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Sussex Community College
Health Sciences & Performing Arts Building A

Local Government Energy Program Energy Audit Report FINAL

One College Hill Rd
Newton, NJ 07860

Project Number: LGEA79

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EXECUTIVE SUMMARY

The Health Sciences & Performing Arts building is a two and a half story building with a total conditioned floor area of 30,000 square feet. The original structure was built in 2008. The following chart provides an overview of current energy usage in the building based on the analysis period of January 2009 through December 2009:

Table 1: State of Building-Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Other fuel usage	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	466,062	17,060	N/A	$98,525	110.0	3,296
Proposed	441,650	17,060	N/A	$94,187	107.3	3,215
Savings	24,412	0	N/A	$4,338*	2.7	81
% Savings	5.2%	0%	N/A	4.4%	2.5%	2.5%
Renewables	35,400	Includes SRECs		$27,160	4.0	121
*Includes operation and maintenance savings						

There may be energy procurement opportunities for the Health Sciences & Performing Arts building to reduce annual electric utility costs, which are $11,185 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Health Sciences & Performing Arts building in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. The resulting Site Energy Use Intensity is 110.0 kBtu/sq ft yr, while the average energy use intensity for campus type buildings is 120.0 kBtu/sq ft yr.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	$4,172	2.1	$8,774	42,002
5-10 Year	$166	6.7	$1,120	1,708
Total	$4,338	2.3	$9,864	43,170
Renewables	$27,160	5.0	$135,000	63,384

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 3 cars from the roads each year or the equivalent of planting 102 trees to offset the annual CO2 emissions generated.

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

Operations and Maintenance

- Reprogram Building Automation System
- Maintain roofs
- Maintain downspouts and cap flashing
- Provide weather-stripping/air-sealing
- Repair/seal wall cracks and penetrations

- Provide water-efficient fixtures and controls
- Use smart power electric strips

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Sussex Community College. Based on the requirements of the LGEA program, Sussex Community 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 $2,021 (or 25% of $8,081).

Financial Incentives and Other Program Opportunities

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

Table 3: Next Steps for the Health Sciences & Performing Arts building

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Upgrade (6) Thermostats to Programmable Thermostats	Direct Install
Install (67) New CFL fixtures	N/A
Install (7) Motion Sensors	Smart Start, Direct Install
Install (5) Daylight Sensors	Smart Start, Direct Install

There are various incentive programs that the Sussex Community College could apply for that could help lower the cost of installing the ECMs. For the Health Sciences & Performing Arts building, and contingent upon available funding, SWA recommends the following incentive programs:

- **Direct Install 2010 Program**: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades.
- **Smart Start**: Most of energy savings equipment and design measures have moderate incentives under this program.
- **Renewable Energy Incentive Program**: Receive up to $0.75/Watt toward installation cost for PV panels upon available funding. For each 1,000 kWh generated by PV renewable energy, receive a credit between $475 and $600.
- **Utility Sponsored Programs**: See available programs with JCP&L https://www.firstenergycorp.com/JCP_L/index.html and Elizabethtown Gas http://www.elizabethtowngas.com/Business/EnergySavings.aspx
- **Energy Efficiency and Conservation Block Grant Rebate Program**: Provides up to $20,000 per local government toward energy saving measures; http://njcleanenergy.com/EECBG

Please refer to Appendix F for further details.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, halls, police and libraries, 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 Health Sciences & Performing Arts building at One College Hill Rd, Sussex Community College, 07901. The process of the audit included facility visits on August 24, 27, and September 17, 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 Sussex Community College to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Health Sciences & Performing Arts building.

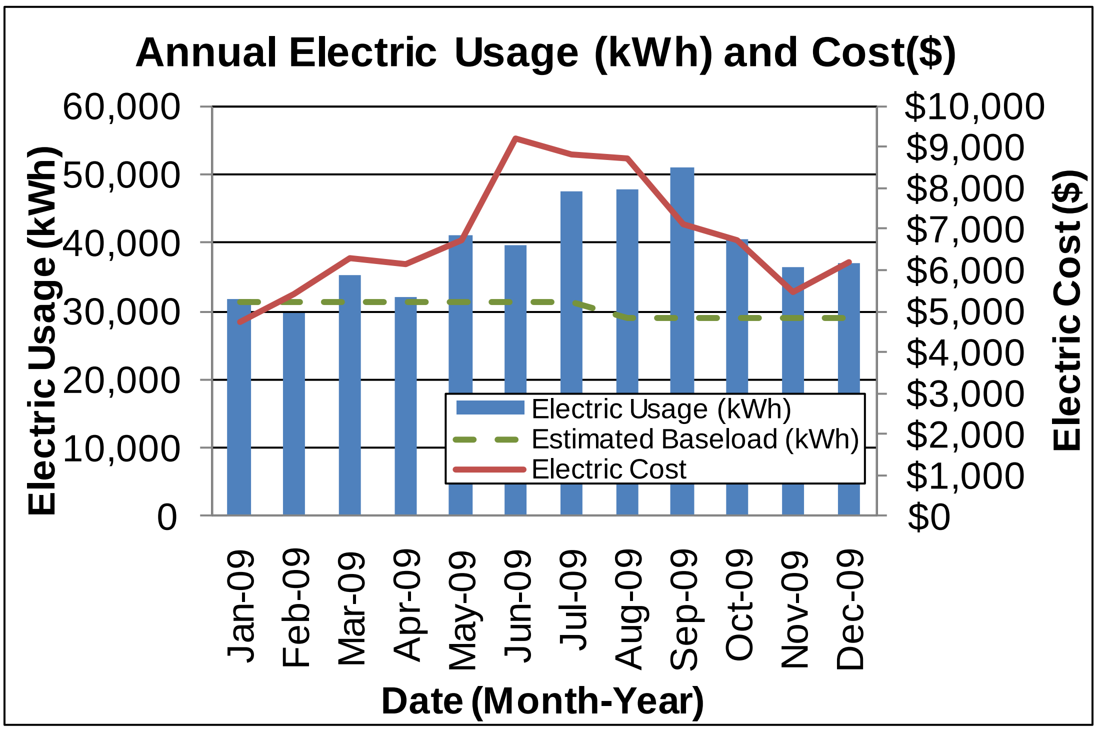
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from July 2008 through July 2010 that were received from the utility companies supplying the Health Sciences & Performing Arts building with electric and natural gas. A 12 month period of analysis from January 2009 through December 2009 was used for all calculations and for purposes of benchmarking the building.

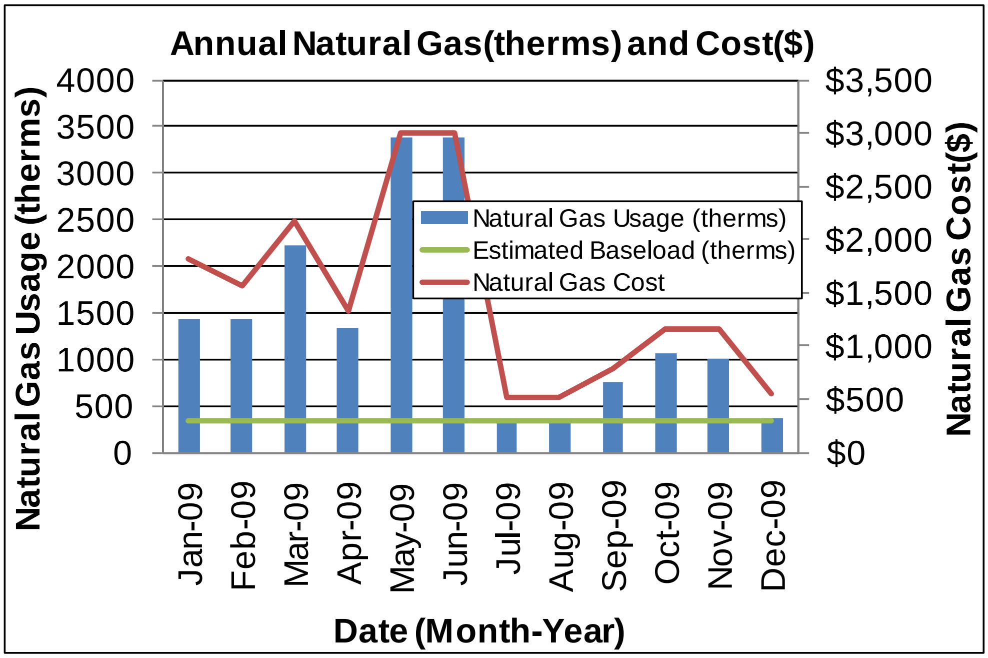
Electricity - The Health Sciences & Performing Arts building is currently served by one electric meter. The Health Sciences & Performing Arts building currently buys electricity from JCP&L at **an average aggregated rate of $0.174/kWh**. The Health Sciences & Performing Arts building purchased **approximately 466,062 kWh, or $80,899 worth of electricity,** in the previous year. The average monthly demand was 141.0 kW and the annual peak demand was 193.2 kW.

