CAMDEN COUNTY COLLEGE
CIM (COMPUTER INTEGRATED MANUFACTURING) BUILDING
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

CHA PROJECT NO. 24364

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TABLE OF CONTENTS

APPENDICES

REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±20%, and are based on data obtained from the owner, data obtained during site observations, professional experience, historical data, and standard engineering practice. Cost data does not include soft costs such as engineering fees, legal fees, project management fees, financing, etc.

A thorough walkthrough of the facility was performed, which included gathering nameplate information and operating parameters for all accessible equipment and lighting systems. Unless otherwise stated, model, efficiency, and capacity information included in this report were collected directly from equipment nameplates and /or from documentation provided by the owner during the site visit. Typical operation and scheduling information was obtained from interviewing facility staff and spot measurements taken in the field.

1.0 EXECUTIVE SUMMARY

The Camden County College recently engaged CHA to perform an energy audit in connection with the New Jersey Board of Public Utilities' Local Government Energy Audit Program. This report details the results of the energy audit conducted for:

Building Name	Address	Square Feet	Construction Date
Camden County College CIM (Computer Integrated Manufacturing) Lab	200 College Drive Building 21 Blackwood, New Jersey	63,900	Original: 1986 Addition: 1996

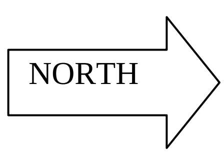
The Energy Conservation Measures (ECMs) identified in this report will allow for a more efficient use of energy and if pursued have the opportunity to qualify for the New Jersey SmartStart Buildings Program and/or Direct Install Program. Potential annual savings of $23,600 for the recommended ECMs may be realized with a payback of 5.0 years. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

Summary of Energy Conservation Measures								
Energy Conservation Measure		Approx. Costs ($)	Approx. Savings ($/year)	Payback (Years) w/o Incentive	Potential Incentive ($)*	Payback (Years) w/ Incentive	Recommended For Implementation
ECM-1	HVAC Condensing Boilers Addition	111,900	1,800	>20	3,000	>20	
ECM-2	Replace Domestic Water Heater (DWH)	9,700	1,700	5.7	100	5.6	X
ECM-3	HVAC Install Variable Speed Drives, High Efficiency Motor	47,800	10,000	4.8	10,600	3.7	X
ECM-4	HVAC Demand Control Ventilation	5,100	1,900	2.7	0	2.7	X
ECM-5	Install Vending Miser	200 (per unit)	190 (per unit)	1.1	0	1.1	X
ECM-6	Rooftop Exhaust Fan Replacement	8,600	400	>20	0	>20	
ECM-7	Replace Domestic Hot Water Pumps	300 (per unit)	100 (per unit)	3.0	0	3.0	X
ECM-8	Roof System (Clerestory Roof System) Replacement in Main Lobby	247,700	700	>20	0	>20	
ECM-9	Lighting Replacement Upgrades	43,300	6,900	6.3	10,300	4.8	X
ECM-10	Install Lighting Controls (Occupancy Sensors)	11,100	4,200	2.6	1,600	2.3	X
ECM-11	Lighting Replacements with Lighting Controls (Occupancy Sensors)	54,400	9,700	5.6	11,900	4.4	X

2.0 INTRODUCTION AND BACKGROUND

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.

The CIM (Computer Integrated Manufacturing) Lab located on the Camden County College campus in Blackwood, NJ, is a 63,900 square foot three story building with a high bay machine shop area, auditorium, large group instruction spaces, classrooms, labs, administration offices, ophthalmology labs, lounge area and support spaces. HVAC rooftop units are located on the rooftop; boilers are in a lower level mechanical room and a chiller outside on grade. The original building was constructed in 1986, with a later two story addition 1996. Occupancy includes approximately XXX students and XXX faculty members. The building operates Monday through Friday from 8:00 am to approximately 8:00 pm. There is also some reduced occupancy on weekends, and occupancy levels are reduced in summer months between semesters for each school year.



3.0 EXISTING CONDITIONS

3.1 Building - General

Originally built in 1986, the CIM lab building is a 63,900 square foot, three-story building with a high bay machine shop area, auditorium, large group instruction spaces, classrooms, labs, administration offices, ophthalmology labs, lounge area and support spaces. An addition in 1996 incorporated a two story classroom block to the south west area of the building. The main entrance is a large glass atrium supported by a truss space frame structure that opens into a lobby on the north side of the building.

The CIM building has approximately XXX students and XXX faculty and staff, and appears to be fully utilized during our field inspection. The building can be assumed to be fully occupied until 8:00 pm during the week, and by approximately one quarter of the occupants during the weekend. The hours of operation are:

- Monday thru Friday 8:00 am to 8:00 pm.
- Saturday, Sunday 8:00 pm to 4:00 pm.

The original building is constructed with reinforced concrete and structural steel with different veneers. The two story east and west wings, and the 1996 addition all have insulation and a brick veneer over the reinforced concrete; the center high bay machine shop area has insulation and a stucco finish over the reinforced concrete. Insulation is incorporated into the wall assemblies for an improved envelope, particularly the 1996 addition. There is a single story loading dock on the east wall of the building, below the east wing. The majority of the interior walls are painted block or concrete walls; 3-5/8" metal studs filled with fiberglass insulation finished with gypsum board are used to repartition spaces, i.e., in renovated areas. The flat roof system is comprised of a structural steel framing with a metal deck having rigid foam board insulation. The original 1986 building rooftops have a light colored EPDM membrane; the 1996 addition rooftop has a dark-colored asphalt rolled roofing system. Stone ballast is used on the 1996 addition rooftop. Windows are minimal (<25% on walls where used), and are double pane set in metal frames with tint; the two story glass main entrance atrium also utilizes double pane windows set in metal frames with tint. The majority of the exterior doors are part glass, and part metal panel with metal frames. The building has exposed walls facing the north, east, south and west directions of varying heights (refer to photo above). The majority of the two story wings and southwest addition are 25' in height, with the high bay machine shop area being approximately 30' tall. The single story loading dock on the east side of the building is approximately 14' tall above grade, with a sunken in drive at its entrance. First floor has concrete slab-on-grade floor, and upper floors have reinforced concrete deck floors between levels.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity is delivered and supplied by Atlantic City Electric. Natural gas is delivered by South Jersey Gas and supplied by South Jersey Gas. Potable water is provided by the municipally owned water department at a charge. See Appendix A for a detailed utility analysis.

The facility has one dedicated electric meter. From June 2011 through April 2012, the electric usage for the facility was 1,443,300 kWh at a cost of $165,543. Review of electricity bills during this period showed that the electricity was charged at the following rates: supply unit consumption cost of $0.110 per kWh; demand unit cost of $5.94 per kW; and blended unit cost of $0.115 per kWh. The peak demand per month is 360 kW from June 2011 through April 2012.

The facility has one natural gas meter. From July 2011 through May 20112, gas-fired equipment consumed 19,437 therms of natural gas. Based on the annual cost of $16,056, the price for natural gas was $0.80 per therm.

The delivery component of the electric and natural gas bills will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party; as is currently the case with electricity and natural gas. The electricity or natural gas commodity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. According to the U.S. Energy Information Administration, the average commercial unit costs of electricity and natural gas in New Jersey during the same periods as those noted above was $0.141 per kWh and $0.959 per therm. The electrical supply rate charged by Hess for the 12 month period from June 2011 through April 2012 resulted in lower cost to the school district than having ACE both supply (see table below). When compared to the average state values, it is recommended that the present natural gas be maintained and the present electricity supply rate charge be monitored and checked monthly.

CIM Building Electric Supply Costs – Atlantic City Electric vs Hess

Month	ACE Supply Costs (For Comparison)	Hess Supply Costs (Actual)
June-11	$12,865	$10,506.21
July-11	$12,460	$12,677.75
August-11	$11,193	$11,388.01
September-11	$11,759	$11,964.28
October-11	$12,618	$10,647.11
November-11	$11,837	$9,988.52
December-11	$12,097	$10,208.06
January-12	$9,740	$7,877.66
February-12	$13,061	$10,564.41
March-12	$12,320	$9,964.46
April-12	$12,094	$9,781.87
May-12	$13,964	$10,506.21
Total	**$132,042.78**	**$115,568.34**
Extra Savings of using Hess for Electric Supply	**$16,474.44**	

A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

The systems and equipment described below serve the CIM building. Specifics on the mechanical equipment can be found within the equipment inventory located in Appendix B.

3.3.1 Cooling Chilled Water System

One Trane air cooled screw compressor chiller with factory control panel was installed in 2012, and is located on grade in a chiller yard on the east side of the building (beside the loading dock). The chilled water system operates from May until September, and the chiller is shut down during the fall and winter.

The chiller is piped to a primary loop pumping system with two on-board 15 HP pumps that operate in lead-lag. The primary pumps are variable speed with inverter duty rated motors for system control. Chilled water is provided to the fan coil units located throughout the building. Chilled water system piping and valves appear to be insulated.

3.3.2 Heating Hot Water Systems

The building is heated with hot water supplied by seven Weil McLain cast iron sectional gas-fired boilers with factory burners and controls. The boilers were installed in 1989, and are located in the basement mechanical room. The hot water system operates from October until April, and the boilers are shut down during the summer.

The boilers are piped to a primary loop pumping system with two 15 HP pumps that operate in lead-lag. The pumps are constant volume with standard efficiency motors; heating capacity control is achieved by staging boilers on one at a time as heating demand increases. Hot water is provided to the fan coil units located throughout the building. Hot water system piping and valves appear to be insulated.

3.3.3 Package DX Cooling and Heating Rooftop Units

Five 2004 and three 2011 packaged DX cooling, natural gas heating, RTUs are located on the rooftop above the areas/spaces they serve. Each RTU is mounted on an extended curb, with outside air intake and relief air dampers, with an air mixing box. Supply and return ductwork is routed down through the roof curbs to duct distribution systems above the ceilings to each space. The 2004 rooftop units serve the factory open floor, first floor south area and second floor south area. The 2011 rooftop units serve multiple level 1 classrooms.

3.3.4 DX Cooling Split System Units

Three split system DX cooling air conditioners with indoor ceiling mounted air handlers were installed in 2001 to serve Rooms 109S, 110S and 111S. The condensing units are located outside each room on grade beside the area/space being served.

3.3.6 Exhaust Systems

Exhaust system fans are integrated into the CIM building automation system (BAS) and generally operate during building occupancy.

Constant volume exhaust fans serve laboratories, large factory open floor area, larger classrooms and spaces. Exhaust fans are also used for restrooms and custodial closets throughout the building.

3.4 Control Systems

The building is controlled by a CM3 BAS. The system consists mainly of original, 1986 DDC field devices and components. All and controls and field devices are integrated into a computerized front end operating the CM3 BAS software for equipment sequencing, scheduling, monitoring, and alarming. This includes the hot water system boilers/pumps, chilled water system chiller/pumps, RTUs, fan coil units and exhaust system fans. Smaller split systems operate stand alone and are not tied into the BAS.

Each split system has a wall mounted thermostat; setpoints in the building are 68°F heating and 74°F cooling during occupied times, and 55°F heating and 85°F cooling during unoccupied times. However, thermostats can be adjusted by occupants to override the central control system.

Buildings having the CM3 Digital Controls have programmed temperature set points; however, the occupants (staff) have the ability to adjust the space temperatures to suit their comfort which results in many areas being over cooled (and most likely over heated). The inconsistent occupancy schedules of the building does not allow for a normal unoccupied temperature set back of the buildings which results in increased energy usage.

3.5 Lighting/Electrical Systems

The original 1986 building areas have 40 watt linear T-12 lights with magnetic ballasts or U-tube 40 watt T-12 light fixtures. Most of the 1996 and newer additions/alterations have 32 watt T-8 lights with electronic ballast. The building is also equipped with 60 and 72 watt incandescent light fixtures and 42 watt compact fluorescent lighting. The main entrance atrium of the building is equipped with 100 watt high pressure sodium fixtures. The high bay factory floor area has 400 watt metal halide lights and lighting quality is poor due to the ceiling height (estimated to be 50 feet). The primary source of control for the lights is switches manually turned off at the end of the day.

The exterior lighting consists of 250 watt metal halide fixtures that are wall mounted to the building.

3.6 Plumbing Systems

3.6.1 Domestic Hot Water System

The basement mechanical room contains two 30 gallon State electric tank type hot water heater installed in 1989; they serve the entire CIM building. Hot water is provided to toilets, , janitor’s closets, a kitchen and laboratories, and the majority of hot water piping appears to be insulated. Hot water demand is very low as there is not a commercial kitchen in this building. Domestic hot water temperature is maintained at 140°F, and chemical disinfection soap is provided at the toilet rooms.

3.6.2 Plumbing Fixtures

The majority of the original lavatories, water closets, and urinals were low flow plumbing fixtures; fixtures should be replaced with low flow fixtures as necessary through attrition. Lavatories are 2.5 GPM with push type faucets, water closets are 1.6 GPF, and urinals are 1.0 GPF.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 HVAC Condensing Boiler Addition

The building is heated with hot water supplied by seven Weil McLain cast iron sectional gas fired boilers from 1989. The boilers are non-condensing and have an estimated efficiency of 83%.

Due to the relatively low efficiency of the existing boilers, an evaluation was performed for adding one high efficiency condensing boiler to operate as the primary boiler during the shoulder months (October-November and March-April) with the existing boilers operating as secondary. The majority of the savings will be achieved during these months when the lower return water temperature enables the condensing boiler to achieve the highest efficiencies.

The boiler fuel consumption was calculated from the natural gas used annually for the shoulder months per utility bills and boiler efficiency. This was then compared to the efficiency of a new condensing boiler at the improved operating efficiency. The difference in fuel usage was the savings.

Natural gas-fired boilers have an expected life of 25 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 57,500 therms and $45,900.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-1 HVAC Condensing Boilers Addition

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
111,900	0	0	2,300	1,800	0	1,800	(0.6)	3,000	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.2 ECM-2 Replace Domestic Water Heater

The building has two domestic hot water heaters that provide hot water to the facility. The State units are tank type electric water heaters installed in 1989. During periods of little or no domestic hot water use, the units must still heat the water within their storage tank. Energy required maintaining the 60 gallons of hot water temperature setpoint during times of zero demand is known as standby losses; replacing these units with higher efficiency natural gas units was evaluated.

According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on a typical tankless type, high efficiency, condensing hot water heater with a storage tank to increase recovery capacity. The new water heater will require gas and water piping modifications, venting, and electrical connections.

Domestic hot water heaters have an expected life of 12 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 157,700 (-4,400 therms as the unit is switching from electric to natural gas) and $20,900.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-2 Replace Domestic Water Heater (DWH)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
9,700	13,140	10	-370	1,700	0	1,700	1.2	100	5.7	5.6

* Incentive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.3 ECM-3 Install Variable Speed Drives, High Efficiency Motors

The hot water system is served by two 15 HP pumps P-1 and P-2, operating in a lead-lag fashion. The pumps are constant volume pumps with standard efficiency motors.

Rooftop air handling units with constant volume supply fan motors serve classroom 119 (RTU-1-1), the factory open floor area (RTU-1 North), first floor south area (RTU-2 South) and second floor south area (RTU-3 South).

The hot water system pumps and Rooftop HVAC unit fans operate at a constant speed/ constant flow (water and air flows) even though the building load may not require all of the flow to maintain temperatures. By adding Variable Speed Drives (VSDs) and inverter-duty high efficiency motors, the flow can be reduced (by slowing the motors down), and electrical energy can be saved. For hydronic systems, pressure differential sensors will need to be installed to measure the water pressure in the systems. As control valves close, the system pressure increases and pump speed is reduced proportionally. Typically for air side systems, static pressure duct sensors are employed to control the fan speed when a variable air volume system is present. In this case space temperature sensors will be used to control the air flow of the fans based on space temperatures as the current ducted distribution systems are not variable volume systems.

For systems that have pumps and fans that cannot be slowed down (due to the nature of the system design), electrical saving can still be obtained by replacing older, less efficient motors with new higher efficiency motors.

The assumption of this calculation is that the operating hours, motor horsepower, and current capacity stay the same. The energy savings are realized from operating higher efficiency motors and reducing power consumption of the motors using the variable speed drives.

Motors and variable speed drives have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 1,738,200 kWh and $199,300.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-3 HVAC Install Speed Frequency Drives, High Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
47,800	86,900	0	0	10,000	0	10,000	3.2	10,600	4.8	3.7

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.4 ECM-4 HVAC Demand Control Ventilation

A rooftop air handling unit serves the factory open floor area (RTU-1-1). It is assumed that the original system controls provide the originally specified design ventilation outside air flow rate. Reducing outside air flow rate during occupied time periods will reduce heating and cooling energy used. This can be accomplished using carbon dioxide sensors to monitor the actual levels of carbon monoxide and adjust the quantity of ventilation air based on maintaining an acceptable carbon dioxide (CO_2) level in the space. A limit of 1000 PPM of CO_2 is recommended in ASHRAE Standard 62-2010, Ventilation for Acceptable Indoor Air Quality. Sensors will be installed to measure the CO_2 concentration in the space, and a revised control sequence of operation will be implemented by the building automation system (BAS) to operate the outdoor air dampers on the roof mounted HVAC unit. During unoccupied periods the outside air dampers will be closed.

For RTU-1-1, the savings from this ECM can either pay back the cost of only adding demand control ventilation, or it can be implemented in conjunction with ECM-2 which addresses the addition of premium efficiency motors and variable speed drives.

Equipment supply and outside airflows were obtained from existing design drawings where possible, or from vendors per serial/model numbers found in the field. For the analysis, estimated savings for implementing demand control ventilation are calculated by reducing the outdoor air quantities from 30% to 10%. The energy savings are the differences in thermal energy usage and fan horsepower electrical savings.

Building controls systems have an expected life of 18 years, according to ASHRAE. Using this data, the total energy savings over the life of the equipment is estimated at 78,000 kWh, 31,400 therms and $34,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-4 HVAC Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,100	4,330	0	1,750	1,900	0	1,900	5.7	0	2.7	2.7

* No applicable incentive as per New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.5 ECM-5 Install Vending Miser

Vending machines are usually leased by building owners who are also required to pay for the electricity to run the machines. Snack machines typically draw 200 watts for lighting and electrical systems while beverage machines can draw around 400 watts to also maintain the cooling systems. Older vending machines may draw even more power. When the machines operate all year round, this can add up to some significant energy usage.

Occupancy sensors can be installed in-line with vending machines that allow the machines to operate with little to no power while a space is unoccupied. Snack machines will completely power down while beverage machines will only have to cycle a few minutes every couple hours to keep the drinks cold. Beverage machines that contain perishable items such as milk are not recommended for occupancy sensor installation.

The exact number of vending machines within the CIM building was unknown; therefore savings were calculated on a per unit basis.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-5 Install Vending Miser

Machine Type	Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
		Electric	Electric	Nat Gas	Total						
	$	kWh	kW	Therms	$	$	$		$	Years	Years
Beverage	200	1,900	0	0	250	0	250	-	0	0.8	0.8
Snack	200	960	0	0	130	0	130	-	0	1.6	1.6
Dual	200	1,400	0	0	190	0	190	-	0	1.1	1.1

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.6 ECM-6 Rooftop Exhaust Fan Replacement

Older rooftop exhaust fans run on less efficient motors and do not have backdraft dampers installed. Backdraft dampers prevent infiltration of outdoor air into the building and help protect the building envelope. According to ASHRAE standard 90.1, low leakage dampers should be less than 3 CFM/sqft. It was estimated that the existing rooftop units allow 2% infiltration per CFM of exhaust air. The existing units have a total airflow rate of 13,200 CFM which will result in 264 CFM of infiltration.

The savings for implementing this measure will therefore be a combination of decreased energy usage for a high efficiency motors and cooling and heating savings from

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-6 Rooftop Exhaust Fan Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
8,600	2,420	0	103	400	0	400	(0.2)	0	>20	>20

* No applicable incentive as per New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.7 ECM-7 Replace Domestic Hot Water Pumps

Maintenance personnel at the CIM Building indicated that domestic hot water pumps were beyond their expected life and were no longer operating at ideal flow rates. Typically water pumps do not need to be upgraded as often as pump motors. This measure aims to address this complaint through the installation of higher output cartridge type pumps. It was assumed that the existing domestic hot water pump were 60% efficient B&G Series 100 1/6 HP motors. This measure proposes an equivalently efficient motor at a decreased HP such as a Taco 007 Series 1/25 HP cartridge motor.

The exact number of water pumps in the CIM building was unknown; therefore this calculation was performed on a per unit basis.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-7 Replace Domestic Hot Water Pumps

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
300	1,190	0	0	100	0	100	7.7	0	3.0	3.0

* No applicable incentive as per New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.8 ECM-8 Roof System Replacement in Main Lobby (Clerestory Roof)

The main lobby of the CIM building consists of a glass atrium with a full glass ceiling and roofing system. School personnel indicated that there is a high infiltration rate and the rain causes the glass ceiling to leak quite significantly. A simple method to mitigate this problem is to install a metal truss roof system above the glass and add insulation, however further study would need to be performed to ensure the underlying structure was adequate.

Savings from the implementation of the metal roof will result from lower air infiltration and better insulation. It was assumed that the existing glass roof had an estimated R-value of 2 whereas the new roof system is proposed to have an R-value of 20.

ECM-8 Roof System Replacement in Main Lobby (Clerestory Roof)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
247,700	390	0	773	700	0	700	(0.9)	0	>20	>20

* No applicable incentive as per New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.9 ECM-8 Lighting Replacement Upgrades

The original 1986 building areas have T-12 lights with magnetic ballasts. The 1996 and newer additions/alterations and occupied spaces have upgraded to electronic ballast and utilize mainly 4 foot 32W T-8 fluorescent bulbs; U-tube T-12s and T-8sare also used in some fixtures. Can lights and surface mounted standard bulb fixtures use biaxial compact fluorescent lights (CFLs) to replace original incandescent bulbs. A fluorescent lamp converts electrical power into useful light more efficiently than an incandescent lamp or T-12 bulbs. A comprehensive fixture survey was conducted of the entire building. Each switch and circuit was identified, and the number of fixtures, locations, and existing wattage established (Appendix C). There is an opportunity to continue to reduce that consumption even more by upgrading the classrooms to super T-8 fixtures, and the metal halides in the high bay areas to induction fixtures.

The existing exterior lighting system for this building consists of four 250 watt metal halide wall pack fixtures. Various spaces in the building contain fifty five 100 watt high pressure sodium fixtures, and the high bay factory area contains twenty five 400 watt metal halide fixtures. The exterior fixtures are utilized for building lighting during nighttime hours and are in operation from sun down until sun up. The interior fixtures are utilized during occupied hours. Alternative LED lighting solutions are available to replace these fixtures. The 250 watt metal halide fixtures can be changed to an156 watt LED fixture. It is suggested to replace the existing metal halide wall pack fixtures on a one for one basis with LED. The reduction in per fixture wattage will result in a reduced total exterior lighting connected wattage, therefore resulting in electrical energy savings. However, maintenance savings were not calculated or included in the payback analysis below due to unknown labor rates and knowledge of existing required maintenance time.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to estimated times of operation. The difference between energy requirements resulted in a total annual savings of 53,600 kWh with an electrical demand reduction of about 21 kW. Supporting calculations, including assumptions for lighting hours and annual energy usage for each fixture, are provided in Appendix C.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 804,000 kWh and $103,300.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as follows:

ECM-5 Lighting Replacement Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
43,300	53,600	21	0	6,900	0	6,900	1.4	10,300	6.3	4.8

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-7.

