CAMDEN COUNTY COLLEGE
TRUMAN HALL
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

CHA PROJECT NO. 24364

November 2012

Prepared by:

6 Campus Drive
Parsippany, NJ 07054

(973) 538-2120

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 Truman Hall	200 College Drive Building 6 Blackwood, New Jersey	33,000	Original: 1974

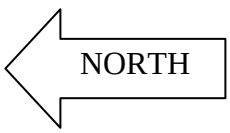
The Energy Conservation Measures (ECMs) identified in this report will allow for a more efficient use of energy and if pursued have the opportunity to qualify for the New Jersey SmartStart Buildings Program. Potential annual savings of $79,400 for the recommended ECMs may be realized with a payback of 5.5 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	186,900	4,500	>20	4,000	>20	
2	Replace Domestic Water Heat Exchanger	20,200	2,000	10.1	250	10.0	X
3	HVAC Air Cooled Chiller Addition	309,400	60,100	5.1	13,000	4.9	X
4	HVAC Install Variable Speed Drives, High Efficiency Motors	20,500	4,500	4.6	2,900	3.9	X
5	Building Automation System Upgrade / Re-Commission	16,500	4,300	3.8	0	3.8	X
6	Install Vending Miser	200 (per unit)	200 (average)	1.0	0	1.0	X
7	Replace Rooftop Exhaust Fans	1,500	400	3.8	0	3.8	X
8	Replace Domestic Hot Water Pumps	300 (per unit)	200 (per unit)	1.5	0	1.5	X
9	Replace Windows	101,600	600	>20	0	>20	
10	Lighting Replacement Upgrades	63,100	4,400	14.3	2,600	13.8	X
11	Install Lighting Controls (Occupancy Sensors)	4,100	3,500	1.2	580	1.0	X
12	Lighting Replacements with Lighting Controls (Occupancy Sensors)	67,300	6,700	10.0	3,200	9.6	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.

Truman Hall located on the Camden County College campus in Blackwood, NJ, is a 33,000 square foot two story building with an automotive technology service area, a machine shop, lecture hall, laboratories, storage, administrative offices, a mock operating room, a X-ray facility, computer labs, classrooms and support spaces. HVAC air handling units are located in a mechanical room; hot and chilled water utilities for HVAC equipment is piped from the Central Plant Building boilers and chillers. The building was constructed in 1974, and functions primarily as an automotive technology facility with dental hygiene teaching facility. 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 1974, Truman Hall is a 33,000 square foot, two-story building with high bays that contains an automotive technology service area, a machine shop, lecture hall, laboratories, storage, administrative offices, a mock operating room, a X-ray facility, computer labs, classrooms and support spaces. Main entrances on the southeast, north and northwest sides of the building open into a common lobby area at the center of the building.

Truman Hall 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 of structural steel framing with masonry walls and a brick stone veneer exterior finish. Insulation incorporated into some wall assemblies for an improved envelope is minimal and not very effective. The first floor contains an automotive technology service area, a machine shop, a 100 seat lecture hall, laboratories, storage, administrative offices, a mock operating room, a X-ray facility, classrooms and support spaces; the second floor contains computer labs, classrooms and support spaces. The flat roof system is comprised of a structural steel framing with a metal deck having rigid foam board insulation. The rooftop has a light-colored asphalt rolled roofing system. Windows are minimal (<25% of the walls where used), occurring on both floors on the north, west and south facades of the building. Windows are original single pane windows with tint. The main entrance doors are tinted glass store front with metal frames. The building has exposed walls facing the north, south and west directions with a uniform height (refer to photo above). The south wing of the building is two stories is approximately 25’ in height; the north wing contains the automotive technology service areas and support spaces is a one story area approximately 25’ in height. All first floor areas have concrete slab-on-grade floors, and the second floor areas have a reinforced concrete deck floor.

3.2 Utility Usage

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

The facility receives electricity from the main electric meter, which does not currently utilize any sub-metering. Electricity usage was determined as a percentage of total square footage of all the buildings contained on the meter. From June 2011 through April 2012, the electric usage for the building was approximately 902,489 kWh at a cost of about $195,646. Review of electricity bills during this period showed that the electricity was charged at the following rates: supply unit consumption cost of $0.119 per kWh; demand unit cost of $5.94 per kW; and blended unit cost of $0.131 per kWh. From June 2011 through April 2012, the facility had an estimated electricity demand of 114 kW. Electrical usage was generally higher in the summer months when air conditioning equipment was operational.

The facility receives natural gas from the main natural gas meter. Usage was determined as a percentage of the total square footage of all the buildings included on the meter. From July 2011 through May 2012, gas-fired equipment consumed about 23,702 therms of natural gas. Based on the annual cost of $34,781, the blended price for natural gas was $0.80 per therm. Natural gas consumption was highest in winter months for heating.

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 less cost to the facility than having Atlantic City Electric for both supply and delivery (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.

Main Meter Electric Supply Costs – Hess vs Atlantic City Electric

Month	ACE Supply Costs (For Comparison)	Hess Supply Costs (Actual)
June-11	$56,524	$0.00
July-11	$59,840	$65,404.53
August-11	$56,583	$61,844.82
September-11	$71,502	$64,413.68
October-11	$54,932	$49,486.97
November-11	$57,110	$51,448.28
December-11	$52,264	$47,082.95
January-12	$50,542	$45,800.14
February-12	$58,915	$53,387.07
March-12	$51,755	$46,899.02
April-12	$53,147	$48,160.52
Total	**$623,112.69**	**$533,927.98**
Extra Savings of using Hess for Electric Supply	$89,184.71	

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 Truman Hall. Specifics on the mechanical equipment can be found within the equipment inventory located in Appendix B.

3.3.1 Cooling Chilled Water System

The building is cooled with chilled water supplied from the Central Power Plant chilled water system. The Central Power Plant contains three Trane water cooled centrifugal chillers with three Baltimore Air Coil forced draft open downdraft cooling towers. The chillers were installed in 1973, and are located inside the physical plant building; the cooling towers were installed in 1973 and are located on the roof of the same building. The chilled water system operates year round to provide cooling for HVAC systems in the Taft Hall and Truman Hall.

The chillers are piped to a primary loop pumping system with three 50 HP pumps that operate in lead-lag also located in the Central Power Plant mechanical room. Three pumps in Truman Hall provide HVAC cooling chilled water to AHU-1 coil (P-1A), to AHU-2 coil (P-2A) and to FCUs throughout the building (P-3A). All pumps are constant volume with standard efficiency motors. Air handler and fan coil units piping use 3-way control valves for capacity control. Chilled water system piping and valves appear to be insulated.

The overall condition of the chilled water system equipment in the Central Power Plant was mostly poor. During our field inspection, only one of the three chillers was operational due to mechanical condition. The chillers use R-11 refrigerant which is not environmentally friendly, is not produced any more and is difficult to obtain. The three buildings utilizing Central Power Plant chilled water system should be de-coupled in the same way other campus buildings have been previously.

3.3.2 Heating Hot Water System

The Central Power Plant hot water system operates year round to provide heating hot water for HVAC systems and domestic hot water systems in the Papiano Gym, Truman Hall and Taft Hall.
The boilers are piped to a primary loop pumping system with three 15 HP pumps that operate in lead-lag also located in the Central Power Plant mechanical room. Three pumps in Truman Hall provide HVAC heating hot water to AHU-1 coil (P-1B), to AHU-2 coil (P-2B) and to FCUs throughout the building (P-3B). All pumps are constant volume with standard efficiency motors, and hot water is provided to air handling units, fan coil units, duct mounted hot water coils, hot water cabinet unit heaters and domestic hot water in Truman Hall. AHU and terminal equipment piping use 3-way control valves for capacity control. Hot water system piping and valves appear to be insulated.
The overall condition of the hot water system equipment in the Central Power Plant was mostly fair. During our field inspection, one of the three boilers was operational just to provide domestic hot water for the connected buildings; this is highly inefficient. The three buildings utilizing Central Power Plant hot water system should be de-coupled in the same way other campus buildings have been previously.

3.3.3 Package Cooling and Heating Air Handling Units

Two 1974 chilled water cooling, hot water heating AHUs are located in one second floor mechanical room. Each AHU contains chilled water cooling coil, a hot water heating coil, return, relief/exhaust, and outside air; the units are ducted to the supply and return duct systems above the ceiling. The air handling units serve the main seminar/lecture room 106 (AHU-1) and the entrance lobby/hallway (AHU-2).

3.3.4 Fan Coil Units with Chilled Water Cooling Coils and Hot Water Heating

Rooms, offices and spaces throughout the building are cooled and heated by approximately 30 horizontal ceiling mounted and vertical floor mounted fan coil units (FCUs). For the ceiling mounted horizontal cabinet FCUs, outside air is ducted and connected to the return ductwork of each FCU; the floor mounted vertical cabinet FCUs are located against an exterior wall, and outside air is drawn through low sidewall louvers. Chilled water coils provide cooling, and hot water coils provide heating. Fan coil units are controlled by individual wall mounted thermostats in each space.

3.3.5 Hot Water Unit Heaters

An unknown number of ceiling mounted cabinet hot water unit heaters provide heating to the stairwells, the mechanical room and storage areas. Each unit heater is controlled by a dedicated space thermostat.

3.3.6 Hydronic Heating Systems (Duct Mounted Heating Coils and Unit Heaters)

Spaces and areas with exterior wall exposures are heated by perimeter hot water fintube radiators with wall mounted thermostats. Other HVAC equipment (AHUs, FCUs) provide ventilation and outside air for these spaces.

3.3.7 Window A/C Units

There were 5 window air conditioning units installed to provide additional cooling in classrooms and other areas; two of the window units are cooling only, and three are heating/cooling heat pumps. The window units are controlled by unit mounted thermostat and operate stand alone.

3.3.8 Exhaust Systems

Constant volume exhaust fans serve shop areas, laboratories, larger classrooms and other spaces. In classrooms, dedicated exhaust fans are connected directly to lab fume hoods, typically controlled by a hood mounted switch. Exhaust fans are also used for restrooms and custodial closets throughout the building.

Exhaust system fans generally operate during building occupancy.

3.4 Control Systems

The building HVAC equipment is controlled by standalone Powers pneumatic controls; there is no central BAS interface. The system consists of original, outdated 1974 pneumatic field devices and components which have become hard to replace and maintain.

Previous occupants added supplemental cooling to small rooms. 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.

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 facility consists of 32 watt T-8 fixtures and 40 watt T-12 fixtures. The facility lighting is all controlled manually by switches turned on and off daily.

The exterior lighting of the building consists of three types of wall mounted fixtures. These fixtures are 100 watt metal halide fixtures, 200 watt metal halide fixtures, and 200 watt high pressure sodium fixtures. The fixtures are all mounted on the exterior walls of the building.

