mechanical Rm	Ceiling Mounted	S	Inc	1	1	65	Sw	2	365	0	65	47	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	365	0	20	15	33	0	33
30	Ext	Storage Rm	Ceiling Mounted	M	4'T12	1	4	40	Sw	2	365	12	172	126	T8	Ceiling Mounted	4'T8	E	Sw	1	4	32	2	365	5	133	97	28	0	28
31	Ext	Exterior	Spotlight	S	PSMH	2	1	660	T	12	365	132	1,584	6,938	N/A	Spotlight	PSMH	S	T	2	1	660	12	365	132	1584	6938	0	0	0
32	Ext	Concession Storage	Ceiling Mounted	S	Inc	1	2	60	Sw	2	365	0	120	88	CFL	Ceiling Mounted	CFL	S	Sw	1	2	20	2	365	0	40	29	58	0	58
33	Ext	Exterior	Wall Mounted	S	CFL	1	2	23	T	12	365	0	46	201	N/A	Wall Mounted	CFL	S	T	1	2	23	12	365	0	46	201	0	0	0
34	Ext	Exterior	Wall Mounted	S	CFL	1	1	23	T	12	365	0	23	101	N/A	Wall Mounted	CFL	S	T	1	1	23	12	365	0	23	101	0	0	0
35	Ext	Exterior	Wall Mounted	S	Hal	1	2	90	T	12	365	20	200	875	CFL	Wall Mounted	CFL	S	T	1	2	30	12	365	0	60	263	612	0	612
36	Park	Exterior	Pole Mounted	S	HPS	10	1	400	T	12	365	80	4,800	21,024	N/A	Pole Mounted	N/A	S	T	10	1	400	12	365	80	4800	21024	0	0	0
Totals:						119	87	2,610				332	14,990	72,075						119	86	1,777			249	10,189	46,851	25,224	0	25,224
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																													

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	5,360		
Average Power Cost ($/kWh)	0.1660		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	10,264	8,303	**1,961**
Exterior Power (watts)	2,838	2,184	**654**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	61,811	38,548	**23,263**
Lighting Power (watts)	12,152	8,005	**4,147**
Lighting Power Density (watts/SF)	2.27	1.49	**0.77**
Estimated Cost of Fixture Replacement ($)	3,930		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**4,841**		

TO MAKE TABLES INTO PICTURE FOR THE REPORT, AS SHOWN BELOW, COPY THE TABLE ABOVE, THEN GO TO "HOME" MENU TAB, THE LEFT MOST BUTTON IS "PASTE". CLICK ON THE "PASTE" DROP DOWN AND SELECT "AS PICTURE", THEN ANOTHER DROP DOWN COMES UP AND SELECT, "PASTE AS P

Legend:

Fixture Type	Lamp Type	Control Type	Ballast Type	Retrofit Category
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Installl new T8)
Pin	1'T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2'T5	T (Timer)		CFL (Install new CFL)
Recessed	3'T5	PC (Photocell)		LEDex (Install new LED Exit)
2'U-shape	4'T5	D (Dimming)		LED (Install new LED)
Circiline	2'T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3'T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4'T8			
	6'T8			
	8'T8			
	2'T12			
	3'T12			
	4'T12			
	6'T12			
	8'T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium			
	LPS (Low Pressure Sodium)			

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Electric Suppliers for Atlantic City Electric Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions	(877) 273-6772

581 Main Street, 8th Floor Woodbridge, NJ 07095	www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

Third Party Gas Suppliers for 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.