The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate base-load or minimum electric usage required to operate the Health Sciences & Performing Arts building.

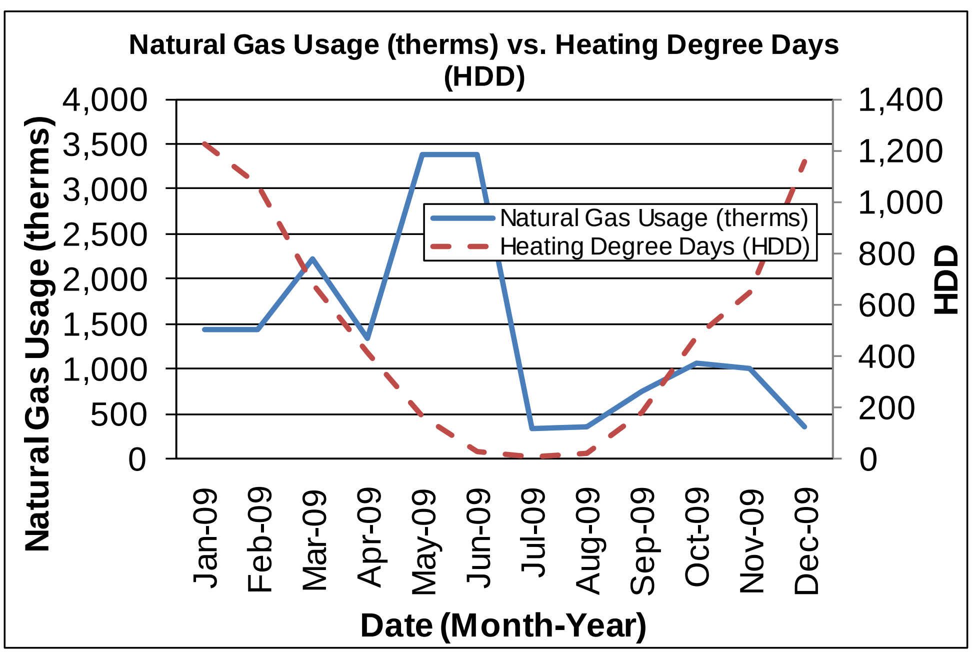


Natural gas - The Health Sciences & Performing Arts building is currently served by one meter for natural gas. The Health Sciences & Performing Arts building currently buys natural gas from Elizabethtown Gas at **an average aggregated rate of $1.033/therm**. The Health Sciences & Performing Arts building purchased **approximately 17,060 therms, or $17,625 worth of natural gas,** in the previous year.

The following chart 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 Health Sciences & Performing Arts building.



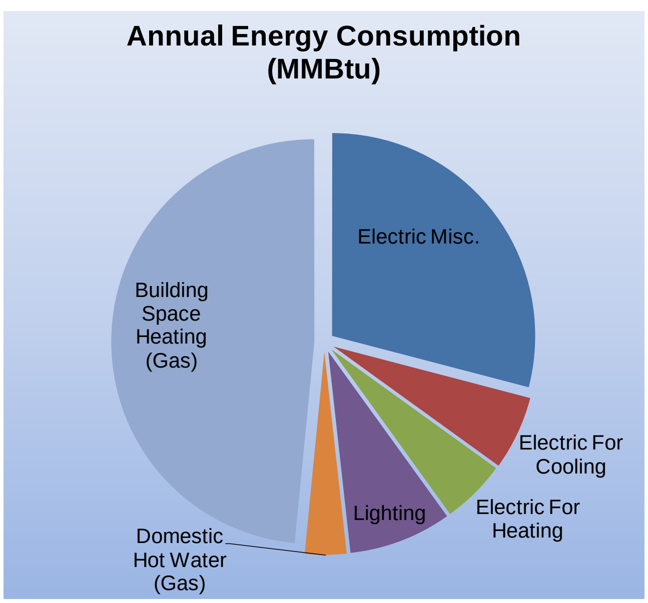
The previous chart shows that peak gas use was in the summer months of May and June. In fact the least gas used was in the month of December. This observation clearly runs contrary to common sense that most gas should be used during the heating months of winter and not during the cooling months of summer. It is possible that the gas meter is misreporting the gas used data. On further investigation, SWA found that the gas meter read zeroes for all the months in 2010. For this reason, SWA kept the utility analysis period ending December 2009. SWA highly recommends the Sussex Community College to investigate the A building gas meter readings with Elizabethtown Gas.

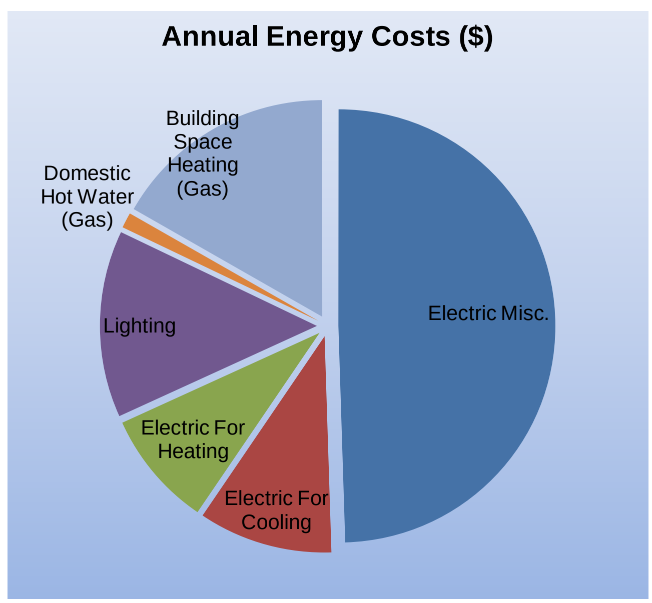


The previous chart shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit. The chart clearly shows that the gas used therms data from the utility company is not reliable.

The following graphs, pie charts, and table show energy use for the Public Health Sciences & Performing Arts building based on utility bills for the 12 month period. Note: electrical cost at $51/MMBtu of energy is 5.1 times as expensive as natural gas at $10/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Misc.	958	29%	$48,755	49%	51
Electric For Cooling	194	6%	$9,869	10%	51
Electric For Heating	168	5%	$8,554	9%	51
Lighting	270	8%	$13,721	14%	51
Domestic Hot Water (Gas)	109	3%	$1,128	1%	10
Building Space Heating	1,597	48%	$16,497	17%	10
Totals	3,296	100%	$98,525	100%	
Total Electric Usage	1,590	48%	$80,899	82%	51
Total Gas Usage	1,706	52%	$17,625	18%	10
Totals	3,296	100%	$98,525	100%	

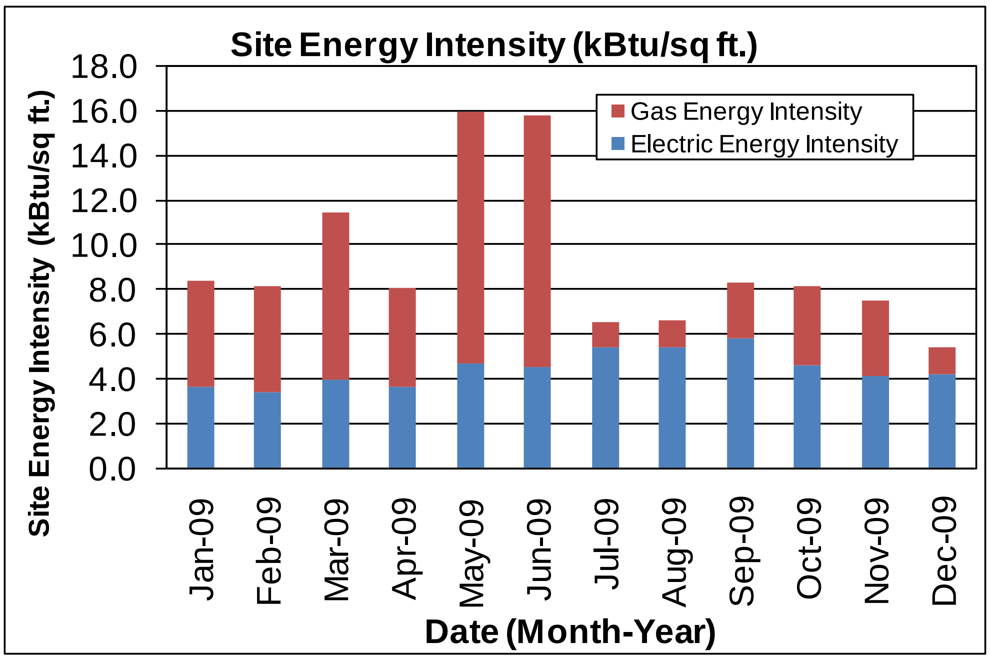




Energy benchmarking

SWA has entered energy information about the Health Sciences & Performing Arts building in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. This Health Sciences & Performing Arts building facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Health Sciences & Performing Arts building is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 110.0 kBtu/sq ft yr compared to the national average of College/University buildings consuming 120.0kBtu/sq ft yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "Other" space types is very subjective, and is not an absolute bellwether for gauging performance.