3.6 Plumbing Systems

3.6.1 Domestic Hot Water System

The air handlers' mechanical room contains a heat exchanger connected to the Central Power Plant hot water system; this serves the entire Taft Hall. Hot water is provided to lavatories, showers, janitor's closets, etc., and the majority of hot water piping appears to be insulated. Hot water demand is mainly for the locker room shower. Domestic hot water temperature is maintained at 130°F, and chemical disinfection soap is provided at the toilet rooms.
During the summer, one of the three main boilers in the Central Power Plant remains operations generating 180°F water to make 130°F domestic hot water.

3.6.2 Plumbing Fixtures

The building's lavatories, water closets, and urinals are original, and require upgrades. These should be replaced during the next renovation to include lavatories having 0.5 GPM faucets, 1.6 GPF water closets and 0.75 GPF urinals.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 HVAC Condensing Boiler Addition

The building is heated with hot water supplied by the Central Power Plant building cast iron gas fired boilers from 1985. The boilers are non-condensing and have an estimated efficiency of 75%. It can be assumed that an additional 10% loss is experienced due to the old, poorly insulated underground piping losses.

Due to the low efficiency of the existing boiler and system, an evaluation was performed for adding high efficiency condensing boilers to provide heating hot water for the building year-round, and to decouple the building from the Central Power Plant. The savings will be achieved during the entire year by operating more efficient equipment and eliminating system losses inherent in piping hot water under ground in old distribution piping.

The boiler fuel consumption was calculated from the natural gas used annually for the entire year 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 141,200 therms and $112,800.

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
186,900	0	0	5,650	4,500	0	4,500	(0.4)	4,000	>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 Heat Exchanger

The building has a hot water heat exchanger using hot water from the Central Power Plant. One central plant boiler needs to remain operational even during the summer to generate domestic hot water heater. During periods of little or no domestic hot water use, the central plant boiler must still provide hot water to maintain potable hot water in the building. This is very inefficient, and replacing the heat exchanger with a high efficiency natural gas unit and decoupling the building from the Central Power Plant was evaluated.

Due to the relatively low efficiency of the existing central plant boilers, an evaluation was performed to add high efficiency, natural gas tankless type condensing water heater to provide domestic hot water for the building year-round, and to decouple the building from the Central Power Plant. The savings will be

achieved during the entire year by operating more efficient equipment, heating a much smaller volume of water and eliminating system losses inherent in piping hot water under ground in old distribution piping.

The Central Plant Boiler fuel consumption necessary to heat a typical 120 gallon domestic water heater to 130°F was calculated. This was then compared to the efficiency of a proposed typical tankless type, high efficiency, condensing hot water heater with a 100 gallon storage tank to increase recovery capacity. The new water heater will require gas and water piping modifications, venting, and electrical connections. The difference in fuel usage was the savings.

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 29,640 therms and $23,700.

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
20,200	0	0	2,470	2,000	0	2,000	0.2	250	10.1	10.0

* 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 HVAC Water Cooled Chiller Addition

The building is currently cooled with chilled water supplied from the Central Power Plant chilled water system. The addition a water cooled chiller would decouple the building from the Central Power Plant Trane chillers. The existing chillers are in poor condition, use environmentally unfriendly R-11 refrigerant and are mechanically unreliable. This would also eliminate system cooling capacity losses from the underground distribution piping between the two buildings. The addition of a high efficiency modular water cooled chiller and associated cooling tower was assessed.

The assumption of this calculation is that the operating hours of the 1973 chilled water system stay the same. The energy savings result from operating a higher efficiency water cooled chiller, smaller capacity and variable speed primary pump control. The existing chillers have very limited turndown capacity, and their efficiency has been heavily degraded due to age; also, modern technology equipment has become much more advanced in terms of operating sequences to improve efficiency, reliability and turndown capacity. By decoupling the building from the existing central plant chillers, adding VSDs and inverter duty high efficiency motors on building chilled water supply pumps and reducing system capacity and flow when possible, significant electrical energy can be saved. Chilled water return temperature can be used to control chiller temperature reset control and system pressure differential sensors can be used to control chilled water system pump flow.

Air cooled modular chillers have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 9,140,955 kWh and $1,201,400.

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

ECM-3 HVAC Water Cooled Chiller 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
309,400	457,050	0	0	60,100	0	60,100	2.9	13,000	5.1	4.9

* 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 Install Variable Frequency Drives, High Efficiency Motors

The chilled water system is served by one 5.0 HP pump (P-3A). The pump is a constant volume pump with a standard efficiency motor.

Packaged air handling units with constant volume supply fan motors serve the main seminar/lecture hall (AHU-1).

Larger motors that operate pumps and fans continuously consume significant electrical energy. The hot water system pumps and RTUs serving these spaces operate at a constant speed (water and air flows) even though the building load does not require all the flow to maintain temperatures. By adding VFDs and inverter duty high efficiency motors, and reducing the flow (by slowing the motors down), significant electrical energy can be saved. Pressure actuated controllers are used to measure the water differential pressure in the hydronic systems and as valves close, the system pressure increases and pump speed is reduced. 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 capacity stay the same. The energy savings are realized from operating higher efficiency motors and reducing power draw with the variable frequency 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 688,000 kWh and $90,400.

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

ECM-4 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
20,500	34,400	0	0	4,500	0	4,500	3.4	2,900	4.6	3.9

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

This measure is recommended.

4.5 ECM-5 HVAC Building Automation System Upgrade/Re-commissioning

The existing mixed pneumatic and electronic control are old, hard to maintain, is difficult to obtain parts, are not as user friendly as more modern standalone DDC controls and are not as functional as systems using current technology. It is recommended the stand alone controls be upgraded and full system replacement and re-commissioning executed as a future facility improvment item. The re-commissioning should include DDC 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 and minimize local thermostat adjustment by occupants. HVAC systems will be tuned up during this process, and significant savings could be obtained by making the following controls improvements:

- Replace all existing 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 for devices that are programmable 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-heat as much as possible. Institute discharge air reset, energy heat recovery and other strategies to reduce re-heat.

Additional benefits of this system are that it can provide useful trending information such as daily, monthly, and seasonal energy usage, and also provide alarm messages via the internet indicating that a piece of equipment needs repair or maintenance. The BAS should also allow the facility to monitor the energy consuming equipment in the building remotely in real-time, track the facility energy performance,

and remotely adjust set points and schedules to optimize facility operation. Full color graphics and logical programming functions should also be provided.

The annual electrical and natural gas consumption is taken from the utility bills. Per the U.S. Energy Information Administration, the percent of a building's cooling and heating is 26% and 82%, respectively. Utilizing these numbers, the annual electrical and natural gas usage was found; based on project experience, retro-commissioning produces a 10% energy savings.

Commissioning can have an expected life of 10 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 215,800 kWh, 18,000 therms and $43,000. To continue to gain this annual saving, proper maintenance of equipment is required.

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

ECM-5 HVAC Building Automation System Upgrade / Re-commissioning

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
16,500	21,580	0	1,800	4,300	0	4,300	1.6	0	3.8	3.8

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

This measure is recommended.

4.6 ECM-6 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 Truman Hall 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-6 Install Vending Miser

Vending Type	Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
		Electric kWh	Electric kW	Nat Gas Therms	Total $						
	$					$	$		$	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

* 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 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 8,900 CFM which will result in 178 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-7 Rooftop Exhaust Fan Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric kWh	Electric kW	Nat Gas Therms	Total $						
$				$	$	$		$	Years	Years
1,500	2,340	0	170	400	0	400	4.7	0	3.8	3.8

* 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 Replace Domestic Hot Water Pumps

Maintenance personnel at the Truman Hall 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 Truman Hall 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-8 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
5,100	4,330	0	1,750	1,900	0	1,900	9.0	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.

4.9 ECM-9 Replace Windows

The buildings existing windows are from the original construction of the building in 1974. There are approximately 25 original windows in the school. The windows are single pane, aluminum frame units, over time the window seals can deteriorate and start to leak unconditioned air in or conditioned air our causing unnecessary energy consumption. The windows could be replaced with energy efficient double pane units with a higher thermal resistance to prevent air infiltration and heat transfer through the glazing.

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

ECM-9 Replace Windows

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
101,600	450	0	680	600	0	600	(0.8)	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.

4.10 ECM-5 Lighting Replacement Upgrades

The building utilizes 4 foot 40W T-12 fluorescent bulbs with magnetic ballasts. There are also some incandescent bulbs/fixtures currently being used as well. 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).

The existing exterior lighting system for this building consists of three 400 watt, three 200 watt and one 100 watt metal halide wall pack fixtures and one 200 watt high pressure sodium pole fixtures. The exterior fixtures are utilized for building lighting during nighttime hours and are in operation from sun down until sun up. Alternative LED lighting solutions are available to replace these fixtures that will reduce the total wattage to 241 watts per 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. In addition to electrical energy savings, LED lights have a longer useful lifetime than the existing lighting fixtures, and will provide significant maintenance 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 29,700 kWh with an electrical demand reduction of about 12 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 445,500 kWh and $65,400.

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 kWh	Electric kW	Nat Gas Therms	Total $						
$					$	$		$	Years	Years
63,100	29,700	12	0	4,400	0	4,400	0.0	2,600	14.3	13.8

* 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.

4.11 ECM-6 Lighting Controls Installation

The current lighting is controlled by manual switches. Lights are generally turned on in the morning and shut off at night by the staff. 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 403,500 kWh and $53,000.

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
4,100	26,900	0	0	3,500	0	3,500	11.9	580	1.2	1.0

* 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.

4.12 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 738,000 kWh and $100,100.

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
67,300	49,200	10	0	6,700	0	6,700	0.5	3,200	10.0	9.6

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

This measure is recommended.

4.13 System Improvement Opportunities

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

- 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.

- The college indicated that garage doors in the automotive labs are left open for long periods of time which results in the HVAC system working harder to heat and cool the space. High speed garage doors would provide a cost effective method to mitigate this problem. Calculation could not be performed on this measure without more information from the client.

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

If eligible, incentives #2 and #3 can be combined to yield additive savings.

Without existing sub meters in place, exact utility consumption for this building was unknown. Therefore, further analysis will need to take place before P4P incentives can be justified.

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.

This program is applicable to the Truman Hall based on the building's average peak demand of 112 kW.

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 available roof area justifies the use of 115 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 $8.00 per watt or $8,000 per kW of installed system, for a 50 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 – 50 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
$480,000	0.0	144,079	0	18,900	18,900	0	17,300	>25	13.3

* 30% federal tax credit

** Solar Renewable Energy Certificate Program (SREC) for 2012 is $120/1000kwh

This measure is not recommended due to long payback time period.

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.

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

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	4,400	0	$580	$580	4,500	>25	18.1

* 30% federal tax credit

This is not recommended since the facility is not occupied year-round and domestic hot water demand is not excessive.

6.2 Demand Response Curtailment

Presently, electricity is delivered by South Jersey Energy Company, which receives the electricity from regional power grid RFC. South Jersey Energy Company 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, Truman Hall had an estimated electricity demand of 112 kW.

This measure is not recommended because 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.

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

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.

