Steven Winter Associates, Inc.
Building Systems Consultants
www.swinter.com

293 Route 18, Suite 330
East Brunswick, NJ 08816

Telephone (866) 676-1972
Facsimile (203) 852-0741

September 3, 2010

Local Government Energy Program
Energy Audit Final Report

Cumberland County College
Alampi Science Building
3322 College Drive
Vineland, NJ 08360

Project Number: LGEA66

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EXECUTIVE SUMMARY

The Cumberland County College Alampi Science Building is a single-story building comprising a total conditioned floor area of 27,482 square feet. The original structure was built in 1979, with major additions in 1996 and 1998. The following chart provides an overview of current energy usage in the building based on the analysis period of April 2009 through March 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	654,999	29,482	$125,439	186.0	5,183
Proposed	521,812	26,534	$101,145	158.7	4,434
Savings	133,187	2,948	$24,293	27.3	749
% Savings	20%	10%	19%	15%	14%
Renewable Savings (Includes SRECs)	*17,700*	*NA*	*$12,509*	*2.2*	*32*

Currently the Cumberland County College Alampi Science Building has third party and demand response agreements for reducing utility costs. There may be energy further procurement opportunities for the Alampi Science Building once individual building electric and gas sub-meters are installed.

SWA has also entered energy information about the Alampi Science Building in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This College facility is comprised of non-eligible ("Other") space type. The resulting score is 186.0 KBtu/sqft-yr, which is higher than the average comparable building by 55.0%. The Alampi Science Building is in the midst of a planned equipment change-over which will likely to reduce the energy utilization of the building.

In conjunction with the planned change-over, 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	$22,930	0.4	$8,472	260,925
5-10 Year	$818	7.6	$6,250	5,161
>10 year	$545	11.9	$6,493	4,884
Total	$24,293	0.9	$21,215	270,969
Renewable	$12,509	7.5	$93,750	31,692

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 22 cars from the roads each year or avoiding the need of 659 trees to absorb the annual CO_2 generated.

Further Recommendations:

SWA recommends that the Alampi Science Building further explore the following:

- Capital Improvements
  - Install premium motors when replacements are required
  - Add all HVAC equipment and space conditions to campus Electronic Building Integrator (EBI) System
  - Replace Exhaust fans in Greenhouses

- Operations and Maintenance
  - Overgrown ground vegetation should be trimmed
  - Insect nesting in exterior cavities should be removed
  - Replace/repair and maintain damaged window units
  - Install/replace and maintain weather-stripping around all exterior doors
  - Provide water-efficient fixtures and controls
  - SWA recommends that the building considers purchasing the most energy-efficient equipment
  - Use smart power electric strips
  - Create an energy educational program

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Cumberland County College. Based on the requirements of the LGEA program, Cumberland County College 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 $2,345.

See more details on these measures in the Proposed Further Recommendations section of the report on page 46.

Financial Incentives and Other Program Opportunities

The overall energy usage of the campus based on the two electric meters and one gas meter is 186.0 kBtu/sq ft yr. This is higher than typical buildings which perform between 90.0 and 130.0 kBtu/sq ft yr and therefore Cumberland County College is an excellent candidate for the NJ Clean Energy Pay for Performance (P4P) incentive program. The three-tiered incentive program requires at least 15% overall energy reduction for the campus buildings. Prior to acceptance in the program it is required that this building be separately metered for a period of 12 consecutive months.

The table below summarizes the recommended next steps that Cumberland County College can take to achieve greater energy efficiency and reduce operating expenses.

Table 3: Next Steps for the Alampi Science Building

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Upgrade 15 manual thermostats to programmable thermostats	Pay for Performance OR Direct Install OR SmartStart
Replace Std. Eff. Motors with Premium Eff., Upgrade Refrigerator	Pay for Performance OR Direct Install OR SmartStart
Lighting: Replace Inc with CFL, MH to PSMH, T12 to T8	Direct Install OR SmartStart

There are various incentive programs that the Cumberland County College could apply for that could help lower the cost of installing the ECMs. For the Alampi Science Building, and contingent upon available funding, SWA recommends the following incentive programs:

New Jersey Clean Energy Pay for Performance – Three phase incentive plan:

1. Develop plan to reduce current energy use by 15%: receive up to 50% of annual energy costs
2. Install measures as outlined in the plan: receive up to $0.13 per kWh saved and $1.45 per therm saved
3. After benchmarking energy savings for one year: receive up to $0.09 per kWh saved and $1.05 per therm.

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

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

Renewable Energy Incentive Program: Receive up to $0.75/Watt toward installation cost for PV panels upon available funding.
AND For each 1,000 kWh generated by renewable energy, receive a credit between $475 and $600.

Utility Sponsored Programs: See available programs with AC Electric and South Jersey Gas.
http://www.atlanticcityelectric.com/home/
http://www.southjerseygas.com/

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

Please refer to Appendix F for further details.

INTRODUCTION

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

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

SWA performed an energy audit and assessment for the Alampi Science Building at 3322 College Drive, Vineland, NJ. The process of the audit included facility visits on April 29, 2010 and June 3, 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 Cumberland County College to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Alampi Science Building.

HISTORICAL ENERGY CONSUMPTION

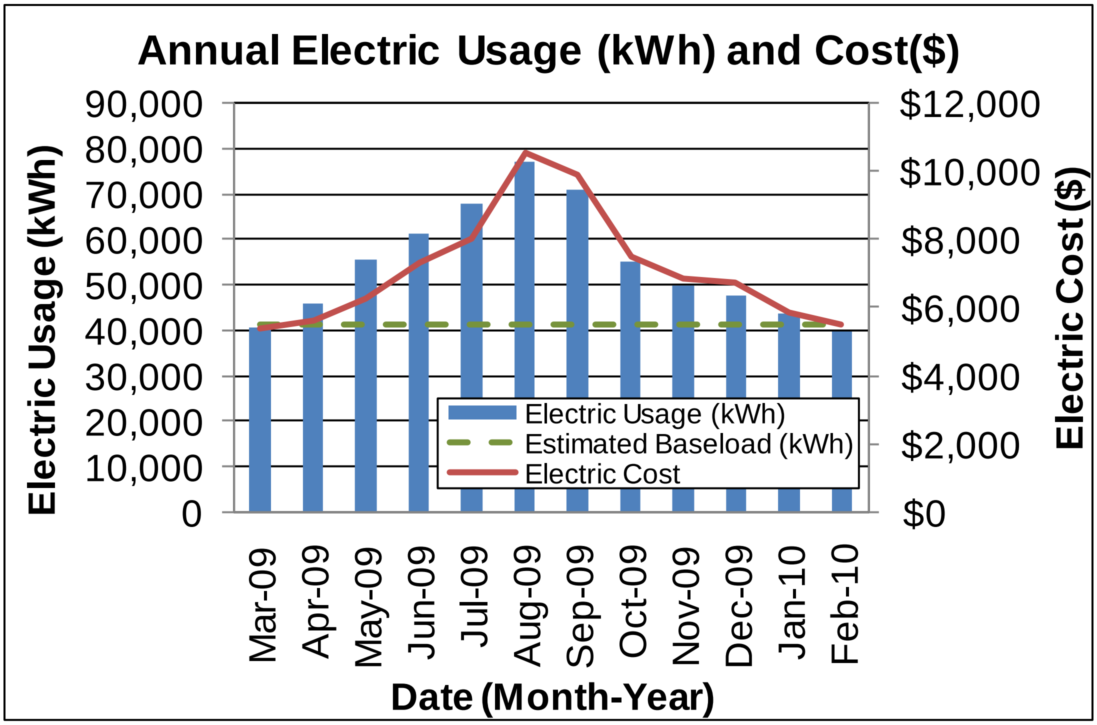
Energy usage, load profile and cost analysis

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

In order to analyze the energy usage of each campus building, since there are no building sub-meters, it was agreed upon with campus management that the energy usage would be proportioned based on the square footage of each building compared to the entire campus building square footage. For gas usage, the entire campus is served by one main meter. The minor gas meters used for the kitchens, lab equipment and small DHW contribute negligible gas usage. There are two electric meters, one serving the Vineland coverage area and one serving the AC Electric coverage area. It is difficult to separate the actual electric usage per building since the Central Plant serves most of the campus heating and cooling. Therefore, the electric consumption of both meters was combined and using the entire campus of 274,527 sqft, the electric usage was proportioned for each building. The billing rate used in the analysis is based on the weighted average of the Vineland Electric and AC Electric utility rates. Both electric suppliers contribute to the campus and in order to reasonably compare Energy Saving Measures, the same rate was used for all buildings. After installation of sub-meters for each building, the rates for each utility supplier will be more relevant.

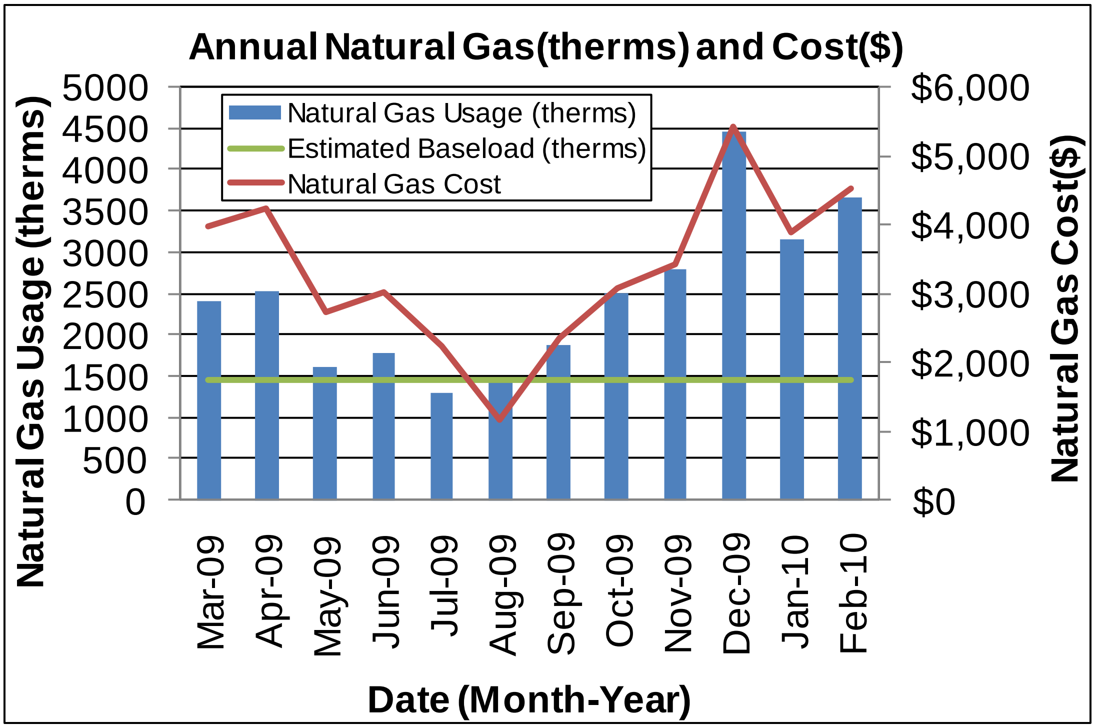
Electricity – Cumberland County College currently buys electricity at **an average aggregated rate of $0.130/kWh.** There are only two electric meters for the Cumberland County College campus buildings, with no sub meters for each building. Therefore the usage of each building was estimated based on square footage compared to the total campus size. Using this method, the Alampi Science Building purchased **approximately 654,999 kWh, or $85,451 worth of electricity,** in the previous year. The average monthly demand was 124.3 kW and the annual peak demand was 158.2 kW.