4.10 ECM-6 Lighting Controls Installation

The current CIM Lab building lighting is controlled by manual switches. Lights are generally turned on in the morning and shut off at night. During occupied times, there are rooms that are not occupied, however the lights remain on. Adding occupancy controls to the individual rooms will automatically control the lights based on occupancy. The occupancy sensor can be wall mounted near the switch or placed at the ceiling for larger room coverage. All occupancy sensors are equipped with a manual override feature. These sensors are generally not recommended in public toilet rooms.

Lighting controls have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 553,500 kWh and $63,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-6 Lighting Controls Installation (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
11,100	36,900	0	0	4,200	0	4,200	4.7	1,600	2.6	2.3

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-7.

4.11 ECM-7 Lighting Replacements with Lighting Controls

Due to interactive effects, the energy and cost savings for occupancy sensors and lighting upgrades are not cumulative. This measure is a combination of ECM-5 and ECM-6 to reflect actual expected energy and demand reduction.

The lighting retrofits and controls have an expected lifetime of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 1,222,500 kWh and $145,300.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as follows:

ECM-7 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
54,400	81,500	20	0	9,700	0	9,700	1.7	11,900	5.6	4.4

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.12 System Improvement Opportunities

The following items can be implemented by the owner to provide additional energy savings:

- The CM3 BAS uses an older interface that is not as user friendly as more modern systems, and is not as functional as systems using current technology. It is recommended the BAS system software be upgraded and full system re-commissioning executed as a future facility improvement item. The re-commissioning should include the BAS front end system, software upgrade, graphics interface, BAS controllers/field devices tuning, as well as HVAC system dampers and valves that are not equipment components. This could be coordinated with a complete systems testing and balancing that must occur prior to system re-commissioning efforts.

  This would allow more accurate control of HVAC systems, prevent local thermostat adjustment by occupants, allow improved trending/logging functions, and monitor that proper ventilation is being provided. Improved trending and logging aids in identifying improved scheduling and systems startup times. HVAC systems will be tuned up during this process, and significant savings could be obtained by making the following controls improvements:

  - Re-commission all existing CM3 controls and verify that the input/ output data is actually controlling the valves, dampers, sensors, etc. within the HVAC systems and spaces. This should be done in concert with air and water flow testing and balancing.
  - Institute a set building occupancy schedule and set occupied/ unoccupied temperatures. After hours use of the buildings that require heating/cooling should be restricted to

certain areas only. Limit ventilation to these same schedules (No outdoor air and no exhaust , except for special chemical/fume applications)

- Institute set occupied space temperatures of 68°F - 72°F for heating and 74°F - 76°F for cooling and prohibit staff adjustment of the thermostats. This will require some education of the staff members on the actual cost of the building energy consumption.
- Institute a set time of the year when heating is turned on and when cooling is turned on through the control system. Economizer cooling should be used for shoulder weather whenever possible.
- Limit re-heating as much as possible. Institute discharge air reset, energy heat recovery and other strategies to reduce re-heat.
- Institute optimum start/stop to anticipate the heating/ cooling needs based on outdoor air temperature and building heat transfer.

- It is recommended that vending misers be added to all college owned vending machines. It is also recommended the college requests vendor owned machines be upgraded or removed if they are not high efficiency equipment.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The facility will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects applied to facilities whose demand in any of the preceding 12 months exceeds 100 kW. This average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations, however. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP).

- Incentive Amount: $0.10/SF
- Minimum incentive: $5,000
- Maximum Incentive: $50,000 or 50% of Facility annual energy cost

The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy savings as determined in Incentive #1 (Minimum 15% savings must be achieved), and is paid upon successful installation of recommended measures.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

Incentive cap: 25% of total project cost

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

Incentives #2 and #3 can be combined to yield additive savings.

Combining incentives #2 and #3 can provide a total of $0.18/ kWh and $1.8/therm not to exceed 50% of total project cost. Additional incentives for #2 and #3 are increased by $0.005/kWh and $0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

Total P4P incentives are summarized below:

Total Recommended Project Savings	**Incentives $**		
11.2%	Elec	Gas	Total
Incentive #1	$0	$0	$5,000
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$5,000**

The current ECM's do not meet the minimum savings requirement of 15% for the Pay for Performance Program and therefore the building will not be eligible for incentives #2 and #3.

See Appendix D for calculations.

5.1.2 New Jersey Smart Start Program

For this program, specific incentives for energy conservation measures are calculated on an individual basis utilizing the 2011 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices.

If the complex qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total site energy reduction, and savings will be applied towards the Pay for Performance incentive. A project is not applicable for both New Jersey incentive programs.

5.1.3 Direct Install Program

The Direct Install Program targets small and medium sized facilities where the peak electrical demand does not exceed 150 kW in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies. On a case-by-case basis, the program manager may accept a project for a customer that is within 10% of the 150 kW peak demand threshold.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 70% of the costs for lighting, HVAC, motors, natural gas, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can significantly reduce the implementation cost of energy conservation projects.

The program pays 70% of each project cost up to $75,000 per electrical utility account; total funding for each year is capped at $250,000 per customer. Installations must be completed by a Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website at http://www.njcleanenergy.com. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this document.

The facility is not eligible to receive funding from the Direct Install Program because peak demand for the year exceeds the 150 kW maximum.

5.1.4 Energy Savings Improvement Plans (ESIP)

The Energy Savings Improvement Program (ESIP) allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the ESIP provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

ESIP allows local units to use “energy savings obligations” to pay for the capital costs of energy improvements to their facilities. This can be done over a maximum term of 15 years. Energy savings obligations are not considered “new general obligation debt” of a local unit and do not count against debt limits or require voter approval. They may be issued as refunding bonds or leases. Savings generated from the installation of energy conservation measures pay the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach. The “Local Finance Notice” outlines how local governments can develop and implement an ESIP for their facilities (see Appendix E). The ESIP can be prepared internally if the entity has qualified staff. If not, the ESIP must be implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Solar

6.1.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. All rooftop areas have been replaced, and are in good condition. It is recommended to install a permanent PV array at this time.

The PVWATTS solar power generation model was utilized to calculate PV power generation. The closest city available in the model is Newark, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix F.

Federal tax credits are also available for renewable energy projects up to 30% of installation cost. Since the facility is a non-profit organization, federal taxes are paid and this project is eligible for this incentive.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The average SREC value per credit is estimated to be about $120/ SREC per year based on current market data, and this number was utilized in the cash flow for this report.

The roof area justifies the use of 90 kW PV solar array. The system costs for PV installations were derived from contractor budgetary pricing in the state of New Jersey for estimates of total cost of system installation. It should be noted that the cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a 90 kW system. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized as follows:

Photovoltaic (PV) Rooftop Solar Power Generation – 90 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	Federal Tax Credit *	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
$	kW	kWh	Therms	$	$	$	$	Years	Years
$360,000	0.0	108,059	0	$12,400	$12,400	0	$10,266	>20	15.9

* 30% federal tax credit
** Solar Renewable Energy Certificate Program (SREC) for 2012 is $120/1000kwh

This measure is not recommended due to payback time period exceeding 25 years.

6.1.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, another fluid, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by gas-fired water heaters and, therefore, this measure would offer natural gas utility savings.

Currently, an incentive is not available for installation of thermal solar systems; a Federal tax credit of 30% of installation cost for the thermal applications is available.

Solar Thermal Hot Water Plant

Budgetary Cost	Annual Utility Savings				Total Savings	Federal Tax Credit *	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
$15,000	0.0	13,400	0	$1,500	$1,500	4,500	10.0	7.0

* 30% federal tax credit

This is not recommended since the building occupancy is reduced during the summer and domestic hot water demand is not excessive.

6.2 Demand Response Curtailment

Presently, electricity is delivered by Hess, which receives the electricity from regional power grid RFC. Hess is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From June 2011 through April 2012, the CIM Lab Building had a maximum electricity demand of 360 kW and a minimum of 270 kW. The monthly average over the observed 12 month period was 290 kW.

This measure is not recommended because the facility is not operating year round and the building does not have back up/emergency generator power.

7.0 EPA PORTFOLIO MANAGER

The EPA Portfolio Manager benchmarking tool was used to assess the building's energy performance. Portfolio Manager provides a Site and Source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft^2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive and Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed ECMs, the Energy Star rating will increase.

The Site EUI is the amount of heat and electricity consumed by a building as reflected in utility bills. Site energy may be delivered to a facility in the form of primary energy, which is raw fuel burned to create heat or electricity (such as natural gas or oil), or as secondary energy, which is the product created from a raw fuel (such as electricity or district steam). Site EUI is a measure of a building's annual energy utilization per square foot. Site EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types.

$$\textit{Site Energy Intensity} = \frac{\textit{(Electric Usage in kBtu + Natural Gas in kBtu)}}{\textit{Building Square Footage}}$$

To provide an equitable comparison for different buildings with varying proportions of primary and secondary energy consumption, the Portfolio Manager uses the convention of Source EUIs. The source energy also accounts for all losses incurred in production, storage, transmission, and delivery of energy to the site; which provides an equivalent measure for various types of buildings with different energy sources.

$$\textit{Source Energy Intensity} = \frac{\textit{(Electric Usage in kBtu X Site/Source Ratio + Natural Gas in kBtu X Site/Source Ratio)}}{\textit{Building Square Footage}}$$

The EPA Score, Site EUI, and Source EUI for CIM Lab Buildnig are as follows:

Energy Intensity	Camden County College CIM Lab Building	National Average
EPA Score	N/A	50
Site (kBtu/sf/year)	107	104
Source (kBtu/sf/year)	289	244

The CIM Lab Building does not qualify for performance benchmarking in Portfolio Manager because the program does not currently include this building type. However it is expected to begin benchmarking these buildings in the near future. It is suggested that the client check for updates in the future to see if any of their buildings qualify for an Energy Star label. For the building to qualify for the Energy Star label the EPA score is required to be above 75. There are several energy conservation measures recommended in this report, that if implemented will further reduce the energy use intensity and increase the EPA score of the facility.

The Portfolio Manager account can be accessed by entering the username and password shown below at the login screen of the Portfolio Manager website (https://www.energystar.gov/istar/pmpam/).

A full EPA Energy Star Portfolio Manager Report is located in Appendix G.

The user name ([redacted]) and password ([redacted]) for the building's EPA Portfolio Manager Account have been provided to Ed Carney, Director of Public Safety for the Camden County College.

8.0 CONCLUSIONS & RECOMMENDATIONS

Summary of Energy Conservation Measures							
Energy Conservation Measure		**Approx. Costs ($)**	**Approx. Savings ($/year)**	**Payback (Years) w/o Incentive**	**Potential Incentive ($)***	**Payback (Years) w/ Incentive**	**Recommended For Implementation**
ECM-2	Replace Domestic Water Heater (DWH)	9,700	1,700	5.7	100	5.6	X
ECM-3	HVAC Install Variable Speed Drives, High Efficiency Motor	47,800	10,000	4.8	10,600	3.7	X
ECM-4	HVAC Demand Control Ventilation	5,100	1,900	2.7	0	2.7	X
ECM-5	Install Vending Miser	200 (per unit)	190 (per unit)	1.1	0	1.1	X
ECM-7	Replace Domestic Hot Water Pumps	300 (per unit)	100 (per unit)	3.0	0	3.0	X
ECM-9	Lighting Replacement Upgrades	43,300	6,900	6.3	10,300	4.8	X
ECM-10	Install Lighting Controls (Occupancy Sensors)	11,100	4,200	2.6	1,600	2.3	X
ECM-11	Lighting Replacements with Lighting Controls (Occupancy Sensors)	54,400	9,700	5.6	11,900	4.4	X

APPENDIX A

Utility Usage Analysis, Energy Suppliers List

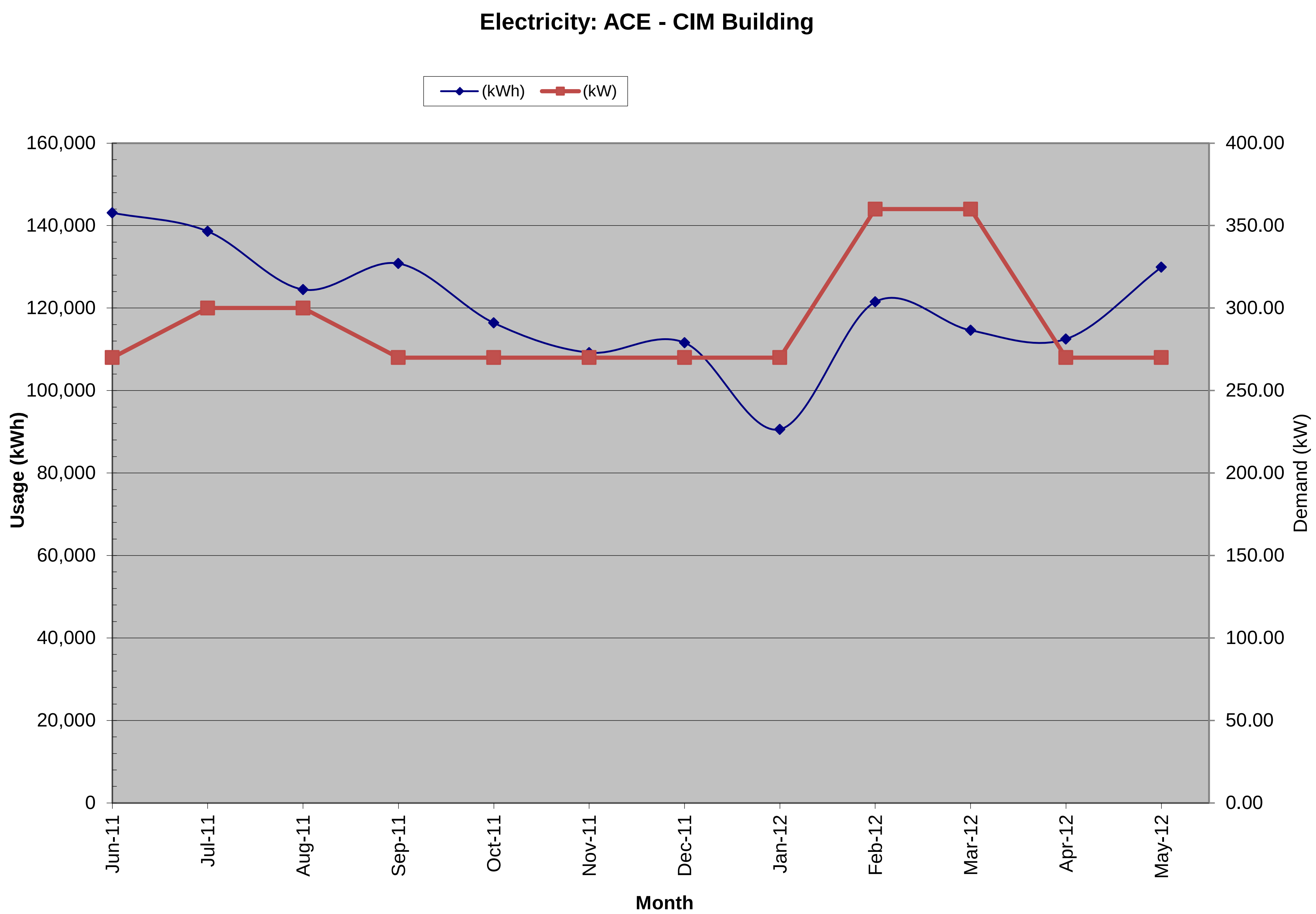
Camden County Community College
Peter Cheeseman Road, Blackwood, NJ 08012

Electric Service
Delivery - ACE
Supplier - S.J. Energy Company

For Service at: **CIM Building**
Account No.: 069569899995
Meter No.: 76750034

CIM Center 76750034

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total Cost ($)	Delivery ($)	Supply ($)	Blended Rate ($/Lamp)	Consumption ($/Lamp)	Demand ($/kW)
June-11	143,100	270.00	$5,791.43	$5,791.43		$ 0.040	$ 0.029	$ 6.33
July-11	138,600	300.00	$18,401.45	$5,723.70	$12,677.75	$ 0.133	$ 0.120	$ 5.93
August-11	124,500	300.00	$16,661.87	$5,273.86	$11,388.01	$ 0.134	$ 0.120	$ 5.73
September-11	130,800	270.00	$17,461.56	$5,497.28	$11,964.28	$ 0.133	$ 0.120	$ 6.52
October-11	116,400	270.00	$15,316.05	$4,668.94	$10,647.11	$ 0.132	$ 0.118	$ 5.93
November-11	109,200	270.00	$14,664.57	$4,676.05	$9,988.52	$ 0.134	$ 0.119	$ 6.33
December-11	111,600	270.00	$14,894.96	$4,686.90	$10,208.06	$ 0.133	$ 0.119	$ 6.13
January-12	90,600	270.00	$11,819.39	$3,941.73	$7,877.66	$ 0.130	$ 0.114	$ 5.53
February-12	121,500	360.00	$16,077.13	$5,512.72	$10,564.41	$ 0.132	$ 0.114	$ 6.33
March-12	114,600	360.00	$15,074.72	$5,110.26	$9,964.46	$ 0.132	$ 0.114	$ 5.73
April-12	112,500	270.00	$14,380.51	$4,598.64	$9,781.87	$ 0.128	$ 0.114	$ 5.93
May-12	129,900	270.00	$4,998.87	$4,998.87		$ 0.038	$ 0.027	$ 5.73
Total (All)	**1,443,300**	**360.00**	**$165,542.51**	**$60,480.38**	**$105,062.13**	**$ 0.115**	**$ 0.100**	**$ 6.01**



Electricity: ACE - CIM Building
(kWh)
(kW)
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Usage (kWh)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Demand (kW)
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Month

APPENDIX B

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #24364
Camden County College
CIM Computer Integrated Mnfr Lab
Original Construction Date: 1986
Renovation/Addtion Date: 1996

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
CH-1	1	Trane	CGAM 120F 2F02 AX02 A1A1 B1AX XA1C 1A2X XXXX XA1A 3A10 XXXC XX	U11M26451	HVAC Chilled Water Cooling / Electric	1440 MBH (120 tons) / 9.6 EER / (2) 15.0 HP On-board Pumps with VSDs	On Grade, East Side of CIM Building	CIM Building	2012	23	Air Cooled Screw Compressor Chiller
Boiler # 1-7	7	Weil McLain	CGI6PINS2	#1: CP 4083061 #2: CP 4083054 #3: CP 4083077 #4: CP 4117260 #5: CP 4083075 #6: CP 4135106 #7: CP 4117241	Heating / Natural Gas Boilers	167 MBH input / 140 MBH output / 83% Efficiency	Mechanical Room	North End Office & Older Classrooms on 1st, 2nd, 3rd Levels	1989	12	Cast Iron Sectional
P-1	1	Taco	BB301270-2-05B2HL0	N/A	Primary HW Loop Pump / Electric	15.0 HP / 1760 RPM / Standard Efficiency, 81%	Mechanical Room	North Building / Primary HW System	1989	-3	Back up to Back up (Standby)
P-2	1	Taco	N/A	N/A	Primary HW Loop Pump / Electric	5.0 HP / 1755 RPM / Standard Efficiency, 89.5%	Mechanical Room	North Building / Primary HW System	1989	-3	Supply Loop Pump (Primary)
DHW-1	1	State	SSX521ART4JWX	988380836	Domestic Hot Water Heating / Electric	5.00 kW / 30 gal	Mechanical Room	Level 1 North End Bathrooms	1989	-11	Poor
DHW-2	1	State	SSX301ART1JWX	988380766	Domestic Hot Water Heating / Electric	5.00 kW / 30 gal	Mechanical Room	Level 1 North End Bathrooms	1989	-11	Poor
RTU-1-1	1	York	DJ210N24B4AAA1A	NGMM076614	HVAC / DX Electric Cooling, Natural Gas Heating	8000 CFM / CLG: 210 MBH HTG: 240 MBH / 7.5 HP SF	High Roof of Factory Floor	Level 1 Classroom 119	2004	12	Fair
RTU-2-1	1	York	DM078N10P4AAA3A	NFMM0G5962	HVAC / DX Electric Cooling, Natural Gas Heating	3400 CFM / CLG: 78 MBH HTG: 96 MBH / 2.0 HP SF	High Roof of Factory Floor	Level 1 Classroom	2004	12	Fair
RTU-2-2	1	York	D7CG060N09946EBA	NFMM069208	HVAC / DX Electric Cooling, Natural Gas Heating	2000 CFM / CLG: 60 MBH HTG: 100 MBH / 1.5 HP SF	High Roof of Factory Floor	Level 1 Classroom	2004	12	Fair
RTU-2-3	1	York	D7CG060N09946EBA	NGMM076097	HVAC / DX Electric Cooling, Natural Gas Heating	2000 CFM / CLG: 60 MBH HTG: 100 MBH / 1.5 HP SF	High Roof of Factory Floor	Level 1 Classroom	2004	12	Fair
RTU-2-4	1	York	D7CG060N09946EBA	NGMM076096	HVAC / DX Electric Cooling, Natural Gas Heating	2000 CFM / CLG: 60 MBH HTG: 100 MBH / 1.5 HP SF	High Roof of Factory Floor	Level 1 Classroom	2004	12	Fair
RTU-1 North	1	Trane Voyager	YCD420B4PG4B3GE2A00D0 00HHK0M00RT	C11K05745	HVAC / DX Electric Cooling, Natural Gas Heating	14000 CFM / CLG: 420 MBH HTG: 486 MBH / 15 HP SF Standard Efficiency	North Building East Roof	Factory Open Floor	2011	19	Good

New Jersey BPU Energy Audit Program
CHA #24364
Camden County College
CIM Computer Integrated Mnfr Lab
Original Construction Date: 1986
Renovation/Addtion Date: 1996