Per the LGEA program requirements, SWA has assisted the Sussex Community College to create an ENERGY STAR® Portfolio Manager account and share the Health Sciences & Performing Arts 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 Sussex Community College [redacted]

Tariff analysis

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

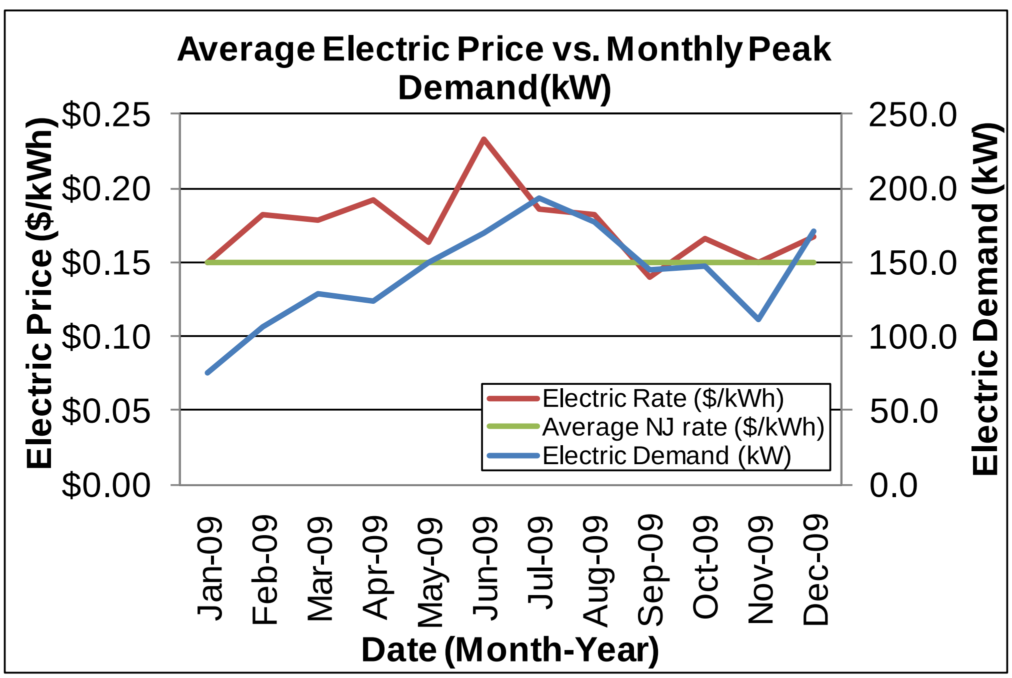
Tariff analysis is performed to determine if the rate that a building is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used for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

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

Energy Procurement strategies

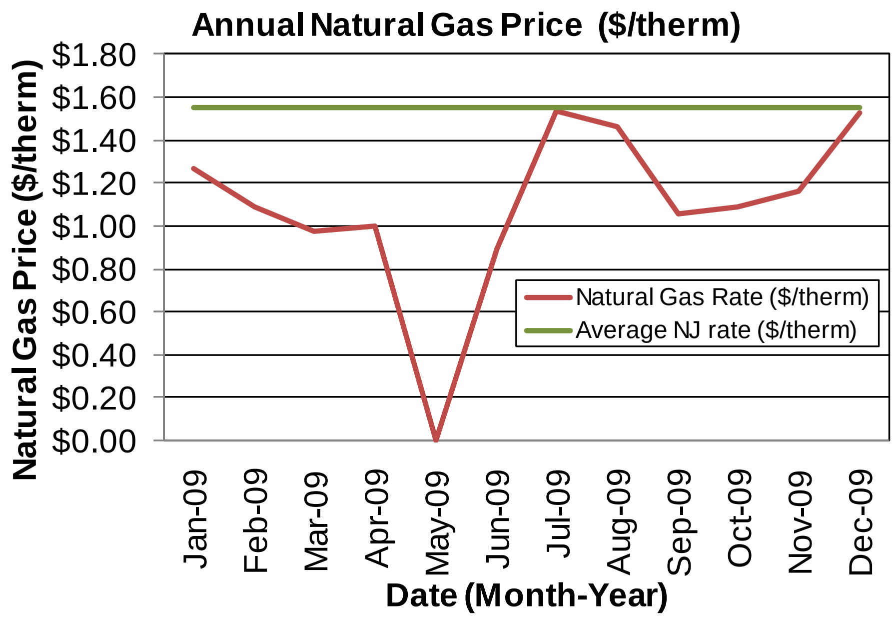
Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy.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

The average estimated NJ commercial utility rates for electric are $0.150/kWh, while Health Sciences & Performing Arts building pays a rate of $0.174/kWh. The Health Sciences & Performing Arts building annual electric utility costs are $11,185 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 49% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Health

Sciences & Performing Arts building pays a competitive rate of $1.033/therm. Natural gas bill analysis shows fluctuations up to 53% 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. Also, as noted earlier, the gas meter data may itself be inaccurate, and the analysis above can be only as good as the data is. SWA recommends that Sussex Community College further investigate the gas meter issues with the utility company.

SWA recommends that the Health Sciences & Performing Arts building further explore opportunities of purchasing both natural gas and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Health Sciences & Performing Arts building. Appendix C contains a complete list of third-party energy suppliers for the Newton service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

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

Based on the visit from SWA on August 24, 27, and September 17, 2010, the following data was collected and analyzed.

Building Characteristics

The two and a half story 30,000 square foot Health Sciences & Performing Arts building was built in 2008. The building is LEED certified. The Health Sciences & Performing Arts building houses classrooms, office areas, a theater, atrium, storage spaces, mechanical rooms, and bathrooms.


South West Façade and Main Entrance


South East Façade


North West Façade


South East Façade

Building Occupancy Profiles

There are approximately 100-140 people in the building at any given time on average comprising employees and students when the Health Sciences & Performing Arts building is in use weekdays from 8am through 10pm (approximately 80 hours/week on average). There are approximately 40 employees in the building.

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

Exterior insulation finish system (EIFS) covers the North West building façade. The rest of the building facades consist of 4” brick veneer. All above grade walls consist of 5/8” sheathing, 6” metal framing 16”o.c., and 6” fiberglass batt insulation. Below grade walls consist of 8” CMU, 3” of rigid insulation and 4” face brick veneer.

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

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall acceptable, age-appropriate condition with minor 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:

Damaged EIFS

Typical building facades - EIFS and brick veneer

Roof

The building’s roof is predominantly a flat and parapet type over steel decking, with a light-colored EPDM single-membrane finish. There are three inches of rigid polyisocynurate on plywood and steel decking, tapered at roof drains.

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

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

Standing water near RTU

Debris filling corner of roof

Debris clogged scupper with 2-3” standing water

Base

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

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

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

Windows

The building contains 2008 installed fixed and awning style storefront windows with an aluminum clad frame, low-E coated/gas-filled, double glazing and interior roller blinds.

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 very good condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

Typical aluminum frame low-e window

Interior shading in classroom

Exterior doors

The building contains two different types of exterior doors:

- There are exterior glass doors with aluminum/steel frames. They are located at building entrances and on the third floor balcony.

- There are metal doors located near the mechanical room.

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

Images show typical building doors with need for regular maintenance to verify weather-stripping

Building air-tightness

Overall, the field auditors found the building to be reasonably air-tight with only a few areas of suggested improvements.

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 Health Sciences & Performing Arts building is conditioned by three gas-fired heating and direct expansion cooling packaged rooftop HVAC units. There are two boilers that provide hot water for supplementary heating. The building also has an under floor radiant heating system in the lobby. A comprehensive Equipment List can be found in Appendix A.

Equipment

There are three Aaon roof top packaged units with direct expansion (DX) systems for cooling made up of an evaporator, condenser and refrigerant loop. The units are equipped with gas fired heating. The units were installed in 2008 and have more than 90% of service life remaining. They are variable flow units equipped with variable speed drives. Fan motors are equipped with premium efficiency motors. The various spaces of the building are provided ventilation by outside air intake louvers on the rooftop units. The outside air louvers are motorized to allow economizer operation when the outside air conditions are favorable.

The Health Sciences & Performing Arts building also contains two Trane condensing units located on the roof. The units are connected to evaporative units to from DX split systems that serve the Computer and Dimmer rooms respectively. They were installed in 2008 and have more than 90% service life remaining. All the units are in good condition.

There are two Daikin mini split units that serve elevator lobbies. The outdoor units provide 2 tons of cooling and are located on the roof. They were installed in 2008 and have more than 90% service life remaining and are in good condition.

The heating hot water is produced by two (2) wall mounted condensing hot water boilers located in the mechanical room. The boilers were manufactured by Viessmann and are rated for a capacity of 230 MBH each and were installed in 2009. The boilers are in good condition with more than 95% of estimated life remaining, estimated to be 23 years as published in the 2007 ASHRAE HVAC Applications Handbook. Hot water is distributed in the building to hot water finned tube radiation, under floor radiant heating system, and reheat coils.