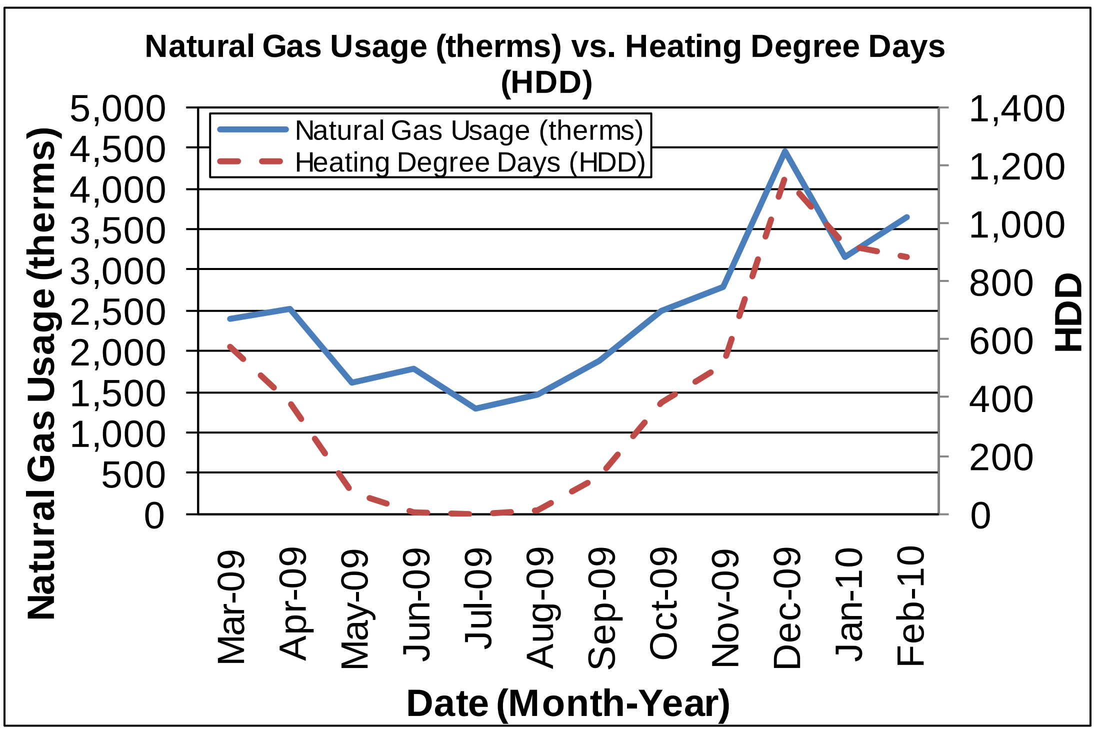
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Alampi Science Building.



Natural gas – There is only one gas meter for all of the buildings on the Cumberland County campus. Therefore, the usage of each building was estimated based on the square footage compared to the total square footage of all buildings on the same meter. Based on this, the Alampi Science Building currently buys natural gas from South Jersey Gas at **an average aggregated rate of $1.356/therm**. The Alampi Science Building purchased **approximately 29,482 therms, or $39,987 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 Alampi Science Building.

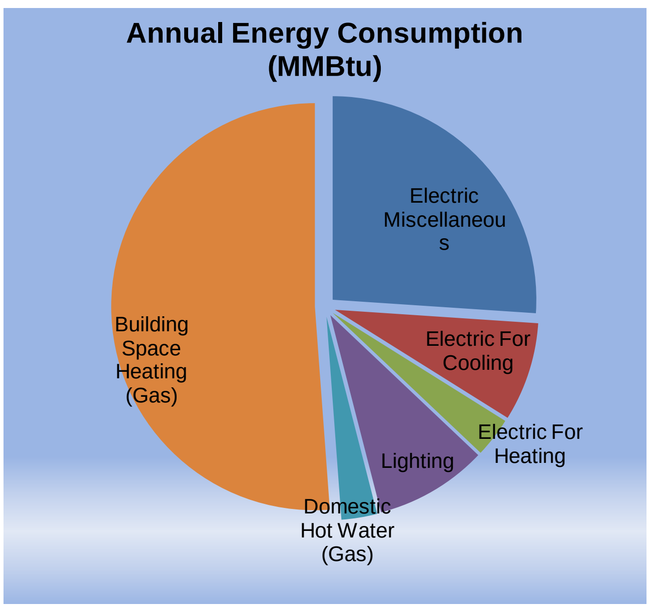


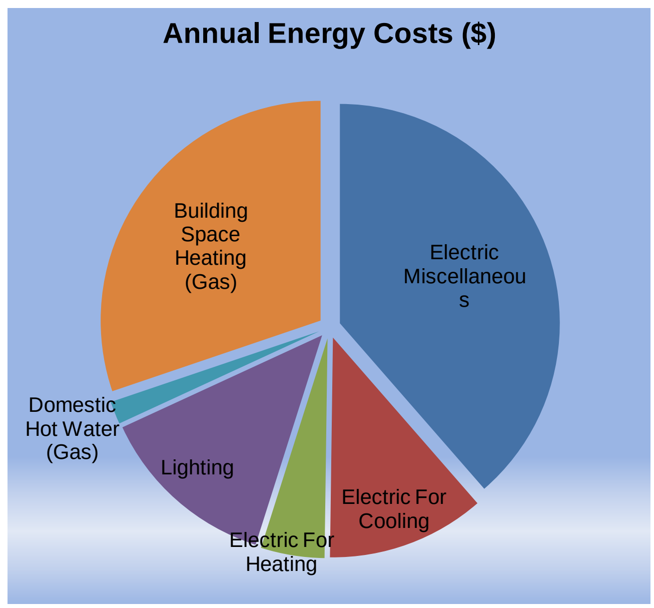


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the BUILDING based on utility bills for the 12 month period. Note: electrical cost at $38/MMBtu of energy is 2.5 times as expensive as natural gas at $14/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	1,266	24%	$48,405	39%	38
Electric For Cooling	381	7%	$14,585	12%	38
Electric For Heating	153	3%	$5,867	5%	38
Lighting	434	8%	$16,594	13%	38
Domestic Hot Water (Gas)	149	3%	$2,020	2%	14
Building Space Heating	2,799	54%	$37,967	30%	14
Totals	5,183	100%	$125,438	100%	
Total Electric Usage	2,235	43%	$85,452	68%	38
Total Gas Usage	2,948	57%	$39,987	32%	14
Totals	5,183	100%	$125,438	100%	

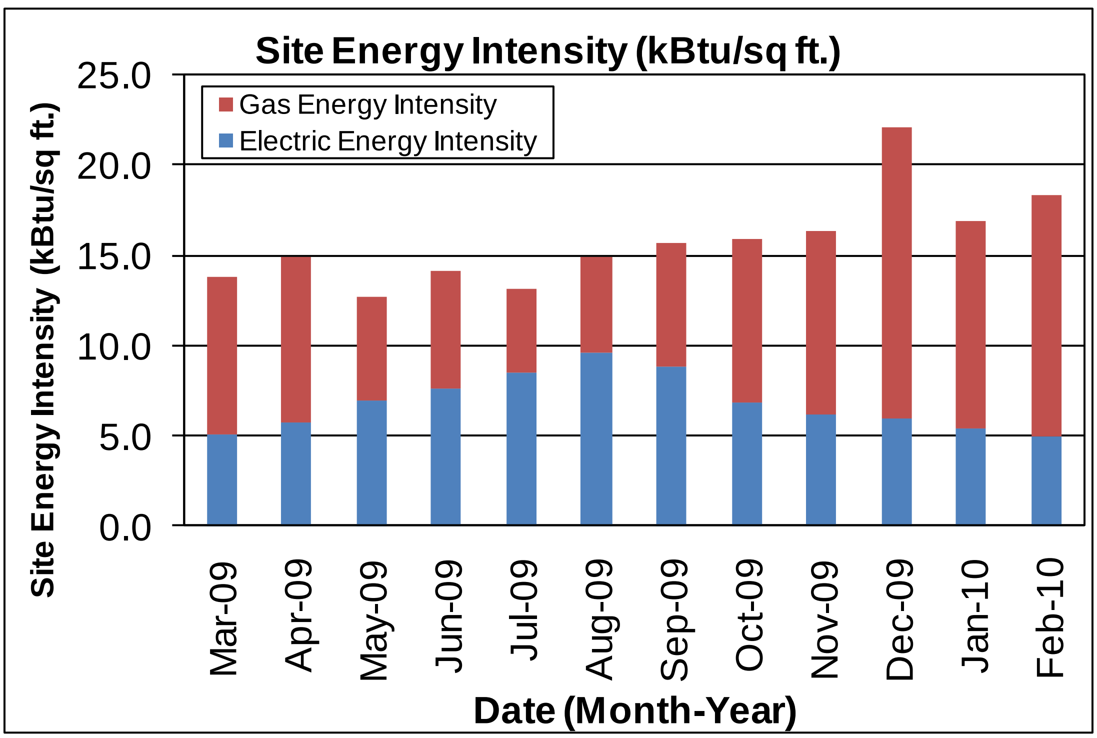




Energy benchmarking

SWA has entered energy information about the Alampi Science Building in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This College facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Alampi Science Building is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 186.0 kBtu/ft^2-yr compared to the national average of a College building consuming 120.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "Other" space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the Cumberland County College 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 Cumberland County College to create an *ENERGY STAR® Portfolio Manager* account and share the Alampi Science Building 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 Cumberland County College (user name of "cumberlandcollege" with a password of "cumberland2010") 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 Cumberland County College 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 needed for cooling equipment

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 Cumberland County College 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.