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
RTU-2 South	1	Trane Voyager	YCD300B4PG4B2EE2A00D0 00HHK0M00RT	C11K05746	HVAC / DX Electric Cooling, Natural Gas Heating	10000 CFM / CLG: 300 MBH HTG: 486 MBH / 10 HP SF Standard Efficiency	South Roof	1st Floor South Area	2011	19	Good
RTU-3 South	1	Trane Voyager	YCD360B4PG4B2EE2A00D0 00HHKOM00RT	C11K05747	HVAC / DX Electric Cooling, Natural Gas Heating	12000 CFM / CLG: 360 MBH HTG: 486 MBH / 10 HP SF / 85% Eff.	South Roof	2nd Floor South Area	2011	19	Good
AC-1	1	Unionaire	ORTC025W60	11955	HVAC / DX Electric Cooling	600 CFM / CLG: 24 MBH / EER: NOT RATED	Outside Grade Split System	Room - 109S	2001	4	-
AC-2	1	Unionaire	ORTC025W60	11956	HVAC / DX Electric Cooling	600 CFM / CLG: 24 MBH / EER: NOT RATED	Outside Grade Split System	Room - 110S	2001	4	-
AC-3	1	Unionaire	ORTC025W60	11957	HVAC / DX Electric Cooling	600 CFM / CLG: 24 MBH / EER: NOT RATED	Outside Grade Split System	Room - 111S	2001	4	-
FC-1 thru FC-37	37	International Environmental Corporation	Models 4CP31S (1/12), 20HB62S & 30HB62S	NOT AVAILABLE	HVAC / Chilled Water Cooling, Hot Water Heating (4) pipe	Fractional HP fan motors	Horizontal ducted fan coil unit ceiling mounted cabinet	CIM Building Occupied Areas	1986	-6	Good Condition

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364

Existing Lighting

Cost of Electricity: **$0.115** $/kWh
$6.01 $/kW

	EXISTING CONDITIONS										
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
234	Entrance Vestibule	3	**SP 100 W I 2**	i100/2	200	0.60	SW	2500	None	1,500	
143	Front Glass Atrium	14	**HPS 100 POLE**	HPS100/1	138	1.93	SW	2500	None	4,830	
129A	2nd Floor Atrium	19	**SP 72 I**	I72/1	75	1.43	SW	2500	None	3,563	
146	Warehouse	25	**High Bay MH 400**	MH400/1	458	11.45	SW	2125	C-OCC	24,331	
4A	Room - 204	13	**2-LAMP U-TUBE T-12**	FU2SS	95	1.24	SW	2125	C-OCC	2,624	
162A	Room - 204A	2	**4' 4-LAMP T-12**	F44EL	120	0.24	SW	2125	C-OCC	510	
162A	Room - 205	21	**4' 4-LAMP T-12**	F44EL	120	2.52	SW	2500	None	6,300	
162A	Room - 205A	10	**4' 4-LAMP T-12**	F44EL	120	1.20	SW	2125	OCC	2,550	
162A	Room - 205B	2	**4' 4-LAMP T-12**	F44EL	120	0.24	SW	2125	OCC	510	
162A	Room - 205C	3	**4' 4-LAMP T-12**	F44EL	120	0.36	SW	2125	OCC	765	
4A	Room - 207F	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2250	C-OCC	855	
4A	Room - 207G	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2250	C-OCC	855	
4A	Room - 207D	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2125	OCC	808	
4A	Room - 207A	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2125	OCC	808	
4A	Room - 207B	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2125	OCC	808	
4A	Room - 207C	5	**2-LAMP U-TUBE T-12**	FU2SS	95	0.48	SW	2000	OCC	950	
4A	Room - 207E	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2125	OCC	808	
4A	Room - 207	9	**2-LAMP U-TUBE T-12**	FU2SS	95	0.86	SW	2125	OCC	1,817	
35A	Room - 218	16	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.51	SW	2125	OCC	1,088	
35A	Room - 219	11	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.35	SW	2125	OCC	748	
35A	Room - 220	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2125	OCC	816	
4A	2nd Floor Men's Bathroom	5	**2-LAMP U-TUBE T-12**	FU2SS	95	0.48	SW	2125	OCC	1,009	
4A	2nd Floor Women's Bathroom	5	**2-LAMP U-TUBE T-12**	FU2SS	95	0.48	SW	2125	OCC	1,009	
4A	Room - 203	12	**2-LAMP U-TUBE T-12**	FU2SS	95	1.14	SW	2125	OCC	2,423	
143	Room - 203	13	**HPS 100 POLE**	HPS100/1	138	1.79	SW	2500	None	4,485	
143	Auditorium - 202	28	**HPS 100 POLE**	HPS100/1	138	3.86	SW	2125	OCC	8,211	
129A	Auditorium - 202	5	**SP 72 I**	I72/1	75	0.38	SW	2125	OCC	797	
11A	Auditorium - 233	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	500	None	30	
11A	Auditorium - 234	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	2125	OCC	128	
4A	Room - 201	12	**2-LAMP U-TUBE T-12**	FU2SS	95	1.14	SW	2500	None	2,850	
129A	Room - 201	15	**SP 72 I**	I72/1	75	1.13	SW	2500	None	2,813	
162A	Room - 220 (Shred Room)	2	**4' 4-LAMP T-12**	F44EL	120	0.24	SW	2500	None	600	
129A	3rd Floor Atrium	12	**SP 72 I**	I72/1	75	0.90	SW	2125	OCC	1,913	
4A	Room - 301	9	**2-LAMP U-TUBE T-12**	FU2SS	95	0.86	SW	1063	None	908	
4A	Room - 301A	5	**2-LAMP U-TUBE T-12**	FU2SS	95	0.48	SW	2125	OCC	1,009	
4A	Room - 301B	6	**2-LAMP U-TUBE T-12**	FU2SS	95	0.57	SW	1063	None	606	
4A	Closet Room - 301B	1	**2-LAMP U-TUBE T-12**	FU2SS	95	0.10	SW	1063	None	101	
4A	Room - 302	5	**2-LAMP U-TUBE T-12**	FU2SS	95	0.48	SW	2125	OCC	1,009	
4A	Room - 302A	3	**2-LAMP U-TUBE T-12**	FU2SS	95	0.29	SW	500	None	143	
4A	Room - 302B	3	**2-LAMP U-TUBE T-12**	FU2SS	95	0.29	SW	500	None	143	
4A	Room - 302C	3	**2-LAMP U-TUBE T-12**	FU2SS	95	0.29	SW	500	None	143	
4A	3rd Floor Men's Bathroom	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	2125	OCC	808	
4A	3rd Floor Women's Bathroom	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	SW	1063	None	404	
71	3rd Floor HVAC Access	1	**I 60**	I60/1	60	0.06	SW	2125	OCC	128	
129A	1st Floor Lower Level Stairs	11	**SP 72 I**	I72/1	75	0.83	SW	1063	None	877	

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	EXISTING CONDITIONS										
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
129A	1st Floor Corridor	14	**SP 72 I**	I72/1	75	1.05	SW	2250	None	2,363	
35A	1st Floor Corridor	10	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.32	SW	2250	None	720	
4A	Room - 105	12	**2-LAMP U-TUBE T-12**	FU2SS	95	1.14	SW	500	None	570	
129A	Room - 105	15	**SP 72 I**	I72/1	75	1.13	SW	520	None	585	
35A	Room - 119	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	520	C-OCC	200	
4A	Room - 108	23	**2-LAMP U-TUBE T-12**	FU2SS	95	2.19	SW	520	None	1,136	
4A	Room - 118	8	**2-LAMP U-TUBE T-12**	FU2SS	95	0.76	SW	500	None	380	
4A	Room - 107	4	**2-LAMP U-TUBE T-12**	FU2SS	95	0.38	Timer	4380	None	1,664	
4A	Room - 106A	26	**2-LAMP U-TUBE T-12**	FU2SS	95	2.47	Timer	4380	None	10,819	
4A	Room - 106B	13	**2-LAMP U-TUBE T-12**	FU2SS	95	1.24	SW	8760	None	10,819	
4A	Room - 106	13	**2-LAMP U-TUBE T-12**	FU2SS	95	1.24	SW	8760	None	10,819	
11A	1st Floor Mechanical Room	3	**4' 2-LAMP T-12**	F42EL	60	0.18	SW	2125	OCC	383	
35A	Room - 118	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2125	OCC	816	
35A	Optimology - A	4	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.13	SW	500	None	64	
35A	Optimology - B	2	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.06	SW	500	None	32	
35A	Optimology - C	2	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.06	SW	8760	None	561	
35A	Optimology - D	2	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.06	SW	500	None	32	
35A	Optimology - E	3	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.10	SW	3285	OCC	315	
35A	Optimology - F	4	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.13	SW	3285	OCC	420	
35A	Optimology - G	16	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.51	SW	8760	None	4,485	
234	East Lower Vestibule	6	**SP 100 W I 2**	i100/2	200	1.20	SW	8760	None	10,512	
175A	East Lower Corridor	23	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.74	SW	500	None	368	
35A	Room - 109S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2125	OCC	816	
35A	Room - 110S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	500	None	192	
35A	Room - 111S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2000	OCC	768	
35A	Room - 112S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2000	None	768	
11A	1st Floor Men's Bathroom	3	**4' 2-LAMP T-12**	F42EL	60	0.18	SW	500	None	90	
11A	1st Floor Women's Bathroom	3	**4' 2-LAMP T-12**	F42EL	60	0.18	SW	8760	OCC	1,577	
175A	Custodial Closet	1	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.03	SW	500	None	16	
35A	Room - 112	8	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.26	SW	500	None	128	
11A	Men's	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	8760	OCC	526	
11A	Women's	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	2000	None	120	
35A	Room - 113S	4	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.13	SW	8760	None	1,121	
35A	Room - 115S	5	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.16	SW	2000	OCC	320	
35A	Room - 114S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	4380	OCC	1,682	
175A	Room - 114S	4	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.13	SW	4380	C-OCC	561	
234	Back Vestuble	6	**SP 100 W I 2**	i100/2	200	1.20	SW	4380	OCC	5,256	
175A	Elevator Machine Room	2	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.06	SW	520	C-OCC	33	
227	2nd Floor Sitting Area	5	**W60CF1**	F81EL	60	0.30	SW	520	OCC	156	
234	2nd Floor Sitting Area	4	**SP 100 W I 2**	i100/2	200	0.80	SW	2500	None	2,000	
175A	Lounge Room - 213S	1	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.03	SW	2125	OCC	68	
175A	2nd Floor Corridor	26	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.83	SW	2125	OCC	1,768	
234	2nd Floor Corridor	4	**SP 100 W I 2**	i100/2	200	0.80	SW	1125	None	900	
175A	Room - 215S	4	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.13	SW	2500	None	320	
175A	Room - 212S	4	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.13	SW	2250	C-OCC	288	

Energy Audit of Camden County College (CIM Lab Building)

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		EXISTING CONDITIONS									
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
175A	Janitor - 212	1	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.03	SW	2250	C-OCC	72	
35A	Room - 211S	8	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.26	SW	2250	C-OCC	576	
35A	Room - 210S	10	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.32	SW	2250	C-OCC	720	
35A	Room - 209	6	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.19	SW	2250	C-OCC	432	
129A	Room - 209	6	**SP 72 I**	I72/1	75	0.45	SW	2250	C-OCC	1,013	
175A	2nd Floor Men's Bathroom	3	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.10	SW	2250	C-OCC	216	
175A	2nd Floor Women's Bathroom	3	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.10	SW	2250	C-OCC	216	
175A	2nd Floor Closet	1	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.03	SW	2250	C-OCC	72	
35A	Room - 216S	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2250	C-OCC	864	
35A	Room - 208S	15	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.48	SW	2250	C-OCC	1,080	
35A	Room - 216A	4	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.13	SW	2250	C-OCC	288	
35A	Room - 216B	4	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.13	SW	2250	C-OCC	288	
35A	Room - 217A	6	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.19	SW	2250	C-OCC	432	
35A	Room - 217B	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	2250	C-OCC	864	
35A	Corridor - 217	2	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.06	SW	2250	C-OCC	144	
35A	1st Floor Men's Bathroom	6	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.19	SW	2250	C-OCC	432	
35A	1st Floor Women's Bathroom	6	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.19	SW	2250	C-OCC	432	
180	Room - 104	9	**T 32 R F 4 (ELE)**	F44ILL	112	1.01	SW	2250	C-OCC	2,268	
209A	Room - 103	16	**2' 2-LAMP T-8 (32W)**	FU2ILL	32	0.51	SW	2250	C-OCC	1,152	
4A	Room - 103A	18	**2-LAMP U-TUBE T-12**	FU2SS	95	1.71	SW	2250	C-OCC	3,848	
4A	Room - 102	30	**2-LAMP U-TUBE T-12**	FU2SS	95	2.85	SW	2250	C-OCC	6,413	
61A	Room - 101	3	**4' 3-LAMP T-12**	F43EL	115	0.35	SW	2250	C-OCC	776	
4A	Room - 101	1	**2-LAMP U-TUBE T-12**	FU2SS	95	0.10	SW	2250	C-OCC	214	
4A	Room - 101	6	**2-LAMP U-TUBE T-12**	FU2SS	95	0.57	SW	2250	C-OCC	1,283	
204	Manufacturing Stock Room	5	**S 96 P F 2 (MAG) 8'**	F82EHE	207	1.04	SW	2250	C-OCC	2,329	
227	Loading Dock	6	**W60CF1**	F81EL	60	0.36	SW	2250	C-OCC	810	
169	Exterior	4	**SP 250 MH ROOF**	MH250/1	295	1.18	SW	2250	C-OCC	2,655	
	Total	**931**				**79.19**				**197,807**	

APPENDIX C

ECM Calculations

Summary of Energy Conservation Measures							
Energy Conservation Measure		Approx. Costs ($)	Approx. Savings ($/year)	Payback (Years) w/o Incentive	Potential Incentive ($)*	Payback (Years) w/ Incentive	Recommended For Implementation
ECM-1	HVAC Condensing Boilers Addition	111,900	1,800	62.2	3,000	60.5	
ECM-2	Replace Domestic Water Heater (DWH)	9,700	1,700	5.6	100	5.5	X
ECM-3	HVAC Install Speed Frequency Drives, High Efficiency Motors	47,800	10,000	4.8	10,588	3.7	X
ECM-4	HVAC Demand Control Ventilation	5,100	1,900	2.7	0	2.7	X
ECM-5	Vending Miser & Vending Machine Upgrade	600	500	1.2	0	1.2	X
ECM-6	Rooftop Exaust Fan Replacement	8,600	400	21.5	0	21.5	
ECM-7	Replace Domestic Hot Water Pumps	300	100	3.0	0	3.0	X
ECM-8	Roof System Replacement In Main Lobby (Clerestory Roof)	247,700	700	353.9	0	353.9	
ECM-9	Lighting Replacement Upgrades	43,300	6,900	6.3	10,285	4.8	X
ECM-10	Lighting Controls Installation (Occupancy Sensors)	11,100	4,200	2.6	1,645	2.3	X
ECM-11	Lighting Replacements with Lighting Controls (Occupancy Sensors)	54,400	9,700	5.6	11,930	4.4	X

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM Summary Sheet

ECM-1 HVAC Condensing Boilers Addition

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
111,900	0	0	2,300	1,800	0	1,800	(0.6)	3,000	>20	>20

ECM-2 Replace Domestic Water Heater (DWH)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
9,700	13,140	10	-370	1,700	0	1,700	1.2	100	5.7	5.6

ECM-3 HVAC Install Speed Frequency Drives, High Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
47,800	86,900	0	0	10,000	0	10,000	3.2	10,588	4.8	3.7

ECM-4 HVAC Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,100	4,330	0	1,750	1,900	0	1,900	5.7	0	2.7	2.7

ECM-5 Vending Miser & Vending Machine Upgrade

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
600	4,340	0	0	500	0	500	11.5	0	1.2	1.2

ECM-6 Rooftop Exaust Fan Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
8,600	2,420	0	103	400	0	400	(0.2)	0	>20	>20

ECM-7 Replace Domestic Hot Water Pumps

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
300	1,190	0	0	100	0	100	7.7	0	3.0	3.0

ECM-8 Roof System Replacement In Main Lobby (Clerestory Roof)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
247,700	390	0	773	700	0	700	(0.9)	0	>20	>20

ECM-9 Lighting Replacement Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
43,300	53,600	21	0	6,900	0	6,900	1.4	10,285	6.3	4.8

ECM-10 Lighting Controls Installation (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
11,100	36,900	0	0	4,200	0	4,200	4.7	1,645	2.6	2.3

ECM-11 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
54,400	81,500	20	0	9,700	0	9,700	1.7	11,930	5.6	4.4

Camden County College Blackwood Campus- NJBPU
CHA Project #24364

Utility Costs		Yearly Usage	MTCDE	Building Area	Annual Utility Cost	
$ 0.115	$/kWh blended		0.00042021	63,900	Electric	Natural Gas
$ 0.100	$/kWh consumpt	1,443,300	0.00042021		$165,543	$16,056
$ 6.01	$/kW	360.00	0			
$ 0.80	$/Therm	19,437	0.00533471			
$ -	$/kgals	-	0			

CIM (Computer Integrated Manufacturing) Building

	Item	Savings						Cost	Simple Payback	MTCDE	Life Expectancy	NJ Smart Start Incentives	Direct Install Eligible (Y/N)*	Direct Install Incentives**	Max Incentives	Payback w/ Incentives***
		kW	kWh	therms	cooling kWh	kgal/yr	$									
ECM-1	HVAC Condensing Boilers Addition	0.0	0	2,300	0	0	$ 1,800	$ 111,900	62.2	12.3	25	$ 3,000	Y	$ 75,000	$ 3,000	60.5
ECM-2	Replace Domestic Water Heater (DWH)	10.0	13,138	-367	0	0	$ 1,740	$ 9,700	5.6	3.6	12	$ 100	Y	$ 6,800	$ 100	5.5
ECM-3	HVAC Install Speed Frequency Drives, High Efficiency Motors	0.0	86,900	0	0	0	$ 10,000	$ 47,800	4.8	36.5	20	$ 10,588	Y	$ 33,500	$ 10,588	3.7
ECM-4	HVAC Demand Control Ventilation	0.0	4,334	1,745	0	0	$ 1,900	$ 5,100	2.7	11.1	18		Y	$ 3,600	$ -	2.7
ECM-5	Vending Miser & Vending Machine Upgrade	0.0	4,336	0	0	0	$ 500	$ 600	1.2	1.8	15		Y	$ 400	$ -	1.2
ECM-6	Rooftop Exaust Fan Replacement	0.0	2,415	103	0	0	$ 400	$ 8,600	21.5	1.6	20		Y	$ 6,000	$ -	21.5
ECM-7	Replace Domestic Hot Water Pumps	0.1	1,190	0	0	0	$ 100	$ 300	3.0	0.5	20		Y	$ 200	$ -	3.0
ECM-8	Roof System Replacement In Main Lobby (Clerestory Roof)	0.0	390	773	0	0	$ 700	$ 247,700	353.9	4.3	30		Y	$ 75,000	$ -	353.9
ECM-9	Lighting Replacement Upgrades	21.0	53,600	0	0	0	$ 6,900	$43,300	6.3	22.5	15	$ 10,285	Y	$ 30,300	$ 10,285	4.8
ECM-10	Lighting Controls Installation (Occupancy Sensors)	0.0	36,900	0	0	0	$ 4,200	$11,100	2.6	15.5	15	$ 1,645	Y	$ 7,800	$ 1,645	2.3
ECM-11	Lighting Replacements with Lighting Controls (Occupancy Sensors)	21.0	81,500	0	0	0	$ 9,700	$54,400	5.6	34.2	15	$ 11,930	Y	$ 38,100	$ 11,930	4.4
	Total (Does Not Include ECM-9 & ECM-10)	**31.2**	**194,204.2**	**4,553.7**	**0.0**	**0.0**	**26,840.0**	**486,100.0**	18.1		19	$ 25,618		$ 238,600	$ 25,618	17.2
	Total Measures with Positive ROI	**31.0**	**185,872.3**	**1,378.2**	**0.0**	**0.0**	**23,340.0**	**117,000.0**	5.0		16.25	$ 22,618		$ 82,600	$ 22,618	4.0
	% of Existing	**9%**	**13%**	**23%**	**0%**	**-**										

	Item	Simple Projected Lifetime Savings						ROI
		kW	kWh	therms	cooling	kgal/yr	$	
ECM-1	HVAC Condensing Boilers Addition	0	0	57,500	0	0	$ 45,900	(0.6)
ECM-2	Replace Domestic Water Heater (DWH)	120	157,700	-4,400	0	0	$ 20,900	1.2
ECM-3	HVAC Install Speed Frequency Drives, High Efficiency Motors	0	1,738,000	0	0	0	$ 199,300	3.2
ECM-4	HVAC Demand Control Ventilation	0	78,000	31,400	0	0	$ 34,000	5.7
ECM-5	Vending Miser & Vending Machine Upgrade	0	65,000	0	0	0	$ 7,500	11.5
ECM-6	Rooftop Exaust Fan Replacement	0	48,300	2,100	0	0	$ 7,200	(0.2)
ECM-7	Replace Domestic Hot Water Pumps	3	23,800	0	0	0	$ 2,600	7.7
ECM-8	Roof System Replacement In Main Lobby (Clerestory Roof)	0	11,700	23,200	0	0	$ 19,900	(0.9)
ECM-9	Lighting Replacement Upgrades	316	804,000	0	0	0	$ 103,300	1.4
ECM-10	Lighting Controls Installation (Occupancy Sensors)	0	553,500	0	0	0	$ 63,500	4.7
ECM-11	Lighting Replacements with Lighting Controls (Occupancy Sensors)	316	1,222,500	0	0	0	$ 145,300	1.7
	Total (Does Not Include ECM-9 & ECM-10)	**438.2**	**3,345,000**	**109,800**	**0**	**0**	**$ 482,600**	(0.0)
	Total Measures with Positive ROI	**438.2**	**3,285,000**	**27,000**	**0**	**0**	**$ 409,600**	2.5

**Direct Install Incentives program provides70% of each project cost up to $75,000 per electrical utility account; total funding for each year is capped at $250,00

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-1: HVAC Condensing Boiler Added

ECM Description Summary

One (1) high efficiency condensing boiler will be added to operate as the primary boiler during the milder winter months (October-November and March-April) with the existing boilers operating as secondary boilers. Boiler installation location/space to be determined since there is not enough room in the existing boiler room. Space may have to be provided in existing building or constructed if boiler cannot fit in exsiting mechanical space.

Existing Fuel Nat.Gas
Proposed Fuel Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.80	/ Therm	
Proposed Fuel Cost	$ 0.80	/ Therm	
Baseline Fuel Use	17,493	Therms	Based on historical utility data.
Existing Boiler Plant Efficiency	80%		Estimated or Measured
Baseline Boiler Load	1,399,463	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 100 Mbtu/Therms
Baseline Fuel Cost	$ 13,979		
Proposed Boiler Plant Efficiency	92%		New Condensing Boiler Efficiency
Proposed Fuel Use	15,212	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 12,156		
Annual Utility Savings	2,300	Therms	
Annual Savings	$ 1,800		
Boiler Addition Project Cost	$ 111,900		
Simple Payback	62	Years	Negative number indicates

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

ECM-1: HVAC Condensing Boiler Added - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
600 MBH NG Condensing Boiler	2	EA	$ 16,500	$ 2,000		$ 36,300	$ 5,400	$ -	$ 41,700	
Flue Installation	25	LF	$ 75.0	$ 15.00		$ 2,063	$ 506	$ -	$ 2,569	
Reprogram DDC system	1	EA	$ 100.0	$ 350.00		$ 110	$ 473	$ -	$ 583	
Miscellaneous Electrical	1	LS	$ 500	$ 250		$ 550	$ 338	$ -	$ 888	
Miscellaneous HW Piping	1	LS	$ 2,000	$ 1,000		$ 2,200	$ 1,350	$ -	$ 3,550	
Boiler room/space construction	1	LS	$ 20,000	$ 10,000		$ 22,000	$ 13,500	$ -	$ 35,500	
						$ -	$ -	$ -	$ -	

$ 84,789	Subtotal
$ 8,479	10% Contingency
$ 18,654	20% Contractor O&P
$ -	0% Engineering
$ 111,900	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-2B: Replace Electric DHW Heater w/ Condensing Gas-Fired Instantaneous DHW Heater

ECM Summary

During periods of little or no domestic hot water use, domestic hot water heaters must still heat the water within their storage tank. Energy required maintaining the hot water temperature setpoint during times of zero demand is known as standby losses. According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on a tankless-type, high efficiency condensing hot water heater with an auxiliary storage tank for increased hot water recovery capacity.