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

The EPA Score, Site EUI, and Source EUI for the Community Center Building are as follows:

Energy Intensity	Camden County College Truman Hall	National Average
EPA Score	N/A	50
Site (kBtu/sf/year)	62	104
Source (kBtu/sf/year)	207	244

Truman Hall 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 Heat Exchanger	20,200	2,000	10.1	250	10.0	X
3	HVAC Air Cooled Chiller Addition	309,400	60,100	5.1	13,000	4.9	X
4	HVAC Install Variable Speed Drives, High Efficiency Motors	20,500	4,500	4.6	2,900	3.9	X
5	Building Automation System Upgrade / Re-Commission	16,500	4,300	3.8	0	3.8	X
6	Install Vending Miser	200 (per unit)	200 (average)	1.0	0	1.0	X
7	Replace Rooftop Exhaust Fans	1,500	400	3.8	0	3.8	X
8	Replace Domestic Hot Water Pumps	300 (per unit)	200 (per unit)	1.5	0	1.5	X
12	Lighting Replacements with Lighting Controls (Occupancy Sensors)	67,300	6,700	10.0	3,200	9.6	X

APPENDIX A

Utility Usage Analysis, Energy Suppliers List

Main Electricity Meter Electricity Consumption (Excluding Central Power Plant)	4,626,006	kWh
Central Power Plant Electricity Consumption (Cooling Season)	1,161,896	
Main Electric Meter Demand	1,632.96	kW
Main Electric Meter Cost	$ 760,716	

Building Name	sq. ft	% of Total Area	Main or Dedicated Meter	Electric Cost ($)	~Electric Consumption (kWh)	~Electric Demand (kW)	Blended Rate ($/kWh)	Consumption Rate ($/kWh)	Demand Rate ($/kW)	Gas Meter Number	Gas Cost ($)	Gas Consumption Therm	Gas Rate $/Therm
Child Care	4,649	-	D	$ 1,806	14,235	1	$ 0.127	$ 0.121	$ 8.60	310674	$ 901.78	1,442.38	$ 0.80
CIM	63,869	-	D	$ 165,543	1,443,300	360	$ 0.115	$ 0.100	$ 6.01	497191	$ 16,056.35	19,436.98	$ 0.80
Community Center	56,612	11.9%	M	$ 73,678	551,776	195	$ 0.131	$ 0.119	$ 5.94	431186	$ 2,687.79	3,240.64	$ 0.80
Connector Building	31,748	6.7%	M	$ 41,319	309,436	109	$ 0.131	$ 0.119	$ 5.94		$ 2,180.98	2,729.25	$ 0.80
Criminal Justice Center	13,702	2.9%	M	$ 17,833	133,548	47	$ 0.131	$ 0.119	$ 5.94	180372	$ 941.28	1,177.91	$ 0.80
Helene Fuld	36,000	7.6%	M	$ 46,853	350,879	124	$ 0.131	$ 0.119	$ 5.94	341687	$ 2,473.08	3,094.78	$ 0.80
Jefferson Hall	9,495	2.0%	M	$ 12,357	92,544	33	$ 0.131	$ 0.119	$ 5.94	4393670	$ 2,752.49	3,868.58	$ 0.80
Laser Building	9,991	2.1%	M	$ 13,003	97,379	34	$ 0.131	$ 0.119	$ 5.94	199278	$ 686.35	858.89	$ 0.80
Lincoln Hall	41,504	8.7%	M	$ 54,016	404,524	143	$ 0.131	$ 0.119	$ 5.94	514828	$ 6,161.23	9,560.71	$ 0.80
Madison Hall	50,508	10.6%	M	$ 65,734	492,283	174	$ 0.131	$ 0.119	$ 5.94	453525	$ 3,469.73	4,341.98	$ 0.80
Papiano Gym	40,000	8.4%	M	$ 52,058	389,865	138	$ 0.131	$ 0.119	$ 5.94	180448	$ 21,522.08	58,276.13	$ 0.80
Taft Hall	42,387	8.9%	M	$ 207,875	994,078	146	$ 0.131	$ 0.119	$ 5.94	461792	$ 4,738.76	14,034.42	$ 0.80
Truman Hall	32,990	7.0%	M	$ 195,646	902,489	114	$ 0.131	$ 0.119	$ 5.94	411069	$ 17,416.69	47,343.31	$ 0.80
Wolverton Library	49,284	10.4%	*M*	$ 64,141	*480,353*	*170*	$ 0.131	$ 0.119	$ 5.94	430957	$ 6,752.35	9,307.28	$ 0.80
Wilson Hall East	*20,571*	*4.3%*	*M*	$ 26,772	*200,498*	*71*	$ 0.131	$ 0.119	$ 5.94				
Wilson Hall Center	*8,292*	*1.7%*	*M*	$ 10,792	*80,819*	*29*	$ 0.131	$ 0.119	$ 5.94				
Wilson Hall West	*16,857*	*3.6%*	*M*	$ 21,939	*164,299*	*58*	$ 0.131	$ 0.119	$ 5.94				
Roosevelt Hall	*14,685*	*3.1%*	*M*	$ 19,112	*143,129*	*51*	$ 0.131	$ 0.119	$ 5.94				
Central Power Plant	*6,200*	-	*M*	*$ 152,710*	*1,161,896*	-	$ 0.131	$ 0.119	$ 5.94				
Total sq. ft (Main Meter)	474,626	100.0%		$ 772,223	5,802,136	1,633.96	$ 0.131	$ 0.119	$ 6.09		$ 88,741	178,713.23	$ 0.80

Electric Heat

Electric
Delivery Atlantic City Electric
Supplier Hess

Gas
Delivery South Jersey Gas
Supplier Woodruff Energy

Notes
1. Values calculated based on square footage of each building related to the total square footage of all buildings on the main electric meter
2. Values calculated based on the average btu/sq. foot of each building
3. *Italics represent buildings that were not included in the scope of this project but use electricity off the main meter*

Electric Usage Comparison

Building	Lighting (kWh)	Total From Matrix
Child Care	23,577	14,235
CIM Building	N/A	N/A
Community Center	149,864	551,776
Connector Building	39,736	309,436
Criminal Justice	33,600	133,548
Helene Fuld	109,842	350,879
Jefferson Hall	52,614	92,544
Laser Building	34,977	97,379
Lincoln Hall	179,383	404,524
Madison Hall	119,776	492,283
Papiano Gym	73,095	389,865
Taft Hall	120,182	994,078
Truman Hall	103,919	902,489
Wolverton Library	*134,640*	480,353

Gas Breakdown Estimates Based on Max Annual Therm Usage

	sq. ft	Btu/sq ft	Est. Btu/sq ft	Est. Therms	Est. Cost
Child Care	4,649	10,056			
CIM	63,869	10,226			
Community Center	56,612	741			
Connector Building	31,748		8,597	2,729.25	$ 2,180.98
Criminal Justice Center	13,702		8,597	1,177.91	$ 941.28
Helene Fuld	36,000		8,597	3,094.78	$ 2,473.08
Jefferson Hall	9,495	9,911			
Laser Building	9,991		8,597	858.89	$ 686.35
Lincoln Hall	41,504	6,572			
Madison Hall	50,508		8,597	4,341.98	$ 3,469.73
Papiano Gym	40,000	15,426			
Taft Hall	42,387	4,942			
Truman Hall	32,990	15,426			
Wolverton Library	49,284	4,069			
	avg btu/sq ft	8,597			

Main Boiler Plant Electricity Usage (Cooling Season)

Electric Rate $ 0.131 $/kWh

Cooling Equipment Runtime		Comments
6	Months/Year	
30	Days (avg)/Month	
24	hrs/day	
0.25	Runtime multiplier	Estimated run hours as 1/4 of total hours between May-October
1,500	hrs	

Chiller		Comments
412	Tons	
1.5	COP (kW/Ton)	Based off an estimated 8 EER
618	kW	
927,000	kWh	
$ 121,838	Cost/year	

Chilled Water Pumps		Comments
3	# of Pumps	
50	HP	
112	kW	Calculated using 1 kW = 0.7457 HP
167,783	kWh	
$ 22,052	Cost/year	

Cooling Towers		Comments
4	# of Motors	
15	HP of Motors	
45	kW	
67,113	kWh	
$ 8,821	Cost/yr	

Notes

1. Calculated Values

Cooling System

Annual Electric Usage	Annual Cost
1,161,896 kWh	$ 152,710

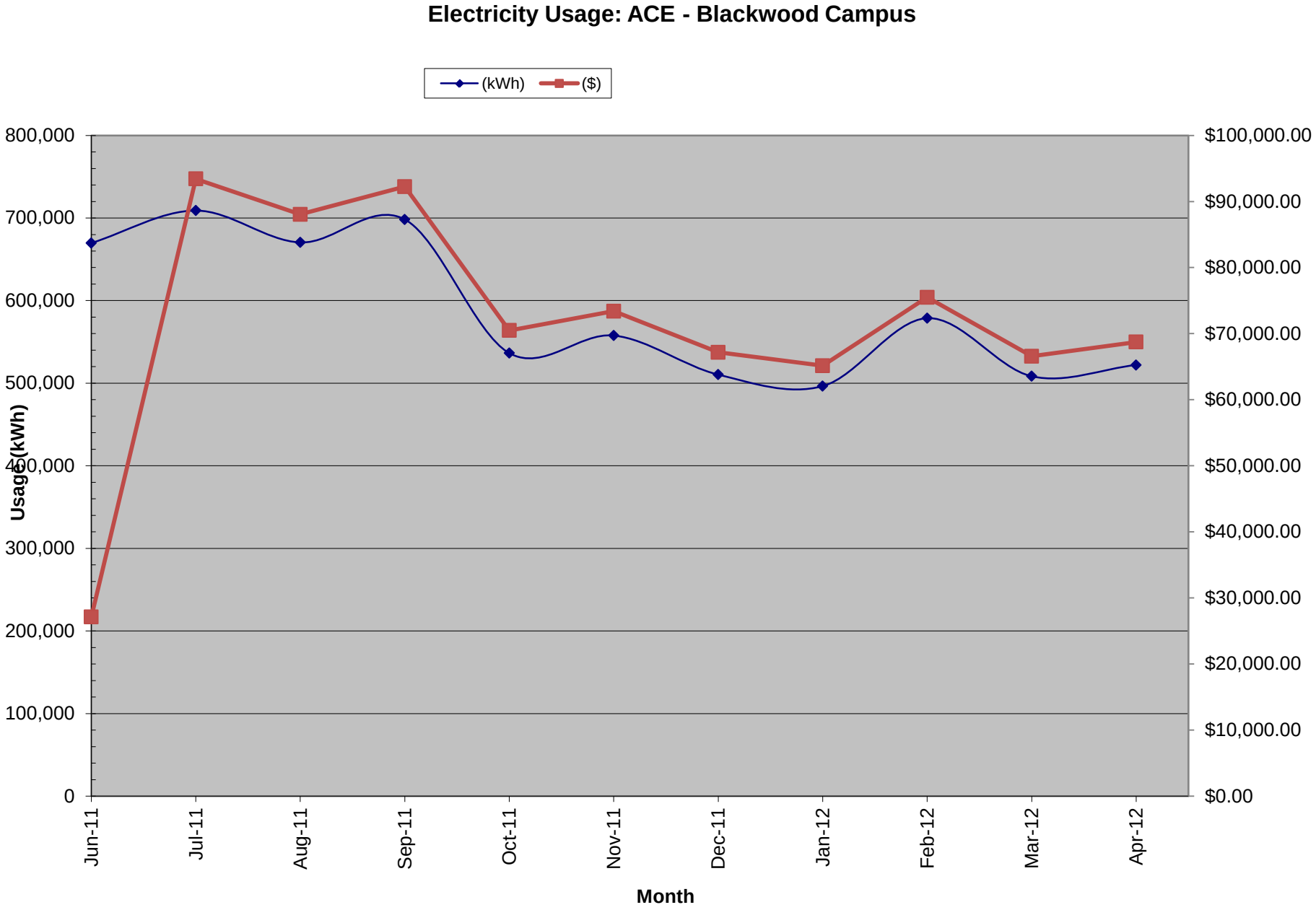
Building Name	~Electrical Consumption	Cost
Building		$ -
Taft Hall	580,947.75	$ 76,355
Truman Hall	580,947.75	$ 76,355