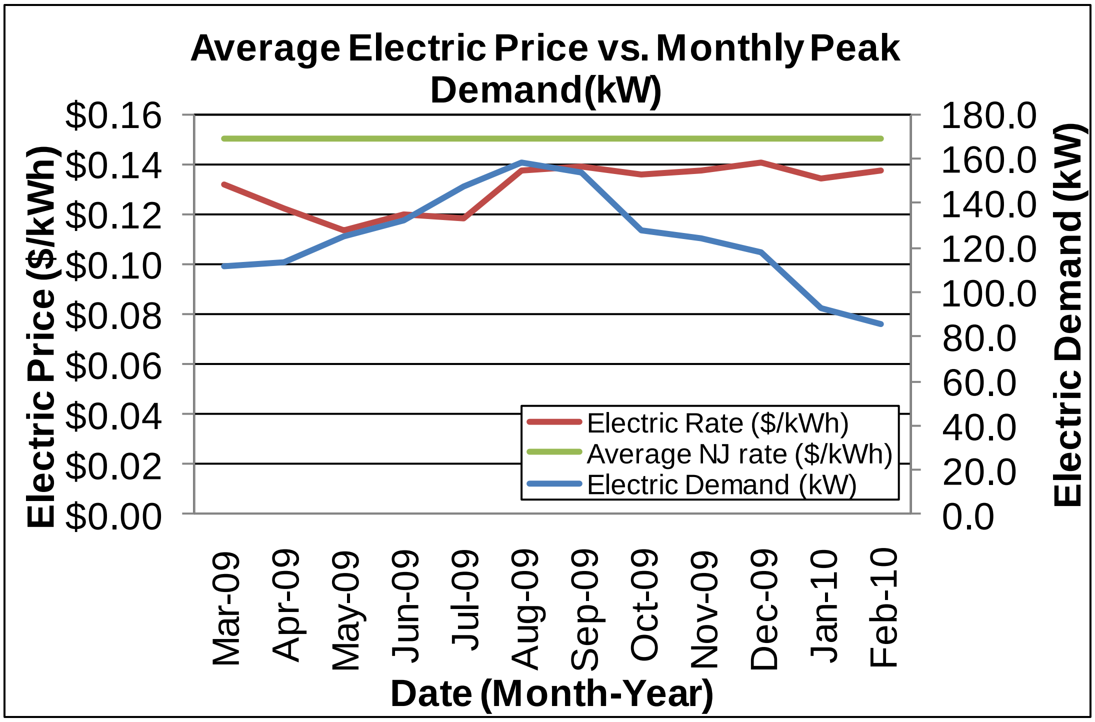
Cumberland County College has an agreement with PEPCO Energy Services as a third party electric supplier with AC Electric and also has a natural gas third party supplier. In addition, the College has an agreement with an energy services provider for a demand response program. Upon request by the provider, Cumberland County College will reduce their electric consumption in exchange for savings per kilowatt hour.

There are two electric meters and one gas meter for the entire campus. 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. Because there are not individual meters for each building, the Alampi Science Building usage was estimated based on square footage compared to all buildings on the same meter.

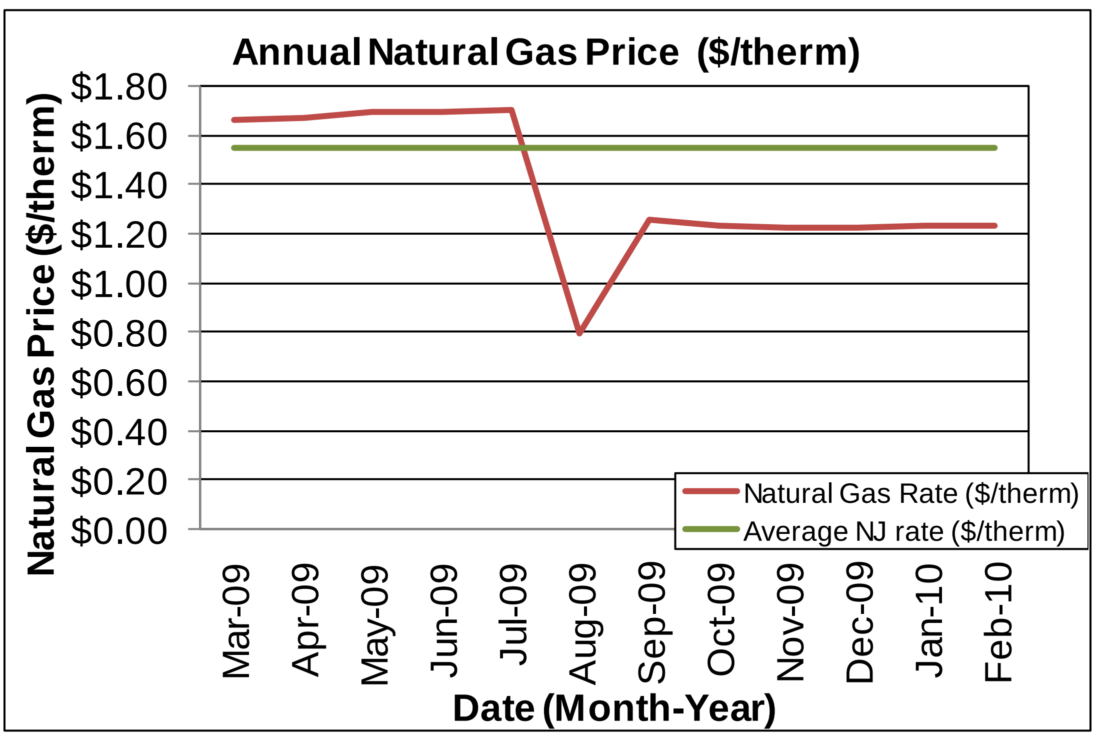
Energy Procurement strategies

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 Alampi Science Building pays a competitive average rate of $0.130/kWh. Electric bill analysis shows fluctuations up to 19% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Alampi Science Building pays a competitive rate of $1.356/therm. Natural gas bill analysis shows fluctuations up to 55% 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 College maintain 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 Alampi Building, as well as continue the demand response program. Appendix C contains a complete list of third-party energy suppliers for the Cumberland County College 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.

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Based on visits from SWA on April 29 and June 3, 2010, the following data was collected and analyzed.

Building Characteristics

The one-story, 27,482 square feet Alampi Science Building was originally constructed in 1979 with major additions completed in 1996 and 1998. The building consists of laboratories, general classrooms, two greenhouses, offices and mechanical rooms.

Overall Building Site Plan – Original Building & Major Additions

Front Façade

Front Façade- North Wing

Left Side Façade - Greenhouses

Rear Façade

Building Occupancy Profiles

The facility is occupied by approximately 100 students and 20 staff Monday to Thursday from 8am to 11:30am and 4:30pm to 10pm, and 50 students and 10 staff from 11:30am to 4:30pm. Saturday classes are in session from 7:45am to 12pm. Occupancy is minimal on Fridays and Sundays with only a 5 to 15 maintenance staff.

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 steel siding accents, with a 2“air gap, 3” of rigid insulation and 8” CMU block. The interior is mostly painted gypsum wallboard. The north wing is constructed of split-face concrete block and some vinyl clapboard siding accents, with a 2“air gap, 3” of rigid insulation and 8” CMU block. The greenhouses are constructed of ½” cell translucent polymer with an aluminum frame. The rooftop penthouse enclosure consists of ¾” laminated metal panels with 6” foil-faced batt insulation.

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

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

Insect nesting in exterior cavities

Overgrown ground vegetation blocking exterior wall surfaces which can damage exterior walls and contribute to moisture damage

Roof

The majority of the building's roof is predominantly a flat, no parapet type over steel decking, with a built-up asphalt finish and gravel ballast. All roofs are original; the North wing was installed in 1995 and consists of a flat, no parapet type over steel decking with a metal panel finish. No ceiling insulation and four inches of rigid roof insulation were recorded. Visible from the ceiling of the aquaculture center was at least 4" of foil-faced insulation.

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

Base

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

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

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

Windows

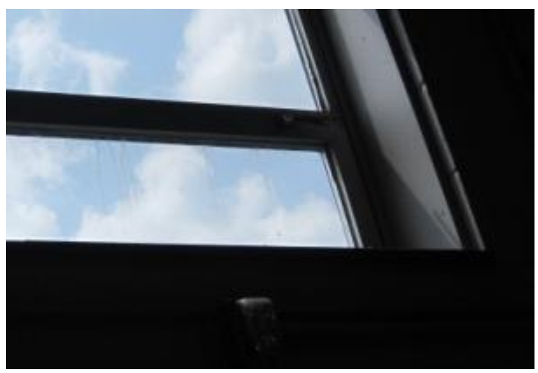
The building contains basically two different types of windows:

1. Approximately 60 fixed type windows with separate awning sections and with insulated aluminum frames, clear double glazing and interior roller blinds in offices and no blinds in hallways. The windows are located throughout the building and are original.

2. Approximately 4 skylight type windows with a non-insulated aluminum frame, tinted double glazing and no interior or exterior shading devices. The windows are located on the roof and are original.

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

The following specific window problem spots were identified:



Water damage signs in between window panes

Exterior doors

The building contains three different types of exterior doors:

1. Five aluminum type exterior doors. They are located throughout the building and are original/have never been replaced.

2. Eight glass with aluminum frame type exterior doors. They are located throughout the building and are original/have never been replaced.

3. Two aluminum garage type exterior doors. They are located in the rear of the building 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 condition with only a few signs of uncontrolled moisture, air-leakage and other energy-compromising issues.

The following specific door problem spots were identified:

Missing/worn weather-stripping

Missing/worn weather-stripping

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

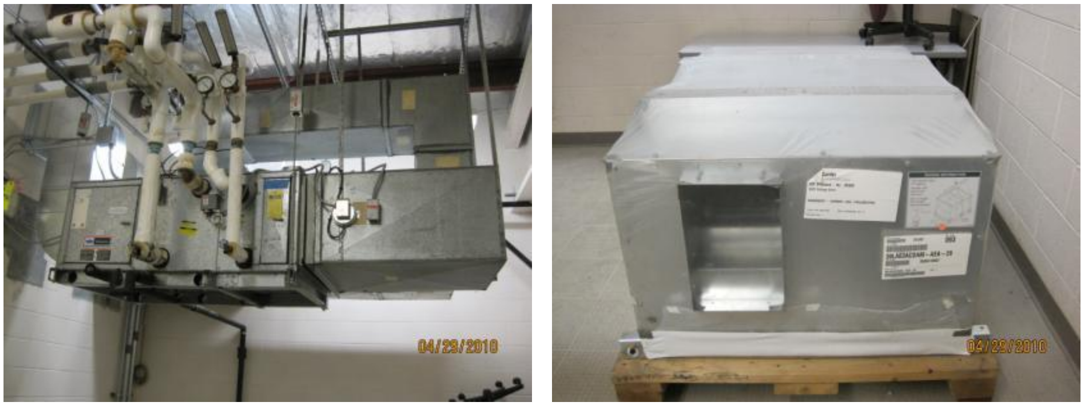
Heating Ventilation Air Conditioning

The Alampi Science Building is heated and cooled by a comprehensive variable volume distribution system. There is also special equipment for science laboratories that which do not impact the temperature conditions, but do significantly contribute to the building's energy use. There are no major comfort issues in the building.