Roof top packaged unit

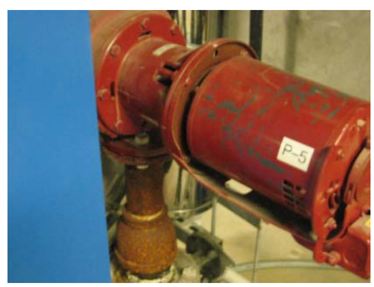

Condensing units


Boilers

The building is heated by hot water baseboards located under the windows. The units are in good condition with 90% of estimated life remaining. The variable air volume (VAV) boxes are equipped with hot water reheat coils.

There are two roof mounted exhaust fans which serve the bathrooms, mechanical room, and general building. All the exhaust fans are in good condition with approximately 90% life remaining.


Typical Ventilation rooftop fan



Typical HW pump


Boilers controls

Distribution Systems

A typical rooftop unit arrangement draws in fresh air and brings it into a mixing box, where it is combined with return air from the building. A small portion of the return air is purged and vented outside prior to entering the mixing box. The mixed air inside the air handler is sent through a filter before passing through the evaporator or direct expansion (DX) coil. The air handler fan then pushes the air through the furnace section before the conditioned air is distributed into the building spaces. The DX system is only active in the cooling season. In between seasons only the blower will be active to provide fresh air to the building.

The supply air duct distribution of the units consists of constant and variable air volume boxes with hot water reheat coils.

There are four hot water pumps that provide hot water to the various heating coils, baseboards, and radiant panels. The pumps and respective motors are in good condition with more than 90% of service life remaining.

Controls

There is a state of the art Automated Logic building automation system (BAS) to monitor and control the HVAC equipment within the building. The BAS has full functionality to control for occupied, unoccupied, and night setback modes. The winter night setback is maintained at 62 deg F, while the equipment is shut down during unoccupied modes in summer. The units are set to deliver 55 deg F supply air, which is reheated in the variable air volume boxes reheat coils, if required. The units are equipped with variable frequency drives to vary the return fan speed as required.

BAS Controls screens – showing occupied and unoccupied areas and settings

Domestic Hot Water

Domestic hot water to the building is provided from two 120 gallons hot water holding tanks. Hot water heating boilers provide hot water to these tanks. DHW tanks and boilers were installed in 2009 and appear to be in good condition.


DHW Storage tanks

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.

Interior Lighting - The Health Sciences & Performing Arts building currently contains a mixture of T8 lamps with electronic ballasts, and a few halogen and compact fluorescent lamps. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.

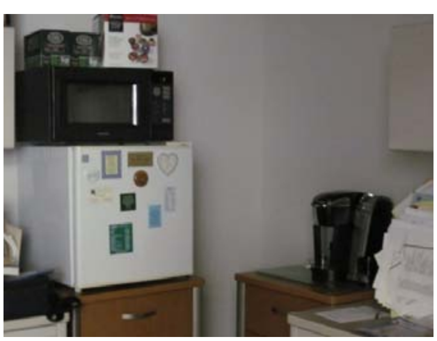

Daylighting sufficient without need for artificial lighting; Recessed Halogen lamps in Library

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 fixtures. Exterior lights are on manual time clocks.

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.




Personal refrigerators, microwaves contribute to plug loads

Elevators

The Health Sciences & Performing Arts building is a two story building and equipped with a Schindler make elevator with a 30hp submersible motor manufactured by US Electric Motors. The elevator appears to be in satisfactory condition and no action is required at this time besides routine maintenance.

Other electrical systems

The incoming power main transformer is owned/maintained by JCP&L and it appears in satisfactory condition.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

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

Existing systems

Currently, there is no renewable system installed at the Health Sciences & Performing Arts building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

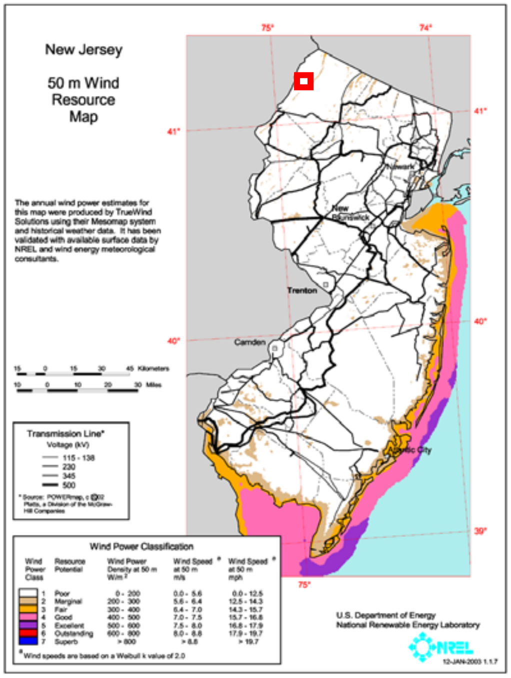
Based on utility analysis and a study of roof conditions, the Health Sciences & Performing Arts building is a good candidate for a 30 kW Solar Panel installation. See ECM#8 for details.

Solar Thermal Collectors

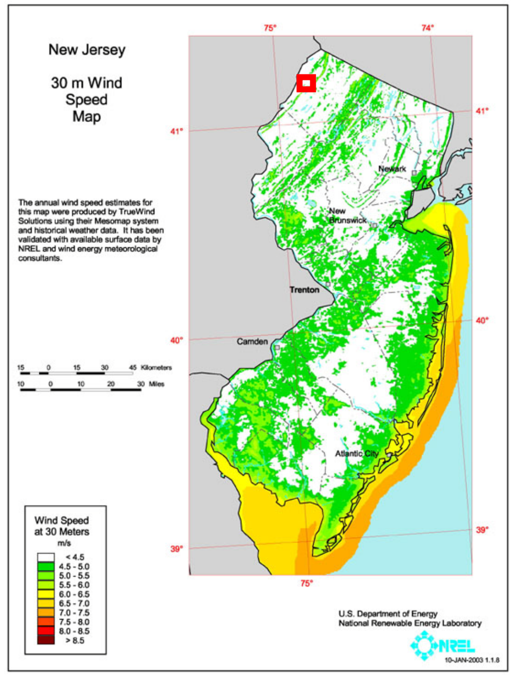
Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Wind

The Health Sciences & Art building is not a good candidate for wind power generation due to unfavorable wind conditions in this area of New Jersey, according to the following wind map by "Wind Powering America", a US DOE analysis. Average wind speeds in Sussex County are less than 12mph, and most wind turbines tend to be efficient at speeds greater than this. Shown below are two wind maps for New Jersey with the location of Sussex Community College marked as a square.



New Jersey 50-Meter Wind Resource Maps



New Jersey 30-Meter Wind Resource Maps

The first map shows the annual wind power estimates at 50 meters using NREL's standard classification system for utility-scale applications in relation to transmission lines and major cities. The second shows the annual wind speed estimates at 30 meters, which is useful for identifying areas that hold promise for small wind turbine applications. Wind speeds in Sussex County for both these type of applications are less than 12mph (5.3mph) and do not justify wind power systems. Please see the following for more details:

http://www.windpoweringamerica.gov/where_is_wind_new_jersey.asp

Geothermal

The Health Sciences & Performing Arts building is not a good candidate for a geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have 80% remaining useful lives.

Combined Heat and Power

The Health Sciences & Performing Arts building is not a good candidate for a CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical base-load to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

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

Recommendations: Energy Conservation Measures

ECM #	Description	net est. ECM cost with incentives, $	kWh, 1st yr savings	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	total 1st yr savings, $	life of measure, yrs	simple payback, yrs	net present value, $	CO_2 reduced, lbs/yr
1	Install 67 new CFL fixtures	671	6,209	0	0.7	1,170	5	0.6	4,658	11,117
2	Retrofit 1 existing vending machine with VendingMiser™ device	199	1,612	0	0.2	280	10	0.7	2,169	2,886
3	Retrofit 1 existing vending machine with SnackMiser™ device	99	387	0	0.0	67	10	1.5	470	693
4	Install 7 new motion sensors with incentives	1,400	4,718	0	0.5	821	15	1.7	8,260	8,448
5	Install 5 new Daylight sensors with incentives	975	1,952	0	0.2	340	15	2.9	3,022	3,495
6	Install 27 new Occupancy Sensors with incentives	5,400	8,580	0	1.0	1,493	15	3.6	12,167	15,362
7	Install 8 new Bi-level fixtures with incentives	1,120	954	0	0.1	166	15	6.7	833	1,708
	TOTALS	**9,864**	**24,412**	**0**	**2.7**	**4,338**		**2.3**	**31,580**	**43,710**
8	Install 30 kW Solar Photovoltaic system	135,000	35,400	0	4	27,160	25	5	217,015	63,384

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

ECM#1: Install 67 New CFL Fixtures

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting also contains inefficient incandescent lamps. SWA recommends that each incandescent lamp be 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: $671 (Includes $201 of labor)
Source of cost estimate: Manufacturers information

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 67 new CFL fixtures	671	0	671	6,209	1.9	0	0.7	90	1,170	5	5,852	0.6	168	173	4,658	11,117

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

Rebates/financial incentives:

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

Please see Appendix F for more information on Incentive Programs.