Camden County Community College
302 College Drive, Blackwood, NJ 08012

Electric Service
Delivery - ACE
Supplier - Hess

For Service at: **Blackwood Campus**
Account No.: 050767599934
Meter No.: 83431473

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Delivery ($)	Supply ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
June-11	669,721	1,560.96	$27,133.38	$ 27,133.38		$ 0.041	$ 0.027	$ 5.61
July-11	709,000	1,632.96	$93,414.28	$28,009.75	$65,404.53	$ 0.132	$ 0.119	$ 5.36
August-11	670,412	1,539.36	$88,047.34	$26,202.52	$61,844.82	$ 0.131	$ 0.120	$ 5.08
September-11	698,259	1,500.48	$92,240.86	$27,827.18	$64,413.68	$ 0.132	$ 0.120	$ 5.79
October-11	536,450	1,429.92	$70,486.53	$20,999.56	$49,486.97	$ 0.131	$ 0.118	$ 5.08
November-11	557,711	1,306.36	$73,398.01	$21,949.73	$51,448.28	$ 0.132	$ 0.118	$ 5.79
December-11	510,390	1,306.36	$67,167.13	$20,084.18	$47,082.95	$ 0.132	$ 0.118	$ 5.26
January-12	496,484	1,306.36	$65,141.43	$19,341.29	$45,800.14	$ 0.131	$ 0.118	$ 5.08
February-12	578,728	1,306.36	$75,496.79	$22,109.72	$53,387.07	$ 0.130	$ 0.118	$ 5.61
March-12	508,396	1,306.36	$66,585.12	$19,686.10	$46,899.02	$ 0.131	$ 0.118	$ 5.08
April-12	522,071	1,306.36	$68,738.63	$20,578.11	$48,160.52	$ 0.132	$ 0.119	$ 5.08
Total (All)	**5,787,901**	**1,632.96**	**$760,716.12**	**$226,788.14**	**$533,927.98**	**$ 0.131**	**$ 0.119**	**$ 5.94**


Electricity Usage: ACE - Blackwood Campus
(kWh)
($)
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Usage(kWh)
$100,000.00
$90,000.00
$80,000.00
$70,000.00
$60,000.00
$50,000.00
$40,000.00
$30,000.00
$20,000.00
$10,000.00
$0.00
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
Month

Main Natural Gas Meter

		Cost ($)				129292 (Monkey House)				Usage (Therms) Meter Number **180448 (Papiano Gym)**				249260 (Roosevelt House)			
Month	**Total**	Delivery	Supply	Total Therms	Therm	Cost	% Tot	$/Therm		Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm
Jul-11	$ 3,604.91	$ 3,604.91		5,306.26	12.46	$ 8.46	0.23%	$	0.68	23.87	$ 16.22	0.45%	$ 0.68	43.6	$ 29.62	0.82%	$ 0.68
Aug-11	$ -			-		$ -	0.00%	#DIV/0!			#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!
Sep-11	$ 3,402.14	$ 3,402.14		5,089.27		$ -	0.00%	#DIV/0!		21.86	$ 14.61	0.43%	$ 0.67	37.48	$ 25.06	0.74%	$ 0.71
Oct-11	$ 3,577.46	$ 3,577.46		4,611.32		$ -	0.00%	#DIV/0!		37.19	$ 28.85	0.81%	$ 0.78	49.58	$ 38.46	1.08%	$ 0.78
Nov-11	$ 9,843.06	$ 9,843.06		9,117.98		$ -	0.00%	#DIV/0!		29.84	$ 32.21	0.33%	$ 1.08	166.7	$ 179.96	1.83%	$ 0.40
Dec-11	$ 21,671.14	$ 21,671.14		23,331.55		$ -	0.00%	#DIV/0!		29.84	$ 27.72	0.13%	$ 0.93	938.45	$ 871.66	4.02%	$ 0.15
Jan-12	$ 32,847.20	$ 32,847.20		36,482.23		$ -	0.00%	#DIV/0!		35.81	$ 32.24	0.10%	$ 0.90	1322.74	$ 1,190.94	3.63%	$ 0.10
Feb-12	$ 15,880.61	$ 15,880.61		42,477.14		$ -	0.00%	#DIV/0!		34.06	$ 12.73	0.08%	$ 0.37	1607.86	$ 601.12	3.79%	$ 0.08
Mar-12	$ 13,557.55	$ 13,557.55		35,389.55		$ -	0.00%	#DIV/0!		42.35	$ 16.22	0.12%	$ 0.38	1318.11	$ 504.96	3.72%	$ 0.10
Apr-12	$ 38,795.86	$ 13,397.93	$ 25,397.93	36,285.87		$ -	0.00%	#DIV/0!		42.23	$ 45.15	0.12%	$ 1.07	834.3	$ 892.01	2.30%	$ 0.10
May-12	$ 20,089.02	$ 7,674.46	$ 12,414.56	17,736.60		$ -	0.00%	#DIV/0!		26.78	$ 30.33	0.15%	$ 1.13	545.9	$ 618.30	3.08%	$ 0.20
Total	$ 163,269	$ 125,456	$ 37,812	215,827.77	12.46					323.83	256.29			6,864.72			
Average											30.33						
											30.331854						
											$ 30.33						

Master Meter List

Unknown	Known	Used	Needed
362093	129292 (Monkey House)	**310674 (Child Care)**	Connector Building
470558	249260 (Roosevelt House)	**497191 (CIM)**	Criminal Justice Center (180372)
497759	268114 (Print Shop)	**431186 (Community Center)**	Helene Fuld (341687)
516533	307090 (Animal Barn)	**4393670 (Jefferson Hall)**	Laser Building (199278)
543578	450781 (Main Boiler Room)	**514828 (Lincoln Hall)**	Madison Hall (453525)
		180448 (Papiano Gym)	
		461792 (Taft Hall)	
		555971 (Taft Hall)	
		411069 (Truman Hall)	
		430957 (Wolverton)	

Building Meters and Totals

Building Name	Gas Meter	Therms	$/Therm	Secondary Meter #	Therms
Child Care	310674	1,442.38	$ 0.80		
CIM	497191	19,436.98	$ 0.80		
Community Cente	431186	3,240.64	$ 0.80		
Connector Building			$ 0.80		
Criminal Justice C	180372		$ 0.80		
Helene Fuld	341687		$ 0.80		
Jefferson Hall	4393670	3,868.58	$ 0.80		
Laser Building	199278		$ 0.80		
Lincoln Hall	514828	9,560.71	$ 0.80		
Madison Hall	453525		$ 0.80		
Papiano Gym	180448	29,299.98	$ 0.80		
Taft Hall	461792	7,040.50	$ 0.80	555971	6,993.92
Truman Hall	411069	23,702.06	$ 0.80		
Wolverton Library	430957	9,307.28	$ 0.80		

Main Boiler House

Therms	Cost
52,617.40	$ 38,630.26

	sq ft	% total	Therms	Cost
Papiano Gym	40,000	54.8%	28,835.40	$ 21,170.16
Truman Hall	32,990	45.2%	23,782.00	$ 17,460.09

Main Boiler House Gas Usage

	Main Boiler House		Papiano Gym				Truman Hall			
Month	MBH Therms	MBH Cost	Therms	Cost	DHW	HHW	Therms	Cost	DHW	HHW
Jul-11	311	$ 211.56	311.40	$ 211.56	311.40	-	-	$ -		
Aug-11	-	$ -	-				-	$ -		
Sep-11	-	$ -	-	$ -			-	$ -		
Oct-11	-	$ -	-	$ -			-	$ -		
Nov-11	3,087	$ 3,332.48	1,691.74	$ 1,826.27	1,168.43	523.30	1,395.26	$ 1,506.22	627.87	767.39
Dec-11	6,277	$ 5,830.20	3,439.87	$ 3,195.07	1,168.43	2,271.43	2,837.03	$ 2,635.13	627.87	2,209.16
Jan-12	9,207	$ 8,289.63	5,045.62	$ 4,542.89	1,168.43	3,877.19	4,161.38	$ 3,746.74	627.87	3,533.51
Feb-12	11,042	$ 4,128.34	6,051.46	$ 2,262.41	1,168.43	4,883.03	4,990.94	$ 1,865.93	627.87	4,363.07
Mar-12	11,260	$ 4,313.53	6,170.54	$ 2,363.90	1,168.43	5,002.11	5,089.16	$ 1,949.63	627.87	4,461.29
Apr-12	6,695	$ 7,158.11	3,669.00	$ 3,922.79	1,168.43	2,500.56	3,026.00	$ 3,235.32	627.87	2,398.14
May-12	4,738	$ 5,366.40	2,596.52	$ 2,940.90	1,168.43	1,428.09	2,141.48	$ 2,425.51	627.87	1,513.61
Total	52,617	$ 38,630	$ 28,976	$ 21,266	$ 8,490	$ 20,486	$ 23,641	$ 17,364	$ 4,395	$ 19,246