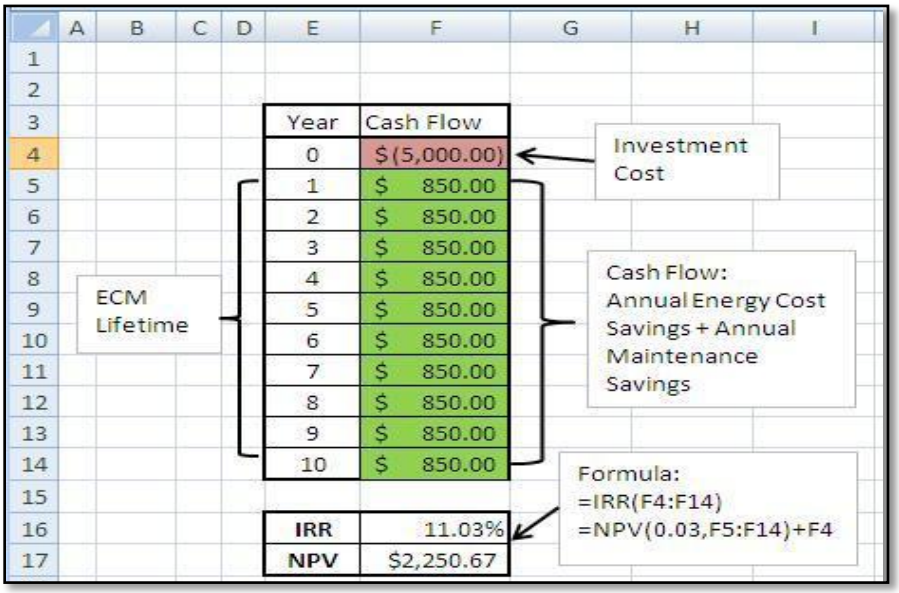
Calculation References

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
City of Brigantine - The Links at Brigantine Beach Golf Course Clubhouse

Building ID: 2308524
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes Ineligible: N/A

Date SEP Generated: October 04, 2010

Facility
City of Brigantine - The Links at Brigantine Beach Golf Course Clubhouse
1075 North Shore Drive
Brigantine, NJ 08203

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1974
Gross Floor Area (ft²): 5,360

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	674,239
Natural Gas (kBtu)[4]	667,863
Total Energy (kBtu)	1,342,102

Energy Intensity[5]	
Site (kBtu/ft²/yr)	250
Source (kBtu/ft²/yr)	551

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	138

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison	
National Average Site EUI	351
National Average Source EUI	786
% Difference from National Average Source EUI	-30%
Building Type	Food Service

Stamp of Certifying Professional

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

Certifying Professional
N/A

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

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

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 80%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

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

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

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.

APPENDIX G: ENERGY CONSERVATION MEASURES

Energy Conservation Measures																			
ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	Install (74) new CFL lamps	RS Means	2,353	0	2,353	23,786	5.0	0	15.1	304	4,252	5	21,262	0.6	804%	161%	180%	17,011	42,589
2	Retrofit (1) existing refrigerated cooler with CoolingMiser™ device	Manufacturer	199	0	199	607	0.1	0	0.4	0	101	5	504	2.0	153%	31%	42%	260	1,087
3	Install (1) new LED exit sign	RS Means	151	20	131	228	0.0	0	0.1	6	44	15	658	3.0	402%	27%	33%	385	408
4	Install (4) new T8 Fluorescent Fixtures	RS Means	1,596	60	1,536	1,210	0.3	0	0.8	39	240	15	3,598	6.4	134%	9%	13%	1,286	2,167
5	Convert (1) electric domestic hot water heater to natural gas	RS Means	1,488	50	1,438	1,217	0.2	-52	-0.2	0	115	15	1,727	12.5	20%	1%	2%	-83	1,606
	TOTALS		**5,787**	**130**	**5,657**	**27,048**	**5.6**	**-52**	**16.2**	**349**	**4,752**	-	**27,749**	**1.2**	-	-	-	**18,859**	**47,856**

APPENDIX H: COOLINGMISER™ Energy Savings Calculator

EnergyMisers

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

Savings Calculator

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

Energy Costs ($0.000 per kWh)	$.166
Facility Occupied Hours per Week	28
Number of Cold Drink Vending Machines	1
Number of Non-refrigerated Snack Machines	0
Power Requirements of Cold Drink Machine (Watts; 400 typical)	100
Power Requirements of Snack Machine (Watts; 80 typical)	0
VendingMiser® Sale Price (for cold drink machines)	199
SnackMiser™ Sale Price (for snack machines)	0

Calculate Savings!

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

COLD DRINK MACHINES	Current	Projected	Total Savings	% Savings
kWh	874	267	607	69%
Cost of Operation	$145.02	$44.31	$100.71	69%

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

Location's Total Annual Savings

	Current	Projected	Total Savings	% Savings
kWh	874	267	607	69%
Cost of Operation	$145.02	$44.31	$100.71	69%

Total Project Cost	Break Even (Months)
$199	23.71

Estimated Five Year Savings on ALL Machines = $503.53

APPENDIX I: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions, eQUEST
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.