ECM#2: Retrofit 1 Existing Vending Machine with VendingMiser™ Device

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

Installation cost:
Estimated installed cost: $199 (Includes $20 of labor)
Source of cost estimate: Manufacturers information

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Retrofit 1 existing vending machine with VendingMiser™ device	199	0	199	1,612	0.5	0	0.2	0	280	10	2,805	0.7	131	141	2,169	2,886

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

Rebates/financial incentives:
NJ Clean Energy – Direct Install program (up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs and Appendix H for calculations.

ECM#3: Retrofit 1 Existing Vending Machine with SnackMiser™ Device

Energy vending miser devices are now available for conserving energy used by beverage vending machines and coolers. There is not a need to purchase new machines to reduce operating costs and greenhouse gas emissions. Snack vending miser devices can be used on snack vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snack vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up.

Installation cost:

Estimated installed cost: $99 (Includes $20 of labor)
Source of cost estimate: Manufacturers information

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Retrofit 1 existing vending machine with SnackMiser™ device	99	0	99	387	0.1	0	0.0	0	67	10	673	1.5	58	68	470	693

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

Rebates/financial incentives:
NJ Clean Energy – Direct Install program (up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs and Appendix H for calculations.

ECM#4: Install 7 New Motion Sensors

SWA recommends installing motion sensors in areas that are occupied only part of the day, and where payback on savings is justified. Typically, motion 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. Please see Appendix B for a detailed lighting inventory.

Installation cost:
Estimated installed cost: $1,400 (includes $462 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program, ENERGY STAR*®

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 7 new motion sensors with incentives	1,540	140	1,400	4,718	1.4	0	0.5	0	821	15	12,314	1.7	52	58	8,260	8,448

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 – Smart Start – Ceiling-mounted motion sensors ($20 per control). Maximum incentive amount is $140.

Please see Appendix F for more information on Incentive Programs.

ECM#5: Install 5 new Daylight Sensors

During the field audit, SWA completed a building lighting inventory (see Appendix B). SWA observed that the existing lighting has minimal to no control via day lighting sensors. SWA identified open areas like hallways that could benefit from the installation of a day lighting sensor. SWA recommends installing one day lighting sensor where lighting fixtures are mounted above windows and where the payback on savings is justified. Ceiling mounted day light sensors measure the ambient light reflected from surfaces ranging from 0 to 6,500 foot candles. 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: $975 (Includes $330 of labor)
Source of cost estimate: Manufacturers information

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 5 new Daylight sensors with incentives	1,100	125	975	1,952	0.6	0	0.2	0	340	15	5,095	2.9	28	34	3,022	3,495

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

Rebates/financial incentives:

NJ Clean Energy - Occupancy sensors, wall mounted ($25 per control) - Maximum incentive amount is $125.

Please see Appendix F for more information on Incentive Programs.

ECM#6: Install 27 new Occupancy Sensors

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

Installation cost:

Estimated installed cost: $5,400 (Includes $1,782 of labor)
Source of cost estimate: Manufacturers information

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 27 new Occupancy Sensors with incentives	5,940	540	5,400	8,580	2.6	0	1.0	0	1,493	15	22,394	3.6	21	26	12,167	15,362

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

Rebates/financial incentives:

NJ Clean Energy - Occupancy sensors, wall mounted ($20 per control) - Maximum incentive amount is $540.

Please see Appendix F for more information on Incentive Programs.

ECM#7: Install 8 New Bi-level T8 Fixtures in Stairwells

On the day of the site visit, SWA completed a lighting inventory of Health Sciences & Performing Arts building (see Appendix B). The building currently contains T8 fluorescent lighting fixtures that are operated 16 hours per day in stairwells. New technology called bi-level lighting, combines fluorescent lighting fixtures with an occupancy sensor. These efficient light fixtures operate at a minimal light level in order to meet code and safety requirements and power up to a higher level when any motion is detected in the stairwells. This building would be an appropriate application for these fixtures since there are large periods of time when the stairwells should be unoccupied.

Installation cost:

Estimated installed cost: $1,120 (includes $396 of labor)

Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 8 new Bi-level fixtures with incentives	1,320	200	1,120	954	0.3	0	0.1	0	166	15	2,490	6.7	8	10	833	1,708

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

Rebates/financial incentives:

NJ Clean Energy – SmartStart – bi-level T8 fluorescent fixtures ($25 per fixture). Maximum incentive amount is $200.

Please see Appendix F for more information on Incentive Programs

ECM#8: Install a 30 kW solar photovoltaic rooftop system

Description:

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 roof with panels facing south. A commercial multi-crystalline 230 watt panel has 17.5 square feet of surface area (providing 13.1 watts per square foot). A 30 kW system needs approximately 131 panels which would take up 2,293 square feet. SWA found the available roof area for solar panels to be 7,500 square feet which could accommodate up to 100 kW of solar panels. The price of a 100 kW system is $0.6 M, and the payback comes to 5.7 years. SWA considered the 30kW option because of lower capital investment cost and the available incentive structure.

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

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that the Sussex Community 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: $157,500 (including $49,480 total labor cost)
Source of cost estimate: Similar projects

Economics:

Description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
Install 30 kW Solar Photovoltaic system	157,500	22,500	135,000	35,400	30.0	0	4.0	0	27,160	25	468,990	5.0	990	17	217,015	63,384

Cash Flow Year 0	-$135,000								
Cash Flow Year 1	$27,160	Cash Flow Year 6	$27,160	Cash Flow Year 11	$27,160	Cash Flow Year 16	$6,160	Cash Flow Year 21	$6,160
Cash Flow Year 2	$27,160	Cash Flow Year 7	$27,160	Cash Flow Year 12	$27,160	Cash Flow Year 17	$6,160	Cash Flow Year 22	$6,160
Cash Flow Year 3	$27,160	Cash Flow Year 8	$27,160	Cash Flow Year 13	$27,160	Cash Flow Year 18	$6,160	Cash Flow Year 23	$6,160
Cash Flow Year 4	$27,160	Cash Flow Year 9	$27,160	Cash Flow Year 14	$27,160	Cash Flow Year 19	$6,160	Cash Flow Year 24	$6,160
Cash Flow Year 5	$27,160	Cash Flow Year 10	$27,160	Cash Flow Year 15	$27,160	Cash Flow Year 20	$6,160	Cash Flow Year 25	$6,160

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (230 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $0.75 / watt Solar PV application for systems 30 kW or less. Incentive amount for this application is $22,500 for the proposed option. http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total annual SREC credit of $21,000 has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

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 does not recommend any capital improvement measures for the Health Sciences & Performing Arts building because all equipment is new and high performance as the building is LEED certified. For example, all large motors are premium efficiency motors and boilers are high efficiency condensing boilers.

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.

- Reprogram BMS – The building has a state of the art Automated Logic building automation system with full programming capabilities. The building site energy use intensity currently is 110.0kBtu/sqft/yr and SWA opines that this is on the higher side for a LEED certified building equipped with all high performing equipment. Also, SWA noted that the gas meter readings reported by Elizabethtown Gas are not reliable. Hence, the current energy site use intensity number is not reliable as well. In this light, SWA recommends that Sussex Community College to reprogram its building automation system for occupied, unoccupied, and winter night setback settings. SWA estimates the cost of reprogramming to be around $2,000, but calculation of savings is difficult to estimate for reasons stated above.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly and drains are cleaned.

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

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

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

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

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

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

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

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

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

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Sussex Community College. Based on the requirements of the LGEA program, Sussex Community 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 $2,021 (or 25% of $8,081).