Usage (Therms)
Meter Number

	268114 (Print Shop)				307090 (Animal Barn)				**310674 (Child Care)**				362093				**411069 (Truman Hall)**				**430957 (Wolverton)**			
	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm
	0	$ -	0.00%	#DIV/0!	36.33	$ 24.68	0.68%	$ 0.68	0	$ -	0.00%	#DIV/0!	26.99	$ 18.34	0.51%	$ 0.68	5.19	$ 3.53	0.10%	$ 0.68	104.84	$ 71.23	1.98%	$ 0.68
		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!	0	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!
	0	$ -	0.00%	#DIV/0!	10.41	$ 6.96	0.20%	$ 0.67	0	$ -	0.00%	#DIV/0!	5.21	$ 3.48	0.10%	$ 0.67	1.04	$ 0.70	0.02%	$ 0.67	14.57	$ 9.74	0.29%	$ 0.67
	0	$ -	0.00%	#DIV/0!	46.49	$ 36.07	1.01%	$ 0.78	3.1	$ 2.40	0.07%	$ 0.78	0	$ -	0.00%	#DIV/0!	4.13	$ 3.20	0.09%	$ 0.78	23.76	$ 18.43	0.52%	$ 0.78
	1.03	$ 1.11	0.01%	$ 1.08	12.35	$ 13.33	0.14%	$ 1.08	0	$ -	0.00%	#DIV/0!	374.56	$ 404.35	4.11%	$ 1.08	7.2	$ 7.77	0.08%	$ 1.08	55.57	$ 59.99	0.61%	$ 1.08
	23.67	$ 21.99	0.10%	$ 0.93		$ -	0.00%	#DIV/0!	73.06	$ 67.86	0.31%	$ 0.93	912.72	$ 847.77	3.91%	$ 0.93	8.23	$ 7.64	0.04%	$ 0.93	1041.35	$ 967.24	4.46%	$ 0.93
	57.29	$ 51.58	0.16%	$ 0.90		$ -	0.00%	#DIV/0!	236.31	$ 212.76	0.65%	$ 0.90	1499.72	$ 1,350.29	4.11%	$ 0.90	4.09	$ 3.68	0.01%	$ 0.90	1954.95	$ 1,760.16	5.36%	$ 0.90
	107.33	$ 40.13	0.25%	$ 0.37		$ -	0.00%	#DIV/0!	467.5	$ 174.78	1.10%	$ 0.37	1732.73	$ 647.80	4.08%	$ 0.37	4.13	$ 1.54	0.01%	$ 0.37	2005.18	$ 749.66	4.72%	$ 0.37
	98.14	$ 37.60	0.28%	$ 0.38		$ -	0.00%	#DIV/0!	394.61	$ 151.17	1.12%	$ 0.38	1418.31	$ 543.35	4.01%	$ 0.38	7.23	$ 2.77	0.02%	$ 0.38	1929.64	$ 739.23	5.45%	$ 0.38
	48.41	$ 51.76	0.13%	$ 1.07		$ -	0.00%	#DIV/0!	165.83	$ 177.30	0.46%	$ 1.07	1038.24	$ 1,110.06	2.86%	$ 1.07	12.36	$ 13.21	0.03%	$ 1.07	1411.1	$ 1,508.71	3.89%	$ 1.07
	14.42	$ 16.33	0.08%	$ 1.13		$ -	0.00%	#DIV/0!	101.97	$ 115.49	0.57%	$ 1.13	610.79	$ 691.80	3.44%	$ 1.13	7.21	$ 8.17	0.04%	$ 1.13	766.32	$ 867.96	4.32%	$ 1.13
Total	350.29				105.58				1,442.38	901.78			7,619.27				60.81	52.22			9,307.28	$ 6,752.35		

Usage (Therms)
Meter Number

	431186 (Community Center)				**450781 (Main Boiler Room)**				**461792 (Taft Hall)**				470558				**497191 (CIM)**				497759			
	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm
	162.97	$ 110.72	3.07%	$ 0.68	311.4	$ 211.56	5.87%	$ 0.68	8.3	$ 5.64	0.16%	$ 0.68	20.76	$ 14.10	0.39%	$ 0.68	1.04	$ 0.71	0.02%	$ 0.68	3684.9	$ 2,503.41	69.44%	$ 0.68
		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!
	224.86	$ 150.32	4.42%	$ 0.67	0	$ -	0.00%	#DIV/0!	7.29	$ 4.87	0.14%	$ 0.67	0	$ -	0.00%	#DIV/0!	195.52	$ 130.70	3.84%	$ 0.67	4528.35	$ 3,027.17	88.98%	$ 0.67
	363.62	$ 282.10	7.89%	$ 0.78	0	$ -	0.00%	#DIV/0!	30.99	$ 24.04	0.67%	$ 0.78	0	$ -	0.00%	#DIV/0!	169.41	$ 131.43	3.67%	$ 0.78	3842.76	$ 2,981.21	83.33%	$ 0.78
	382.79	$ 413.23	4.20%	$ 1.08	3087	$ 3,332.48	33.86%	$ 1.08	0	$ -	0.00%	#DIV/0!	0	$ -	0.00%	#DIV/0!	307.67	$ 332.14	3.37%	$ 1.08	4362.96	$ 4,709.91	47.85%	$ 1.08
	353.98	$ 328.79	1.52%	$ 0.93	6276.9	$ 5,830.20	26.90%	$ 0.93		$ -	0.00%	#DIV/0!	2315.25	$ 2,150.48	9.92%	$ 0.93	2215.44	$ 2,057.78	9.50%	$ 0.93	6698.79	$ 6,222.06	28.71%	$ 0.93
	333.5	$ 300.27	0.91%	$ 0.90	9207	$ 8,289.63	25.24%	$ 0.90		$ -	0.00%	#DIV/0!	3017.85	$ 2,717.16	8.27%	$ 0.90	3227.57	$ 2,905.98	8.85%	$ 0.90	9278.61	$ 8,354.10	25.43%	$ 0.90
	216.72	$ 81.02	0.51%	$ 0.37	11042.4	$ 4,128.34	26.00%	$ 0.37		$ -	0.00%	#DIV/0!	3653.28	$ 1,365.82	8.60%	$ 0.37	4468.56	$ 1,670.63	10.52%	$ 0.37	9731.76	$ 3,638.34	22.91%	$ 0.37
	419.4	$ 160.67	1.19%	$ 0.38	11259.7	$ 4,313.53	31.82%	$ 0.38		$ -	0.00%	#DIV/0!	0	$ -	0.00%	#DIV/0!	1046.43	$ 400.88	2.96%	$ 0.38	10619.24	$ 4,068.17	30.01%	$ 0.38
	408.91	$ 437.20	1.13%	$ 1.07	6695	$ 7,158.11	18.45%	$ 1.07		$ -	0.00%	#DIV/0!	5489.9	$ 5,869.65	15.13%	$ 1.07	6531.23	$ 6,983.01	18.00%	$ 1.07	9383.3	$ 10,032.37	25.86%	$ 1.07
	373.89	$ 423.48	2.11%	$ 1.13	4738	$ 5,366.40	26.71%	$ 1.13		$ -	0.00%	#DIV/0!	1246.3	$ 1,411.60	7.03%	$ 1.13	1274.11	$ 1,443.10	7.18%	$ 1.13	5737.1	$ 6,498.02	32.35%	$ 1.13
Total	3,240.64	$ 2,687.79			52,617.40	$ 38,630.26			46.58	$ 34.55			15,743.34				19,436.98	$ 16,056.35			67,867.77			

Usage (Therms)
Meter Number

	514828 (Lincoln Hall)				516533				543578				**4393670 (Jefferson)**				**555971 (Taft Hall)**			
	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm	Therm	Cost	% Tot	$/Therm
	807.56	$ 548.63	15.22%	$ 0.68	56.05	$ 38.08	1.06%	$ 0.68	0	$ -	0.00%	#DIV/0!	0	$ -	0.00%	#DIV/0!		$ -	0.00%	#DIV/0!
		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!
	0	$ -	0.00%	#DIV/0!	42.68	$ 28.53	0.84%	$ 0.67	0	$ -	0.00%	#DIV/0!	0	$ -	0.00%	#DIV/0!		$ -	0.00%	#DIV/0!
	0	$ -	0.00%	#DIV/0!	40.29	$ 31.26	0.87%	$ 0.78	0	$ -	0.00%	#DIV/0!	0	$ -	0.00%	#DIV/0!		$ -	0.00%	#DIV/0!
	101.87	$ 109.97	1.12%	$ 1.08	89.52	$ 96.64	0.98%	$ 1.08	115.25	$ 124.41	1.26%	$ 1.08	23.67	$ 25.55	0.26%	$ 1.08		$ -	0.00%	#DIV/0!
	636.95	$ 591.62	2.73%	$ 0.93	315.9	$ 293.42	1.35%	$ 0.93	803.65	$ 746.46	3.44%	$ 0.93	419.83	$ 389.95	1.80%	$ 0.93	267.54	$ 248.50	1.15%	$ 0.93
	1443.45	$ 1,299.63	3.96%	$ 0.90	1547.8	$ 1,393.58	4.24%	$ 0.90	1511.99	$ 1,361.34	4.14%	$ 0.90	596.41	$ 536.98	1.63%	$ 0.90	1207.14	$ 1,086.86	3.31%	$ 0.90
	2727.58	$ 1,019.74	6.42%	$ 0.37	0	$ -	0.00%	#DIV/0!	1714.15	$ 640.86	4.04%	$ 0.37	868.94	$ 324.86	2.05%	$ 0.37	2094.96	$ 783.23	4.93%	$ 0.37
	2256.07	$ 864.29	6.37%	$ 0.38	676.62	$ 259.21	1.91%	$ 0.38	1351.16	$ 517.62	3.82%	$ 0.38	941.06	$ 360.52	2.66%	$ 0.38	1611.48	$ 617.35	4.55%	$ 0.38
	1109.31	$ 1,186.04	3.06%	$ 1.07	326.51	$ 349.10	0.90%	$ 1.07	833.27	$ 890.91	2.30%	$ 1.07	616.97	$ 659.65	1.70%	$ 1.07	1339	$ 1,431.62	3.69%	$ 1.07
	477.92	$ 541.31	2.69%	$ 1.13	169.95	$ 192.49	0.96%	$ 1.13	770.44	$ 872.62	4.34%	$ 1.13	401.7	$ 454.98	2.26%	$ 1.13	473.8	$ 536.64	2.67%	$ 1.13
Total	9,560.71	$ 6,161.23			3,265.32				7,099.91				3,868.58	$ 2,752.49			6,993.92	$ 4,704.20		

APPENDIX B

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #24364
Camden County College
Truman Hall
Original Construction Date: 1974
Renovation/Addtion Date: 2010