Item	Value	Units	Formula/Comments
Occupied days per week	5	days/wk	
Water supply Temperature	50	˚F	Termperature of water coming into building
Hot Water Temperature	130	˚F	
Hot Water Usage per day	195	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	33,786	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	60	Gallons	Per manufacturer nameplate (two 30 gallon water heaters)
Hot Water Temperature	130	˚F	Per building personnel
Average Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.8	MBH	
Annual Standby Hot Water Load	6,570	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	40,356	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	90%		Per Manufacturer
Total Annual Energy Required	44,841	Mbtu/yr	
Total Annual Electric Required	**13,138**	**kWh/yr**	**Electrical Savings**
Average Annual Electric Demand	1.50	kW	
Peak Electric Demand	**10.00**	**kW**	**Per Manufacturer's Nameplate (Demand Savings)**
New Tank Size	0	Gallons	Based on Rinnai tankless water heater with no storage tank
Hot Water Temperature	130	˚F	
Average Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.0	MBH	
Annual Standby Hot Water Load	0	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	33,786	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		Based on Rinnai instantaneous, tankless DHW heater
Proposed Total Annual Energy Required	36,724	MBTU/yr	
Proposed Fuel Use	**367**	**Therms/yr**	
Elec Utility Demand Unit Cost	$6.01	$/kW	
Elec Utility Supply Unit Cost	$0.10	$/kWh	
NG Utility Unit Cost	$0.80	$/Therm	
Existing Operating Cost of DHW	$2,038	$/yr	
Proposed Operating Cost of DHW	$293	$/yr	
Annual Utility Cost Savings	**$1,744**	**$/yr**	

Daily Hot Water Demand

			#USES PER DAY		FULL TIME				
FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	MALE	FEMALE	MALE	FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY
LAVATORY (Low-Flow Lavs use 0.5 GPM)	2.5	0.25	3	3	100	100	375	50%	188
SHOWER	2.5	5	1	1	0	0	0	75%	0
KITCHEN SINK	2.5	0.5	1	1	0	0	0	75%	0
MOP SINK	2.5	2	1	1	2	0	10	75%	8
Dishwasher (gal per use)	10	1	1	0	0	0	0	100%	0
						TOTAL	385		**195**

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.
**These are the occupanct that use the fixtures. If fixture does not exist change to (0).

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-2: Replace Electric & Gas-Fired DHW Heaters w/ Condensing Gas-Fired DHW Heater - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Electric DHW Heater Removal	2	EA	$ -	$ 50		$ -	$ 135	$ -	$ 135	
High Efficiency Gas-Fired tankless DHW Heater	2	EA	$ 1,200	$ 300		$ 2,640	$ 810	$ -	$ 3,450	
Miscellaneous Electrical	2	EA	$ 50	$ 100		$ 110	$ 270	$ -	$ 380	
Venting Kit	2	EA	$ 450	$ 650		$ 990	$ 1,755	$ -	$ 2,745	
Miscellaneous Piping and Valves	2	LS	$ 300			$ 660	$ -	$ -	$ 660	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 7,370	Subtotal
$ 737	10% Contingency
$ 1,621	20% Contractor O&P
$ -	0% Engineering
$ 9,700	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-3A: Install Variable Speed Drives - HW Pump

Variable Inputs

Blended Electric Rate	$0.115
Heating System "On" Point	55
VFD Efficiency	98.5%

ECM Description Summary

Larger motors that operate pumps unnecessarily consume electrical energy. The hot water system pumps operate at a constant speed even though the building load does not require all of the flow to maintain temperatures. By adding speed controllers to the motors, called Variable Frequency Drives (VFD's), and reducing the flow (by slowing the motors down), significant electrical energy can be saved. Pressure actuated controllers are used to measure the water pressure in the hto water system and as valves close, the system pressure increases and in turn the pump speed is reduced.

PUMP SCHEDULE

Pump ID	Qty	HP	Total HP	Existing Motor Motor Eff.	New Motor Motor Eff.	Exist. Motor kW Note 1	New Motor kW Note 2
P-1	1	15.0	15.0	81.0%	93.0%	11.05	9.63
					Total:	11.05	9.63

SAVINGS ANALYSIS

OAT - DB Avg Temp F	OAT - WB Avg 120	Annual Hours in Bin	Heating Hours Bin	Pump Load %	Existing Pump kWh	Proposed Pump kW	Speed efficiency %	Proposed Pump kWh	Proposed Savings kWh
(A) See Note 3	(B) See Note 3	(C) See Note 3	(D) =IF(A>TP,0,C)	(E) =0.5+0.5*(50-A)/(50-10)) See Note 4	(F) =D*AA	(G) =BB*E^2.5/CC See Note 5	(H)	(I) =D*G	(J) =F-H
97.5	75	3	0	0%	0	0.0	0.0%	0	0
92.5	74	34	0	0%	0	0.0	0.0%	0	0
87.5	72	131	0	0%	0	0.0	0.0%	0	0
82.5	69	500	0	0%	0	0.0	0.0%	0	0
77.5	67	620	0	0%	0	0.0	0.0%	0	0
72.5	64	664	0	0%	0	0.0	0.0%	0	0
67.5	62	854	0	0%	0	0.0	0.0%	0	0
62.5	58	927	0	0%	0	0.0	0.0%	0	0
57.5	53	600	0	0%	0	0.0	0.0%	0	0
52.5	47	610	610	53%	6,742	2.0	84.1%	1,434	5,308
47.5	43	611	611	58%	6,753	2.5	88.8%	1,747	5,006
42.5	38	656	656	64%	7,250	3.2	92.7%	2,255	4,995
37.5	34	1,023	1,023	69%	11,306	3.9	95.9%	4,191	7,115
32.5	30	734	734	75%	8,112	4.8	98.2%	3,558	4,554
27.5	25	334	334	81%	3,691	5.7	99.8%	1,906	1,786
22.5	20	252	252	86%	2,785	6.7	100.0%	1,695	1,091
17.5	16	125	125	92%	1,381	7.9	100.0%	983	399
12.5	11	47	47	97%	519	9.1	99.7%	429	90
7.5	6	22	22	100%	243	9.8	99.0%	217	26
2.5	2	13	13	100%	144	9.8	99.0%	128	15
-2.5	-3	0	0	0%	0	0.0	0.0%	0	0
-7.5	-8	0	0	0%	0	0.0	0.0%	0	0
		8,760	**4,427**		**48,927**			**18,544**	**30,383**

Notes:

1) Existing motor power based on operation with existing motor efficiency, operating at 80% load factor when at full load. Formula: Motor HP x 0.746 x 0.8 / Exist. Motor Eff., New motor power is based on same formula using the new motor efficiency.
2) New motor power is the same as existing motor power adjusted for the new efficiency, if a new motor is proposed.
3) Weather data from NOAA for Newark, New Jersey.
4) The pump load is estimated at 100% at X deg. OAT and 50% at X deg. OAT and varies linearly in between.
5) The required VFD motor draw is based on a 2.5 power relationship to load.

Annual Utility Savings	30,400	kWh
Annual Savings	$ 3,500	
Install Variable Speed Drives - HW Pump Cost	$ 14,900	
Simple Payback	4	Years

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-3A: Install Variable Speed Drives - HW Pump - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
15 HP VFD	1	ea	$ 1,925	$ 880		$ 2,118	$ 1,188	$ -	$ 3,306	
15 HP Motors	1	ea	$ 845	$ 150		$ 930	$ 203	$ -	$ 1,132	
Reprogram DDC system	1	ea	$ 100	$ 350		$ 110	$ 473	$ -	$ 583	
Electrical - misc.	1	ls	$ 200	$ 150		$ 220	$ 203	$ -	$ 423	
2-way or 3-way control valve(s) for system sequence	1	ea	$ 1,000	$ 2,000		$ 1,100	$ 2,700	$ -	$ 3,800	
Pipe pressure sensor/transmitter	1	ea	$ 850	$ 500		$ 935	$ 675	$ -	$ 1,610	
Misc. piping modification	1	ea	$ 200	$ 150		$ 220	$ 203	$ -	$ 423	
						$ -	$ -	$ -	$ -	

$ 11,275	Subtotal
$ 1,128	10% Contingency
$ 2,481	20% Contractor O&P
$ -	0% Engineering
$ 14,900	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturring) Building

ECM-3B: Install Variable Speed Drives - AHU Fans

AIR HANDLER	AREA SERVED	FAN MOTOR HP
RTU-1-1	Classroom 119	7.5
RTU-1 North	Factory Open Floor Area	15.0
RTU-2 South	First Floor South Area	10.0
RTU-3 South	Second Floor South Area	10.0
Total Combined Motor Horsepower:		*42.5* *HP*

Utility Costs

Blended Electric Rate $0.115

ECM Description Summary

Air handling units with constant volume supply fan motors serve spaces with intermittent large occupancy loads. By adding Variable Frequency Drives (VFD's) to reducing the air flow by slowing the motors down, significant electrical energy can be saved. The fan motors will also be replaced with a premium efficiency motor. System static pressure will be permitted to float with fan speed, and pressure will not be controlled or monitored. Control strategy is to program the EMCS system to permit the AHU fan to ramp speed linearly between 100% and 50% as OAT varies between the design heating load and building balance point.

UNIT	HP	Existing Motor Eff (Note 1)	New Motor Eff (Note 1)	Existing Motor kW	New Motor kW
RTU-1-1	7.5	88.5%	91.0%	5.06	4.92
RTU-1 North	15.0	91.0%	93.0%	9.84	9.63
RTU-2 South	10.0	89.5%	91.7%	6.67	6.51
RTU-3 South	10.0	89.5%	91.7%	6.67	6.51
				28.23	27.56

Building Balance Point
55.0

VFD Eff. (CC) 98.5%

OAT - DB Avg Temp F (A)	Bin Hours 120 (B)	Occupied Hours in Bin (C)	AHU Hours in Bin (D)	Existing Fan Kw (F)	Existing Fan kWh (F)	Fan Load % (E)	Proposed Fan kW (G)	Speed efficiency % (H)	Proposed Fan kWh (I)	Savings Fan kWh (J)
102.5	0	0	0	28.2	0	50%	3.50	81.5%	0	0
97.5	3	1	1	28.2	25	50%	3.50	81.5%	4	21
92.5	34	10	10	28.2	286	50%	3.50	81.5%	43	242
87.5	131	39	39	28.2	1,101	50%	3.50	81.5%	167	933
82.5	500	149	149	28.2	4,201	50%	3.50	81.5%	639	3,562
77.5	620	185	185	28.2	5,209	50%	3.50	81.5%	792	4,417
72.5	664	198	198	28.2	5,579	50%	3.50	81.5%	848	4,731
67.5	854	254	254	28.2	7,175	50%	3.50	81.5%	1091	6,085
62.5	927	276	276	28.2	7,789	50%	3.50	81.5%	1184	6,605
57.5	600	179	179	28.2	5,041	50%	3.50	81.5%	766	4,275
52.5	610	182	182	28.2	5,125	52%	4.00	83.7%	867	4,258
47.5	611	182	182	28.2	5,134	57%	5.13	87.6%	1065	4,069
42.5	656	195	195	28.2	5,512	61%	6.47	91.1%	1386	4,126
37.5	1,023	304	304	28.2	8,595	66%	8.01	94.0%	2596	6,000
32.5	734	218	218	28.2	6,167	70%	9.79	96.3%	2219	3,948
27.5	334	99	99	28.2	2,806	75%	11.80	98.2%	1195	1,611
22.5	252	75	75	28.2	2,117	80%	14.08	99.5%	1061	1,056
17.5	125	37	37	28.2	1,050	84%	16.64	100.0%	619	431
12.5	47	14	14	28.2	395	89%	19.48	100.0%	273	122
7.5	22	7	7	28.2	185	93%	22.64	100.0%	148	37
2.5	13	4	4	28.2	109	98%	26.12	99.6%	101	8
-2.5	0	0	0	28.2	0	100%	27.98	99.0%	0	0
-7.5	0	0	0	28.2	0	100%	27.98	99.0%	0	0
TOTALS		**2,607**	**2,607**	**649**	**73,603**				**17,066**	**56,538**

Notes:
1) Existing motor power based on operation with existing motor efficiency, operating at 80% load factor when at full load. Formula: Motor HP x 0.746 x 0.8 / Exist. Motor Eff., New motor power is based on same formula using the new motor efficiency.
2) Weather data from NOAA for Newark, NJ International Airport.
3) Occupied & AHU Bin Hours are based upon current Owner reported occuped schedule.
4) The required VFD motor power draw is based on a 3.0 power relationship to load, since system static pressure will not be controlled.

Annual Utility Savings	56,500	kWh
Annual Savings	$ 6,500	
Install Variable Speed Drives - Air Handling Fan Cost	$ 32,900	
Simple Payback	5	Years

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-3B: Install Variable Speed Drives - AHU Fans - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
7.5 HP VFD	1	ea	$ 1,375	$ 585		$ 1,513	$ 790	$ -	$ 2,302	
7.5 HP Motors	1	ea	$ 545	$ 95		$ 600	$ 128	$ -	$ 728	
10 HP VFD	2	ea	$ 1,625	$ 585		$ 3,575	$ 1,580	$ -	$ 5,155	
10 HP Motors	2	ea	$ 660	$ 100		$ 1,452	$ 270	$ -	$ 1,722	
15 HP VFD	1	ea	$ 1,925	$ 880		$ 2,118	$ 1,188	$ -	$ 3,306	
15 HP Motors	1	ea	$ 845	$ 150		$ 930	$ 203	$ -	$ 1,132	
Reprogram DDC system	4	ea	$ 100	$ 1,000		$ 440	$ 5,400	$ -	$ 5,840	
Electrical - misc.	4	ea	$ 150	$ 150		$ 660	$ 810	$ -	$ 1,470	
Duct pressure sensor/transmitter	4	ea	$ 500	$ 200		$ 2,200	$ 1,080	$ -	$ 3,280	

$ 24,934	Subtotal
$ 2,493	10% Contingency
$ 5,485	20% Contractor O&P
$ -	0% Engineering
$ 32,900	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Wolverton Library

	Total CFM	O.A. CFM	O.A. %	
Org. scheduled CFM	12,460	3,738	30%	
Derated CFM	12,460	1,246	10%	
SA Enthalpy	26.4	BTU/lbma		
SA Set point, Winter	68.0	°F		
SA Set point, Summer	74.0	°F		
Heating "On" Point	55.0	°F		
Cooling System Eff.	1.1	kW/Ton		(Includes ancillary equipment)
Heating System Eff.	80%			(Includes distribution losses)

ECM-M8A: Install Demand Control Ventilation

Description:
Outside air can be significantly reduced for most of the time that the building is occupied.
Savings will result from the avoided heating and cooling of excessive outside air.

Method:
The outdoor air introduced into the spaces is currently constant based on design occupancy conditions.
This ECM proposes the installation of CO2 sensors in the space to allow for reduced outdoor air flows when conditions allow.
An average reduction of 50% is assumed possible with the implementation of DCV
The DCV system will automatically adjust the outdoor air damper position through the EMS to reduce outdoor air flows based on indoor CO2 levels.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
			Existing					Proposed Demand Ventilation					Savings	
Avg. DB Bin Temp °F	OA Enthalpy Btu/lb	Occupied Bin HOURS	OA CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating therms	Derated O.A. CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating therms	Cooling kWh	Heating therms
102.5	49.1	-	3,738	382	0	0	-	1,246	127	0	0	-	0	-
97.5	42.5	1	3,738	271	0	28	-	1,246	90	0	9	-	19	-
92.5	39.5	13	3,738	220	0	258	-	1,246	73	0	86	-	172	-
87.5	36.6	51	3,738	172	0	774	-	1,246	57	0	258	-	516	-
82.5	34	196	3,738	128	0	2,201	-	1,246	43	0	734	-	1467	-
77.5	31.6	244	3,738	87	0	1,867	-	1,246	29	0	622	-	1245	-
72.5	29.2	261	3,738	47	0	1,077	-	1,246	16	0	359	-	718	-
67.5	27	336	3,738	10	0	297	-	1,246	3	0	99	-	198	-
62.5	24.5	364	3,738	0	0	0	-	1,246	0	0	0	-	0	-
57.5	21.4	236	3,738	0	0	0	-	1,246	0	0	0	-	0	-
52.5	18.7	240	3,738	0	63	0	187	1,246	0	21	0	62	0	125
47.5	16.2	240	3,738	0	83	0	248	1,246	0	28	0	83	0	166
42.5	14.4	258	3,738	0	103	0	332	1,246	0	34	0	111	0	221
37.5	12.6	402	3,738	0	123	0	619	1,246	0	41	0	206	0	412
32.5	10.7	288	3,738	0	143	0	517	1,246	0	48	0	172	0	344
27.5	8.6	131	3,738	0	164	0	268	1,246	0	55	0	89	0	179
22.5	6.8	99	3,738	0	184	0	227	1,246	0	61	0	76	0	152
17.5	5.5	49	3,738	0	204	0	125	1,246	0	68	0	42	0	83
12.5	4.1	18	3,738	0	224	0	52	1,246	0	75	0	17	0	34
7.5	2.6	9	3,738	0	244	0	26	1,246	0	81	0	9	0	18
2.5	1	5	3,738	0	264	0	17	1,246	0	88	0	6	0	11
-2.5	0	-	3,738	0	285	0	-	1,246	0	95	0	-	0	-
-7.5	-1.5	-	3,738	0	305	0	-	1,246	0	102	0	-	0	-
Total		**3,441**		**1,317**		**6,501**	**2,618**		**439**		**2,167**	**873**	**4,334**	**1,745**

ANNUAL SAVINGS		
Annual Natural Gas	**1,745**	**Therms**
Annual Electrical Usag	**4,334**	**kWh**
Annual Cost Savings	$1,892	
Total Project Cost	$5,100	
Simple Payback	2.7	years

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-4: HVAC Demand Control Ventilation - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
CO2 sensor	1	ea	$ 500	$ 150	$ -	$ 550	$ 203	$ -	$ 753	
Replace damper actuators	3	ea	$ 250	$ 50	$ -	$ 825	$ 203	$ -	$ 1,028	
Reprogram DDC system	1	ea	$ 150	$ 350	$ -	$ 165	$ 473	$ -	$ 638	
Miscellaneous electrical/wiring	1	ls	$ 300	$ 750	$ -	$ 330	$ 1,013	$ -	$ 1,343	

$ 3,760	Subtotal
$ 752	10% Contingency
$ 564	20% Contractor O&P
$ -	0% Engineering
$ 5,100	**Total**

ECM-5 Install Vending Machine Controls

Ex. Cold Beverage Vending Machine Electric usage	3,504	kWh[1,4,7]
Ex. Snack Vending Machine Electric usage	1,752	kWh[2,5,7]
Ex. Dual Vending Machine Electric Usage	2,628	kWh[3,6,7]
Total Vending Machine Electric Usage	7,884	kWh
Proposed Vending Machine Electric usage	3,548	kWh[8]
Vending Machine Controls Usage Savings	**4,336**	**kWh**
Total cost savings	**$ 570**	
Estimated Total Project Cost	**$ 600**	[9]
Simple Payback	**1.05**	**years**

Assumptions

1	1	Number of cold beverage vending machines
2	1	Number of snack vending machines
3	1	Number of dual snack/beverage vending machines
4	400	Average wattage, typical of cold beverage machines based on prior project experience
5	200	Average wattage, typical of snack machines based on prior project experience
6	300	Average wattage, typical of dual snack/beverage machines based on prior project experience
7	8760	Hours per year vending machine plugged in
8	55%	Typical savings for cold vending machines based on historical data for runtime savings
9	$200	Estimated installed cost per vending machine

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-6a: Install Modern Roof Top Exhaust Fans with Premium Efficiency Motors

Demand Cost $/kW-month	Energy Cost $/kWh
$ 6.01	$ 0.11

Multipliers Material	Labor	Equipment
1.10	1.35	1.10

Savings Analysis

#	Description	Location	Existing HP	Load Factor	Existing Efficiency$_a$	Existing kW	New HP$_b$	New Load Factor	New Efficiency$_a$	New kW	Demand Savings	Demand Savings $	Annual Hours	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years
1	EF-1	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
2	EF-2	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
3	EF-3	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
4	EF-4	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
5	EF-5	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
6	EF-6	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
7	EF-7	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
8	EF-8	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
9	EF-9	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
10	EF-10	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
11	EF-11	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
12	EF-12	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
13	EF-13	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
14	EF-14	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
15	EF-15	N/A	0.17	0.75	70%	0.1	0.17	0.75	0.802	0.1	0.017	$ 1	8,760	149	$ 17	$ 18	$ 575	31.4
		Total	**2.5**			**2.0**	**2.5**			**1.7**	**0.25**	**$ 18**		**2,232**	**$ 256**	**$ 274**	**$ 8,600**	

Cost Estimates

#	Description	Unit Costs Materials	Unit Costs Labor	Unit Costs Equipment	Subtotal Costs Materials	Subtotal Costs Labor	Subtotal Costs Equipment	Total Cost	Remarks
1	EF-1	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
2	EF-2	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
3	EF-3	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
4	EF-4	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
5	EF-5	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
6	EF-6	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
7	EF-7	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
8	EF-8	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
9	EF-9	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
10	EF-10	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
11	EF-11	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
12	EF-12	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
13	EF-13	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
14	EF-14	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
15	EF-15	$ 400	$ 100	$ -	$ 440	$ 135	$ -	$ 575	
	Total								

Notes

a Existing and new efficiencies should be entered if known. If not known, use provided curve fit based on "DOE Survey Installed Average" and NEMA Premium values, respectively.

b Same as existing HP unless resized to better match load

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

Note: pricing is for energy calculations only -do not use for procurement

ECM-9b: Rooftop Exhaust Replacement (Infiltration Savings)

Assume: Existing rooftop exhaust fans do not emply backdraft dampers to prevent outdoor air from seeping into the building
Proposed: Newer rooftop exhaust systems use back draft dampers to protect the building envelope and prevent outdoor air infiltration.