APPENDIX A: EQUIPMENT LIST

Building System	Description	Location	Model#	Fuel	Space served	Year Equip Installed	Remaining useful life %
Electric	Sorgel 3 Phase, 300 kVa,	Electric room	Cat No: EE300T68HBISCONLP52DB, S/N 23543204-005	Elec.	Whole building	2008	97%
Electric	Sorgel 3 Phase, 75 kVa, TRM3	Electric room	Cat No: EE75T3HBCU, S/N	Elec.	Whole building	2008	97%
Electric	Sorgel 3 Phase, 30 kVa, TRM1	Electric room	Cat No: EE30T3HBCU S/N	Elec.	Whole building	2008	97%
Heating	#6 Heating pump, Emerson motor c/w, 7.5 hp,1185 rpm, 230/3/60, 90.2% eff	Mechanical room	ITT Bell & Gossett, VSC 9.875, S/N C036645-02 B70	Elec.	Secondary HW, whole building	2008	95%
Heating	#7 Heating pump, Emerson motor c/w, 7.5 hp,1185 rpm, 230/3/60, 90.2% eff	Mechanical room	ITT Bell & Gossett, VSC 9.875, S/N C036645-01 B70	Elec.	Secondary HW, whole building	2008	95%
Heating	Hot water boiler, condensing, 205/230 in/out MBH, est. 90% eff.; c/w Riellors Power Gas Burner RS28	Mechanical room	Viessmann, Vitodens 200, Model WB2 15-60, S/N: 7188 577	Gas	Whole building	2008	96%
Heating	Hot water boiler, condensing, 205/230 in/out MBH, est. 90% eff.; c/w Riellors Power Gas Burner RS28	Mechanical room	Viessmann, Vitodens 200, Model WB2 15-60, S/N: not available	Gas	Whole building	2008	96%
Heating	#5 Heating pump, Bell & Gossett c/w, 1/2 hp,1725 rpm, 208/3/60	Mechanical room	ITT Bell & Gossett, Model: 48717D1759 P, Part no: 903531	Elec.	Primary HW, Boiler 1	2008	95%
Heating	#4 Heating pump, Bell & Gossett c/w, 1/2 hp,1725 rpm, 208/3/60	Mechanical room	ITT Bell & Gossett, Model: 4871781751 P, Part no: 903531	Elec.	Primary HW, Boiler 2	2008	95%
DHW	Domestic water heater tank, 120 gallons	Mechanical room	Viessman Vitocell-V 300, model EVI, S/N 7134373600975104	-	Whole building	2008	95%
DHW	Domestic water heater tank, 120 gallons	Mechanical room	Viessman Vitocell-V 300, model EVI, S/N 7134373600975104	-	Whole building	2008	95%
DHW	DHW circulation pump, 1/8 hp, 3250 rpm, 115/1/60	Mechanical room	Taco circulation pump, model 0014-F1	Elec.	Whole building	2008	95%
DHW	DHW circulation pump, 1/8 hp, 3250 rpm, 115/1/60	Mechanical room	Taco circulation pump, model 0014-F1	Elec.	Whole building	2008	95%
DHW	DHW circulation pump, 3450 rpm, Hi Capacity circulator	Mechanical room	Taco circulation pump, model 1400-10B	Elec.	Whole building	2008	95%
H/V	H&V-1 (AHU) - M Series Climate Changer, 3000cfm, c/w 3hp premium efficiency supply fan motor, 278MBH heating capacity	Mechanical room	Trane, model MCCB006UA0C0UA, S/N K07B14111	Elec.	Boiler room	2008	93%
Heating	Hot Water Unit heater, 4100cfm, 1/2 hp, 115/1/60, 207MBH heating capacity	Mechanical room	Trane, model UHSA260S2EAA1T0000000, S/N F06M42997	Elec.	Mechanical room	2008	93%
Process	Air Compressor, portable for medical use, c/w 2hp, Marathon Electric motor, 115/1/60, 3450rpm	Mechanical room	TwinAir, Model TA-1, S/N TA-1664	Elec.	Mechanical room	2008	93%
HVAC	RTU-1, 36 tons cooling capacity, 632/780 in/out MBH heating, 81% eff., 460/3/60, MCA 141; 11500cfm	Roof	AAON Model: RN-040-3-0-BB04-389, S/N 200704-BNGV02739	Gas/Elec.	Lobby	2008	93%

Building System	Description	Location	Model#	Fuel	Space served	Year Equip Installed	Remaining useful life %
HVAC	RTU-2, 53 tons cooling capacity, 632/780 in/out MBH heating, 81% eff., 460/3/60, MCA 141; 16000cfm	Roof	AAON Model: RN-060-3-0-BB04-389, S/N 200704-BNGX02740	Gas/Elec.	Classrooms	2008	93%
HVAC	RTU-3, 59 tons cooling capacity, 632/780 in/out MBH heating, 81% eff., 460/3/60, MCA 171; 16000cfm	Roof	AAON Model: RN-070-3-0-BA04-389, S/N 200704-BNGY02741	Gas/Elec.	Auditorium	2008	93%
Cooling	ACCU#1, Condensing unit, 4 tons, R410A, 208/1/60, ENERGY STAR	Roof	Trane XR 14, Model 4TTR048A1000AA, S/N 721214T2F	Elec.	Computer room, 2nd floor	2008	93%
Cooling	ACCU#4, Condensing unit, 4 tons, R410A, 208/1/60, ENERGY STAR	Roof	Trane XR 14, Model 4TTR4048A1000AA, S/N 625346K2F	Elec.	Dimmer room, 2nd floor	2008	93%
Heating, Cooling	Condensing unit, 208/1/60, 2 tons cooling, R410A, MCA15.8	Roof	Daikin, Model RXS24DVJU, S/N E000537	Elec.	Elevator lobby, 1st floor	2008	93%
Heating, Cooling	Condensing unit, 208/1/60, 2 tons cooling, R410A, MCA15.8	Roof	Daikin Model RXS24DVJU, S/N E000556	Elec.	Elevator lobby, 2nd floor	2008	93%
Ventilation	REF-1 Power Ventilator, 1/2 hp, 115/1/60, 1775rpm	Roof	PennBarry Model DX16B, S/N M06AB51134803	Elec.	Toilet exhaust	2008	93%
Ventilation	REF-2 Power Ventilator, 1/4 hp, 115/1/60, 1550rpm	Roof	PennBarry Model DX08B, S/N M06AB51416 1306	Elec.	Locker room	2008	93%