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.
P-1A (Chilled Water) P-1B (Hot Water)	2	B & G	Series 60 2AA Series 60 1AA	NOT AVAILABLE	HVAC Cooling Chilled and Heating Hot Water System / Electric	1 HP / 1750 RPM 1/4 HP / 1750 RPM Standard Efficiency, 76%	2nd Floor Mechanical Room	AHU-1 / Cooling Chilled Water Coil & Heating Hot Water Coil	1973	-19	Fair Condition
P-2A (Chilled Water) P-2B (Hot Water)	2	B & G	Series 60 1.5AA Series 75	NOT AVAILABLE	HVAC Cooling Chilled and Heating Hot Water System / Electric	1 HP / 1750 RPM 1/12 HP / 1750 RPM Standard Efficiency, 76%	2nd Floor Mechanical Room	AHU-2 / Cooling Chilled Water Coil & Heating Hot Water Coil	1973	-19	Fair Condition
P-3A (Chilled Water) P-3B (Hot Water)	2	TACO	4070-LQ 1595-LQ	NOT AVAILABLE	HVAC Cooling Chilled and Heating Hot Water System / Electric	5 HP / 1750 RPM Standard Efficiency, 78% 2 HP / 1750 RPM High Efficiency, 90%	2nd Floor Mechanical Room	FCUs / Cooling Chilled Water Coil & Heating Hot Water Coil	1973	-19	Fair Condition
DHW HX	1	B&G	WU45-42	NOT AVAILABLE	Domestic Hot Water Heat Exchanger / Plant Hot Water	2.5 GPM / EWT: 40°F, LWT: 140°F / 125 MBH	2nd Floor Mechanical Room	Truman Hall / Domestic Hot Water Storage Tank	1973	-27	Poor Condition (DHW put in as backup for this)
DHWT	1	Patterson Kelley	NOT AVAILABLE	NOT AVAILABLE	DHW Hot Water Heating / Heat Exchanger	1000 gal / 140 °F	2nd Floor Mechanical Room	Truman Hall / Potable Domestic Water	1973	-19	Fair Condition
P-4 (Domestic Hot Water)	1	B & G	Series 60 1.5A	NOT AVAILABLE	Domestic Hot Water Heat Exchanger / Plant Hot Water	1/3 HP / 1750 RPM Standard Efficiency, 72%	2nd Floor Mechanical Room	Truman Hall / Hot Water Circulator to Plant	1973	-19	N/A
P-5 (Domestic Hot Water)	1	B & G	1"-PR	NOT AVAILABLE	Domestic Hot Water Circulation Pump / Electric	1/6 / 1750 RPM Standard Efficiency, 72%	2nd Floor Mechanical Room	Truman Hall / Hot Water Circulator to Building	1973	-19	N/A
P-6 (Hot Water)	11	B & G	1"-BR	NOT AVAILABLE	HVAC Heating Hot Water System / Electric	1/6 HP / 1750 RPM Standard Efficiency, 72%	2nd Floor Mechanical Room	FTR / Heating Hot Water Baseboard Fintube Radiators	1973	-19	Fair Condition
AHU-1	1	TRANE	T-12	K3J248108	HVAC / DX Cooling & HW Heating	6400 CFM / CLG: 463 MBH HTG: 484 MBH / 7.5 HP SF Standard Efficiency	2nd Floor Mechanical Room	Seminar/Lecture Room 106	1974	-18	Fair Condition
AHU-2	1	TRANE	T-6	K3L248109	HVAC / DX Cooling & HW Heating	3000 CFM / CLG: 76 MBH HTG: 55 MBH / 2.0 HP SF Standard Efficiency	2nd Floor Mechanical Room	Entrance Lobby/Hallway	1974	-18	Good Condition
FCUs	~30	McQuay	NOT AVAILABLE	NOT AVAILABLE	HVAC / Chilled Water Cooling, Hot Water Heating	Variaous Heating and Cooling Capacities, Fractional HP Motors (1/4 HP max size)	Mix of Above Ceiling Horizontal Units and Floor Mounted Vertical Cabinet In Spaces/Areas Being Served	Truman Hall Occupied Spaces	1973	-24	Good Condition
UHs	-	Modine	CR6 CW6 HS190 V-250	NOT AVAILABLE	HVAC / Hot Water Heating	Fractional HP Fan Motor, Various MBH Heating Capacities	In Area Being Served	Stairwells, Mechanical Room, Storage Areas	1974	-18	Fair Condition

New Jersey BPU Energy Audit Program
CHA #24364
Camden County College
Truman Hall
Original Construction Date: 1974
Renovation/Addtion Date: 2010

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.
FTR	-	McQuay	NOT AVAILABLE	NOT AVAILABLE	HVAC / Hot Water Heating	Baseboard Fin Tube Radiaton, Total Length and BTU/ft Not Known	In Area being Served	Outside Walls of Zones With Exterior Wall Exposures	1974	-18	N/A
AC-1	1	EMI	NOT AVAILABLE	NOT AVAILABLE	HVAC / DX Electric Cooling	600 CFM / CLG: 18 MBH / Fractional HP SF	Inside Area Being Served	2nd Floor Server Room in Room 201	2004	7	N/A
Window Unit Air Conditioners	2	Frigidaire	NOT AVAILABLE	NOT AVAILABLE	HVAC / DX Cooling Electric	600 CFM / CLG: 24 MBH / Efficiency Unknown	Inside Area Being Served	Classrooms	1974	-23	N/A
Window Unit Heat Pumps	3	Frigidaire	NOT AVAILABLE	NOT AVAILABLE	HVAC / DX Cooling & Heating Electric	600 CFM / CLG: 24 MBH HTG: 30 MBH / Efficiency Unknown	Inside Area Being Served	Classrooms	1974	-23	N/A

Energy Audit of Camden County College (Truman Hall)

CHA Project No. 24364

Existing Lighting

Cost of Electricity: **$0.131** **$/kWh**

$5.94 **$/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
180	Automotive Tehcnology - 1	31	**T 32 R F 4 (ELE)**	F44ILL	112	3.47	SW	2500	None	8,680	
111A	Electrical Room	8	**4' 1-LAMP T-12**	F41EL	32	0.26	SW	2500	None	640	
180	Classroom 101 - A	9	**T 32 R F 4 (ELE)**	F44ILL	112	1.01	SW	2500	None	2,520	
11A	Classroom 101- B	10	**4' 2-LAMP T-12**	F42EL	60	0.60	SW	2125	C-OCC	1,275	
180	Automotive Tehcnology - 2	52	**T 32 R F 4 (ELE)**	F44ILL	112	5.82	SW	2125	C-OCC	12,376	
204	102 - A	12	**S 96 P F 2 (MAG) 8'**	F82EHE	207	2.48	SW	2125	C-OCC	5,279	
180	119	6	**T 32 R F 4 (ELE)**	F44ILL	112	0.67	SW	2500	None	1,680	
175A	Technician Office	4	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.13	SW	2125	OCC	272	
111A	Locker Room	6	**4' 1-LAMP T-12**	F41EL	32	0.19	SW	2125	OCC	408	
11A	Vestibule	2	**4' 2-LAMP T-12**	F42EL	60	0.12	SW	2125	OCC	255	
35A	1st Floor Hallway	26	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.83	SW	2250	C-OCC	1,872	
180	105 Classroom	24	**T 32 R F 4 (ELE)**	F44ILL	112	2.69	SW	2250	C-OCC	6,048	
11A	Janitor Closet	4	**4' 2-LAMP T-12**	F42EL	60	0.24	SW	2125	OCC	510	
11A	Elevator Room	2	**4' 2-LAMP T-12**	F42EL	60	0.12	SW	2125	OCC	255	
11A	Cooridor	9	**4' 2-LAMP T-12**	F42EL	60	0.54	SW	2125	OCC	1,148	
11A	Women's Bathroom	6	**4' 2-LAMP T-12**	F42EL	60	0.36	SW	2000	OCC	720	
11A	Men's Bathroom	8	**4' 2-LAMP T-12**	F42EL	60	0.48	SW	2125	OCC	1,020	
11A	Room 123 Office	4	**4' 2-LAMP T-12**	F42EL	60	0.24	SW	2125	OCC	510	
180	Room 122	20	**T 32 R F 4 (ELE)**	F44ILL	112	2.24	SW	2125	OCC	4,760	
11A	Room 124	6	**4' 2-LAMP T-12**	F42EL	60	0.36	SW	2125	OCC	765	
180	Room 100 Office	8	**T 32 R F 4 (ELE)**	F44ILL	112	0.90	SW	2125	OCC	1,904	
180	Room 100 - A Office	3	**T 32 R F 4 (ELE)**	F44ILL	112	0.34	SW	2125	OCC	714	
180	Room 100 - B	2	**T 32 R F 4 (ELE)**	F44ILL	112	0.22	SW	2125	OCC	476	
11A	Room 100 - C	4	**4' 2-LAMP T-12**	F42EL	60	0.24	SW	2125	OCC	510	
11A	Room 100 - D	4	**4' 2-LAMP T-12**	F42EL	60	0.24	SW	2500	None	600	
11A	Men's Bathroom	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	2125	OCC	128	
11A	Women's Bathroom	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	2125	OCC	128	
162A	Room 100 - F	2	**4' 4-LAMP T-12**	F44EL	120	0.24	SW	500	None	120	
180	Room 100 - E	4	**T 32 R F 4 (ELE)**	F44ILL	112	0.45	SW	2125	OCC	952	
11A	Room 100 - E	2	**4' 2-LAMP T-12**	F42EL	60	0.12	SW	2500	None	300	
180	Room 125	20	**T 32 R F 4 (ELE)**	F44ILL	112	2.24	SW	2500	None	5,600	
180	Room 124 - B	2	**T 32 R F 4 (ELE)**	F44ILL	112	0.22	SW	2500	None	560	
180	Room 129	4	**T 32 R F 4 (ELE)**	F44ILL	112	0.45	SW	2125	OCC	952	
180	Room 129	9	**T 32 R F 4 (ELE)**	F44ILL	112	1.01	SW	1063	None	1,071	
180	Room 126	2	**T 32 R F 4 (ELE)**	F44ILL	112	0.22	SW	2125	OCC	476	
180	Room 129 Office	4	**T 32 R F 4 (ELE)**	F44ILL	112	0.45	SW	1063	None	476	
11A	Room 129 - A	9	**4' 2-LAMP T-12**	F42EL	60	0.54	SW	1063	None	574	
11A	Stair Tower # 2	4	**4' 2-LAMP T-12**	F42EL	60	0.24	SW	2125	OCC	510	
180	Room 210 - A	2	**T 32 R F 4 (ELE)**	F44ILL	112	0.22	SW	500	None	112	
175A	2nd Floor Cooridor	30	**4' 2-LAMP T-8 (32W)**	F42ILL	32	0.96	SW	500	None	480	
35A	Room 209	10	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.32	SW	500	None	160	
180	Room 210	11	**T 32 R F 4 (ELE)**	F44ILL	112	1.23	SW	2125	OCC	2,618	
35A	Room 208	12	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.38	SW	1063	None	408	
180	Room 207	10	**T 32 R F 4 (ELE)**	F44ILL	112	1.12	SW	2125	OCC	2,380	
180	Room 206	10	**T 32 R F 4 (ELE)**	F44ILL	112	1.12	SW	1063	None	1,190	

Energy Audit of Camden County College (Truman Hall)