Perimeter of Exhaust Fans	120	LF	Cooling System Efficiency	1.2	kW/ton	Heating System Efficiency	82%	
Area of Exhaust Fans	60	SF	Ex Occupied Clng Temp.	74	*F	Heating On Temp.	60	*F
Existing Infiltration Factor	4	**cfm/SF**	Ex Unoccupied Clng Temp.	78	*F	Ex Occupied Htg Temp.	68	*F
Proposed Infiltration Factor	3	**cfm/SF**	Cooling Occ Enthalpy Setpoint	27.5	Btu/lb	Ex Unoccupied Htg Temp.	60	*F
			Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb	Electricity	$ 0.115	$/kWh
						Natural Gas	$ 0.80	$/therm

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	**Unoccupied**	**Occupied**	**Unoccupied**				
Avg Outdoor Air Temp. Bins °F	**Avg Outdoor Air Enthalpy**	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Exhaust Infiltration BTUH**	**Exhaust Infiltration BTUH**	**Exhaust Infiltration BTUH**	**Exhaust Infiltration BTUH**	**Existing Cooling Energy kWh**	**Proposed Cooling Energy kWh**	**Existing Heating Energy Therms**	**Proposed Heating Energy Therms**
A		**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
102.5	50.1	0.0	0	0	-26,849	-26,849	-18,306	-18,306	0	0	0	0
97.5	42.5	3.0	1	1	-17,820	-17,820	-12,150	-12,150	4	3	0	0
92.5	39.5	34.0	13	13	-14,256	-14,256	-9,720	-9,720	38	26	0	0
87.5	36.6	131.0	51	51	-10,811	-10,811	-7,371	-7,371	111	76	0	0
82.5	34.0	500.0	196	196	-7,722	-7,722	-5,265	-5,265	303	207	0	0
77.5	31.6	620.0	244	244	-4,871	0	-3,321	0	119	81	0	0
72.5	29.2	664.0	261	261	0	0	0	0	0	0	0	0
67.5	27.0	854.0	336	336	0	0	0	0	0	0	0	0
62.5	24.5	927.0	364	364	0	0	0	0	0	0	0	0
57.5	21.4	600.0	236	236	2,994	713	2,041	486	0	0	11	7
52.5	18.7	610.0	240	240	4,419	2,138	3,013	1,458	0	0	19	13
47.5	16.2	611.0	240	240	5,845	3,564	3,985	2,430	0	0	28	19
42.5	14.4	656.0	258	258	7,271	4,990	4,957	3,402	0	0	39	26
37.5	12.6	1,023.0	402	402	8,696	6,415	5,929	4,374	0	0	74	50
32.5	10.7	734.0	288	288	10,122	7,841	6,901	5,346	0	0	63	43
27.5	8.6	334.0	131	131	11,547	9,266	7,873	6,318	0	0	33	23
22.5	6.8	252.0	99	99	12,973	10,692	8,845	7,290	0	0	29	19
17.5	5.5	125.0	49	49	14,399	12,118	9,817	8,262	0	0	16	11
12.5	4.1	47.0	18	18	15,824	13,543	10,789	9,234	0	0	7	5
7.5	2.6	22.0	9	9	17,250	14,969	11,761	10,206	0	0	3	2
2.5	1.0	13.0	5	5	18,675	16,394	12,733	11,178	0	0	2	1
0.0	0.0	0.0	0	0	19,388	17,107	13,219	11,664	0	0	0	0
Totals		**8,760**	**3,441**	**3,441**					576	392	**323**	**220**

Existing Exhaust Infiltration **264** **cfm**

Proposed Exhaust Infiltration **180** **cfm**

Savings	**103**	**Therms**	**$**	**82**
	183	**kWh**	**$**	**21**
			$	**103**

Window ID	Location	Quantity	Width (ft)	Height (ft)	Linear Feet (LF)	Area (SF)	Airflow (CFM)	Infiltration Rate (CFM/SF)	Infiltration (CFM)
EF-1	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-2	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-3	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-4	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-5	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-6	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-7	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-8	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-9	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-10	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-11	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-12	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-13	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-14	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
EF-15	Roof	1	2.0	2.0	8.0	4.0	880.0	4.40	17.6
Total		**15**	**30**	**30**	**120.0**	**60.0**	**13,200.0**	**4.40**	**264.0**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

Demand Cost $/kW-month	Energy Cost $/kWh
$ 6.01	$ 0.11

Multipliers		
Material	Labor	Equipment
1.10	1.35	1.10

ECM-7: DHW Pumps

Savings Analysis

#	Description	Location	Existing HP	Load Factor	Existing Hours	Existing $Efficiency_a$	Existing kW	Existing kWh	New HP_b	New Load Factor	New $Efficiency_a$	New kW	New kWh	Demand Savings	Demand Savings $	Annual Hours	kW Savings	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years
1	DHW Pump		0.17	0.8	8760	60%	0.2	1,452	0.04	0.8	60%	0.04	261	0.126	$ 9	6,570	0.13	1,190	$ 137	$ 146	$ 300	2.1

Cost Estimates

Unit Costs			Subtotal Costs				
Materials	Labor	Equipment	Materials	Labor	Equipment	Total Cost	Remarks
$ 175	$ 100	$ -	$ 193	$ 135	$ -	$ 300	

Notes
a Existing and new efficiencies should be entered if known. If not known, use provided curve fit based on "DOE Survey Installed Average" and NEMA Premium values, respectively.

b Same as existing HP unless resized to better match load

Assumptions:
a Existing pump is Bell & Gosset 100 series 1/6 HP pump w/ 60% efficiency

b Proposed pump is Taco 007 series cartridge circulator 1/25 HP at equivalent efficiency

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

Note: pricing is for energy calculations only -do not use for procurement

ECM-8: Roof System Replacement In Main Lobby(Clerestory Roof)

Existing: Ceiling can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.

Proposed: Install EPDM roofing membrane system with new metal roof over insulation to reduce heat transfer.

Area of ceiling	1,112 SF	Cooling System Efficiency	1.2 kW/ton	Heating System Efficiency	80%
Existing Infiltration Factor	**0.20 cfm/SF**	Ex Occupied Clng Temp.	74 *F	Heating On Point	58 *F
Proposed Infiltration Factor	**0.10 cfm/SF**	Ex Unoccupied Clng Temp.	85 *F	Ex Occupied Htg Temp.	68 *F
Existing U Value	**0.500 Btuh/SF/°F**	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	55 *F
Proposed U Value	**0.050 Btuh/SF/°F**	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	$ 0.115 $/kWh
Rigid Board Insulation				Natural Gas	$ 0.80 $/Therm

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	**Unoccupied**	**Occupied**	**Unoccupied**				
Avg Outdoor Air Temp. Bins °F	**Avg Outdoor Air Enthalpy**	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Wall Infiltration & Heat Load BTUH**	**Wall Infiltration & Heat Load BTUH**	**Wall Infiltration & Heat Load BTUH**	**Wall Infiltration & Heat Load BTUH**	**Existing Cooling Energy kWh**	**Proposed Cooling Energy kWh**	**Existing Heating Energy Therm**	**Proposed Heating Energy Therm**
A		**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
102.5	49.1	0.0	0	0	(37,475)	(31,357)	(12,397)	(11,785)	-	-	-	-
97.5	42.5	3.0	1	2	(28,087)	(21,969)	(8,815)	(8,204)	7	3	-	-
92.5	39.5	34.0	13	21	(22,303)	(16,185)	(7,036)	(6,424)	63	23	-	-
87.5	36.6	131.0	51	80	(16,619)	(10,501)	(5,306)	(4,694)	169	65	-	-
82.5	34	500.0	196	304	(11,235)	0	(3,726)	0	221	73	-	-
77.5	31.6	620.0	244	376	(6,051)	0	(2,247)	0	147	55	-	-
72.5	29.2	664.0	261	403	0	0	0	0	-	-	-	-
67.5	27	854.0	336	519	0	0	0	0	-	-	-	-
62.5	24.5	927.0	364	563	0	0	0	0	-	-	-	-
57.5	21.4	600.0	236	364	8,363	0	1,845	0	-	-	25	5
52.5	18.7	610.0	240	370	12,345	1,991	2,724	439	-	-	46	10
47.5	16.2	611.0	240	371	16,327	5,973	3,603	1,318	-	-	77	17
42.5	14.4	656.0	258	398	20,309	9,956	4,482	2,197	-	-	115	25
37.5	12.6	1,023.0	402	621	24,292	13,938	5,360	3,076	-	-	230	51
32.5	10.7	734.0	288	446	28,274	17,920	6,239	3,954	-	-	202	45
27.5	8.6	334.0	131	203	32,256	21,902	7,118	4,833	-	-	108	24
22.5	6.8	252.0	99	153	36,238	25,885	7,997	5,712	-	-	94	21
17.5	5.5	125.0	49	76	40,221	29,867	8,876	6,591	-	-	53	12
12.5	4.1	47.0	18	29	44,203	33,849	9,754	7,469	-	-	22	5
7.5	2.6	22.0	9	13	48,185	37,831	10,633	8,348	-	-	12	3
2.5	1	13.0	5	8	52,167	41,814	11,512	9,227	-	-	7	2
-2.5	0	0.0	0	0	56,150	45,796	12,391	10,106	-	-	-	-
-7.5	-1.5	0.0	0	0	60,132	49,778	13,269	10,985	-	-	-	-
TOTALS		**8,760**	**3,441**	**5,319**					608	218	**992**	**219**

Existing Ceiling Infiltration	**222 cfm**
Existing Ceiling Heat Transfer	**556 Btuh/°F**
Proposed Ceiling Infiltration	**111 cfm**
Proposed Ceiling Heat Transfer	**56 Btuh/°F**

Savings			
	773	**Therm**	**$ 618**
	390	**kWh**	**$ 45**
			$ 662

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

ECM-8: Roof System (Clerestory Roof System) In Main Lobby

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Ridge, galvanized 10" Metal Roofing	1112		$ 150	$ -	$ -	$ 183,480	$ -	$ -	$ 183,480	

$ 183,480	Subtotal
$ 36,696	10% Contingency
$ 27,522	20% Contractor O&P
$ -	0% Engineering
$ 247,700	**Total**

Energy Audit of Camden County College (CIM Lab Building)
CHA Project No. 24364

ECM-5 Lighting Replacements

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$43,300	**21.0**	**53,600**	**0**	**$7,665**	**0**	**$7,665**	**$10,285**	**5.6**	**4.3**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-6 Install Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$11,100	**0.0**	**36,900**	**0**	**$4,232**	**0**	**$4,232**	**$1,645**	**2.6**	**2.2**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-7 Lighting Replacements with Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
$	kW	kWh	therms	$	$	$	$	Years	Years
$54,400	**21.0**	**81,500**	**0**	**$10,865**	**0**	**$10,865**	**$11,930**	**5.0**	**3.9**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

ECM-5 Lighting Replacements **$6.01 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
234	Entrance Vestibule	3	SP 100 W I 2	i100/2	200	0.6	SW	2500	1,500	3	WP 42 1	CF42/2-L	100	0.3	SW	2,500	750	750	0.3	$ 107.66	$ 285.75		2.7	2.7
143	Front Glass Atrium	14	HPS 100 POLE	HPS100/1	138	1.9	SW	2500	4,830	14	FXLED39	FXLED39/1	39	0.5	SW	2,500	1,365	3,465	1.4	$ 497.39	$ 1,606.50	$350	3.2	2.5
129A	2nd Floor Atrium	19	SP 72 I	I72/1	75	1.4	SW	2500	3,563	19	SP 72 I	I72/1	72	1.4	SW	2,500	3,420	143	0.1	$ 20.46	$ -		0.0	0.0
146	Warehouse	25	High Bay MH 400	MH400/1	458	11.5	SW	2125	24,331	25	P 54 C F 4	FC20	20	0.5	SW	2,125	1,063	23,269	11.0	$ 3,458.59	$ -		0.0	0.0
4A	Room - 204	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	2125	2,624	13	F17T8	F22ILL	33	0.4	SW	2,125	912	1,713	0.8	$ 254.58	$ 1,316.25		5.2	5.2
162A	Room - 204A	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510	2	F28T8	F44SSILL-R	86	0.2	SW	2,125	366	145	0.1	$ 21.48	$ -	$50	0.0	-2.3
162A	Room - 205	21	4' 4-LAMP T-12	F44EL	120	2.5	SW	2500	6,300	21	F28T8	F44SSILL-R	86	1.8	SW	2,500	4,515	1,785	0.7	$ 256.23	$ -	$525	0.0	-2.0
162A	Room - 205A	10	4' 4-LAMP T-12	F44EL	120	1.2	SW	2125	2,550	10	F28T8	F44SSILL-R	86	0.9	SW	2,125	1,828	723	0.3	$ 107.39	$ -		0.0	0.0
162A	Room - 205B	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510	2	F28T8	F44SSILL-R	86	0.2	SW	2,125	366	145	0.1	$ 21.48	$ -	$50	0.0	-2.3
162A	Room - 205C	3	4' 4-LAMP T-12	F44EL	120	0.4	SW	2125	765	3	F28T8	F44SSILL-R	86	0.3	SW	2,125	548	217	0.1	$ 32.22	$ -		0.0	0.0
4A	Room - 207F	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855	4	F17T8	F22ILL	33	0.1	SW	2,250	297	558	0.2	$ 81.89	$ 405.00		4.9	4.9
4A	Room - 207G	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855	4	F17T8	F22ILL	33	0.1	SW	2,250	297	558	0.2	$ 81.89	$ 405.00		4.9	4.9
4A	Room - 207D	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	SW	2,125	281	527	0.2	$ 78.33	$ 405.00		5.2	5.2
4A	Room - 207A	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	SW	2,125	281	527	0.2	$ 78.33	$ 405.00		5.2	5.2
4A	Room - 207B	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	SW	2,125	281	527	0.2	$ 78.33	$ 405.00		5.2	5.2
4A	Room - 207C	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2000	950	5	F17T8	F22ILL	33	0.2	SW	2,000	330	620	0.3	$ 93.47	$ 506.25		5.4	5.4
4A	Room - 207E	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	SW	2,125	281	527	0.2	$ 78.33	$ 405.00		5.2	5.2
4A	Room - 207	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	2125	1,817	9	F17T8	F22ILL	33	0.3	SW	2,125	631	1,186	0.6	$ 176.25	$ 911.25		5.2	5.2
35A	Room - 218	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2125	1,088	16	4' 3-LAMP T-8 (32W)	F43ILL	89	1.4	SW	2,125	3,026	(1,938)	(0.9)	$ (288.06)	$ -			
35A	Room - 219	11	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	748	11	4' 3-LAMP T-8 (32W)	F43ILL	89	1.0	SW	2,125	2,080	(1,332)	(0.6)	$ (198.04)	$ -			
35A	Room - 220	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,125	2,270	(1,454)	(0.7)	$ (216.04)	$ -			
4A	2nd Floor Men's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	SW	2,125	351	659	0.3	$ 97.91	$ 506.25	$125	5.2	3.9
4A	2nd Floor Women's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	SW	2,125	351	659	0.3	$ 97.91	$ 506.25		5.2	5.2
4A	Room - 203	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2125	2,423	12	F17T8	F22ILL	33	0.4	SW	2,125	842	1,581	0.7	$ 234.99	$ 1,215.00		5.2	5.2
143	Room - 203	13	HPS 100 POLE	HPS100/1	138	1.8	SW	2500	4,485	13	FXLED39	FXLED39/1	39	0.5	SW	2,500	1,268	3,218	1.3	$ 461.86	$ 1,491.75		3.2	3.2
143	Auditorium - 202	28	HPS 100 POLE	HPS100/1	138	3.9	SW	2125	8,211	28	FXLED39	FXLED39/1	39	1.1	SW	2,125	2,321	5,891	2.8	$ 875.54	$ 3,213.00		3.7	3.7
129A	Auditorium - 202	5	SP 72 I	I72/1	75	0.4	SW	2125	797	5	SP 72 I	I72/1	72	0.4	SW	2,125	765	32	0.0	$ 4.74	$ -		0.0	0.0
11A	Auditorium - 233	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	500	30	1	F42ILL-R	FXLED78/1	78	0.1	SW	500	39	(9)	(0.0)	$ (2.33)	$ 250.00	$25		
11A	Auditorium - 234	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F42ILL-R	FXLED78/1	78	0.1	SW	2,125	166	(38)	(0.0)	$ (5.69)	$ 250.00			
4A	Room - 201	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2500	2,850	12	F17T8	F22ILL	33	0.4	SW	2,500	990	1,860	0.7	$ 266.99	$ 1,215.00		4.6	4.6
129A	Room - 201	15	SP 72 I	I72/1	75	1.1	SW	2500	2,813	15	SP 72 I	I72/1	72	1.1	SW	2,500	2,700	113	0.0	$ 16.15	$ -	$375	0.0	-23.2
162A	Room - 220 (Shred Room)	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2500	600	2	F28T8	F44SSILL-R	86	0.2	SW	2,500	430	170	0.1	$ 24.40	$ -	$50	0.0	-2.0
129A	3rd Floor Atrium	12	SP 72 I	I72/1	75	0.9	SW	2125	1,913	12	SP 72 I	I72/1	72	0.9	SW	2,125	1,836	77	0.0	$ 11.37	$ -		0.0	0.0
4A	Room - 301	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	1062.5	908	9	F17T8	F22ILL	33	0.3	SW	1,063	316	593	0.6	$ 108.24	$ 911.25		8.4	8.4
4A	Room - 301A	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	SW	2,125	351	659	0.3	$ 97.91	$ 506.25		5.2	5.2
4A	Room - 301B	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	1062.5	606	6	F17T8	F22ILL	33	0.2	SW	1,063	210	395	0.4	$ 72.16	$ 607.50		8.4	8.4
4A	Closet Room - 301B	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	1062.5	101	1	F17T8	F22ILL	33	0.0	SW	1,063	35	66	0.1	$ 12.03	$ 101.25		8.4	8.4
4A	Room - 302	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	SW	2,125	351	659	0.3	$ 97.91	$ 506.25		5.2	5.2
4A	Room - 302A	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	SW	500	50	93	0.2	$ 24.08	$ 303.75		12.6	12.6
4A	Room - 302B	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	SW	500	50	93	0.2	$ 24.08	$ 303.75		12.6	12.6
4A	Room - 302C	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	SW	500	50	93	0.2	$ 24.08	$ 303.75		12.6	12.6
4A	3rd Floor Men's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	SW	2,125	281	527	0.2	$ 78.33	$ 405.00		5.2	5.2
4A	3rd Floor Women's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	1062.5	404	4	F17T8	F22ILL	33	0.1	SW	1,063	140	264	0.2	$ 48.11	$ 405.00		8.4	8.4
71	3rd Floor HVAC Access	1	I 60	I60/1	60	0.1	SW	2125	128	1	CF 26	CFQ26/1-L	27	0.0	SW	2,125	57	70	0.0	$ 10.42	$ 40.50		3.9	3.9
129A	1st Floor Lower Level Stairs	11	SP 72 I	I72/1	75	0.8	SW	1062.5	877	11	SP 72 I	I72/1	72	0.8	SW	1,063	842	35	0.0	$ 6.40	$ -	$77	0.0	-12.0
129A	1st Floor Corridor	14	SP 72 I	I72/1	75	1.1	SW	2250	2,363	14	SP 72 I	I72/1	72	1.0	SW	2,250	2,268	95	0.0	$ 13.87	$ -		0.0	0.0
35A	1st Floor Corridor	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	SW	2,250	2,003	(1,283)	(0.6)	$ (188.21)	$ -			
4A	Room - 105	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	500	570	12	F17T8	F22ILL	33	0.4	SW	500	198	372	0.7	$ 96.33	$ 1,215.00		12.6	12.6
129A	Room - 105	15	SP 72 I	I72/1	75	1.1	SW	520	585	15	SP 72 I	I72/1	72	1.1	SW	520	562	23	0.0	$ 5.93	$ -		0.0	0.0
35A	Room - 119	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	520	200	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	520	555	(356)	(0.7)	$ (90.13)	$ -			
4A	Room - 108	23	2-LAMP U-TUBE T-12	FU2SS	95	2.2	SW	520	1,136	23	F17T8	F22ILL	33	0.8	SW	520	395	742	1.4	$ 187.90	$ 2,328.75	$575	12.4	9.3
4A	Room - 118	8	2-LAMP U-TUBE T-12	FU2SS	95	0.8	SW	500	380	8	F17T8	F22ILL	33	0.3	SW	500	132	248	0.5	$ 64.22	$ 810.00		12.6	12.6
4A	Room - 107	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	Timer	4380	1,664	4	F17T8	F22ILL	33	0.1	Timer	4,380	578	1,086	0.2	$ 142.47	$ 405.00		2.8	2.8
4A	Room - 106A	26	2-LAMP U-TUBE T-12	FU2SS	95	2.5	Timer	4380	10,819	26	F17T8	F22ILL	33	0.9	Timer	4,380	3,758	7,061	1.6	$ 926.09	$ 2,632.50		2.8	2.8
4A	Room - 106B	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,819	13	F17T8	F22ILL	33	0.4	SW	8,760	3,758	7,061	0.8	$ 867.96	$ 1,316.25		1.5	1.5
4A	Room - 106	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,819	13	F17T8	F22ILL	33	0.4	SW	8,760	3,758	7,061	0.8	$ 867.96	$ 1,316.25		1.5	1.5
11A	1st Floor Mechanical Room	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	383	3	F42ILL-R	FXLED78/1	78	0.2	SW	2,125	497	(115)	(0.1)	$ (17.06)	$ 750.00	$75		
35A	Room - 118	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,125	2,270	(1,454)	(0.7)	$ (216.04)	$ -	$300		
35A	Optimology - A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	64	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	500	178	(114)	(0.2)	$ (29.52)	$ -	$100		
35A	Optimology - B	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	SW	500	89	(57)	(0.1)	$ (14.76)	$ -	$50		
35A	Optimology - C	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	561	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	SW	8,760	1,559	(999)	(0.1)	$ (122.76)	$ -	$50		
35A	Optimology - D	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	SW	500	89	(57)	(0.1)	$ (14.76)	$ -	$50		
35A	Optimology - E	3	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	315	3	4' 3-LAMP T-8 (32W)	F43ILL	89	0.3	SW	3,285	877	(562)	(0.2)	$ (76.76)	$ -	$75		
35A	Optimology - F	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	420	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	3,285	1,169	(749)	(0.2)	$ (102.35)	$ -	$100		
35A	Optimology - G	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	8760	4,485	16	4' 3-LAMP T-8 (32W)	F43ILL	89	1.4	SW	8,760	12,474	(7,989)	(0.9)	$ (982.10)	$ -	$400		
234	East Lower Vestibule	6	SP 100 W I 2	i100/2	200	1.2	SW	8760	10,512	6	WP 42 1	CF42/2-L	100	0.6	SW	8,760	5,256	5,256	0.6	$ 646.12	$ 571.50		0.9	0.9
175A	East Lower Corridor	23	4' 2-LAMP T-8 (32W)	F42ILL	32	0.7	SW	500	368	23	4' 2-LAMP T-8	F42ILL	59	1.4	SW	500	679	(311)	(0.6)	$ (80.40)	$ -	$575		
35A	Room - 109S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,125	2,270	(1,454)	(0.7)	$ (216.04)	$ -	$300		
35A	Room - 110S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	500	192	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	500	534	(342)	(0.7)	$ (88.56)	$ -	$300		
35A	Room - 111S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,000	2,136	(1,368)	(0.7)	$ (206.24)	$ -	$300		
35A	Room - 112S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,000	2,136	(1,368)	(0.7)	$ (206.24)	$ -	$300		
11A	1st Floor Men's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	500	90	3	F42ILL-R	FXLED78/1	78	0.2	SW	500	117	(27)	(0.1)	$ (6.99)	$ 750.00	$75		
11A	1st Floor Women's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	8760	1,577	3	F42ILL-R	FXLED78/1	78	0.2	SW	8,760	2,050	(473)	(0.1)	$ (58.15)	$ 750.00	$75		
175A	Custodial Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	500	16	1	4' 2-LAMP T-8	F42ILL	59	0.1	SW	500	30	(14)	(0.0)	$ (3.50)	$ -	$25		
35A	Room - 112	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	128	8	4' 3-LAMP T-8 (32W)	F43ILL	89	0.7	SW	500	356	(228)	(0.5)	$ (59.04)	$ -	$200		
11A	Men's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	8760	526	1	F42ILL-R	FXLED78/1	78	0.1	SW	8,760	683	(158)	(0.0)	$ (19.38)	$ 250.00	$25		
11A	Women's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2000	120	1	F42ILL-R	FXLED78/1	78	0.1	SW	2,000	156	(36)	(0.0)	$ (5.43)	$ 250.00	$25		
35A	Room - 113S	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	1,121	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	8,760	3,119	(1,997)	(0.2)	$ (245.53)	$ -	$100		
35A	Room - 115S	5	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2000	320	5	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	2,000	890	(570)	(0.3)	$ (85.93)	$ -	$125		
35A	Room - 114S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	4380	1,682	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	4,380	4,678	(2,996)	(0.7)	$ (392.95)	$ -	$300		
175A	Room - 114S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	4380	561	4	4' 2-LAMP T-8	F42ILL	59	0.2	SW	4,380	1,034	(473)	(0.1)	$ (62.05)	$ -	$100		
234	Back Vestuble	6	SP 100 W I 2	i100/2	200	1.2	SW	4380	5,256	6	WP 42 1	CF42/2-L	100	0.6	SW	4,380	2,628	2,628	0.6	$ 344.70	$ 571.50	$150	1.7	1.2
175A	Elevator Machine Room	2	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	520	33	2	4' 2-LAMP T-8	F42ILL	59	0.1	SW	520	61	(28)	(0.1)	$ (7.12)	$ -	$50		
227	2nd Floor Sitting Area	5	W60CF1	F81EL	60	0.3	SW	520	156	5	CF42W	CF42/1-L	48	0.2	SW	520	125	31	0.1	$ 7.91	$ 1,012.50	$125	128.1	112.3
234	2nd Floor Sitting Area	4	SP 100 W I 2	i100/2	200	0.8	SW	2500	2,000	4	WP 42 1	CF42/2-L	100	0.4	SW	2,500	1,000	1,000	0.4	$ 143.55	$ 381.00		2.7	2.7
175A	Lounge Room - 213S	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2125	68	1	4' 2-LAMP T-8	F42ILL	59	0.1	SW	2,125	125	(57)	(0.0)	$ (8.53)	$ -	$25		
175A	2nd Floor Corridor	26	4' 2-LAMP T-8 (32W)	F42ILL	32	0.8	SW	2125	1,768	26	4' 2-LAMP T-8	F42ILL	59	1.5	SW	2,125	3,260	(1,492)	(0.7)	$ (221.73)	$ -	$650		
234	2nd Floor Corridor	4	SP 100 W I 2	i100/2	200	0.8	SW	1125	900	4	WP 42 1	CF42/2-L	100	0.4	SW	1,125	450	450	0.4	$ 80.46	$ 381.00	$28	4.7	4.4
175A	Room - 215S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2500	320	4	4' 2-LAMP T-8	F42ILL	59	0.2	SW	2,500	590	(270)	(0.1)	$ (38.76)	$ -	$100		
175A	Room - 212S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	288	4	4' 2-LAMP T-8	F42ILL	59	0.2	SW	2,250	531	(243)	(0.1)	$ (35.66)	$ -	$100		
175A	Janitor - 212	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72	1	4' 2-LAMP T-8	F42ILL	59	0.1	SW	2,250	133	(61)	(0.0)	$ (8.92)	$ -			