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	Atrium	Recessed	S	CFL	12	2	13	Sw	9	345	0	312	969	C	Recessed	CFL	S	DL	12	2	13	7	345	0	312	727	0	242	242
2	1	Atrium	Recessed	S	Hal	16	1	75	Sw	9	345	17	1,464	4,546	CFL	Recessed	CFL	S	DL	16	1	25	7	345	0	400	932	3304	311	3614
3	1	Atrium	Sconce	S	CFL	9	2	13	Sw	9	345	0	234	727	C	Sconce	CFL	S	DL	9	2	13	7	345	0	234	545	0	182	182
4	1	Atrium	Exit Sign	S	LED	6	1	5	N	24	365	1	33	289	N/A	Exit Sign	LED	S	N	6	1	5	24	365	1	33	289	0	0	0
5	1	Atrium	Recessed	S	CFL	47	2	13	Sw	9	345	0	1,222	3,794	C	Recessed	CFL	S	DL	47	2	13	7	345	0	1222	2846	0	949	949
6	1	Atrium	Chandelier	S	CFL	4	1	23	Sw	4	345	0	92	127	N/A	Chandelier	CFL	S	Sw	4	1	23	4	345	0	92	127	0	0	0
7	1	Atrium	Chandelier	E	4'T8	1	1	32	Sw	4	345	5	37	51	N/A	Chandelier	4'T8	E	Sw	1	1	32	4	345	5	37	51	0	0	0
8	1	Classroom (227)	Ceiling Suspended	E	4'T8	16	2	32	Sw	6	345	5	1,104	2,285	C	Ceiling Suspended	4'T8	E	OS	16	2	32	5	345	5	1104	1714	0	571	571
9	1	Hallway	Ceiling Suspended	E	4'T8	9	2	32	Sw	12	345	5	621	2,571	C	Ceiling Suspended	4'T8	E	MS	9	2	32	9	345	5	621	1928	0	643	643
10	1	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
11	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
12	1	Hallway	Ceiling Suspended	E	4'T8	8	2	32	Sw	12	345	5	552	2,285	C	Ceiling Suspended	4'T8	E	MS	8	2	32	9	345	5	552	1714	0	571	571
13	1	Theater	Recessed	S	Inc	33	1	60	Sw	4	345	0	1,980	2,732	CFL	Recessed	CFL	S	Sw	33	1	20	4	345	0	660	911	1822	0	1822
14	1	Theater	Recessed	S	Inc	14	1	20	Sw	4	345	0	280	386	CFL	Recessed	CFL	S	Sw	14	1	5	4	345	0	70	97	290	0	290
15	1	Theater	Ceiling Suspended	E	4'T8	30	2	32	Sw	2	345	5	2,070	1,428	N/A	Ceiling Suspended	4'T8	E	Sw	30	2	32	2	345	5	2070	1428	0	0	0
16	1	Theater	Exit Sign	S	LED	4	1	5	N	24	365	1	22	193	N/A	Exit Sign	LED	S	N	4	1	5	24	365	1	22	193	0	0	0
17	2	Control room theater	Recessed Parabolic	E	4'T8 U-Shaped	4	2	32	Sw	4	345	5	276	381	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	4	2	32	4	345	5	276	381	0	0	0
18	2	Control room theater	Ceiling Suspended	E	4'T8	2	2	32	Sw	4	345	5	138	190	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	4	345	5	138	190	0	0	0
19	2	Control room theater	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
20	2	Control room theater	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
21	2	Hallway	Recessed Parabolic	E	4'T8	2	3	32	Sw	12	345	5	202	836	C	Recessed Parabolic	4'T8	E	MS	2	3	32	9	345	5	202	627	0	209	209
22	2	Classroom (312)	Recessed Parabolic	E	4'T8	6	3	32	Sw	6	345	5	606	1,254	C	Recessed Parabolic	4'T8	E	OS	6	3	32	5	345	5	606	941	0	314	314
23	2	Hallway	Ceiling Suspended	E	4'T8	22	2	32	Sw	12	345	5	1,518	6,285	C	Ceiling Suspended	4'T8	E	MS	22	2	32	9	345	5	1518	4713	0	1571	1571
24	2	Hallway	Recessed	S	CFL	3	2	23	Sw	12	345	0	138	571	C	Recessed	CFL	S	MS	3	2	23	9	345	0	138	428	0	143	143
25	2	Hallway	Exit Sign	S	LED	5	1	5	N	24	365	1	28	241	N/A	Exit Sign	LED	S	N	5	1	5	24	365	1	28	241	0	0	0
26	2	Staircase	Wall Mounted	E	4'T8	3	2	32	Sw	12	345	5	207	857	T8-BL	Wall Mounted	4'T8	E	BL	3	2	32	0	345	5	207	499	0	358	358
27	2	Office	Ceiling Suspended	E	4'T8	18	2	32	Sw	7	345	5	1,242	2,999	C	Ceiling Suspended	4'T8	E	OS	18	2	32	5	345	5	1242	2250	0	750	750
28	2	Office (325)	Recessed Parabolic	E	4'T8	2	3	32	Sw	7	345	5	202	488	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	366	0	122	122
29	2	Office (326)	Ceiling Suspended	E	4'T8	4	2	32	Sw	7	345	5	276	667	C	Ceiling Suspended	4'T8	E	OS	4	2	32	5	345	5	276	500	0	167	167
30	2	Office (327)	Ceiling Suspended	E	4'T8	4	2	32	Sw	7	345	5	276	667	C	Ceiling Suspended	4'T8	E	OS	4	2	32	5	345	5	276	500	0	167	167
31	2	Classroom (321)	Recessed Parabolic	E	4'T8	6	3	32	Sw	6	345	5	606	1,254	C	Recessed Parabolic	4'T8	E	OS	6	3	32	5	345	5	606	941	0	314	314
32	2	Classroom (321)	Recessed Parabolic	E	4'T8	2	3	32	Sw	6	345	5	202	418	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	314	0	105	105
33	2	Classroom (318)	Recessed Parabolic	E	4'T8 U-Shaped	4	2	32	Sw	6	345	5	276	571	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	4	2	32	5	345	5	276	428	0	143	143
34	2	Classroom (318)	Recessed Parabolic	E	4'T8	8	3	32	Sw	6	345	5	808	1,673	C	Recessed Parabolic	4'T8	E	OS	8	3	32	5	345	5	808	1254	0	418	418
35	2	Classroom (319)	Recessed Parabolic	E	4'T8	2	3	32	Sw	6	345	5	202	418	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	314	0	105	105
36	2	Office (320)	Recessed Parabolic	E	4'T8	2	3	32	Sw	7	345	5	202	488	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	366	0	122	122
37	2	Classroom (317)	Ceiling Suspended	E	4'T8	30	2	32	Sw	6	345	5	2,070	4,285	C	Ceiling Suspended	4'T8	E	OS	30	2	32	5	345	5	2070	3214	0	1071	1071
38	2	Server Room Unoccupied (307)	Recessed Parabolic	E	4'T8	1	3	32	Sw	1	345	5	101	35	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	1	345	5	101	35	0	0	0
39	2	Janitor's Closet (301)	Recessed Parabolic	E	4'T8	1	3	32	Sw	1	345	5	101	35	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	1	345	5	101	35	0	0	0
40	2	Bathroom Women (306)	Recessed Parabolic	E	4'T8 U-Shaped	6	2	32	Sw	7	345	5	414	1,000	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	6	2	32	5	345	5	414	750	0	250	250
41	2	Bathroom Men (302)	Recessed Parabolic	E	4'T8 U-Shaped	6	2	32	Sw	7	345	5	414	1,000	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	6	2	32	5	345	5	414	750	0	250	250
42	2	Staircase	Wall Mounted	E	4'T8	5	2	32	Sw	12	345	5	345	1,428	T8-BL	Wall Mounted	4'T8	E	BL	5	2	32	0	345	5	345	832	0	596	596
43	1	Bathroom Men	Recessed Parabolic	E	4'T8 U-Shaped	5	2	32	Sw	7	345	5	345	833	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	5	2	32	5	345	5	345	625	0	208	208
44	1	Bathroom Women	Recessed Parabolic	E	4'T8 U-Shaped	7	2	32	Sw	7	345	5	483	1,166	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	7	2	32	5	345	5	483	875	0	292	292
45	1	Janitor's Closet (203)	Recessed Parabolic	E	4'T8	1	3	32	Sw	1	345	5	101	35	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	1	345	5	101	35	0	0	0
46	1	Server Room Unoccupied (205)	Recessed Parabolic	E	4'T8	1	3	32	Sw	1	345	5	101	35	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	1	345	5	101	35	0	0	0
47	1	Classroom (207C)	Ceiling Suspended	E	4'T8	18	2	32	Sw	6	345	5	1,242	2,571	C	Ceiling Suspended	4'T8	E	OS	18	2	32	5	345	5	1242	1928	0	643	643
48	1	Classroom (207A)	Recessed Parabolic	E	4'T8	1	3	32	Sw	2	345	5	101	70	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	2	345	5	101	70	0	0	0
49	1	Classroom (208)	Ceiling Suspended	E	4'T8	16	2	32	Sw	6	345	5	1,104	2,285	C	Ceiling Suspended	4'T8	E	OS	16	2	32	5	345	5	1104	1714	0	571	571
50	1	Office (209)	Recessed Parabolic	E	4'T8	1	3	32	Sw	7	345	5	101	244	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	7	345	5	101	244	0	0	0
51	1	Conference room (210)	Recessed Parabolic	E	4'T8	2	3	32	Sw	7	345	5	202	488	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	366	0	122	122
52	1	Classroom (211)	Ceiling Suspended	E	4'T8	16	2	32	Sw	6	345	5	1,104	2,285	C	Ceiling Suspended	4'T8	E	OS	16	2	32	5	345	5	1104	1714	0	571	571
53	GF	Lobby	Recessed	S	CFL	10	2	13	Sw	12	345	0	260	1,076	C	Recessed	CFL	S	DL	10	2	13	9	345	0	260	807	0	269	269
54	GF	Elevator Mech. Rm (102)	Ceiling Suspended	E	4'T8	1	2	32	Sw	1	345	5	69	24	N/A	Ceiling Suspended	4'T8	E	Sw	1	2	32	1	345	5	69	24	0	0	0
55	GF	Recycling room (105)	Ceiling Suspended	E	4'T8	1	2	32	Sw	1	345	5	69	24	N/A	Ceiling Suspended	4'T8	E	Sw	1	2	32	1	345	5	69	24	0	0	0
56	GF	Mechanical Rm (104)	Ceiling Suspended	E	4'T8	16	2	32	Sw	7	345	5	1,104	2,666	C	Ceiling Suspended	4'T8	E	OS	16	2	32	5	345	5	1104	2000	0	667	667
57	1	Hallway	Ceiling Suspended	E	4'T8	21	2	32	Sw	12	345	5	1,449	5,999	C	Ceiling Suspended	4'T8	E	MS	21	2	32	9	345	5	1449	4499	0	1500	1500
58	1	Hallway	Recessed	S	CFL	3	2	13	Sw	12	345	0	78	323	C	Recessed	CFL	S	MS	3	2	13	9	345	0	78	242	0	81	81
59	1	Hallway	Exit Sign	S	LED	5	1	5	N	24	365	1	28	241	N/A	Exit Sign	LED	S	N	5	1	5	24	365	1	28	241	0	0	0
60	1	Office	Recessed Parabolic	E	4'T8	2	3	32	Sw	7	345	5	202	488	C	Recessed Parabolic	4'T8	E	OS	2	3	32	5	345	5	202	366	0	122	122
61	1	Office (216)	Recessed Parabolic	E	4'T8	4	3	32	Sw	7	345	5	404	976	C	Recessed Parabolic	4'T8	E	OS	4	3	32	5	345	5	404	732	0	244	244
62	1	Storage Rm (217)	Recessed Parabolic	E	4'T8	2	3	32	Sw	1	345	5	202	70	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	1	345	5	202	70	0	0	0
63	1	Storage Rm (218)	Recessed Parabolic	E	4'T8	3	3	32	Sw	1	345	5	303	105	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	1	345	5	303	105	0	0	0
64	1	Storage Rm (219)	Recessed Parabolic	E	4'T8	2	3	32	Sw	1	345	5	202	70	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	1	345	5	202	70	0	0	0
65	1	Storage Rm (221)	Recessed Parabolic	E	4'T8	3	3	32	Sw	1	345	5	303	105	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	1	345	5	303	105	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)
66	1	Green room (222)	Recessed Parabolic	E	4'T8	4	3	32	Sw	2	345	5	404	279	N/A	Recessed Parabolic	4'T8	E	Sw	4	3	32	2	345	5	404	279	0	0	0
67	1	Dress room (223)	Recessed Parabolic	E	4'T8 U-Shaped	4	2	32	Sw	4	345	5	276	381	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	4	2	32	3	345	5	276	286	0	95	95
68	1	Dress room toilet (224)	Recessed Parabolic	E	4'T8 U-Shaped	3	2	32	Sw	1	345	5	207	71	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	3	2	32	1	345	5	207	71	0	0	0
69	1	Dress room toilet (224)	Wall Mounted	S	Inc	1	6	40	Sw	1	345	0	240	83	CFL	Wall Mounted	CFL	S	Sw	1	6	15	1	345	0	90	31	52	0	52
70	1	Dress room (223)	Wall Mounted	S	Inc	1	16	40	Sw	4	345	0	640	883	CFL	Wall Mounted	CFL	S	OS	1	16	15	3	345	0	240	248	552	83	635
71	1	Dress room (225)	Recessed Parabolic	E	4'T8 U-Shaped	4	2	32	Sw	4	345	5	276	381	C	Recessed Parabolic	4'T8 U-Shaped	E	OS	4	2	32	3	345	5	276	286	0	95	95
72	1	Dress room toilet (226)	Recessed Parabolic	E	4'T8 U-Shaped	3	2	32	Sw	1	345	5	207	71	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	3	2	32	1	345	5	207	71	0	0	0
73	1	Dress room toilet (226)	Wall Mounted	S	Inc	1	6	40	Sw	1	345	0	240	83	CFL	Wall Mounted	CFL	S	Sw	1	6	15	1	345	0	90	31	52	0	52
74	1	Dress room (225)	Wall Mounted	S	Inc	1	16	40	Sw	1	345	0	640	221	CFL	Wall Mounted	CFL	S	Sw	1	16	15	1	345	0	240	83	138	0	138
75	Ext	Exterior	Recessed	S	CFL	4	1	13	T	8	345	0	52	144	N/A	Recessed	CFL	S	T	4	1	13	8	345	0	52	144	0	0	0
76	Ext	Exterior	Wall Mounted	S	CFL	8	1	32	T	8	345	0	256	707	N/A	Wall Mounted	CFL	S	T	8	1	32	8	345	0	256	707	0	0	0
77	Ext	Exterior	Wallpack	S	CFL	3	2	23	T	8	345	0	138	381	N/A	Wallpack	CFL	S	T	3	2	23	8	345	0	138	381	0	0	0
78	Ext	Exterior	Wallpack	S	MH	7	1	100	T	8	345	28	896	2,473	MH	Wallpack	MH	S	T	7	1	100	8	345	28	896	2473	0	0	0
Totals:						548	198	2,298				309	34,934	79,048						548	198	2,093			292	31,240	56,636	6,209	16,203	22,412