CHA Project No. 24364

Existing Lighting

Cost of Electricity: **$0.131** **$/kWh**

$5.94 **$/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
180	Room 205	10	**T 32 R F 4 (ELE)**	F44ILL	112	1.12	SW	2250	None	2,520	
180	Room 204	12	**T 32 R F 4 (ELE)**	F44ILL	112	1.34	SW	2250	None	3,024	
180	Room 203	10	**T 32 R F 4 (ELE)**	F44ILL	112	1.12	SW	500	None	560	
180	Room 204	12	**T 32 R F 4 (ELE)**	F44ILL	112	1.34	SW	520	None	699	
180	Room 203	10	**T 32 R F 4 (ELE)**	F44ILL	112	1.12	SW	520	C-OCC	582	
180	Room 202	12	**T 32 R F 4 (ELE)**	F44ILL	112	1.34	SW	520	None	699	
35A	Room 201	10	**4' 3-LAMP T-8 (32W)**	F43ILL	32	0.32	SW	500	None	160	
180	Room 200	9	**T 32 R F 4 (ELE)**	F44ILL	112	1.01	SW	4380	None	4,415	
209A	Room 200	2	**2' 2-LAMP T-8 (32W)**	FU2ILL	32	0.06	SW	4380	None	280	
209A	Office	3	**2' 2-LAMP T-8 (32W)**	FU2ILL	32	0.10	SW	8760	None	841	
11A	2nd Floor Men's Bathroom	3	**4' 2-LAMP T-12**	F42EL	60	0.18	SW	8760	None	1,577	
11A	2nd Floor All Purpose	1	**4' 2-LAMP T-12**	F42EL	60	0.06	SW	2125	OCC	128	
180	2nd Floor Sitting Area	5	**T 32 R F 4 (ELE)**	F44ILL	112	0.56	SW	2125	OCC	1,190	
111A	2nd Floor Janitor	1	**4' 1-LAMP T-12**	F41EL	32	0.03	SW	500	None	16	
111A	2nd Floor Mechanical Room	7	**4' 1-LAMP T-12**	F41EL	32	0.22	SW	500	None	112	
209A	Stair Tower # 1	1	**2' 2-LAMP T-8 (32W)**	FU2ILL	32	0.03	SW	8760	None	280	
11A	Stair Tower # 1	5	**4' 2-LAMP T-12**	F42EL	60	0.30	SW	500	None	150	
146	Exterior	3	**High Bay MH 400**	MH400/1	458	1.37	SW	3285	OCC	4,514	
9A	Exterior	2	**High Bay MH 200 35 Feet High**	MH200/1	232	0.46	SW	3285	OCC	1,524	
141A	Exterior	1	**HPS 200**	HPS200/1	250	0.25	SW	8760	None	2,190	
9A	Exterior	1	**High Bay MH 200 35 Feet High**	MH200/1	232	0.23	SW	8760	None	2,032	
142	Exterior	1	**MH 100**	MH100/1	128	0.13	SW	500	None	64	
9A	Exterior	4	**High Bay MH 200 35 Feet High**	MH200/1	232	0.93	SW	2125	OCC	1,972	
	Total	**544**				**50.10**				**103,919**	

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	186,900	4,510	>25	4,000	>25	
ECM-2	Replace Domestic Water Heater (DWH)	20,200	1,970	10.3	250	10.1	X
ECM-3	HVAC Water Cooled Chiller Addition	309,400	60,100	5.1	13,000	4.9	X
ECM-4	HVAC Install Speed Frequency Drives, High Efficiency Motors	20,500	4,500	4.6	2,838	3.9	X
ECM-5	Upgrade / Recommission Building Automation System	16,500	4,300	3.8	0	3.8	X
ECM-6	Install Vending Machine Occupancy Sensors	600	600	1.0	0	1.0	X
ECM-7	Replace Rooftop Exhaust Fans with High Efficiency Units	1,500	400	3.8	0	3.8	X
ECM-8	Replace Domestic Hot Water Pumps	300	200	1.5	0	1.5	X
ECM-9	Replace Windows	101,600	600	>25	0	>25	
ECM-10	Lighting Replacement Upgrades	63,120	4,400	14.3	2,620	13.8	X
ECM-11	Lighting Controls Installation (Occupancy Sensors)	4,100	3,500	1.2	580	1.0	X
ECM-12	Lighting Replacements with Lighting Controls (Occupancy Sensors)	67,255	6,700	10.0	3,200	9.6	X

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

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
186,900	0	0	5,650	4,510	0	4,510	(0.4)	4,000	>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
20,200	0	0	2,470	2,000	0	2,000	0.2	250	10.1	10.0

ECM-3 HVAC Water Cooled Chiller 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
309,400	457,050	0	0	60,100	0	60,100	2.9	13,000	5.1	4.9

ECM-4 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
20,500	34,400	0	0	4,500	0	4,500	3.4	2,838	4.6	3.9

ECM-5 Upgrade / Recommission Building Automation System

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
16,500	21,580	0	1,800	4,300	0	4,300	1.6	0	3.8	3.8

ECM-6 Install Vending Machine 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
600	4,340	0	0	600	0	600	13.2	0	1.0	1.0

ECM-7 Replace Rooftop Exhaust Fans with High Efficiency Units

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
1,500	2,340	0	170	400	0	400	4.7	0	3.8	3.8

ECM-8 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	200	0	200	9.0	0	1.5	1.5

ECM-9 Replace Windows

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
101,600	450	0	680	600	0	600	-0.8	0	>20	>20

ECM-10 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
63,120	29,700	12	0	4,400	0	4,400	0.0	2,620	14.3	13.8

ECM-11 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
4,100	26,900	0	0	3,500	0	3,500	11.9	580	1.2	1.0

ECM-12 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
67,255	49,200	10	0	6,700	0	6,700	0.5	3,200	10.0	9.6

Camden County College Blackwood Campus- NJBPU
CHA Project #24364

Utility Costs		Yearly Usage	MTCDE	Building Area	Annual Utility Cost	
$ 0.131	$/kWh blended		0.00042021	33,000	Electric	Natural Gas
$ 0.119	$/kWh consumption supply	899,370	0.00042021		$195,229	$34,781
$ 5.940	$/kW	112	0			
$ 0.80	$/Therm	23,702	0.00533471			
$ -	$/kgals	-	0			

Truman Hall

	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***	Simple Projected Lifetime Savings						ROI
		kW	kWh	therms	cooling kWh	kgal/yr	$										kW	kWh	therms	cooling	kgal/yr	$	
ECM-1	HVAC Condensing Boilers Addition	0.0	0	5,648	0	0	$ 4,510	$ 186,900	41.4	30.1	25	$ 4,000	Y	$ 75,000	$ 4,000	40.6	0	0	141,200	0	0	$ 112,800	(0.4)
ECM-2	Replace Domestic Water Heater (DWH)	0.0	0	2,470	0	0	$ 1,970	$ 20,200	10.3	13.2	12	$ 250	Y	$ 14,100	$ 250	10.1	0	0	29,640	0	0	$ 23,700	0.2
ECM-3	HVAC Water Cooled Chiller Addition	0.0	457,048	0	0	0	$ 60,100	$ 309,400	5.1	192.1	20	$ 13,000	Y	$ 75,000	$ 13,000	4.9	0	9,140,955	0	0	0	$ 1,201,400	2.9
ECM-4	HVAC Install Speed Frequency Drives, High Efficiency Motors	0.0	34,400	0	0	0	$ 4,500	$ 20,500	4.6	14.5	20	$ 2,838	Y	$ 14,400	$ 2,838	3.9	0	688,000	0	0	0	$ 90,400	3.4
ECM-5	Upgrade / Recommission Building Automation System	0.0	21,585	1,801	0	0	$ 4,300	$ 16,500	3.8	18.7	10			$ -	$ -	3.8	0	215,849	18,014	0	0	$ 42,800	1.6
ECM-6	Install Vending Machine Occupancy Sensors	0.0	4,336	0	0	0	$ 600	$ 600	1.0	1.8	15			$ -	$ -	1.0	0	65,043	0	0	0	$ 8,500	13.2
ECM-7	Replace Rooftop Exhaust Fans with High Efficiency Units	0.2	2,343	166	0	0	$ 400	$ 1,500	3.8	1.9	20			$ -	$ -	3.8	4	46,851	3,313	0	0	$ 8,500	4.7
ECM-8	Replace Domestic Hot Water Pumps	0.1	1,190	0	0	0	$ 200	$ 300	1.5	0.5	20			$ -	$ -	1.5	3	23,807	0	0	0	$ 3,000	9.0
ECM-9	Replace Windows	0.0	448	675	0	0	$ 600	$ 101,600	169.3	3.8	30			$ -	$ -	169.3	0	13,434	20,258	0	0	$ 18,000	(0.8)
ECM-10	Lighting Replacement Upgrades	11.7	29,700	0	0	0	$ 4,400	$63,120	14.3	12.5	15	$ 2,620		$ -	$ 2,620	13.8	176	445,500	0	0	0	$ 65,400	0.0
ECM-11	Lighting Controls Installation (Occupancy Sensors)	0.0	26,900	0	0	0	$ 3,500	$4,100	1.2	11.3	15	$ 580		$ -	$ 580	1.0	0	403,500	0	0	0	$ 53,000	11.9
ECM-12	Lighting Replacements with Lighting Controls (Occupancy Sensors)	11.7	49,200	0	0	0	$ 6,700	$67,255	10.0	20.7	15	$ 3,200	Y	$ 47,100	$ 3,200	9.6	176	738,000	0	0	0	$ 100,100	0.5
	Total (Does Not Include ECM-5 & ECM-6)	**12.1**	**570,549.6**	**10,760.3**	**0.0**	**0.0**	**83,880.0**	**724,755.0**	8.6		19	$ 23,288		$ 225,600	$ 23,288	8.4	**182.7**	**10,931,939**	**212,425**	**0**	**0**	**$ 1,609,200**	1.2
	Total Measures with Positive ROI	**11.7**	**540,647.8**	**2,470.0**	**0.0**	**0.0**	**73,270.0**	**417,355.0**	5.7		16.2	$ 19,288		$ 150,600	$ 19,288	5.4	**182.7**	**10,918,505**	**50,967**	**0**	**0**	**$ 1,478,400**	2.5
	% of Existing	**11%**	**63%**	**45%**	**0%**	**#DIV/0!**																	

**Direct Install Incentives program provides70% of each project cost up to $75,000 per electrical utility

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

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	19,246	Therms	Based on Utility data for Truman Hall and Main Boiler Plant
Existing Boiler Plant Efficiency	65%		Estimated or Measured
Baseline Boiler Load	1,251,002	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 100 Mbtu/Therms
Baseline Fuel Cost	$ 15,380		
Proposed Boiler Plant Efficiency	92%		New Condensing Boiler Efficiency
Proposed Fuel Use	13,598	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 10,866		
Annual Utility Savings	**5,648**	**Therms**	
Annual Savings	$ 4,510		
Boiler Addition Project Cost	**$ 186,900**		
Simple Payback	41.4	Years	Negative number indicates

*Note to engineer: Link savings back to summary sheet in appropriate column.