Equipment

The Alampi Science Building is directly heated and cooled by three air handling units, two Carrier units AHU-1, AHU-3 and one McQuay AHU-4. A comprehensive Equipment List can be found in Appendix A.

The air handling units contain hot water coils and chilled glycol coils. The air handlers serve 13 variable air volume boxes throughout the building. In order to dehumidify the air, the air handlers cool the air below the dew point so that moisture condenses out of the air. Then individual reheat coils installed in the ductwork downstream of each VAV box heats the air back to comfort conditions. The AHU-3 serves the massage room, and is slated to be replaced. The new unit has been purchased, but has not yet been installed.



Suspended Air Handling Unit AHU-3 Serving Massage Area; New AHU-3 to replace existing

The hot water for all heating throughout the building is currently supplied from a cast iron HB Smith, 1,939 MBH capacity boiler with 40% remaining useful life and an estimated 80% thermal efficiency.

Smith Cast Iron Hot Water Boiler

The hot water is circulated by two sets of hot water pumps, two primary Bell & Gosset pumps and two booster pumps.

For cooling there is a McQuay Air-Cooled Chiller with 140 Ton capacity with 40% remaining useful life and an estimated 10.8 EER at full load. The chiller produces a chilled glycol-water mixture. There are also two sets of pumps for the glycol, two primary CHW glycol pumps and two distribution pumps. Each set includes a lead pump and a stand by.



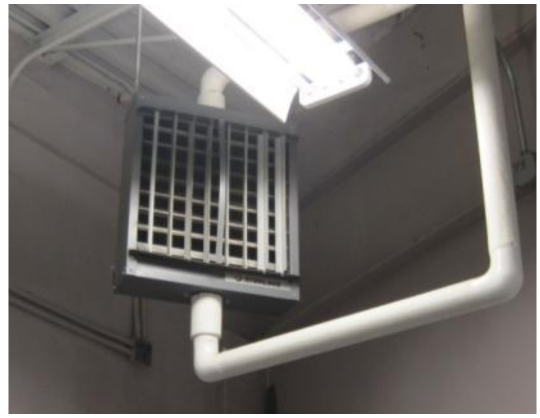
Primary Hot Water Pumps; Secondary Hot Water and Glycol Chilled Water Pumps

By the end of 2010, the College plans to disconnect the McQuay glycol chiller and HB Smith hot water boiler and supply the hot water and chilled water from the Central Plant. The existing primary pumps and booster pumps will still be used. The Central Plant produces hot water and chilled water, not glycol, so connecting to the Central Plant will require completely draining the glycol water system. Also, for the McQuay air handler, AHU-4, there is a hot water to hot glycol heat exchanger used for the heating coil. After the switch-over the heat exchanger and hot water glycol return pumps will be abandoned. According to building staff, the system was originally designed for chilled water and therefore the cooling capacity will not be compromised when switching from the glycol solution to chilled water. All hot water and chilled water primary and booster pumps will still be used and the existing boiler will remain as a backup.



McQuay Air Cooled Glycol Chiller to be removed (Left);
Hot Water to HW Glycol Heat Exchanger to be removed (Right)

There are also supplemental hot water unit heaters, perimeter hot water fin tube radiators and cabinet unit heaters which are served by a set of inline hot water radiator pumps.

Cabinet Unit heater, typ.; Hot Water Unit Heater, typ.

Ventilation is provided through several means. There are outside air intake louvers and on each air handling unit which ensures a minimum amount of air changes throughout the building. There are HEPA filters on most of the AHU's to ensure that particulates are removed before air enters occupied spaces.

Also there are 14 rooftop exhaust fans, 9 which serve laboratory hood exhaust, and the remaining 5 serve toilets, general exhaust and mechanical rooms. The outside air louvers are motorized using pneumatic valves to allow economizer operation when the outside air conditions are favorable. In general, the building exhaust fans have an estimated 35% remaining operating life left.

During the field visit it was noted that the MER Penthouse has a 15 HP return fan serving AHU-4 which causes vibrations and noise while operating.


Pneumatic automatic outside air damper, typical; MER Return Fan, noisy

The greenhouses have separate heating and ventilation systems. The greenhouses were built in 1979 and most of the equipment is original. Each greenhouse has cross ventilation with a gravity louver on the south wall and an exhaust fan on the north wall to continuously draw air through the space. There is also a Reznor 250,000 Btu/hr gas unit heater in each greenhouse for heating in winter. There are two small circulating fans mounted on the ceiling as well. The heating and ventilation equipment are over 20 years old and beyond their useful operating life.

Greenhouse Exhaust Fan

There are six laboratories in the Alampi Science Complex and several lab prep rooms. The labs use equipment such as lab hoods, incubators, freezers, and process air. Each of the nine lab hoods has a dedicated lab exhaust fan on the roof with sound attenuation. There is a Fluid Energy air compressor which uses an air dryer to first remove moisture from the air and then compress it for lab use. There is also a vacuum compressor used for labs. Due to the potential of volatile chemicals in the lab areas, these rooms do not have a return air diffuser. All other rooms have return diffusers which lead to a return air plenum and eventually back to the air handling units.

Laboratory Hood, typ.; Lab Hood Exhaust fan with sound attenuator, Typ.

Air Dryer and Air Compressor for lab process air; Incubators, refrigerators, etc.

Distribution Systems

The air handler draws in fresh air and brings it into a mixing box, where it is combined with return air from the building through a return air plenum. A 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 using a supply fan through a filter before passing through the hot water coil and then the chilled water coil and is distributed to the ductwork system. The hot water and chilled water piping has automatic control valves to adjust the flow in order to meet the space temperature conditions.

The Alampi Science Building has a Variable Air Volume (VAV) system, using VAV boxes throughout the ductwork system. The VAV boxes have a modulating 2-position damper within the ductwork which open to a pre-set position or close to satisfy the temperature settings of the rooms that it serves.   The lab rooms have a constant volume air supply.

The hot water and glycol systems are distributed by a several sets of pumps. There are primary hot water pumps, booster hot water pumps, fin tube radiator pumps and reheat pumps. Each set consists of a lead pump and a standby and all pumps are constant speed. The glycol system has two sets of pumps, primary and booster pumps.

Controls

All of the building controls are a local Honeywell control system using electronic programming and executed by pneumatic actuators. Unlike many of the campus buildings, Alampi is not integrated into the campus wide Honeywell Enterprise Building Integrator, (EBI) System. There are however local ports at the controller to make set point adjustments as seen in the photo below. There is a compressor with an air dryer in the Penthouse for the pneumatic controls.

Electronic to pneumatic controller; Pneumatic piston, typ.

Each of the 13 VAV boxes is controlled by a Honeywell temperature sensor. There is a separate thermostat to adjust the set point which is dial-type and is highly inaccurate according to building staff. Because of the lack of programmable thermostats, the air handling units operate to meet set point 24 hours a day.

Thermostat and temp. sensor, typ.; Pneumatic Air Compressor & Air dryer

There are variable speed drives on the supply and return fans for AHU-4. This unit serves 13 VAV boxes downstream and as the dampers modulate, changing the air flow, the VFD reduces the fan motor speed to a minimum to save energy. There is a cubed relationship between motor speed and power requirements. If the speed is reduced by 50%, the motor brake horsepower will reduce to 12.5% of the full horsepower; therefore using a VFD can generate significant energy savings.

AHU-4 fan VFD Drives

Domestic Hot Water

The domestic hot water (DHW) for the Alampi Science Building is provided by a natural gas State Water Heater, 75,100 Btu/hr with 75 gal storage and small recirculating pump. When the heater activates, a small outside air damper opens to allow in at least 20% outside air in the boiler room.

Domestic Hot Water Heater

This heater has 20% estimated useful operating life remaining and appears in good condition.

Electrical systems

Lighting

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

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

Interior Lighting - The Alampi Science Building currently contains mostly T8 fixtures, some T12 fixtures and CFLs with self-ballast bulbs. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.


CFL lights; T8 fixtures

Laboratory T8 lighting

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

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide, Mercury Vapor lamps and Incandescent fixtures. Exterior lighting is controlled by photocell.

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 Alampi Science Building does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Alampi Science Building other than transformers, and an emergency generator. There are approximately six GE transformers in the building mostly used for HVAC equipment, with capacities from 3.0 kVa to 45.0 kVa. The emergency generator is a diesel Onan generator exercised once a week for 20 minutes, with 343.8 kVa capacity. Transformers and generator appear to be in good operating condition.

Onan Generator

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 other than a set of five solar thermal heating panels, installed before 1980, which are no longer used.

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 Alampi Science Building is a good candidate for a 15.0 kW Solar Panel installation. See ECM#7 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 Alampi Science Building is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The Alampi Science Building is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 20% and 35% remaining useful life.

Combined Heat and Power

The Alampi Science Building 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	Upgrade 15 manual thermostats to programmable
2	Lighting Upgrades: 12 New CFL fixtures to be installed with incentives
3	Motor Upgrades: Replace two 7.5 HP CHW Primary Pumps with premium efficiency
4	Upgrade 1 old Bohn walk-in refrigerator with energy efficient controls, motors, compressors
5	Motor Upgrades: Replace two Primary HW 5.0 HP standard motors, with premium efficiency
	Description of Recommended 5-10 Year Payback ECMs
6	Lighting Upgrades: 6 New PSMH fixtures to be installed with incentives
7	Install 15.0 kW Solar Photovoltaic system
8	Motor Upgrades: Replace two Reheat Pump 1.5 HP standard motors with premium efficiency
9	Motor Upgrades: Replace Four Std. Eff. 1.0 HP Motors with Premium Eff.
	Description of Recommended >10 Year Payback ECMs
10	Lighting Upgrades: 23 New T8 fixtures to be installed with incentives
11	Lighting Upgrades: Install 13 occupancy sensors

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 Manual thermostats to programmable type*

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 8 to 10 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. 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.

Each air handler operation is determined by the space temperature setpoints which are currently adjusted by manual thermostats so there are no evening or weekend setbacks. Each VAV box thermostat can be replaced with a programmable type for an estimated 15 thermostats throughout the building. It is assumed that there will be evening setbacks for 8 hours a day for which the set point adjusts from 70 deg to 62 deg in the winter and 78 deg in the summer.

Installation cost:
Estimated installed cost: $2,505 (includes $1,127 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
1	2,505	0	2,505	117,900	23	2,948	25	1,167	20,546	12	246,549	0.1	9,742	243,598

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed evening setbacks for 8 hours a day for which the setpoint will adjust from 70 deg to 62 deg in the winter and 78 deg in the summer, resulting in 18% savings in overall energy usage, based on Energy Star Thermostat Savings Calculator.