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

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	30,000		
Average Power Cost ($/kWh)	0.1740		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	3,704	3,704	**0**
Exterior Power (watts)	1,342	1,342	**0**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	75,344	52,932	**22,412**
Lighting Power (watts)	33,592	29,898	**3,694**
Lighting Power Density (watts/SF)	1.12	1.00	**0.12**
Estimated Cost of Fixture Replacement ($)	671		
Estimated Cost of Controls Improvements ($)	8,895		
Total Consumption Cost Savings ($)	**4,367**		

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

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.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
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 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
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 Elizabethtown Gas Co. 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
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.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.

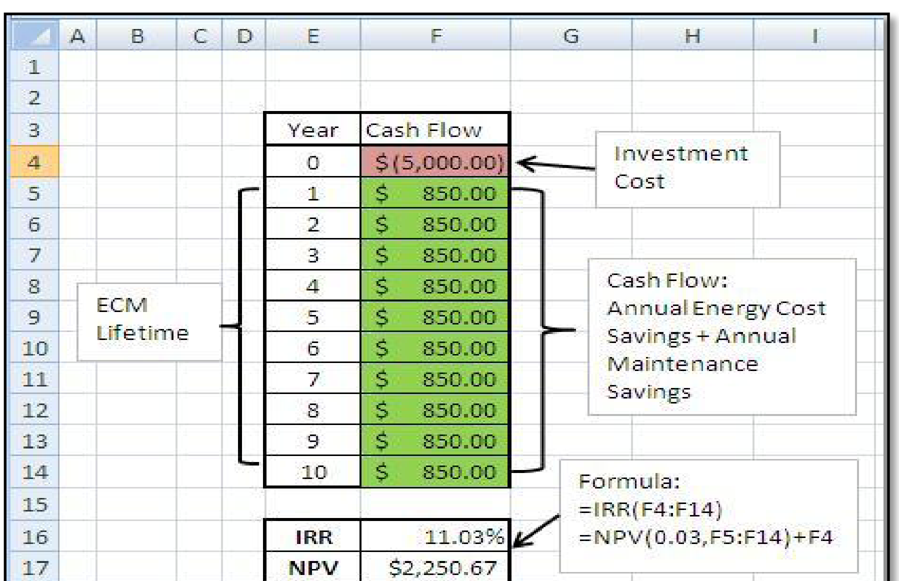
Calculation References

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 30kW or less, $0.75/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

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

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

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

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

STATEMENT OF ENERGY PERFORMANCE
Sussex County Community College - Building A

Building ID: 2473088
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: October 08, 2010

Facility
Sussex County Community College - Building A
One College Hill Road
Newton, NJ 07860

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 2008
Gross Floor Area (ft^2): 30,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	1,590,343
Natural Gas (kBtu)[4]	1,705,987
Total Energy (kBtu)	3,296,330

Energy Intensity[5]	
Site (kBtu/ft^2/yr)	110
Source (kBtu/ft^2/yr)	237

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	333

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	-15%
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.

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

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

Eligibility:

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

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

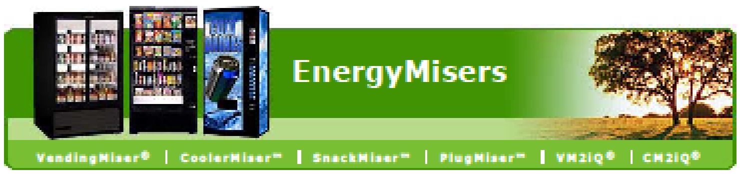
ECM Counter		ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st year cost savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO2 reduced, lbs/yr
1	0 to 5 Year Payback ECM	Install 67 new CFL fixtures	671	0	671	6,209	1.9	0	0.7	90	1,170	5	5,852	0.6	839	168	173	4,658	11,117
2		Retrofit 1 existing vending machine with VendingMiser™ device	199	0	199	1,612	0.5	0	0.2	0	280	10	2,805	0.7	1,309	131	141	2,169	2,886
3		Retrofit 1 existing vending machine with SnackMiser™ device	99	0	99	387	0.1	0	0.0	0	67	10	673	1.5	580	58	68	470	693
4		Install 7 new motion sensors with incentives	1,540	140	1,400	4,718	1.4	0	0.5	0	821	15	12,314	1.7	780	52	58	8,260	8,448
5		Install 5 new Daylight sensors with incentives	1,100	125	975	1,952	0.6	0	0.2	0	340	15	5,095	2.9	423	28	34	3,022	3,495
6		Install 27 new Occupancy Sensors with incentives	5,940	540	5,400	8,580	2.6	0	1.0	0	1,493	15	22,394	3.6	315	21	26	12,167	15,362
		TOTALS	**9,549**	**805**	**8,744**	**23,458**	**7**	**0**	**2.6**	**90**	**4,172**		**49,133**	**2.1**	-	-	-	-	**42,002**
7	5 to 10 Year Payback	Install 8 new Bi-level fixtures with incentives	1,320	200	1,120	954	0.3	0	0.1	0	166	15	2,490	6.7	122	8	10	833	1,708
		TOTALS	**1,320**	**200**	**1,120**	**954**	**0.3**	**0**	**0.1**	**0**	**166**		**2,490**	**6.7**	-	-	-	-	**1,708**

APPENDIX H: VendingMiser™ and SnackMiser™ Energy Savings

USA Technologies :: Energy Management :: Savings Calculator

PRODUCTS & SERVICES | COMPANY INFO

EPORT | ENERGYMISERS | BUSINESS EXPRESS | ESUDS | EPORT CONNECT



Savings Calculator

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

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

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

COLD DRINK MACHINES	Current	Projected	Total Savings	% Savings
kWh	3494	1882	1612	46%
Cost of Operation	$608.03	$327.54	$280.49	46%
SNACK MACHINES	**Current**	**Projected**	**Total Savings**	**% Savings**
kWh	699	312	387	55%
Cost of Operation	$121.61	$54.29	$67.32	55%

Location's Total Annual Savings

	Current	Projected	Total Savings	% Savings
kWh	4193	2194	1999	48%
Cost of Operation	$729.63	$381.83	$347.81	48%

Total Project Cost	Break Even (Months)
$298	10.28

Estimated Five Year Savings on ALL Machines = $1,739.03

Estimated Five Year Return on Investment = 484%

http://www.usatech.com/energy_management/energy_calculator.php[10/12/2010 2:30:22 PM]

APPENDIX I: METHOD OF ANALYSIS

Assumptions and tools

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

Disclaimer

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

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