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

ECM-5 Lighting Replacements **$6.01 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35A	Room - 211S	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	576	8	4' 3-LAMP T-8 (32W)	F43ILL	89	0.7	SW	2,250	1,602	(1,026)	(0.5)	$ (150.57)	$ -	$200		
35A	Room - 210S	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	SW	2,250	2,003	(1,283)	(0.6)	$ (188.21)	$ -			
35A	Room - 209	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	SW	2,250	1,202	(770)	(0.3)	$ (112.92)	$ -	$150		
129A	Room - 209	6	SP 72 I	I72/1	75	0.5	SW	2250	1,013	6	SP 72 I	I72/1	72	0.4	SW	2,250	972	41	0.0	$ 5.94	$ -	$150	0.0	-25.2
175A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216	3	4' 2-LAMP T-8	F42ILL	59	0.2	SW	2,250	398	(182)	(0.1)	$ (26.75)	$ -	$75		
175A	2nd Floor Women's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216	3	4' 2-LAMP T-8	F42ILL	59	0.2	SW	2,250	398	(182)	(0.1)	$ (26.75)	$ -	$75		
175A	2nd Floor Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72	1	4' 2-LAMP T-8	F42ILL	59	0.1	SW	2,250	133	(61)	(0.0)	$ (8.92)	$ -	$25		
35A	Room - 216S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,250	2,403	(1,539)	(0.7)	$ (225.85)	$ -	$300		
35A	Room - 208S	15	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2250	1,080	15	4' 3-LAMP T-8 (32W)	F43ILL	89	1.3	SW	2,250	3,004	(1,924)	(0.9)	$ (282.31)	$ -	$375		
35A	Room - 216A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	2,250	801	(513)	(0.2)	$ (75.28)	$ -	$100		
35A	Room - 216B	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	SW	2,250	801	(513)	(0.2)	$ (75.28)	$ -	$100		
35A	Room - 217A	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	SW	2,250	1,202	(770)	(0.3)	$ (112.92)	$ -	$150		
35A	Room - 217B	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	2,250	2,403	(1,539)	(0.7)	$ (225.85)	$ -	$300		
35A	Corridor - 217	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	144	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	SW	2,250	401	(257)	(0.1)	$ (37.64)	$ -	$50		
35A	1st Floor Men's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	SW	2,250	1,202	(770)	(0.3)	$ (112.92)	$ -	$150		
35A	1st Floor Women's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	SW	2,250	1,202	(770)	(0.3)	$ (112.92)	$ -	$150		
180	Room - 104	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2250	2,268	9	T 28 C F 4	F43SSILL	72	0.6	SW	2,250	1,458	810	0.4	$ 118.87	$ 1,032.75	$225	8.7	6.8
209A	Room - 103	16	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.5	SW	2250	1,152	16	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.9	SW	2,250	2,124	(972)	(0.4)	$ (142.64)	$ -			
4A	Room - 103A	18	2-LAMP U-TUBE T-12	FU2SS	95	1.7	SW	2250	3,848	18	F17T8	F22ILL	33	0.6	SW	2,250	1,337	2,511	1.1	$ 368.49	$ 1,822.50		4.9	4.9
4A	Room - 102	30	2-LAMP U-TUBE T-12	FU2SS	95	2.9	SW	2250	6,413	30	F17T8	F22ILL	33	1.0	SW	2,250	2,228	4,185	1.9	$ 614.15	$ 3,037.50		4.9	4.9
61A	Room - 101	3	4' 3-LAMP T-12	F43EL	115	0.3	SW	2250	776	3	F28T8	F43SSILL-R	66	0.2	SW	2,250	446	331	0.1	$ 48.54	$ 384.75		7.9	7.9
4A	Room - 101	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	2250	214	1	F17T8	F22ILL	33	0.0	SW	2,250	74	140	0.1	$ 20.47	$ 101.25	$25	4.9	3.7
4A	Room - 101	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	2250	1,283	6	F17T8	F22ILL	33	0.2	SW	2,250	446	837	0.4	$ 122.83	$ 607.50	$150	4.9	3.7
204	Manufacturing Stock Room	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	SW	2250	2,329	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	SW	2,250	2,329	-	0.0	$ -	$ -			
169	Exterior	4	SP 250 MH ROOF	MH250/1	295	1.2	SW	2250	2,655	4	FXLED78	FXLED78/1	78	0.3	SW	2,250	702	1,953		$ 286.60	$ 513.00	$80	1.8	1.5
	Total	**925**				**78.8**			**196,997**	**925**			**7,599**	**57.8**			**143,429**	**53,568**	**20.2**	**$7,662**	**$43,300**	**$10,285**		
																	Demand Savings			**21.0**	**$1,518**			
																	kWh Savings			**53,600**	**$6,148**			
																	Total savings				**$7,665**		**5.6**	**4.3**

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

$6.01 $/kW

ECM-6 Install Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
234	Entrance Vestibule	3	SP 100 W I 2	i100/2	200	0.6	SW	2500	1,500.0	3	SP 100 W I 2	i100/2	200	0.6	None	2500	1,500.0	0.0	0.0	$0.00	$0.00	$0.00		
143	Front Glass Atrium	14	HPS 100 POLE	HPS100/1	138	1.9	SW	2500	4,830.0	14	HPS 100 POLE	HPS100/1	138	1.9	None	2500	4,830.0	0.0	0.0	$0.00	$0.00	$0.00		
129A	2nd Floor Atrium	19	SP 72 I	I72/1	75	1.4	SW	2500	3,562.5	19	SP 72 I	I72/1	75	1.4	None	2500	3,562.5	0.0	0.0	$0.00	$0.00	$0.00		
146	Warehouse	25	High Bay MH 400	MH400/1	458	11.5	SW	2125	24,331.3	25	High Bay MH 400	MH400/1	458	11.5	C-OCC	1200	13,740.0	10,591.3	0.0	$1,214.79				
4A	Room - 204	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	2125	2,624.4	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	C-OCC	1200	1,482.0	1,142.4	0.0	$131.03	$202.50	$35.00	0.1	0.1
162A	Room - 204A	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510.0	2	4' 4-LAMP T-12	F44EL	120	0.2	C-OCC	1200	288.0	222.0	0.0	$25.46				
162A	Room - 205	21	4' 4-LAMP T-12	F44EL	120	2.5	SW	2500	6,300.0	21	4' 4-LAMP T-12	F44EL	120	2.5	None	2500	6,300.0	0.0	0.0	$0.00	$0.00	$0.00		
162A	Room - 205A	10	4' 4-LAMP T-12	F44EL	120	1.2	SW	2125	2,550.0	10	4' 4-LAMP T-12	F44EL	120	1.2	OCC	1200	1,440.0	1,110.0	0.0	$127.31	$118.75	$20.00	0.9	0.8
162A	Room - 205B	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510.0	2	4' 4-LAMP T-12	F44EL	120	0.2	OCC	1200	288.0	222.0	0.0	$25.46	$118.75	$20.00	4.7	3.9
162A	Room - 205C	3	4' 4-LAMP T-12	F44EL	120	0.4	SW	2125	765.0	3	4' 4-LAMP T-12	F44EL	120	0.4	OCC	1200	432.0	333.0	0.0	$38.19	$118.75	$20.00	3.1	2.6
4A	Room - 207F	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855.0	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	C-OCC	1000	380.0	475.0	0.0	$54.48	$202.50	$35.00	3.7	3.1
4A	Room - 207G	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855.0	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	C-OCC	1000	380.0	475.0	0.0	$54.48	$202.50	$35.00	3.7	3.1
4A	Room - 207D	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	807.5	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	OCC	1200	456.0	351.5	0.0	$40.32	$118.75	$20.00	2.9	2.4
4A	Room - 207A	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	807.5	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	OCC	1200	456.0	351.5	0.0	$40.32	$118.75	$20.00	2.9	2.4
4A	Room - 207B	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	807.5	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	OCC	1200	456.0	351.5	0.0	$40.32	$118.75	$20.00	2.9	2.4
4A	Room - 207C	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2000	950.0	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	OCC	1000	475.0	475.0	0.0	$54.48	$118.75	$0.00	2.2	2.2
4A	Room - 207E	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	807.5	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	OCC	1200	456.0	351.5	0.0	$40.32	$118.75	$20.00	2.9	2.4
4A	Room - 207	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	2125	1,816.9	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	OCC	1200	1,026.0	790.9	0.0	$90.71	$118.75	$20.00	1.3	1.1
35A	Room - 218	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2125	1,088.0	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	OCC	1200	614.4	473.6	0.0	$54.32	$118.75	$20.00	2.2	1.8
35A	Room - 219	11	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	748.0	11	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	1200	422.4	325.6	0.0	$37.35	$118.75	$20.00	3.2	2.6
35A	Room - 220	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	1200	460.8	355.2	0.0	$40.74	$118.75	$20.00	1.3	1.1
4A	2nd Floor Men's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009.4	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	OCC	1200	570.0	439.4	0.0	$50.40				
4A	2nd Floor Women's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009.4	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	OCC	1200	570.0	439.4	0.0	$50.40	$118.75	$20.00	2.4	2.0
4A	Room - 203	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2125	2,422.5	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	OCC	1200	1,368.0	1,054.5	0.0	$120.95	$118.75	$20.00	1.0	0.8
143	Room - 203	13	HPS 100 POLE	HPS100/1	138	1.8	SW	2500	4,485.0	13	HPS 100 POLE	HPS100/1	138	1.8	None	2500	4,485.0	0.0	0.0	$0.00	$0.00	$0.00		
143	Auditorium - 202	28	HPS 100 POLE	HPS100/1	138	3.9	SW	2125	8,211.0	28	HPS 100 POLE	HPS100/1	138	3.9	OCC	1200	4,636.8	3,574.2	0.0	$409.95	$118.75	$20.00	0.3	0.2
129A	Auditorium - 202	5	SP 72 I	I72/1	75	0.4	SW	2125	796.9	5	SP 72 I	I72/1	75	0.4	OCC	1000	375.0	421.9	0.0	$48.39	$118.75	$20.00	2.5	2.0
11A	Auditorium - 233	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	500	30.0	1	4' 2-LAMP T-12	F42EL	60	0.1	None	500	30.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	Auditorium - 234	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	127.5	1	4' 2-LAMP T-12	F42EL	60	0.1	OCC	1200	72.0	55.5	0.0	$6.37	$118.75	$20.00	18.7	15.5
4A	Room - 201	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2500	2,850.0	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	None	2500	2,850.0	0.0	0.0	$0.00	$0.00	$0.00		
129A	Room - 201	15	SP 72 I	I72/1	75	1.1	SW	2500	2,812.5	15	SP 72 I	I72/1	75	1.1	None	2500	2,812.5	0.0	0.0	$0.00	$0.00	$0.00		
162A	Room - 220 (Shred Room)	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2500	600.0	2	4' 4-LAMP T-12	F44EL	120	0.2	None	2500	600.0	0.0	0.0	$0.00	$0.00	$0.00		
129A	3rd Floor Atrium	12	SP 72 I	I72/1	75	0.9	SW	2125	1,912.5	12	SP 72 I	I72/1	75	0.9	OCC	1200	1,080.0	832.5	0.0	$95.49	$118.75	$0.00	1.2	1.2
4A	Room - 301	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	1062.5	908.4	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	None	1062.5	908.4	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 301A	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009.4	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	OCC	1200	570.0	439.4	0.0	$50.40	$118.75	$20.00	2.4	2.0
4A	Room - 301B	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	1062.5	605.6	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	None	1062.5	605.6	0.0	0.0	$0.00	$0.00	$0.00		
4A	Closet Room - 301B	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	1062.5	100.9	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	None	1062.5	100.9	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 302	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009.4	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	OCC	1200	570.0	439.4	0.0	$50.40	$118.75	$20.00	2.4	2.0
4A	Room - 302A	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	142.5	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	None	500	142.5	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 302B	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	142.5	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	None	500	142.5	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 302C	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	142.5	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	None	500	142.5	0.0	0.0	$0.00	$0.00	$0.00		
4A	3rd Floor Men's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	807.5	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	OCC	1200	456.0	351.5	0.0	$40.32	$118.75	$20.00	2.9	2.4
4A	3rd Floor Women's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	1062.5	403.8	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	None	1062.5	403.8	0.0	0.0	$0.00	$0.00	$0.00		
71	3rd Floor HVAC Access	1	I 60	I60/1	60	0.1	SW	2125	127.5	1	I 60	I60/1	60	0.1	OCC	1200	72.0	55.5	0.0	$6.37	$118.75	$0.00	18.7	18.7
129A	1st Floor Lower Level Stairs	11	SP 72 I	I72/1	75	0.8	SW	1062.5	876.6	11	SP 72 I	I72/1	75	0.8	None	1062.5	876.6	0.0	0.0	$0.00	$0.00	$0.00		
129A	1st Floor Corridor	14	SP 72 I	I72/1	75	1.1	SW	2250	2,362.5	14	SP 72 I	I72/1	75	1.1	None	2250	2,362.5	0.0	0.0	$0.00	$0.00	$0.00		
35A	1st Floor Corridor	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720.0	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	None	2250	720.0	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 105	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	500	570.0	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	None	500	570.0	0.0	0.0	$0.00	$0.00	$0.00		
129A	Room - 105	15	SP 72 I	I72/1	75	1.1	SW	520	585.0	15	SP 72 I	I72/1	75	1.1	None	520	585.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 119	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	520	199.7	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	C-OCC	390	149.8	49.9	0.0	$5.73	$202.50	$35.00	35.4	29.3
4A	Room - 108	23	2-LAMP U-TUBE T-12	FU2SS	95	2.2	SW	520	1,136.2	23	2-LAMP U-TUBE T-12	FU2SS	95	2.2	None	520	1,136.2	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 118	8	2-LAMP U-TUBE T-12	FU2SS	95	0.8	SW	500	380.0	8	2-LAMP U-TUBE T-12	FU2SS	95	0.8	None	500	380.0	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 107	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	Timer	4380	1,664.4	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	None	4380	1,664.4	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 106A	26	2-LAMP U-TUBE T-12	FU2SS	95	2.5	Timer	4380	10,818.6	26	2-LAMP U-TUBE T-12	FU2SS	95	2.5	None	4380	10,818.6	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 106B	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,818.6	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	None	8760	10,818.6	0.0	0.0	$0.00	$0.00	$0.00		
4A	Room - 106	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,818.6	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	None	8760	10,818.6	0.0	0.0	$0.00	$0.00	$0.00		
11A	1st Floor Mechanical Room	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	382.5	3	4' 2-LAMP T-12	F42EL	60	0.2	OCC	1200	216.0	166.5	0.0	$19.10	$118.75	$20.00	2.0	1.7
35A	Room - 118	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	1200	460.8	355.2	0.0	$40.74				
35A	Optimology - A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	64.0	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	None	500	64.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Optimology - B	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32.0	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	None	500	32.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Optimology - C	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	560.6	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	None	8760	560.6	0.0	0.0	$0.00	$0.00	$0.00		
35A	Optimology - D	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32.0	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	None	500	32.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Optimology - E	3	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	315.4	3	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	OCC	1825	175.2	140.2	0.0	$16.08	$118.75	$20.00	7.4	6.1
35A	Optimology - F	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	420.5	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	OCC	1825	233.6	186.9	0.0	$21.43	$118.75	$20.00	5.5	4.6
35A	Optimology - G	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	8760	4,485.1	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	None	8760	4,485.1	0.0	0.0	$0.00	$0.00	$0.00		
234	East Lower Vestibule	6	SP 100 W I 2	i100/2	200	1.2	SW	8760	10,512.0	6	SP 100 W I 2	i100/2	200	1.2	None	8760	10,512.0	0.0	0.0	$0.00	$0.00	$0.00		
175A	East Lower Corridor	23	4' 2-LAMP T-8 (32W)	F42ILL	32	0.7	SW	500	368.0	23	4' 2-LAMP T-8 (32W)	F42ILL	32	0.7	None	500	368.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 109S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	1000	384.0	432.0	0.0	$49.55	$118.75	$0.00	2.4	2.4
35A	Room - 110S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	500	192.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	None	500	192.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 111S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	1000	384.0	384.0	0.0	$44.04	$118.75	$0.00	2.7	2.7
35A	Room - 112S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	None	2000	768.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	1st Floor Men's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	500	90.0	3	4' 2-LAMP T-12	F42EL	60	0.2	None	500	90.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	1st Floor Women's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	8760	1,576.8	3	4' 2-LAMP T-12	F42EL	60	0.2	OCC	2000	360.0	1,216.8	0.0	$139.56	$118.75	$20.00	0.9	0.7
175A	Custodial Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	500	16.0	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	None	500	16.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 112	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	128.0	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	None	500	128.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	Men's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	8760	525.6	1	4' 2-LAMP T-12	F42EL	60	0.1	OCC	2000	120.0	405.6	0.0	$46.52	$118.75	$0.00	2.6	2.6
11A	Women's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2000	120.0	1	4' 2-LAMP T-12	F42EL	60	0.1	None	2000	120.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 113S	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	1,121.3	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	None	8760	1,121.3	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room - 115S	5	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2000	320.0	5	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	OCC	1000	160.0	160.0	0.0	$18.35	$118.75	$20.00	6.5	5.4
35A	Room - 114S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	4380	1,681.9	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	OCC	2000	768.0	913.9	0.0	$104.82	$118.75	$20.00	1.1	0.9
175A	Room - 114S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	4380	560.6	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	C-OCC	2000	256.0	304.6	0.0	$34.94	$202.50	$35.00	5.8	4.8
234	Back Vestuble	6	SP 100 W I 2	i100/2	200	1.2	SW	4380	5,256.0	6	SP 100 W I 2	i100/2	200	1.2	OCC	2000	2,400.0	2,856.0	0.0	$327.58	$118.75	$20.00	0.4	0.3
175A	Elevator Machine Room	2	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	520	33.3	2	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	C-OCC	390	25.0	8.3	0.0	$0.95	$202.50	$35.00	212.2	175.5
227	2nd Floor Sitting Area	5	W60CF1	F81EL	60	0.3	SW	520	156.0	5	W60CF1	F81EL	60	0.3	OCC	390	117.0	39.0	0.0	$4.47	$118.75	$20.00	26.5	22.1
234	2nd Floor Sitting Area	4	SP 100 W I 2	i100/2	200	0.8	SW	2500	2,000.0	4	SP 100 W I 2	i100/2	200	0.8	None	2500	2,000.0	0.0	0.0	$0.00	$0.00	$0.00		
175A	Lounge Room - 213S	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2125	68.0	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	OCC	1200	38.4	29.6	0.0	$3.40	$118.75	$20.00	35.0	29.1
175A	2nd Floor Corridor	26	4' 2-LAMP T-8 (32W)	F42ILL	32	0.8	SW	2125	1,768.0	26	4' 2-LAMP T-8 (32W)	F42ILL	32	0.8	OCC	1200	998.4	769.6	0.0	$88.27	$118.75	$0.00	1.3	1.3
234	2nd Floor Corridor	4	SP 100 W I 2	i100/2	200	0.8	SW	1125	900.0	4	SP 100 W I 2	i100/2	200	0.8	None	1125	900.0	0.0	0.0	$0.00	$0.00	$0.00		
175A	Room - 215S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2500	320.0	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	None	2500	320.0	0.0	0.0	$0.00	$0.00	$0.00		