Rebates/financial incentives:

- *None at this time*

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Building Lighting Upgrades: 12 Incandescent lamps replaced with CFLs*

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting also contains several 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: $654 (includes $491of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
2	654	0	654	2,077	0	0	0	436	706	5	3,528	0.9	439	3,719

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 10 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *None at this time*

Please see Appendix F for more information on Incentive Programs.

ECM#3: ***Replace Two 7.5 HP CHW Pump Standard Efficiency Motors with Premium Efficiency***

During the field audit, SWA completed the building equipment inventory and observed several standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $1,350 (includes $382 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM#	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
3	1,530	180	1,350	1,645	0	0	0	263	477	20	9,542	2.8	607	2,945

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html . SWA estimated savings based on the following assumptions: the heating and cooling season is 7 months each and pumps operate at full capacity for 16 hours a day, (based on staff reports of continuous use) for total of 3406 hours of full load operation annually. There is a 4-pipe system, so the seasons can overlap. For each set of pumps there is a primary pump and a standby pump, therefore the cost and incentives for both motors is included, but only the electric savings for one motor is used because it is unlikely that they will operate at the same time.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors 7.5 HP - $90/Motor - Maximum incentive amount is $180*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Upgrade 1 Old Bohn Walk-In Refrigerator*

During the field audit, SWA inspected old commercial walk-in refrigerators(s) which were not updated to the latest energy efficiency standards. Walk-in refrigerators and freezers commonly used in restaurants, institutional kitchens and other businesses are room-sized insulated compartments, typically refrigerated by a self-contained system. Walk-in refrigeration equipment consumes a substantial amount of electricity, ranging from 16,200 kWh per year for a typical refrigerator. Refrigeration capacity can range from 1½ to 5 tons. The most common sizes are 2 tons for walk-in refrigerators and 3 tons for walk-in freezers. Commercial walk-in refrigeration systems are typically made up of pre-fabricated walls and ceilings insulated to R 27 (polyurethane foam), with an insulated floor. The room is cooled by a packaged unitary or split refrigeration system consisting of: an evaporator fan-coil (usually mounted near the ceiling in the room), a compressor (usually mounted outside on the roof of the room or on the floor near the insulated room) and a condensing coil, which may be water-cooled but generally air-cooled.

All walk-in refrigeration systems use a working fluid called a refrigerant. The refrigerant absorbs heat from the room and rejects the heat through evaporation and condensation within the closed refrigeration system. Heat may be rejected to any of three places: to the building interior, to the cooling water (which may be discarded) or to the outdoors.

The Bohn walk-in refrigerator in the Head House was installed in the 1980's and has reached the end of its useful life. The actual box does not have to be replaced, although the door should be checked for proper sealing. Significant energy savings can be realized by replacing the cooling section with one using high efficiency motors and compressors.

Installation cost:
Estimated installed cost: $2,658 (includes $665 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
4	2,658	0	2,658	4,860	1	0	1	250	884	15	13,261	3.0	399	8,702

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The cost savings was based on published data for walk-in refrigerator energy analysis indicating that 30% savings can be realized over conventional cooling systems.

Rebates/financial incentives:

- *None at this time for fractional HP motors*

Please see Appendix F for more information on Incentive Programs.

ECM#5: ***Replace Two 5.0 HP HW Primary Pump Standard Efficiency Motors with Premium Efficiency***

During the field audit, SWA completed the building equipment inventory and observed several standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $1,305 (includes $356 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM#	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
5	1,425	120	1,305	1,095	0	0	0	175	318	20	6,357	4.1	387	1,961

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html . SWA estimated savings based on the following assumptions: the heating and cooling season is 7 months each and pumps operate at full capacity for 16 hours a day, (based on staff reports of continuous use) for total of 3406 hours of full load operation annually. There is a 4-pipe system, so the seasons can overlap. For each set of pumps there is a primary pump and a standby pump, therefore the cost and incentives for both motors is included, but only the electric savings for one motor is used because it is unlikely that they will operate at the same time.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors 5 HP - $60/Motor - Maximum incentive amount is $120*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Building Lighting Upgrades: Metal Halide replaced with PSMH 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: $4,050 (includes $2,430 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
6	4,200	150	4,050	1,892	0	0	0	320	566	15	8,490	7.2	110	3,388

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 - Metal Halide with PSMH ($25 per fixture) - Maximum incentive amount is $150.*

Please see Appendix F for more information on Incentive Programs.

ECM#7: *Install 15 kW Solar Photovoltaic system*

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

The size of the system was determined considering the available roof surface area, without compromising service space for roof equipment and safety, as well as the facilities' annual base load and mode of operation. A PV system could be installed on a portion of the 1996 addition roof which is already pitched facing southwest, or on an unused area on the ground, with panels pitched south. A commercial multi-crystalline 123 watt panel has 10.5 square feet of surface area. A 15 kW system needs approximately 122 panels which would take up 1,304 square feet.

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

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that the Cumberland County College 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 College should include these costs in the financial analysis of the project.

Installation cost:

Estimated installed cost: $93,750 (includes $60,000 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
7	105,000	11,250	93,750	17,700	15	0	2	0	12,509	25	312,729	7.5	234	31,692

For Cash Flow, please see Appendix D.

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (123 Watts, Model ND-123UJF). PV systems are sized based on 35,000 Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

- *NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $0.75/watt Solar PV application for systems 30.0 kW or less. Incentive amount for this application is $11,250 for the Cumberland County College.* *http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program*

- *NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total of $10,200/year, based on $600/SREC, has been incorporated in the above costs for a period of 15 years; however it requires proof of performance, application approval and negotiations with the utility.*

Please see Appendix F for more information on Incentive Programs.

ECM#8: *Replace Two 1.5 HP Reheat Pump Standard Efficiency Motors with Premium Efficiency*

During the field audit, SWA completed the building equipment inventory and observed several standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $955 (includes $263 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM#	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
8	1,055	100	955	532	0	0	0	53	122	20	2,438	7.8	155	953

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html. SWA estimated savings based on the following assumptions: the heating and cooling season is 7 months each and pumps operate at full capacity for 16 hours a day, (based on staff reports of continuous use) for total of 3406 hours of full load operation annually. There is a 4-pipe system, so the seasons can overlap. For each set of pumps there is a primary pump and a standby pump, therefore the cost and incentives for both motors is included, but only the electric savings for one motor is used because it is unlikely that they will operate at the same time.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors 1.5 HP - $50/Motor – Maximum incentive amount is $100*

Please see Appendix F for more information on Incentive Programs.

ECM#9: *Replace Four 1.0 HP Standard Efficiency Motors with Premium Efficiency*

During the field audit, SWA completed the building equipment inventory and observed several standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $1,245 (includes $361 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Motor Details	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
Replace two 1.0 HP CHW Booster Pumps with premium efficiency	723	100	623	229	0.0	0	0.0	35	65	20	1,298	9.6	5	410
Replace two 1.0 HP HW Booster Pumps with premium efficiency	723	100	623	229	0.0	0	0.0	35	65	20	1,298	9.6	5	410
TOTAL	**1,445**	**200**	**1,245**	**458**	**0**	**0**	**0**	**70**	**130**	**20**	**2,595**	**9.6**	**108**	**820**

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html. SWA estimated savings based on the following assumptions: the heating and cooling season is 7 months each and pumps operate at full capacity for 16 hours a day, (based on staff reports of continuous use) for total of 3406 hours of full load operation annually. There is a 4-pipe system, so the seasons can overlap. For each set of pumps there is a primary pump and a standby pump, therefore the cost and incentives for both motors is included, but only the electric savings for one motor is used because it is unlikely that they will operate at the same time.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors 1.0 HP - $50/Motor – Maximum incentive amount is $200*

Please see Appendix F for more information on Incentive Programs.

ECM#10: *Building Lighting Upgrades: T12 Fixtures replaced with T8 Fixtures*

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting contains several 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: $3,893 (includes $2,425 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
10	4,238	345	3,893	1,370	0	0	0	191	369	15	5,530	10.6	42	2,452

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy – T12 to T8 ($15 per fixture) - Maximum incentive amount is $345.*

Please see Appendix F for more information on Incentive Programs.

ECM#11: *Building Lighting Upgrades: Install Occupancy Sensors*

SWA observed that the existing lighting has 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 approximately 13 areas that are occupied only part of the day and the payback on savings is justified such as offices, bathrooms and meeting rooms. 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: $2,600 (includes $1,560 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
11	2,860	260	2,600	1,358	0	0	0	0	177	15	2,649	14.7	2	2,432

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

Rebates/financial incentives:

- *NJ Clean Energy – Wall Mounted Occupancy Sensors- ($20 per sensor) - Maximum incentive amount is $260.*

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 Alampi Science Building:

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.
    - As the lab hood exhaust fans reach the end of their useful life, replace with NEMA premium motors. Due to the intermittent use of the lab exhaust fans, the payback for the installation is in excess of 20 years.

- Add all HVAC equipment and space condition set points to campus-wide Electronic Building Integrator System for remote access to all control points such as: supply air temperatures, outside air temperatures, space temperature set points, humidity, valve position, damper position, VAV box position and high/low pressure alarms.

- Replace Windmaster Exhaust fans which are well beyond their useful life, in each Greenhouse with new fans using premium efficiency motors. The cost savings are in excess of 20 years, and this should be part of the next major capital improvement.

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.

- Overgrown ground vegetation should be trimmed/removed to not touch or block exterior wall surfaces from access, ventilation and sunlight.

- Insect nesting in exterior cavities should be removed.

- Replace/repair and maintain damaged window units with moisture embedded within glazing layers.

- Install/replace and maintain weather-stripping around all exterior doors and roof hatches.

- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.

- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. More information can be found in the "Products" section of the ENERGY STAR® website at: http://www.energystar.gov.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize energy use. The U.S. Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: http://www1.eere.energy.gov/education/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Cumberland County College. Based on the requirements of the LGEA program, Cumberland County College 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 $2,345.

APPENDIX A: EQUIPMENT LIST

Inventory

- Equipment *italicized* are assumed to be abandoned with switch-over to Central Plant by 2011
- Equipment **bolded** are recommended to be upgraded/replaced in this report

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Air Dryer	Dryer Motor - 1/4 HP, 3450 RPM	Marathon Electric, Cat# P004, M# 4VF56T34D5313B, FR-56c-65	Elec.	Boiler MER	Pneumatic Controls Compressor	1998	40%
Air Dryer	Max working press. 175 psig, 12 bar, Max inlet temp. 120*F, min/max ambient temp. 35/110*F, R-22	Hankison Model#8025/SN#0 317-101-9709-592N	Elec.	Roof MER	Lab Process Air Compressor	1998	40%
Air Handler	AHU-1, Air Handling Unit	Carrier WeatherMaker M# 781897 S# 39La-08-6-75186	Elec.	MER AHU-1	SL 5, AQ Prep & Hallway	1998	40%
Air Handler	AHU-3, Air Handling Unit to be replaced with New	Carrier Weathermaker M#39LA1031BA12 21-LS# 4285T75089 ; New Unit: Cat# 39LA03ACDAM-AEA-29, S#3509U18907	Elec.	MER AHU-3	Massage Room	1998 / 2010	100%
Air Handler	AHU-4, fans run 24/7, 90% Eff Air Filters, 30 HP Supply Fan, 1750 RPM, 480 MBH Heating, 10 tons cooling, Automatic Louver, 23,600 CFM, serves 13 VAV boxes	McQuay Model#006357911 3, MSL150DH, Filter: M# 21PS10X06, S#97-2794	Elec.	MER Penthouse	Main floor, 1998 Addition	1998	40%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Air Handler	AHU-4 Return Fan Super-Efficient motor 15HP, 1765rpm, 15,650 CFM, Nema nom eff. 92.4%, 3 phase, very noisy	Baldor Super-E Cat#5M2333T/ SN697C-318	Elec.	MER Penthouse	Main floor, 1998 Addition	1998	40%
Compressor	Compressor, 80 Gal 1HP, 1735 RPM	Curtis, M# 8DG5ED, Marathon, P# VM510, M#4VD145TTD R5860,	Elec.	MER Penthouse	Pneumatic Controls	1998	40%
Cooling	*CH-1 McQuay Air Cooled Water Chiller 140 Nom. Tons, Stage 1:100 HP Comp. Stage 2: 120 HP Compr., 10 X 15 HP Cond. Fan Motor, R-22, 450 PSIG High Side, 380 PSIG Low Side, to be removed and connect to central plant, 10.8 EER at full load*	*M#ALS140A/ SN#57HS12960 1*	*Elec.*	*Outside*	*All Areas*	*1998*	*40%*
Cooling	**Chilled Water Booster Pump, P-1, 1 HP, 1725 RPM, 3 Phase**	**Bell&Gossett model#48T17D1 77B P, Part# 903585, Ident. No. 172561**	**Elec.**	**MER AHU-1**	**All Areas**	**2009**	**95%**
Cooling	**Chilled Water Booster Pump, P-2, 1 HP, 1725 RPM, 3 Phase, 25 GPM**	**Marathon # 3VA56T1702109 A, FR-56C**	**Elec.**	**MER AHU-1**	**All Areas**	**1998**	**40%**
Cooling	**Primary CHW Glycol Pumps P-1 Motor 7.5 HP, 1725RPM, 3 phase, 300 GPM, 65 ft, 175 psi**	**Bell&Gossett 2.5BB XX BF 878 J79/ SN#6071085, Baldor, Cat#M33111**	**Elec.**	**Roof MER**	**All Areas**	**1998**	**40%**
Cooling	**Primary CHW Glycol Pumps P-2 Motor 7.5 HP, 1725RPM, 3 phase, 300 GPM, 65 ft, 175 psi**	**Bell&Gossett 2050016, SN# 2071185**	**Elec.**	**Roof MER**	**All Areas**	**1998**	**40%**
Dehumidific ation	**P-7 Inline pump - 1.5 HP, 35 GPM, 50Ft, 3600 RPM**	**Magnetek Motor, Type SC, P# 8-186758-20 Bell & Gossett S#2017023**	**Elec.**	**Boiler MER**	**Reheats SL3 & SL4**	**1998**	**40%**

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Dehumidification	**P-8 Inline pump - 1.5 HP, 35 GPM, 50Ft, 3600 RPM**	**Magnetek Motor, Type SC, P# 8-186758-20 Bell & Gossett S#2017022**	**Elec.**	**Boiler MER**	**Reheats SL3 & SL4**	**1998**	**40%**
DHW	75 Gal, 75,100 BTU/HR, 150 PSI, Recovery 68.3 Gal/Hr with small recirculating pump & OA damper activates to 20% min OA	State Water Heater, Model#PRV 75 NRRTO/SN#C96 224128	Gas	MER AHU-1	All Areas	1994	20%
Generator	3 phase, 275 kW, 343.8 KVA, motorized OA damper, exercised every Wed at 3pm for 20 min	Onan Model#275DFBF / SN# I980789890	Diesel	Outside enclosure	Emergency Power	2000	50%
Heating	**P-3 Primary Hot Water Pumps Industrial 3 phase motor, 5HP, 1725 rpm, class B, NEMA Eff 81.5%, P.F. 80%, 60 GPM, 175 psi**	**Bell&Gossett, Model# 2BC 8x BF H73/ SN#2070964 Motor: Baldor Cat#M3218T/SN #F597**	**Elec.**	**Boiler MER**	**All Areas**	**1980**	**0%**
Heating	**P-4 Standby Primary Hot Water Pumps Industrial 3 phase motor, 5HP, 1725 rpm, class B, NEMA Eff 81.5%, P.F. 80%, 60GPM, 175 psi**	**Bell&Gossett, Model# 2BC 8x BF H73/SN#2061168 Motor: Baldor Cat#M3218T/SN #F597**	**Elec.**	**Boiler MER**	**All Areas**	**1980's**	**0%**
Heating	P-10 - Inline Pump	Bell & Gosset	Elec.	Boiler MER	HW Reheats SL 1 & 2	1998	40%
Heating	*Cast Iron Boilers, Max. W.P. steam 15 psi, water 50 psi, Max water temp 250˚F, 1939000 BTU/HR object capacity, 2590000 BTU/HR SV capacity; Burner: 750 MBH min, 3172 MBH max, 1HP, 2.02 Gas Manifold Press (in.wc), 80% Eff.*	*Smith Series 28A-10/SN#N98-1333 Burner: PowerFlame Model#CZ-G-20B/SN#109781675*	*Natural Gas*	*Boiler MER*	*All Areas*	*1998*	*40%*

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	**HW Booster Pump P-1, 1 HP, 1800 RPM, 25 Ft, 25 GPM**	**Bell&Gossett Part# M80039 SN# 1981256**	**Elec.**	**MER AHU-1**	**AHU-1, CUH & Reheats**	**1980's**	**0%**
Heating	**Hot Water Booster Pump P-2, 1 HP, 1800 RPM, 25 GPM, 25 ft, size 2AA 5 BF**	**Bell&Gossett SN#1981256 Pump: S#1981257**	**Elec.**	**MER AHU-1**	**AHU-1, CUH & Reheats**	**1980's**	**0%**
Heating	Hot Water Unit Heater, 1/20 HP fan motor, manual thermostat control	Sterling	HW/Elec	Head House	Head House	1980's	0%
Heating	Hot Water Unit Heater, 1/20 HP fan motor	Dunham Bush H-175-C, S#960150440	HW/Elec	MER AHU-1	MER AHU-1	1998	40%
Heating	Two Cabinet Unit Heater, 1/10 HP, 30 MBH, 430 CFM	Vulcan Cabinet RW-1120-04	HW/Elec	Entrance	Entrance	1998	40%
Heating	*Heat Exchanger 480 MBH, Hot Side MAWP 150 psi @ 230*F, MDMT 52*F @ 150 psi, Cold Side MAWP 150 psi @ 230*F, MDMT 32*F @ 150 psi*	*Bell&Gossett, model# GPX161-057, SN#300794-01*	*Elec.*	*Hot Glycol for AHU-4*	*MER Penthouse*	*1998*	*40%*
Heating	*P-5 Inline Hot Water Glycol Return Pump 1 HP, 1725 RPM,*	*Magnetek, Part 8-186798-01, Type SC, S#BR6-249*	*Elec.*	*MER Penthouse*	*MER Penthouse*	*1998*	*40%*
Heating	*P-6 Standby Inline Hot Water Glycol Return Pump, 1 HP, 1725 RPM*	*Magnetek, Part 8-186798-01, Type SC, S#BR6-250*	*Elec.*	*MER Penthouse*	*MER Penthouse*	*1998*	*40%*
Heating	HW Unit Heater, 61,000 Btu/hr, 1,400 CFM	Mestek Inc. M# HS-84S, S#J97378219001	HW/Elec	MER Penthouse	MER Penthouse	1998	40%
Heating	HW Unit Heater, 61,000 Btu/hr, 1,400 CFM	Mestek Inc. M# HS-84S, S#J97378219001	HW/Elec	MER Penthouse	MER Penthouse	1998	40%
Heating	Hot Water Radiation Inline Pump, 8 GPM, 1750 RPM, 1/6 HP	Bell & Gosset	Elec.	Hallway above Ceiling	Radiation	2005	75%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	Fin Tube Radiators 1020 MBH	Vulcan	HW	Offices & Labs	Offices & Labs	1998	40%
Heating	Fin Tube Radiators 680 MBH	Vulcan	HW	Offices & Labs	Offices & Labs	1998	40%
HVAC	13 Variable Air Volume Terminal Units, 385 to 2500 CFM, 7.7 to 100 MBH Reheat, only one position as set by balancer - don't modulate	Titus EESV	HW/Elec	Throughout Ductwork	All Areas	1998	40%
Lab Equipment	Lab Hoods, Incubators, Sterilizers	Various	Elec.	Lab Rooms	Lab Rooms	1998	40%
Lighting	See Appendix A	Varies	Elec.	All Areas	All Areas	Varies	Varies
Refrigeration	**BOHN Refrigeration 115 volts, 2x 1/15 HP Motors, 9,000 BTUH, 2,640 Watts**	**Model#ADT0900F/SN #D93J46891**	**Elec.**	**Head House**	**All Areas**	**1980's**	**0%**
Solar Thermal	*5 Solar Thermal panels no longer in use - no nameplate*	*NA*	*NA*	*Rooftop*	*NA*	*1998*	*40%*
Transformer	30.0 kVa, 60 Hz, 3 Ph,	General Electric Cat #9T23B3872	Elec.	MER AHU-3	AHU-3	1995	25%
Transformer	3.0 kVa Transformer	General Electric Cat# 9T23B3872, Type QB, M# 9T51B13	Elec.	Boiler MER	Boiler	1998	40%
Transformer	15.0 kVa	Square D Cat# 15S1H, Type S2		Generator Rm	Generator	1998	40%
Transformer	40.0 kVA, 60 Hz, 3 Phase,	GE Cat#9T23B4004G22, Type QL,	Elec.	MER Penthouse	AHU-4	1998	40%
Transformer	20.0 kVA, 60 Hz, 3 Phase,	GE Cat#9T23B4004G22, Type QL,	Elec.	MER Penthouse	AHU-4 Return Fan	1998	40%
Transformer	NA	GE Cat#9T23Q3572, Type QL,	Elec.		Help 1-1	1998	40%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Transformer	45 kVa	GE M# 9T23 B 3873, S#JP, Type QL	Elec.	Elec Closet	LPP-1	1980's	0%
Vacuum Compressor	Two Compressor Motors, 3 HP, 1730 RPM, 3PH, 60 Hz, NEMA Eff. 84.0%	Marathon, P#TNO-UGM-12680-A, M#2E182T TDR8636A N, FR-182TD	Elec.	MER Penthouse	Lab Vaccuum Air	1998	40%
Ventilation	**In each Greenhouse, Two small ceiling fans and one large exhaust fan and gravity damper - no nameplate, controlled by manual temperature gauge, ordered new fans in 2005, have not yet replaced**	**Windmaster Exhaust Fan**	**Elec.**	**Green houses**	**Green houses**	**1970's**	**0%**
Ventilation	*B-1, Boiler Room Exhaust fan, 750 CFM, 1150 RPM, 1/10HP - turns on when boiler is operating, and 750 CFM automatic louver*	*Loren Cook / Ruskin Louver*	*Elec.*	*Boiler MER*	*Boiler MER*	*1998*	*40%*
Ventilation	EF-1 to EF-9 Nine Lab Hood Exhaust Fan with sound attenuators, 7 hoods with 1/2 HP, 785 CFM; 2 hoods 1/3 HP, 485 CFM	Barry Blower, M#9INDAH CCW, Class 15, S# Varies, 47J00343	Elec.	Rooftop	Prep Labs and Lab Hoods Science Labs	1998	40%
Ventilation	EF-10 General Exhaust Fan, 5HP, 4950 CFM, 1775 RPM	Barry Type AH 17-61	Elec.	Rooftop	General Exhaust	1998	40%
Ventilation	EF-11, 800 CFM, 1805 RPM, 1/6 HP	Loren Cook Type SWD	Elec.	Rooftop	Toilets	1998	40%
Ventilation	EF-12 & EF-13, Penthouse Exhaust, 2100 CFM, 650 RPM, 1/4 HP and 4,200 CFM automatic louver	Loren Cook Type SWD / Ruskin Louver	Elec.	Penthouse	Penthouse	1998	40%
Ventilation	EF-14, Glass Washer Exhaust, 485 CFM, 1062RPM, 1/3 HP	Barry Blower Type AH15 9-61	Elec.	Rooftop	Prep lab	1998	40%
Lighting	See Appendix A	-	Various	Elec.	All Areas	-	-