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

ECM-6 Install Occupancy Sensors **$6.01 $/kW**

EXISTING CONDITIONS

Field Code	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh
	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)
175A	Room - 212S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	288.0
175A	Janitor - 212	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72.0
35A	Room - 211S	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	576.0
35A	Room - 210S	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720.0
35A	Room - 209	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432.0
129A	Room - 209	6	SP 72 I	I72/1	75	0.5	SW	2250	1,012.5
175A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216.0
175A	2nd Floor Women's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216.0
175A	2nd Floor Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72.0
35A	Room - 216S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864.0
35A	Room - 208S	15	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2250	1,080.0
35A	Room - 216A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288.0
35A	Room - 216B	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288.0
35A	Room - 217A	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432.0
35A	Room - 217B	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864.0
35A	Corridor - 217	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	144.0
35A	1st Floor Men's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432.0
35A	1st Floor Women's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432.0
180	Room - 104	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2250	2,268.0
209A	Room - 103	16	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.5	SW	2250	1,152.0
4A	Room - 103A	18	2-LAMP U-TUBE T-12	FU2SS	95	1.7	SW	2250	3,847.5
4A	Room - 102	30	2-LAMP U-TUBE T-12	FU2SS	95	2.9	SW	2250	6,412.5
61A	Room - 101	3	4' 3-LAMP T-12	F43EL	115	0.3	SW	2250	776.3
4A	Room - 101	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	2250	213.8
4A	Room - 101	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	2250	1,282.5
204	Manufacturing Stock Room	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	SW	2250	2,328.8
169	Exterior	4	SP 250 MH ROOF	MH250/1	295	1.2	SW	2250	2,655.0
	Total	**925**				**78.8**			**196,997**

RETROFIT CONDITIONS / **COST & SAVINGS ANALYSIS**

Field Code	Area Description	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
		No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
175A	Room - 212S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	C-OCC	1000	128.0	160.0	0.0	$18.35	$202.50	$35.00	8.8	7.3
175A	Janitor - 212	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	C-OCC	1000	32.0	40.0	0.0	$4.59				
35A	Room - 211S	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	C-OCC	1000	256.0	320.0	0.0	$36.70	$202.50	$35.00	2.5	2.0
35A	Room - 210S	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	C-OCC	1000	320.0	400.0	0.0	$45.88				
35A	Room - 209	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	C-OCC	2250	432.0	0.0	0.0	$0.00	$202.50	$35.00		
129A	Room - 209	6	SP 72 I	I72/1	75	0.5	C-OCC	1825	821.3	191.3	0.0	$21.94	$202.50	$35.00	9.2	7.6
175A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	C-OCC	1825	175.2	40.8	0.0	$4.68	$202.50	$35.00	43.3	35.8
175A	2nd Floor Women's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	C-OCC	2250	216.0	0.0	0.0	$0.00	$202.50	$35.00		
175A	2nd Floor Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	C-OCC	2250	72.0	0.0	0.0	$0.00	$202.50	$35.00		
35A	Room - 216S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	C-OCC	1825	700.8	163.2	0.0	$18.72	$202.50	$35.00	10.8	8.9
35A	Room - 208S	15	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	C-OCC	2250	1,080.0	0.0	0.0	$0.00	$202.50	$35.00		
35A	Room - 216A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	C-OCC	1825	233.6	54.4	0.0	$6.24	$202.50	$35.00	32.5	26.8
35A	Room - 216B	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	C-OCC	1000	128.0	160.0	0.0	$18.35	$202.50	$35.00	11.0	9.1
35A	Room - 217A	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	C-OCC	2250	432.0	0.0	0.0	$0.00	$202.50	$35.00		
35A	Room - 217B	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	C-OCC	2250	864.0	0.0	0.0	$0.00	$202.50	$35.00		
35A	Corridor - 217	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	C-OCC	1825	116.8	27.2	0.0	$3.12	$202.50	$35.00	64.9	53.7
35A	1st Floor Men's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	C-OCC	1000	192.0	240.0	0.0	$27.53	$202.50	$35.00	7.4	6.1
35A	1st Floor Women's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	C-OCC	1825	350.4	81.6	0.0	$9.36	$202.50	$35.00	21.6	17.9
180	Room - 104	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	C-OCC	2250	2,268.0	0.0	0.0	$0.00	$202.50	$35.00		
209A	Room - 103	16	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.5	C-OCC	2250	1,152.0	0.0	0.0	$0.00	$202.50	$35.00		
4A	Room - 103A	18	2-LAMP U-TUBE T-12	FU2SS	95	1.7	C-OCC	2250	3,847.5	0.0	0.0	$0.00	$202.50	$35.00		
4A	Room - 102	30	2-LAMP U-TUBE T-12	FU2SS	95	2.9	C-OCC	2250	6,412.5	0.0	0.0	$0.00	$202.50	$35.00		
61A	Room - 101	3	4' 3-LAMP T-12	F43EL	115	0.3	C-OCC	2250	776.3	0.0	0.0	$0.00	$202.50	$35.00		
4A	Room - 101	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	C-OCC	780	74.1	139.7	0.0	$16.02	$202.50	$35.00	12.6	10.5
4A	Room - 101	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	C-OCC	2250	1,282.5	0.0	0.0	$0.00	$202.50	$35.00		
204	Manufacturing Stock Room	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	C-OCC	2250	2,328.8	0.0	0.0	$0.00	$202.50	$35.00		
169	Exterior	4	SP 250 MH ROOF	MH250/1	295	1.2	C-OCC	2250	2,655.0	0.0	0.0	$0.00	$202.50	$35.00		
	Total	**925**				**79**			**160,061**	**36,936**	**0**	**$4,236**	**$11,100**	**1,645**		
									Demand Savings			**0.0**	**$0**			
									kWh Savings			**36,900**	**$4,232**			
									Total Savings				**$4,232**		**2.6**	**2.2**

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

ECM-7 Lighting Replacements with Occupancy Sensors **$6.01 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
234	Entrance Vestibule	3	SP 100 W I 2	i100/2	200	0.6	SW	2500	1,500	3	WP 42 1	CF42/2-L	100	0.3	None	2,500	750	750	0.3	$ 107.66	$ 285.75	$ -	2.7	2.7
143	Front Glass Atrium	14	HPS 100 POLE	HPS100/1	138	1.9	SW	2500	4,830	14	FXLED39	FXLED39/1	39	0.5	None	2,500	1,365	3,465	1.4	$ 497.39	$ 1,606.50	$ 350	3.2	2.5
129A	2nd Floor Atrium	19	SP 72 I	I72/1	75	1.4	SW	2500	3,563	19	SP 72 I	I72/1	72	1.4	None	2,500	3,420	143	0.1	$ 20.46	$ -	$ -	0.0	0.0
146	Warehouse	25	High Bay MH 400	MH400/1	458	11.5	SW	2125	24,331	25	P 54 C F 4	FC20	20	0.5	C-OCC	1,200	600	23,731	11.0	$ 3,511.64	$ 202.50	$ 35	0.1	0.0
4A	Room - 204	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	2125	2,624	13	F17T8	F22ILL	33	0.4	C-OCC	1,200	515	2,110	0.8	$ 300.09	$ 1,316.25	$ -	4.4	4.4
162A	Room - 204A	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510	2	F28T8	F44SSILL-R	86	0.2	C-OCC	1,200	206	304	0.1	$ 39.73	$ -	$ 50	0.0	-1.3
162A	Room - 205	21	4' 4-LAMP T-12	F44EL	120	2.5	SW	2500	6,300	21	F28T8	F44SSILL-R	86	1.8	None	2,500	4,515	1,785	0.7	$ 256.23	$ -	$ 525	0.0	-2.0
162A	Room - 205A	10	4' 4-LAMP T-12	F44EL	120	1.2	SW	2125	2,550	10	F28T8	F44SSILL-R	86	0.9	OCC	1,200	1,032	1,518	0.3	$ 198.63	$ 118.75	$ 20	0.6	0.5
162A	Room - 205B	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2125	510	2	F28T8	F44SSILL-R	86	0.2	OCC	1,200	206	304	0.1	$ 39.73	$ 118.75	$ 70	3.0	1.2
162A	Room - 205C	3	4' 4-LAMP T-12	F44EL	120	0.4	SW	2125	765	3	F28T8	F44SSILL-R	86	0.3	OCC	1,200	310	455	0.1	$ 59.59	$ 118.75	$ 20	2.0	1.7
4A	Room - 207F	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855	4	F17T8	F22ILL	33	0.1	C-OCC	1,000	132	723	0.2	$ 100.81	$ 607.50	$ 35	6.0	5.7
4A	Room - 207G	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2250	855	4	F17T8	F22ILL	33	0.1	C-OCC	1,000	132	723	0.2	$ 100.81	$ 607.50	$ 35	6.0	5.7
4A	Room - 207D	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	OCC	1,200	158	649	0.2	$ 92.34	$ 523.75	$ 20	5.7	5.5
4A	Room - 207A	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	OCC	1,200	158	649	0.2	$ 92.34	$ 523.75	$ 20	5.7	5.5
4A	Room - 207B	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	OCC	1,200	158	649	0.2	$ 92.34	$ 523.75	$ 20	5.7	5.5
4A	Room - 207C	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2000	950	5	F17T8	F22ILL	33	0.2	OCC	1,000	165	785	0.3	$ 112.39	$ 625.00	$ -	5.6	5.6
4A	Room - 207E	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	OCC	1,200	158	649	0.2	$ 92.34	$ 523.75	$ 20	5.7	5.5
4A	Room - 207	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	2125	1,817	9	F17T8	F22ILL	33	0.3	OCC	1,200	356	1,460	0.6	$ 207.76	$ 1,030.00	$ 20	5.0	4.9
35A	Room - 218	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2125	1,088	16	4' 3-LAMP T-8 (32W)	F43ILL	89	1.4	OCC	1,200	1,709	(621)	(0.9)	$ (136.98)	$ 118.75	$ 20		
35A	Room - 219	11	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	748	11	4' 3-LAMP T-8 (32W)	F43ILL	89	1.0	OCC	1,200	1,175	(427)	(0.6)	$ (94.17)	$ 118.75	$ 20		
35A	Room - 220	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	OCC	1,200	1,282	(466)	(0.7)	$ (102.73)	$ 118.75	$ 20		
4A	2nd Floor Men's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	OCC	1,200	198	811	0.3	$ 115.42	$ 625.00	$ 125	5.4	4.3
4A	2nd Floor Women's Bathroom	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	OCC	1,200	198	811	0.3	$ 115.42	$ 625.00	$ 20	5.4	5.2
4A	Room - 203	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2125	2,423	12	F17T8	F22ILL	33	0.4	OCC	1,200	475	1,947	0.7	$ 277.01	$ 1,333.75	$ 20	4.8	4.7
143	Room - 203	13	HPS 100 POLE	HPS100/1	138	1.8	SW	2500	4,485	13	FXLED39	FXLED39/1	39	0.5	None	2,500	1,268	3,218	1.3	$ 461.86	$ 1,491.75	$ -	3.2	3.2
143	Auditorium - 202	28	HPS 100 POLE	HPS100/1	138	3.9	SW	2125	8,211	28	FXLED39	FXLED39/1	39	1.1	OCC	1,200	1,310	6,901	2.8	$ 991.40	$ 3,331.75	$ 20	3.4	3.3
129A	Auditorium - 202	5	SP 72 I	I72/1	75	0.4	SW	2125	797	5	SP 72 I	I72/1	72	0.4	OCC	1,000	360	437	0.0	$ 51.19	$ 118.75	$ 20	2.3	1.9
11A	Auditorium - 233	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	500	30	1	F42ILL-R	FXLED78/1	78	0.1	None	500	39	(9)	(0.0)	$ (2.33)	$ 250.00	$ 25		
11A	Auditorium - 234	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F42ILL-R	FXLED78/1	78	0.1	OCC	1,200	94	34	(0.0)	$ 2.59	$ 368.75	$ 20	142.4	134.6
4A	Room - 201	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	2500	2,850	12	F17T8	F22ILL	33	0.4	None	2,500	990	1,860	0.7	$ 266.99	$ 1,215.00	$ -	4.6	4.6
129A	Room - 201	15	SP 72 I	I72/1	75	1.1	SW	2500	2,813	15	SP 72 I	I72/1	72	1.1	None	2,500	2,700	113	0.0	$ 16.15	$ -	$ 375	0.0	-23.2
162A	Room - 220 (Shred Room)	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	2500	600	2	F28T8	F44SSILL-R	86	0.2	None	2,500	430	170	0.1	$ 24.40	$ -	$ 50	0.0	-2.0
129A	3rd Floor Atrium	12	SP 72 I	I72/1	75	0.9	SW	2125	1,913	12	SP 72 I	I72/1	72	0.9	OCC	1,200	1,037	876	0.0	$ 103.04	$ 118.75	$ -	1.2	1.2
4A	Room - 301	9	2-LAMP U-TUBE T-12	FU2SS	95	0.9	SW	1062.5	908	9	F17T8	F22ILL	33	0.3	None	1,063	316	593	0.6	$ 108.24	$ 911.25	$ -	8.4	8.4
4A	Room - 301A	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	OCC	1,200	198	811	0.3	$ 115.42	$ 625.00	$ 20	5.4	5.2
4A	Room - 301B	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	1062.5	606	6	F17T8	F22ILL	33	0.2	None	1,063	210	395	0.4	$ 72.16	$ 607.50	$ -	8.4	8.4
4A	Closet Room - 301B	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	1062.5	101	1	F17T8	F22ILL	33	0.0	None	1,063	35	66	0.1	$ 12.03	$ 101.25	$ -	8.4	8.4
4A	Room - 302	5	2-LAMP U-TUBE T-12	FU2SS	95	0.5	SW	2125	1,009	5	F17T8	F22ILL	33	0.2	OCC	1,200	198	811	0.3	$ 115.42	$ 625.00	$ 20	5.4	5.2
4A	Room - 302A	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	None	500	50	93	0.2	$ 24.08	$ 303.75	$ -	12.6	12.6
4A	Room - 302B	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	None	500	50	93	0.2	$ 24.08	$ 303.75	$ -	12.6	12.6
4A	Room - 302C	3	2-LAMP U-TUBE T-12	FU2SS	95	0.3	SW	500	143	3	F17T8	F22ILL	33	0.1	None	500	50	93	0.2	$ 24.08	$ 303.75	$ -	12.6	12.6
4A	3rd Floor Men's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	2125	808	4	F17T8	F22ILL	33	0.1	OCC	1,200	158	649	0.2	$ 92.34	$ 523.75	$ 20	5.7	5.5
4A	3rd Floor Women's Bathroom	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	SW	1062.5	404	4	F17T8	F22ILL	33	0.1	None	1,063	140	264	0.2	$ 48.11	$ 405.00	$ -	8.4	8.4
71	3rd Floor HVAC Access	1	I 60	I60/1	60	0.1	SW	2125	128	1	CF 26	CFQ26/1-L	27	0.0	OCC	1,200	32	95	0.0	$ 13.29	$ 159.25	$ -	12.0	12.0
129A	1st Floor Lower Level Stairs	11	SP 72 I	I72/1	75	0.8	SW	1062.5	877	11	SP 72 I	I72/1	72	0.8	None	1,063	842	35	0.0	$ 6.40	$ -	$ 77	0.0	-12.0
129A	1st Floor Corridor	14	SP 72 I	I72/1	75	1.1	SW	2250	2,363	14	SP 72 I	I72/1	72	1.0	None	2,250	2,268	95	0.0	$ 13.87	$ -	$ -	0.0	0.0
35A	1st Floor Corridor	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	None	2,250	2,003	(1,283)	(0.6)	$ (188.21)	$ -	$ -		
4A	Room - 105	12	2-LAMP U-TUBE T-12	FU2SS	95	1.1	SW	500	570	12	F17T8	F22ILL	33	0.4	None	500	198	372	0.7	$ 96.33	$ 1,215.00	$ -	12.6	12.6
129A	Room - 105	15	SP 72 I	I72/1	75	1.1	SW	520	585	15	SP 72 I	I72/1	72	1.1	None	520	562	23	0.0	$ 5.93	$ -	$ -	0.0	0.0
35A	Room - 119	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	520	200	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	C-OCC	390	417	(217)	(0.7)	$ (74.20)	$ 202.50	$ 35		
4A	Room - 108	23	2-LAMP U-TUBE T-12	FU2SS	95	2.2	SW	520	1,136	23	F17T8	F22ILL	33	0.8	None	520	395	742	1.4	$ 187.90	$ 2,328.75	$ 575	12.4	9.3
4A	Room - 118	8	2-LAMP U-TUBE T-12	FU2SS	95	0.8	SW	500	380	8	F17T8	F22ILL	33	0.3	None	500	132	248	0.5	$ 64.22	$ 810.00	$ -	12.6	12.6
4A	Room - 107	4	2-LAMP U-TUBE T-12	FU2SS	95	0.4	Timer	4380	1,664	4	F17T8	F22ILL	33	0.1	None	4,380	578	1,086	0.2	$ 142.47	$ 405.00	$ -	2.8	2.8
4A	Room - 106A	26	2-LAMP U-TUBE T-12	FU2SS	95	2.5	Timer	4380	10,819	26	F17T8	F22ILL	33	0.9	None	4,380	3,758	7,061	1.6	$ 926.09	$ 2,632.50	$ -	2.8	2.8
4A	Room - 106B	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,819	13	F17T8	F22ILL	33	0.4	None	8,760	3,758	7,061	0.8	$ 867.96	$ 1,316.25	$ -	1.5	1.5
4A	Room - 106	13	2-LAMP U-TUBE T-12	FU2SS	95	1.2	SW	8760	10,819	13	F17T8	F22ILL	33	0.4	None	8,760	3,758	7,061	0.8	$ 867.96	$ 1,316.25	$ -	1.5	1.5
11A	1st Floor Mechanical Room	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	383	3	F42ILL-R	FXLED78/1	78	0.2	OCC	1,200	281	102	(0.1)	$ 7.77	$ 868.75	$ 95	111.8	99.6
35A	Room - 118	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	OCC	1,200	1,282	(466)	(0.7)	$ (102.73)	$ 118.75	$ 300		
35A	Optimology - A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	64	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	None	500	178	(114)	(0.2)	$ (29.52)	$ -	$ 100		
35A	Optimology - B	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	None	500	89	(57)	(0.1)	$ (14.76)	$ -	$ 50		
35A	Optimology - C	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	561	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	None	8,760	1,559	(999)	(0.1)	$ (122.76)	$ -	$ 50		
35A	Optimology - D	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	500	32	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	None	500	89	(57)	(0.1)	$ (14.76)	$ -	$ 50		
35A	Optimology - E	3	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	315	3	4' 3-LAMP T-8 (32W)	F43ILL	89	0.3	OCC	1,825	487	(172)	(0.2)	$ (32.05)	$ 118.75	$ 95		
35A	Optimology - F	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	3285	420	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	OCC	1,825	650	(229)	(0.2)	$ (42.73)	$ 118.75	$ 120		
35A	Optimology - G	16	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	8760	4,485	16	4' 3-LAMP T-8 (32W)	F43ILL	89	1.4	None	8,760	12,474	(7,989)	(0.9)	$ (982.10)	$ -	$ 400		
234	East Lower Vestibule	6	SP 100 W I 2	i100/2	200	1.2	SW	8760	10,512	6	WP 42 1	CF42/2-L	100	0.6	None	8,760	5,256	5,256	0.6	$ 646.12	$ 571.50	$ -	0.9	0.9
175A	East Lower Corridor	23	4' 2-LAMP T-8 (32W)	F42ILL	32	0.7	SW	500	368	23	4' 2-LAMP T-8	F42ILL	59	1.4	None	500	679	(311)	(0.6)	$ (80.40)	$ -	$ 575		
35A	Room - 109S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2125	816	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	OCC	1,000	1,068	(252)	(0.7)	$ (78.23)	$ 118.75	$ 300		
35A	Room - 110S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	500	192	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	None	500	534	(342)	(0.7)	$ (88.56)	$ -	$ 300		
35A	Room - 111S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	OCC	1,000	1,068	(300)	(0.7)	$ (83.74)	$ 118.75	$ 300		
35A	Room - 112S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2000	768	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	None	2,000	2,136	(1,368)	(0.7)	$ (206.24)	$ -	$ 300		
11A	1st Floor Men's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	500	90	3	F42ILL-R	FXLED78/1	78	0.2	None	500	117	(27)	(0.1)	$ (6.99)	$ 750.00	$ 75		
11A	1st Floor Women's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	8760	1,577	3	F42ILL-R	FXLED78/1	78	0.2	OCC	2,000	468	1,109	(0.1)	$ 123.28	$ 868.75	$ 95	7.0	6.3
175A	Custodial Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	500	16	1	4' 2-LAMP T-8	F42ILL	59	0.1	None	500	30	(14)	(0.0)	$ (3.50)	$ -	$ 25		
35A	Room - 112	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	128	8	4' 3-LAMP T-8 (32W)	F43ILL	89	0.7	None	500	356	(228)	(0.5)	$ (59.04)	$ -	$ 200		
11A	Men's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	8760	526	1	F42ILL-R	FXLED78/1	78	0.1	OCC	2,000	156	370	(0.0)	$ 41.09	$ 368.75	$ 25	9.0	8.4
11A	Women's	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2000	120	1	F42ILL-R	FXLED78/1	78	0.1	None	2,000	156	(36)	(0.0)	$ (5.43)	$ 250.00	$ 25		
35A	Room - 113S	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	8760	1,121	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	None	8,760	3,119	(1,997)	(0.2)	$ (245.53)	$ -	$ 100		
35A	Room - 115S	5	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2000	320	5	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	OCC	1,000	445	(125)	(0.3)	$ (34.89)	$ 118.75	$ 145		
35A	Room - 114S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	4380	1,682	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	OCC	2,000	2,136	(454)	(0.7)	$ (101.41)	$ 118.75	$ 320		
175A	Room - 114S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	4380	561	4	4' 2-LAMP T-8	F42ILL	59	0.2	C-OCC	2,000	472	89	(0.1)	$ 2.38	$ 202.50	$ 135	85.2	28.4
234	Back Vestuble	6	SP 100 W I 2	i100/2	200	1.2	SW	4380	5,256	6	WP 42 1	CF42/2-L	100	0.6	OCC	2,000	1,200	4,056	0.6	$ 508.48	$ 690.25	$ 170	1.4	1.0
175A	Elevator Machine Room	2	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	520	33	2	4' 2-LAMP T-8	F42ILL	59	0.1	C-OCC	390	46	(13)	(0.1)	$ (5.36)	$ 202.50	$ 85		
227	2nd Floor Sitting Area	5	W60CF1	F81EL	60	0.3	SW	520	156	5	CF42W	CF42/1-L	48	0.2	OCC	390	94	62	0.1	$ 11.48	$ 1,131.25	$ 145	98.5	85.9
234	2nd Floor Sitting Area	4	SP 100 W I 2	i100/2	200	0.8	SW	2500	2,000	4	WP 42 1	CF42/2-L	100	0.4	None	2,500	1,000	1,000	0.4	$ 143.55	$ 381.00	$ -	2.7	2.7
175A	Lounge Room - 213S	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2125	68	1	4' 2-LAMP T-8	F42ILL	59	0.1	OCC	1,200	71	(3)	(0.0)	$ (2.27)	$ 118.75	$ 45		
175A	2nd Floor Corridor	26	4' 2-LAMP T-8 (32W)	F42ILL	32	0.8	SW	2125	1,768	26	4' 2-LAMP T-8	F42ILL	59	1.5	OCC	1,200	1,841	(73)	(0.7)	$ (58.98)	$ 118.75	$ 650		
234	2nd Floor Corridor	4	SP 100 W I 2	i100/2	200	0.8	SW	1125	900	4	WP 42 1	CF42/2-L	100	0.4	None	1,125	450	450	0.4	$ 80.46	$ 381.00	$ 28	4.7	4.4
175A	Room - 215S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2500	320	4	4' 2-LAMP T-8	F42ILL	59	0.2	None	2,500	590	(270)	(0.1)	$ (38.76)	$ -	$ 100		
175A	Room - 212S	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	288	4	4' 2-LAMP T-8	F42ILL	59	0.2	C-OCC	1,000	236	52	(0.1)	$ (1.82)	$ 202.50	$ 135		
175A	Janitor - 212	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72	1	4' 2-LAMP T-8	F42ILL	59	0.1	C-OCC	1,000	59	13	(0.0)	$ (0.46)	$ 202.50	$ -		