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	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
2	1	Hallway	Recessed Parabolic	S	CFL	12	2	24	Sw	12	345	0	576	2,385	N/A	Recessed Parabolic	CFL	S	Sw	12	2	24	12	345	0	576	2385	0	0	0
3	1	Hallway	Recessed Parabolic	S	CFL	1	1	13	Sw	12	345	0	13	54	N/A	Recessed Parabolic	CFL	S	Sw	1	1	13	12	345	0	13	54	0	0	0
4	1	Hallway	Recessed Parabolic	S	CFL	12	2	52	Sw	12	345	0	1,248	5,167	N/A	Recessed Parabolic	CFL	S	Sw	12	2	52	12	345	0	1248	5167	0	0	0
5	1	Hallway	Recessed Parabolic	S	CFL	1	1	24	Sw	12	345	0	24	99	N/A	Recessed Parabolic	CFL	S	Sw	1	1	24	12	345	0	24	99	0	0	0
6	1	Electrical Rm	Ceiling Mounted	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
7	1	Electrical Rm two	Ceiling Mounted	E	4'T8	2	1	32	Sw	24	365	5	74	648	N/A	Ceiling Mounted	4'T8	E	Sw	2	1	32	24	365	5	74	648	0	0	0
8	1	Secretary office	Ceiling Mounted	M	4'T12	3	3	40	Sw	8	260	12	396	824	T8	Ceiling Mounted	4'T8	E	Sw	3	3	32	8	260	5	303	630	193	0	193
9	1	Office (1)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
10	1	Office (2)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
11	1	Office (3)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
12	1	Office (4)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
13	1	Office (5)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
14	1	Office (6)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
15	1	Office (7)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
16	1	Hallway	Recessed	S	CFL	3	2	25	Sw	12	345	0	150	621	N/A	Recessed	CFL	S	Sw	3	2	25	12	345	0	150	621	0	0	0
17	1	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
18	1	Office (8)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
19	1	Office (9)	Recessed Parabolic	M	4'T12	2	3	40	Sw	8	260	12	264	549	T8	Recessed Parabolic	4'T8	E	OS	2	3	32	6	260	5	202	315	129	105	234
20	1	Classroom (SL-4)	Recessed Parabolic	E	4'T8	39	3	32	Sw	10	345	5	3,939	13,590	N/A	Recessed Parabolic	4'T8	E	Sw	39	3	32	10	345	5	3939	13590	0	0	0
21	1	Classroom (SL-4)	Recessed Parabolic	S	CFL	4	1	13	Sw	10	345	0	52	179	N/A	Recessed Parabolic	CFL	S	Sw	4	1	13	10	345	0	52	179	0	0	0
22	1	Classroom (SL-3)	Recessed Parabolic	S	CFL	4	1	13	Sw	10	345	0	52	179	N/A	Recessed Parabolic	CFL	S	Sw	4	1	13	10	345	0	52	179	0	0	0
23	1	Classroom (SL-3)	Exit Sign	S	LED	2	1	5	N	24	345	1	11	91	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	345	1	11	91	0	0	0
24	1	Classroom (SL-4)	Exit Sign	S	LED	2	1	5	N	24	345	1	11	91	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	345	1	11	91	0	0	0
25	1	Classroom (SL-3)	Recessed Parabolic	E	4'T8	39	3	32	Sw	8	345	5	3,939	10,872	N/A	Recessed Parabolic	4'T8	E	Sw	39	3	32	8	345	5	3939	10872	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
26	1	Prep room 2	Recessed Parabolic	E	4'T8	22	3	32	Sw	8	260	5	2,222	4,622	N/A	Recessed Parabolic	4'T8	E	Sw	22	3	32	8	260	5	2222	4622	0	0	0
27	1	Computer room	Recessed Parabolic	E	4'T8	3	3	32	Sw	8	345	5	303	836	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	8	345	5	303	836	0	0	0
28	1	Hallway	Recessed Parabolic	E	4'T8	3	3	32	Sw	12	345	5	303	1,254	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	12	345	5	303	1254	0	0	0
29	1	Hallway	Recessed Parabolic	E	4'T8	12	3	32	Sw	12	345	5	1,212	5,018	N/A	Recessed Parabolic	4'T8	E	Sw	12	3	32	12	345	5	1212	5018	0	0	0
30	1	Mechanical Rm	Recessed Parabolic	M	4'T12	2	1	40	Sw	2	260	12	104	54	T8	Recessed Parabolic	4'T8	E	Sw	2	1	32	2	260	5	74	38	16	0	16
31	1	AQ prep	Recessed Parabolic	E	4'T8	5	3	32	Sw	8	260	5	505	1,050	N/A	Recessed Parabolic	4'T8	E	Sw	5	3	32	8	260	5	505	1050	0	0	0
32	1	AQ Prep	Recessed	S	CFL	2	2	13	Sw	8	260	0	52	108	N/A	Recessed	CFL	S	Sw	2	2	13	8	260	0	52	108	0	0	0
33	1	Lab Prep Serv.	Recessed Parabolic	E	4'T8	4	3	32	Sw	8	260	5	404	840	N/A	Recessed Parabolic	4'T8	E	Sw	4	3	32	8	260	5	404	840	0	0	0
34	1	Lab Prep Serv.	Recessed	S	CFL	1	2	13	Sw	8	260	0	26	54	N/A	Recessed	CFL	S	Sw	1	2	13	8	260	0	26	54	0	0	0
35	1	Classroom (SL-5)	Recessed Parabolic	E	4'T8	40	3	32	Sw	10	345	5	4,040	13,938	N/A	Recessed Parabolic	4'T8	E	Sw	40	3	32	10	345	5	4040	13938	0	0	0
36	1	Classroom (SL-5)	Recessed	S	CFL	6	2	13	Sw	10	345	0	156	538	N/A	Recessed	CFL	S	Sw	6	2	13	10	345	0	156	538	0	0	0
37	1	Classroom (SL-6)	Recessed Parabolic	E	4'T8	12	3	32	Sw	10	345	5	1,212	4,181	N/A	Recessed Parabolic	4'T8	E	Sw	12	3	32	10	345	5	1212	4181	0	0	0
38	1	Rear Mech. Rm.	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
39	1	Rear Mech. Rm.	Recessed Parabolic	E	4'T8	6	2	32	Sw	8	260	5	414	861	N/A	Recessed Parabolic	4'T8	E	Sw	6	2	32	8	260	5	414	861	0	0	0
40	1	Hallway	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
41	1	Classroom (SL-1)	Recessed Parabolic	E	4'T8	40	3	32	Sw	10	345	5	4,040	13,938	N/A	Recessed Parabolic	4'T8	E	Sw	40	3	32	10	345	5	4040	13938	0	0	0
42	1	Instrument Rm	Recessed Parabolic	E	4'T8	6	4	32	Sw	8	260	5	798	1,660	N/A	Recessed Parabolic	4'T8	E	Sw	6	4	32	8	260	5	798	1660	0	0	0
43	1	Custodial	Recessed Parabolic	E	4'T8	2	1	32	Sw	8	260	5	74	154	N/A	Recessed Parabolic	4'T8	E	Sw	2	1	32	8	260	5	74	154	0	0	0
44	1	Prep Room 1	Recessed Parabolic	E	4'T8	21	3	32	Sw	8	260	5	2,121	4,412	N/A	Recessed Parabolic	4'T8	E	Sw	21	3	32	8	260	5	2121	4412	0	0	0
45	1	Prep Room 1	Recessed Parabolic	E	4'T8	2	4	32	Sw	8	260	5	266	553	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	8	260	5	266	553	0	0	0
46	1	Prep Room 1	Recessed Parabolic	E	4'T8	2	2	32	Sw	8	260	5	138	287	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	8	260	5	138	287	0	0	0
47	1	Specimen Storage	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	260	5	202	420	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	260	5	202	420	0	0	0
48	1	Science Learning Lab	Recessed Parabolic	E	4'T8	2	4	32	Sw	8	260	5	266	553	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	8	260	5	266	553	0	0	0
49	1	Classroom (SL-2)	Recessed Parabolic	E	4'T8	45	3	32	Sw	8	345	5	4,545	12,544	N/A	Recessed Parabolic	4'T8	E	Sw	45	3	32	8	345	5	4545	12544	0	0	0
50	1	Classroom (SL-2)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
51	1	Head House	Recessed Parabolic	E	4'T8	14	4	32	Sw	8	260	5	1,862	3,873	N/A	Recessed Parabolic	4'T8	E	Sw	14	4	32	8	260	5	1862	3873	0	0	0
52	1	Head House	Exit Sign	S	LED	3	1	5	N	24	260	1	17	103	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	260	1	17	103	0	0	0
53	1	Boiler Rm	Recessed Parabolic	E	4'T8	2	4	32	Sw	2	260	5	266	138	N/A	Recessed Parabolic	4'T8	E	Sw	2	4	32	2	260	5	266	138	0	0	0
54	1	Walk-In Refrigerator	Ceiling Mounted	S	Inc	1	1	60	Sw	2	260	0	60	31	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	260	0	20	10	21	0	21
55	1	Bathroom Men	Recessed	S	CFL	4	1	13	Sw	8	260	0	52	108	C	Recessed	CFL	S	OS	4	1	13	6	260	0	52	81	0	27	27
56	1	Bathroom Men	Recessed Parabolic	E	4'T8	5	2	32	Sw	8	260	5	345	718	C	Recessed Parabolic	4'T8	E	OS	5	2	32	6	260	5	345	538	0	179	179
57	1	Bathroom Women	Recessed Parabolic	E	4'T8	5	2	32	Sw	8	260	5	345	718	C	Recessed Parabolic	4'T8	E	OS	5	2	32	6	260	5	345	538	0	179	179
58	1	Bathroom Women	Recessed	S	CFL	4	1	13	Sw	8	260	0	52	108	C	Recessed	CFL	S	OS	4	1	13	6	260	0	52	81	0	27	27
59	1	Hallway	Sconce	S	MH	4	1	150	Sw	12	345	42	768	3,180	MH	Sconce	MH	S	Sw	4	1	150	12	345	42	768	3180	0	0	0
60	1	Greenhouse 1	Ceiling Mounted	S	Inc	1	1	60	Sw	8	260	0	60	125	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	8	260	0	20	42	83	0	83
61	1	Greenhouse 2	Ceiling Mounted	S	Inc	1	1	60	Sw	8	260	0	60	125	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	8	260	0	20	42	83	0	83
62	1	Exterior	Wall Mounted	S	MH	3	1	150	Sw	12	365	42	576	2,523	PSMH	Wall Mounted	PSMH	S	Sw	3	1	100	12	365	20	360	1577	946	0	946
63	1	Exterior	Recessed	S	MV	2	1	150	PC	12	365	24	348	1,524	CFL	Recessed	CFL	S	PC	2	1	100	12	365	0	200	876	648	0	648
64	1	Exterior	Flood	S	Inc	1	1	60	PC	12	365	0	60	263	CFL	Flood	CFL	S	PC	1	1	20	12	365	0	20	88	175	0	175
65	1	Exterior	Spotlight	S	Inc	2	1	60	PC	12	365	0	120	526	CFL	Spotlight	CFL	S	PC	2	1	20	12	365	0	40	175	350	0	350
66	1	Exterior Side	Wall Mounted	S	Inc	2	1	60	PC	12	365	0	120	526	CFL	Wall Mounted	CFL	S	PC	2	1	20	12	365	0	40	175	350	0	350
67	1	Exterior Side	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
68	1	Exterior	Wall Mounted	S	MH	2	1	150	PC	12	365	42	384	1,682	PSMH	Wall Mounted	PSMH	S	PC	2	1	100	12	365	20	240	1051	631	0	631
69	1	Exterior	Wall Mounted	S	MV	1	1	150	PC	12	365	24	174	762	CFL	Wall Mounted	CFL	S	PC	1	1	100	12	365	0	100	438	324	0	324
70	1	Exterior	Spotlight	S	MH	1	1	150	PC	12	365	42	192	841	MH	Spotlight	MH	S	PC	1	1	150	12	365	42	192	841	0	0	0
71	1	Generator	Ceiling Mounted	S	Inc	1	2	60	Sw	2	260	0	120	62	CFL	Ceiling Mounted	CFL	S	Sw	1	2	20	2	260	0	40	21	42	0	42
Totals:						**454**	**146**	**3,011**				**524**	**42,630**	**127,199**						**454**	**146**	**2,393**			**333**	**40,895**	**120,502**	**5,339**	**1,358**	**6,697**

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

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	27,482		
Average Power Cost ($/kWh)	0.1300		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	9,487	5,747	**3,741**
Exterior Power (watts)	2,166	1,312	**854**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	117,712	114,755	**2,957**
Lighting Power (watts)	40,464	39,583	**881**
Lighting Power Density (watts/SF)	1.47	1.44	**0.03**
Estimated Cost of Fixture Replacement ($)	8,597		
Estimated Cost of Controls Improvements ($)	2,600		
Total Consumption Cost Savings ($)	**1,817**		

Legend

Fixture Type		Lamp Type			Control Type	Ballast Type	Retrofit Category
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	Fl.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS
http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Electric Suppliers for 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

Third Party Electric Suppliers for Atlantic City Electric Service Territory	Telephone & Web Site
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
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

Third Party Gas Suppliers for South Jersey Gas Service Territory	Telephone & Web Site
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.

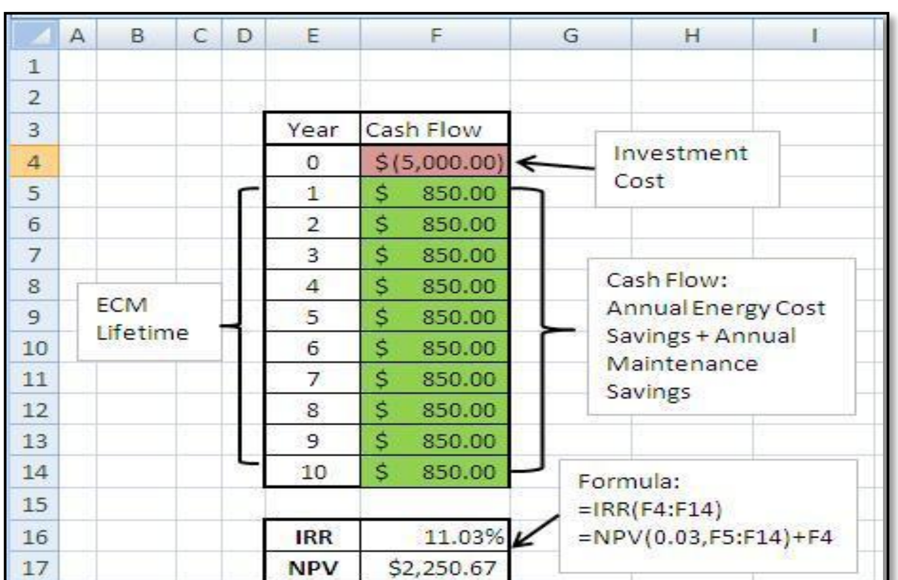
Calculation References

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]

Annual Solar PV Cost Savings Breakdown				
Rated Capacity (kW)	15.0			
Rated Capacity (kWh)	17,700			
Annual Capacity Loss	0%			
Year	kWh Capacity	Installed Cost	Incentives	Electric Savings ($)
0		$105,000	$11,250	
1	17,700		$10,200	$2,309
2	17,700		$10,200	$2,309
3	17,700		$10,200	$2,309
4	17,700		$10,200	$2,309
5	17,700		$10,200	$2,309
6	17,700		$10,200	$2,309
7	17,700		$10,200	$2,309
8	17,700		$10,200	$2,309
9	17,700		$10,200	$2,309
10	17,700		$10,200	$2,309
11	17,700		$10,200	$2,309
12	17,700		$10,200	$2,309
13	17,700		$10,200	$2,309
14	17,700		$10,200	$2,309
15	17,700		$10,200	$2,309
16	17,700		$0	$2,309
17	17,700		$0	$2,309
18	17,700		$0	$2,309
19	17,700		$0	$2,309
20	17,700		$0	$2,309
21	17,700		$0	$2,309
22	17,700		$0	$2,309
23	17,700		$0	$2,309
24	17,700		$0	$2,309
25	17,700		$0	$2,309
	kWh	Cost	Saving	
Lifetime Total	**442,500**	**($105,000)**	**$164,250**	**$57,729**

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
Cumberland County College - Alampi Science Building

Building ID: 2307040
For 12-month Period Ending: February 28, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 24, 2010

Facility
Cumberland County College - Alampi Science Building
3322 College Drive
Vineland, NJ 08360

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1979
Gross Floor Area (ft²): 27,482

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,241,630
Natural Gas (kBtu)[4]	2,859,511
Total Energy (kBtu)	5,101,141
Energy Intensity[5]	
Site (kBtu/ft²/yr)	186
Source (kBtu/ft²/yr)	381
Emissions (based on site energy use)	
Greenhouse Gas Emissions (MtCO_2e/year)	493
Electric Distribution Utility	
Pepco - Atlantic City Electric Co	
National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	36%
Building Type	College/University (Campus-Level)

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, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

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

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

Smart Start

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

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

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

Renewable Energy Incentive Program*

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

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

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

Utility Sponsored Programs

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

Energy Efficiency and Conservation Block Grant Rebate Program

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

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

Other Federal and State Sponsored Programs

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

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

APPENDIX G: ENERGY CONSERVATION MEASURES

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
0-5 Year Payback	1	Upgrade 15 manual thermostats to programmable	0	2,505	117,900	23	2,948	25	1,167	20,546	12	246,549	0.1	9,742	812	820	193,398	243,598
	2	12 New CFL fixtures to be installed with incentives	0	654	2,077	0	0	0	436	706	5	3,528	0.9	439	88	105	2,480	3,719
	3	Replace two 7.5 HP CHW Primary Pumps with premium efficiency	180	1,350	1,645	0	0	0	263	477	20	9,542	2.8	607	30	35	5,444	2,945
	4	Upgrade 1 old Bohn walk-in refrigerator with energy efficient controls, motors, compressors	0	2,658	4,860	1	0	1	250	884	15	13,261	3.0	399	27	33	7,504	8,702
	5	Replace two Primary HW 5.0 HP standard motors, with premium efficiency	120	1,305	1,095	0	0	0	175	318	20	6,357	4.1	387	19	24	3,234	1,961

5-10 Year Payback	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
	6	6 New PSMH fixtures to be installed with incentives	150	4,050	1,892	0	0	0	320	566	15	8,490	7.2	110	7	11	2,529	3,388
	7	Install 15 kW Solar Photovoltaic system	11,250	93,750	17,700	15	0	2	0	12,509	25	312,729	7.5	234	9	11	63,568	31,692
	8	Replace two Reheat Pump 1.5 HP standard motors with premium efficiency	100	955	532	0	0	0	53	122	20	2,438	7.8	155	8	11	800	953
	9	Replace Four Std. Eff. 1.0 HP Motors with Premium Eff.	200	1,245	458	0	0	0	70	130	20	2,595	9.6	108	5	8	630	820

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
<10 Year Payback (End of Life	10	23 New T8 fixtures to be installed with incentives	345	3,893	1,370	0	0	0	191	369	15	5,530	10.6	42	3	5	431	2,452
	11	Install 13 occupancy sensors	260	2,600	1,358	0	0	0	0	177	15	2,649	14.7	2	0	0	-506	2,432

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

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

Disclaimer

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

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