Energy Audit of Camden County College (CIM Lab Building)

CHA Project No. 24364 **Cost of Electricity:** **$0.115 $/kWh**

ECM-7 Lighting Replacements with Occupancy Sensors **$6.01 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35A	Room - 211S	8	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	576	8	4' 3-LAMP T-8 (32W)	F43ILL	89	0.7	C-OCC	1,000	712	(136)	(0.5)	$ (48.49)	$ 202.50	$ 235		
35A	Room - 210S	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	2250	720	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	C-OCC	1,000	890	(170)	(0.6)	$ (60.61)	$ 202.50	$ -		
35A	Room - 209	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	C-OCC	2,250	1,202	(770)	(0.3)	$ (112.92)	$ 202.50	$ 185		
129A	Room - 209	6	SP 72 I	I72/1	75	0.5	SW	2250	1,013	6	SP 72 I	I72/1	72	0.4	C-OCC	1,825	788	224	0.0	$ 27.00	$ 202.50	$ 185	7.5	0.6
175A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216	3	4' 2-LAMP T-8	F42ILL	59	0.2	C-OCC	1,825	323	(107)	(0.1)	$ (18.12)	$ 202.50	$ 110		
175A	2nd Floor Women's Bathroom	3	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2250	216	3	4' 2-LAMP T-8	F42ILL	59	0.2	C-OCC	2,250	398	(182)	(0.1)	$ (26.75)	$ 202.50	$ 110		
175A	2nd Floor Closet	1	4' 2-LAMP T-8 (32W)	F42ILL	32	0.0	SW	2250	72	1	4' 2-LAMP T-8	F42ILL	59	0.1	C-OCC	2,250	133	(61)	(0.0)	$ (8.92)	$ 202.50	$ 60		
35A	Room - 216S	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	C-OCC	1,825	1,949	(1,085)	(0.7)	$ (173.79)	$ 202.50	$ 335		
35A	Room - 208S	15	4' 3-LAMP T-8 (32W)	F43ILL	32	0.5	SW	2250	1,080	15	4' 3-LAMP T-8 (32W)	F43ILL	89	1.3	C-OCC	2,250	3,004	(1,924)	(0.9)	$ (282.31)	$ 202.50	$ 410		
35A	Room - 216A	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	C-OCC	1,825	650	(362)	(0.2)	$ (57.93)	$ 202.50	$ 135		
35A	Room - 216B	4	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	288	4	4' 3-LAMP T-8 (32W)	F43ILL	89	0.4	C-OCC	1,000	356	(68)	(0.2)	$ (24.24)	$ 202.50	$ 135		
35A	Room - 217A	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	C-OCC	2,250	1,202	(770)	(0.3)	$ (112.92)	$ 202.50	$ 185		
35A	Room - 217B	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	2250	864	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	C-OCC	2,250	2,403	(1,539)	(0.7)	$ (225.85)	$ 202.50	$ 335		
35A	Corridor - 217	2	4' 3-LAMP T-8 (32W)	F43ILL	32	0.1	SW	2250	144	2	4' 3-LAMP T-8 (32W)	F43ILL	89	0.2	C-OCC	1,825	325	(181)	(0.1)	$ (28.96)	$ 202.50	$ 85		
35A	1st Floor Men's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	C-OCC	1,000	534	(102)	(0.3)	$ (36.36)	$ 202.50	$ 185		
35A	1st Floor Women's Bathroom	6	4' 3-LAMP T-8 (32W)	F43ILL	32	0.2	SW	2250	432	6	4' 3-LAMP T-8 (32W)	F43ILL	89	0.5	C-OCC	1,825	975	(543)	(0.3)	$ (86.89)	$ 202.50	$ 185		
180	Room - 104	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2250	2,268	9	T 28 C F 4	F43SSILL	72	0.6	C-OCC	2,250	1,458	810	0.4	$ 118.87	$ 1,235.25	$ 260	10.4	8.2
209A	Room - 103	16	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.5	SW	2250	1,152	16	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.9	C-OCC	2,250	2,124	(972)	(0.4)	$ (142.64)	$ 202.50	$ 35		
4A	Room - 103A	18	2-LAMP U-TUBE T-12	FU2SS	95	1.7	SW	2250	3,848	18	F17T8	F22ILL	33	0.6	C-OCC	2,250	1,337	2,511	1.1	$ 368.49	$ 2,025.00	$ 35	5.5	5.4
4A	Room - 102	30	2-LAMP U-TUBE T-12	FU2SS	95	2.9	SW	2250	6,413	30	F17T8	F22ILL	33	1.0	C-OCC	2,250	2,228	4,185	1.9	$ 614.15	$ 3,240.00	$ 35	5.3	5.2
61A	Room - 101	3	4' 3-LAMP T-12	F43EL	115	0.3	SW	2250	776	3	F28T8	F43SSILL-R	66	0.2	C-OCC	2,250	446	331	0.1	$ 48.54	$ 587.25	$ 35	12.1	11.4
4A	Room - 101	1	2-LAMP U-TUBE T-12	FU2SS	95	0.1	SW	2250	214	1	F17T8	F22ILL	33	0.0	C-OCC	780	26	188	0.1	$ 26.04	$ 303.75	$ 60	11.7	9.4
4A	Room - 101	6	2-LAMP U-TUBE T-12	FU2SS	95	0.6	SW	2250	1,283	6	F17T8	F22ILL	33	0.2	C-OCC	2,250	446	837	0.4	$ 122.83	$ 810.00	$ 185	6.6	5.1
204	Manufacturing Stock Room	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	SW	2250	2,329	5	S 96 P F 2 (MAG) 8'	F82EHE	207	1.0	C-OCC	2,250	2,329	-	0.0	$ -	$ 202.50	$ 35		
169	Exterior	4	SP 250 MH ROOF	MH250/1	295	1.2	SW	2250	2,655	4	FXLED78	FXLED78/1	78	0.3	C-OCC	2,250	702	1,953	0.9	$ 286.60	$ 715.50	$ 115	2.5	2.1
	Total	**925**				**78.8**			**196,997**	**925**				**57.8**			**115,511**		**21.0**	**$10,864**	**$54,400**	**11,930**		
																	Demand Savings			**21.0**	**$1,518**			
																	kWh Savings			**81,500**	**$9,348**			
																	Total Savings				**$10,865**		**5.0**	**3.9**

APPENDIX D

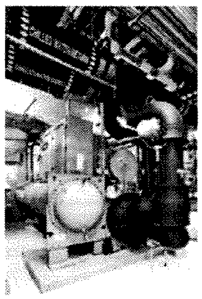
New Jersey Pay For Performance
Incentive Program

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

Take a comprehensive, whole-building approach to saving energy in your existing facilities and earn incentives that are directly linked to your savings. Pay for Performance relies on a network of program partners who provide technical services under direct contract to you. Acting as your energy expert, your partner will develop an energy reduction plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and a construction schedule for installation.



Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following five customer classes are not required to meet the 100 kW demand in order to participate in the program: hospitals, public colleges and universities, 501(c)(3) non-profits, affordable multifamily housing, and local governmental entities. Your energy reduction plan must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more.

Exceptions to the 15% threshold requirement may be made for certain industrial, manufacturing, water treatment and datacenter building types whose annual energy consumption is heavily weighted on process loads. Details are available in the high energy intensity section of the FAQ page.

ENERGY STAR Portfolio Manager

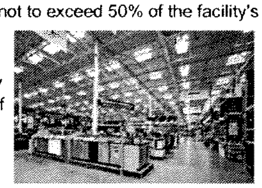
Pay for Performance takes advantage of the ENERGY STAR Program with Portfolio Manager, EPA's interactive tool that allows facility managers to track and evaluate energy and water consumption across all of their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.

This rating system assesses building performance by tracking and scoring energy use in your facilities and comparing it to similar buildings. That can be a big help in locating opportunities for cost-justified energy efficiency upgrades. And, based on our findings, you may be invited to participate in the Building Performance with ENERGY STAR initiative and receive special recognition as an industry leader in energy efficiency.

Incentives

Pay for Performance incentives are awarded upon the satisfactory completion of three program milestones:

Incentive #1 - Submittal of complete energy reduction plan prepared by an approved program partner - Contingent on moving forward, incentives will be between $5,000 and $50,000 based on approximately $.10 per square foot, not to exceed 50% of the facility's annual energy expense.



Incentive #2 - Installation of recommended measures - Incentives are based on the projected level of electricity and natural gas savings resulting from the installation of comprehensive energy-efficiency measures.

Incentive #3 - Completion of Post-Construction Benchmarking Report - A completed report verifying energy reductions based on one year of post-implementation results. Incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum performance threshold of 15% savings has been achieved.

CONTACT US

A detailed Incentive Structure document is available on the applications and forms page.

Energy Efficiency Revolving Loan Fund (EE RLF)

New Jersey-based commercial, institutional or industrial entities (including 501(c)(3) organizations) that have received an approved energy reduction plan under Pay for Performance may be eligible for supplemental financing through the EE RLF. The financing, in the form of low-interest loans, can be used to support up to 80% of total eligible project costs, not to exceed $2.5 million or 100% of total eligible project costs from all public state funding sources. Visit the NJ EDA website for details.

Steps to Participation

Click here for a step-by-step description of the program.

New Jersey's Clean Energy Program
Your Power to Save
njcleanenergy.com

New Jersey SmartStart Buildings®

BPU

2012 PAY FOR PERFORMANCE PROGRAM
Existing Buildings Incentive Structure

Incentive #1: Energy Reduction Plan

Incentive Amount:..............................**$0.10 per sq ft**
Minimum Incentive:...........................**$5,000**
Maximum Incentive::.........................**$50,000 or 50% of facility annual energy cost (whichever is less)**

This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP) and is paid upon ERP approval. Incentive is contingent on implementation of recommended measures outlined in the ERP.

Incentive #2: Installation of Recommended Measures

Minimum Performance Target:................**15%**

Electric Incentives

Base Incentive based on 15% savings:......**$0.09 per projected kWh saved**
For each % over 15% add:.........................**$0.005 per projected kWh saved**
Maximum Incentive:.................................**$0.11 per projected kWh saved**

Gas Incentives

Base Incentive based on 15% savings:......**$0.90 per projected Therm saved**
For each % over 15% add:.........................**$0.05 per projected Therm saved**
Maximum Incentive:.................................**$1.25 per projected Therm saved**

Incentive Cap:....................................**25% of total project cost**

This incentive is based on projected energy savings outlined in the ERP. Incentive is paid upon successful installation of recommended measures.

Incentive #3: Post-Construction Benchmarking Report

Minimum Performance Target:................**15%**

Electric Incentives

Base Incentive based on 15% savings:......**$0.09 per actual kWh saved**
For each % over 15% add:.........................**$0.005 per actual kWh saved**
Maximum Incentive:.................................**$0.11 per actual kWh saved**

Gas Incentives

Base Incentive based on 15% savings:......**$0.90 per actual Therm saved**
For each % over 15% add:.........................**$0.05 per actual Therm saved**
Maximum Incentive:.................................**$1.25 per actual Therm saved**

Incentive Cap:....................................**25% of total project cost**

This incentive will be released upon submittal of a Post-Construction Benchmarking Report that verifies that the level of savings actually achieved by the installed measures meets or exceeds the minimum performance threshold. To validate the savings and achievement of the Energy Target, the EPA Portfolio Manager shall be used. Savings should be rounded to the nearest percent. Total value of Incentive #2 and Incentive #3 may not exceed 50% of the total project cost. Incentives will be limited to $1 million per gas and electric account per building; maximum of $2 million per project. See Participation Agreement for details.

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
CIM (Computer Integrated Manufacturing) Building

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2012. Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
Values used in this calculation are for measures with a positive return on investment (ROI) only.

Total Building Area (Square Feet)	63,900
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

Incentive #1		
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$165,543	$16,056
Existing Usage (from utility)	1,443,300	19,437
Proposed Savings	185,872	1,378
Existing Total MMBtus	6,870	
Proposed Savings MMBtus	772	
% Energy Reduction	**11.2%**	
Proposed Annual Savings	$23,340	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm
Incentive #2	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.00	$0.00
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.00	$0.00

Total Recommended Project Savings	Incentives $		
11.2%	Elec	Gas	Total
Incentive #1	$0	$0	$5,000
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$5,000**

Total Project Cost	$117,000

		Allowable Incentive
% Incentives #1 of Utility Cost*	2.8%	$5,000
% Incentives #2 of Project Cost**	0.0%	$0
% Incentives #3 of Project Cost**	0.0%	$0
Total Eligible Incentives***	**$5,000**	
Project Cost w/ Incentives	$112,000	

Project Payback (years)	
w/o Incentives	w/ Incentives
5.0	4.8

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.
** Maximum allowable amount of Incentive #2 is 25% of total project cost.
Maximum allowable amount of Incentive #3 is 25% of total project cost.
*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account; maximum 2 million per project

APPENDIX E

Energy Savings Improvement Plan (ESIP)

New Jersey's Clean Energy Program
Your Power to Save

Your Power to Save
At Home, for Business, and for the Future

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  - COMBINED HEAT & POWER AND FUEL CELLS
  - LOCAL GOVERNMENT ENERGY AUDIT
  - LARGE ENERGY USERS PILOT
  - ENERGY SAVINGS IMPROVEMENT PLAN
  - DIRECT INSTALL
  - ENERGY BENCHMARKING
  - T-12 SCHOOLS LIGHTING INITIATIVE
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Energy Savings Improvement Plan

A new State law allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the “Energy Savings Improvement Program” (ESIP), provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

This Local Finance Notice outlines how local governments can develop and implement an ESIP for their facilities. Below are two sample RFPs:

- Local Government
- School Districts (K-12)

The Board also adopted protocols to measure energy savings.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs. Local units considering an ESIP should carefully review the Local Finance Notice, the law, and consult with qualified professionals to determine how they should approach the task.

FIRST STEP – ENERGY AUDIT

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. As explained in the Local Finance Notice, this may be done internally if an agency has qualified staff to conduct the audit. If not, the audit must be implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach - and it's free. **Incentives provide 100% of the cost of the audit.**

ENERGY REDUCTION PLANS

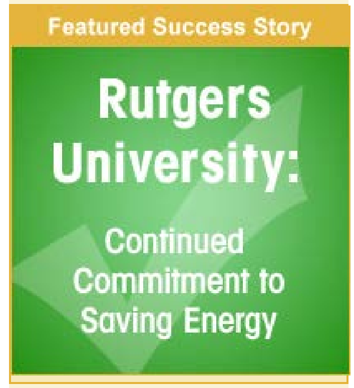
If you have an ESIP plan you would like to submit to the Board of Public Utilities, please email it to ESIP@bpu.state.nj.us. Please limit the file size to 3MB (or break it into smaller files).

- Frankford Township School District
- Northern Hunterdon-Voorhees Regional High School
- Manalapan Township *(**180 MB** - Right Click, Save As)*

Program Updates

- Board Order - Standby Charges for Distributed Generation Customers
- T-12 Schools Lighting Replacement Initiative - Funding Allocation Reached

Other updates posted.



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APPENDIX F

Solar Photovoltaic Analysis

Camden County College
Computer Integrated Manufacturing (CIM Building)

Cost of Electricity	$0.115	/kWh
Electricity Usage	1,443,300	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$640,000	**160.0**	**204,445**	**0**	**$23,511**	**0**	**$23,511**	**$0**	**$16,356**	**27.2**	**16.1**

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $80 /1000kwh

Area Output*
3,149 m2
33,896 ft2

Perimeter Output*
308 m
1,010 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
20,222 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes

8 watt/ft2
161,776 DC watts
160 kW Enter into PV Watts

PV Watts Inputs*

Array Tilt Angle	20	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	180	Enter into PV Watts (default)
Zip Code	08012	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output
204,445 annual kWh calculated in PV Watts program

% Offset Calc

Usage	1,443,300	(from utilities)
PV Generation	204,445	(generated using PV Watts)
% offset	14%	

* http://www.freemaptools.com/area-calculator.htm
**http://www.flettexchange.com

PVWatts ***** **AC Energy & Cost Savings** ***** Cautions for Interpreting the Results

Computer Integrated Manufacturing - CIM Building (Camden County College)

Station Identification

Cell ID:	0267373
State:	New Jersey
Latitude:	39.8 ° N
Longitude:	74.8 ° W

PV System Specifications

DC Rating:	160.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	132.8 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0 °
Array Azimuth:	180.0 °

Energy Specifications

Cost of Electricity:	11.5 ¢/kWh

Results

Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.71	11212	1289.38
2	3.50	13200	1518.00
3	4.81	19343	2224.45
4	5.27	20001	2300.12
5	5.81	22202	2553.23
6	6.13	21951	2524.37
7	5.76	21117	2428.45
8	5.63	20559	2364.28
9	5.03	18176	2090.24
10	4.04	15649	1799.63
11	2.90	11157	1283.06
12	2.46	9878	1135.97
Year	4.51	204445	23511.17

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster

RReDC home page (*http://rredc.nrel.gov*)

APPENDIX G

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
CIM Building

Building ID: 3339099
For 12-month Period Ending: May 31, 2012[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: November 08, 2012

Facility
CIM Building
College Drive
Blackwood, NJ 08012

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1986
Gross Floor Area (ft²): 63,900

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	4,924,540
Natural Gas (kBtu)[4]	1,926,757
Total Energy (kBtu)	6,851,297

Energy Intensity[4]

Site (kBtu/ft²/yr)	107
Source (kBtu/ft²/yr)	289

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	800

Electric Distribution Utility
Atlantic City Electric Co [Pepco Holdings Inc]

National Median Comparison

National Median Site EUI	104
National Median Source EUI	244
% Difference from National Median Source EUI	18%
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[5] 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. Values represent energy intensity, annualized to a 12-month period.
5. 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.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	CIM Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	College Drive, Blackwood, NJ 08012	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
CIM Building (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	63,900 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	N/A(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co [Pepco Holdings Inc]

Fuel Type: Electricity		
Meter: Electric (Meter: 76750034) (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
05/01/2012	05/31/2012	129,900.00
04/01/2012	04/30/2012	112,500.00
03/01/2012	03/31/2012	114,600.00
02/01/2012	02/29/2012	121,500.00
01/01/2012	01/31/2012	90,600.00
12/01/2011	12/31/2011	111,600.00
11/01/2011	11/30/2011	109,200.00
10/01/2011	10/31/2011	116,400.00
09/01/2011	09/30/2011	130,800.00
08/01/2011	08/31/2011	124,500.00
07/01/2011	07/31/2011	138,600.00
06/01/2011	06/30/2011	143,100.00
Electric (Meter: 76750034) Consumption (kWh (thousand Watt-hours))		**1,443,300.00**
Electric (Meter: 76750034) Consumption (kBtu (thousand Btu))		**4,924,539.60**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**4,924,539.60**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐
Fuel Type: Natural Gas		
Meter: Natural Gas (Meter #: 497191) (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
05/01/2012	05/31/2012	0.00
04/01/2012	04/30/2012	0.00
03/01/2012	03/31/2012	1,274.11
02/01/2012	02/29/2012	6,531.23
01/01/2012	01/31/2012	1,046.43
12/01/2011	12/31/2011	4,468.56
11/01/2011	11/30/2011	3,227.57
10/01/2011	10/31/2011	2,215.44
09/01/2011	09/30/2011	307.67
08/01/2011	08/31/2011	195.52

07/01/2011	07/31/2011	0.00
06/01/2011	06/30/2011	1.04
Natural Gas (Meter #: 497191) Consumption (therms)		**19,267.57**
Natural Gas (Meter #: 497191) Consumption (kBtu (thousand Btu))		**1,926,757.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**1,926,757.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: ____ Date: _____________

Signature: _____________________________________

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
CIM Building
College Drive
Blackwood, NJ 08012

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

CIM Building	
Gross Floor Area Excluding Parking: (ft²)	63,900
Year Built	1986
For 12-month Evaluation Period Ending Date:	May 31, 2012

Facility Space Use Summary

CIM Building	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area (ft²)	63,900
Number of PCs °	N/A
Weekly operating hours °	N/A
Workers on Main Shift °	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2012)	**Baseline** (Ending Date 05/31/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	107	107	0	N/A	104
Source (kBtu/ft²)	289	289	0	N/A	244
Energy Cost					
$/year	$ 181,469.17	$ 181,469.17	N/A	N/A	$ 176,019.34
$/ft²/year	$ 2.84	$ 2.84	N/A	N/A	$ 2.75
Greenhouse Gas Emissions					
$MtCO_2e$/year	800	800	0	N/A	776
$kgCO_2e$/ft²/year	13	13	0	N/A	13

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Median column represents the CBECS national median data for College/University (Campus-Level). This building uses 18% more energy per square foot than the CBECS national median for College/University (Campus-Level).

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.