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-1: HVAC Condensing Boiler Added - 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.		
						$ -	$ -	$ -	$ -	
2,000 MBH NG Condensing Boiler	2	EA	$ 40,000	$ 2,000		$ 88,000	$ 5,400	$ -	$ 93,400	
Flue Installation	25	LF	$ 75.0	$ 15.00		$ 2,063	$ 506	$ -	$ 2,600	
Reprogram DDC system	2	EA	$ 100.0	$ 350.00		$ 220	$ 945	$ -	$ 1,200	
Miscellaneous Electrical	2	LS	$ 500	$ 250		$ 1,100	$ 675	$ -	$ 1,800	
Miscellaneous HW Piping	2	LS	$ 2,000	$ 1,000		$ 4,400	$ 2,700	$ -	$ 7,100	
Boiler room/space construction	1	LS	$ 20,000	$ 10,000		$ 22,000	$ 13,500	$ -	$ 35,500	
						$ -	$ -	$ -	$ -	

$ 141,600	Subtotal
$ 14,160	10% Contingency
$ 31,152	20% Contractor O&P
$ -	0% Engineering
$ 186,900	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

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

ECM Description Summary

The building has a hot water heat exchanger using hot water from the Central Power Plant. One central plant boiler needs to remain operational even during the summer to generate domestic hot water heater. During periods of little or no domestic hot water use, the central plant boilers must still provide hot water to maintain potable hot water in the building. Due to the relatively low efficiency of the existing central plant boilers, an evaluation was performed to add high efficiency, natural gas tankless type condensing water heater(s) to provide domestic hot water for the building year-round, and to decouple the building from the Central Power Plant. 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
Avg. Monthly Utility Demand by Water Heater	**4,395**	Therms/yr	From utility bill using month of September's usage when DHW is primary NG usage
Total Annual Utility Demand by Water Heater	439,507	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	65%		Per manufacturer nameplate
Total Annual DHW Load	285,680	MBTU/yr	Reduction due to heater inefficiency
Existing Tank Size	1,000	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	10	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	Per building personnel
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)	14.7	MBH	
Annual Standby Hot Water Load	129,028	MBTU/yr	
New Tank Size	200	Gallons	Based on Rinnai tankless water heater with (2) 100 gal storage tanks
Hot Water Piping System Capacity	20	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	
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)	3.2	MBH	
Annual Standby Hot Water Load	28,105	MBTU/yr	
Total Annual Hot Water Standby Savings	184,757	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		Based on Rinnai tankless high efficiency DHW Heater
Proposed Fuel Use	1,925	Therms	
Utility Cost	$0.80	$/Therm	
Existing Operating Cost of DHW	$3,512	$/yr	
Proposed Operating Cost of DHW	$1,538	$/yr	
Simple Payback	**10.2**		

Savings Summary:

Utility	Energy Savings Therms	Cost Savings
Therms/yr	**2,470**	**$1,974**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

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.		
Hot water HX and existing DHW storage tank removal (possible asbestos abatement)	1	LS	$ 500	$ 5,000		$ 550	$ 6,750	$ -	$ 7,300	
High Efficiency Gas-Fired tankless DHW Heater	2	EA	$ 1,200	$ 300		$ 2,640	$ 810	$ -	$ 3,500	
200 gallon storage tank	1	EA	$ 800	$ 300		$ 880	$ 405	$ -	$ 1,300	
Miscellaneous Electrical	1	EA	$ 50	$ 100		$ 55	$ 135	$ -	$ 200	
Venting Kit	2	EA	$ 450	$ 650		$ 990	$ 1,755	$ -	$ 2,700	
Miscellaneous Piping and Valves	1	LS	$ 300			$ 330	$ -	$ -	$ 300	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 15,300	Subtotal
$ 1,530	10% Contingency
$ 3,366	20% Contractor O&P
$ -	0% Engineering
$ 20,200	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-3: HVAC Water Cooled Chiller Addition

ECM Summary

The addition an water cooled chiller would decouple the building from the older, less efficient Central Power Plant Trane chillers. The existing chillers are in poor condition, use environmentally unfriendly R-11 refrigerant and are mechanically unreliable. This would also eliminate system cooling capacity losses from the underground distribution piping between the two buildings. Modern technology equipment has become much more advanced in terms of operating sequences to improve efficiency, reliability and turndown capacity. By decoupling the building from the existing central plant chillers, adding VSDs and inverter duty high efficiency motors on building chilled water supply pumps and reducing system capacity and flow when possible, significant electrical energy can be saved.

ASSUMPTIONS			Comments
Electrical Utility Cost	$0.131	/kWh	
Average run hours per Week	66	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	68	deg F	Setpoint.
Existing Annual Electrical Usage	580,948	kWh	Estimated based on central plant cooling system electrical usage
Annual Electrical Utility Cost	$76,355		

Item	Value	Units	Comments
Proposed tonnage of new Chiller system	125	Tons	Estimated
Proposed EER	15.0		
Annual Chiller Electrical Usage	104,400	kWh	
Proposed HP of Cooling Tower Fan	10	HP	Estimated
Proposed Electrical Load	7	kW	
Annual Cooling Tower Electrical Usage	7,800	kWh	
Centrifugal Pump	15.0	HP	Estimated
Pump Electrical Load	11.2	kW	
Annual Pump Electrical Usage	11,700	kWh	
Proposed Annual Electric Usage	123,900	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below
Annual Electrical Cost	$16,284		

ANNUAL SAVINGS		
Annual Electrical Savings	457,048	kWh
Annual Cost Savings	$ 60,071	
Total Project Cost	**$309,400**	
Simple Payback	5.2	years

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above setpoint	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	3	1	100%	1
92.5	34	13	83%	11
87.5	131	51	66%	34
82.5	500	196	49%	97
77.5	620	244	32%	78
72.5	664	261	15%	40
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	22	0	0%	0
2.5	13	0	0%	0
Total	8,760	767	34%	261

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-3: HVAC Water Cooled Chiller Addition - 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.		
						$ -	$ -	$ -	$ -	
Existing piping to central plant chillers demolition	1	LS	$ 1,000	$ 2,500		$ 1,100	$ 3,375	$ -	$ 4,500	
(1)Water cooled chiller 125 tons	1	EA	$ 125,000	$ 10,400		$ 137,500	$ 14,040	$ -	$ 151,500	Based on water cooled multi-compressor
- CHW Valves & Piping to building chilled water system	1	EA	$ 1,000	$ 500		$ 1,100	$ 675	$ -	$ 1,800	
- Reprogram DDC system for (1) ACC	1	EA	$ 300	$ 2,000		$ 330	$ 2,700	$ -	$ 3,000	
(1) 140 Ton Cooling Tower	1	EA	$ 30,000	$ 16,000		$ 33,000	$ 21,600	$ -	$ 54,600	Based on draw through-type Cooling Tower
- CHW Valves & Piping to building chiller	1	EA	$ 1,000	$ 500		$ 1,100	$ 675	$ -	$ 1,800	
(1) 15 HP Centrifugal-type 300 GPM Pump	1	EA	$ 7,500	$ 785		$ 8,250	$ 1,060	$ -	$ 9,300	
Electrical - misc.	1	LS	$ 1,000	$ 5,000		$ 1,100	$ 6,750	$ -	$ 7,900	
						$ -	$ -	$ -	$ -	

$ 234,400	Subtotal
$ 23,440	10% Contingency
$ 51,568	20% Contractor O&P
$ -	0% Engineering
$ 309,400	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-4A: Install Variable Speed Drives - CHW Pump

Variable Inputs

Blended Electric Rate	$0.13	
Heating System "On" Point	55	F
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-3A	1	5.0	10.0	78.0%	89.5%	7.65	6.67
					Total:	7.65	6.67

SAVINGS ANALYSIS

OAT - DB Avg Temp F	OAT - WB Avg 120	Annual Hours in Bin	Cooling 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* (A-55)/(55-10)) 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	3	97%	23	6.3	100%	19	4
92.5	74	34	34	92%	260	5.4	100.0%	185	75
87.5	72	131	131	86%	1,002	4.7	100.0%	610	392
82.5	69	500	500	81%	3,826	3.9	99.8%	1,976	1,849
77.5	67	620	620	75%	4,744	3.3	98.2%	2,082	2,662
72.5	64	664	664	69%	5,080	2.7	95.9%	1,885	3,196
67.5	62	854	854	64%	6,534	2.2	92.7%	2,034	4,500
62.5	58	927	927	58%	7,093	1.8	88.8%	1,836	5,257
57.5	53	600	600	53%	4,591	1.4	84.1%	977	3,614
52.5	47	610	0	0%	0	0.0	0.0%	0	0
47.5	43	611	0	0%	0	0.0	0.0%	0	0
42.5	38	656	0	0%	0	0.0	0.0%	0	0
37.5	34	1,023	0	0%	0	0.0	0.0%	0	0
32.5	30	734	0	0%	0	0.0	0.0%	0	0
27.5	25	334	0	0%	0	0.0	0.0%	0	0
22.5	20	252	0	0%	0	0.0	0.0%	0	0
17.5	16	125	0	0%	0	0.0	0.0%	0	0
12.5	11	47	0	0%	0	0.0	0.0%	0	0
7.5	6	22	0	0%	0	0.0	0.0%	0	0
2.5	2	13	0	0%	0	0.0	0.0%	0	0
-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	**4,333**		**33,153**			**11,604**	**21,549**

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 100 deg. OAT and 50% at 50 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	21,500	kWh
Annual Savings	$ 2,826	
Install Variable Speed Drives	$ 13,000	
- CHW Pump Cost		
Simple Payback	5	Years

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-4A: Install Variable Speed Drives - CHW 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.		
						$ -	$ -	$ -	$ -	
5.0 HP VFD	1	ea	$ 1,485	$ 490		$ 1,634	$ 662	$ -	$ 2,295	
5.0 HP Motors	1	ea	$ 525	$ 85		$ 578	$ 115	$ -	$ 692	
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	
						$ -	$ -	$ -	$ -	

$ 9,825	Subtotal
$ 982	10% Contingency
$ 2,161	20% Contractor O&P
$ -	0% Engineering
$ 13,000	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

AIR HANDLER	AREA SERVED	FAN MOTOR HP
AHU-1	Main Seminar/Lecture Hall	7.5

Total Combined Motor Horsepower: *7.5* *HP*

ECM-4B: Install Variable Speed Drives - AHU Fans

Utility Costs

Blended Electric Rate $0.131

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		Building Balance Point
AHU-1	7.5	85.2%	91.0%	5.25	4.92		55.0
				5.25	4.92	**VFD Eff. (CC)**	98.5%

OAT - DB Avg Temp F	Bin Hours 120	Occupied Hours in Bin	AHU Hours in Bin	Existing Fan Kw	Existing Fan kWh	Fan Load %	Proposed Fan kW	Speed efficiency %	Proposed Fan kWh	Savings Fan kWh
(A)	(B)	(C)	(D)	(F)	(F)	(E)	(G)	(H)	(I)	(J)
102.5	0	0	0	5.3	0	50%	0.88	81.5%	0	0
97.5	3	1	1	5.3	6	50%	0.88	81.5%	1	5
92.5	34	13	13	5.3	70	50%	0.88	81.5%	14	56
87.5	131	51	51	5.3	270	50%	0.88	81.5%	56	215
82.5	500	196	196	5.3	1,032	50%	0.88	81.5%	213	819
77.5	620	244	244	5.3	1,280	50%	0.88	81.5%	264	1,016
72.5	664	261	261	5.3	1,370	50%	0.88	81.5%	283	1,088
67.5	854	336	336	5.3	1,763	50%	0.88	81.5%	363	1,399
62.5	927	364	364	5.3	1,913	50%	0.88	81.5%	394	1,519
57.5	600	236	236	5.3	1,238	50%	0.88	81.5%	255	983
52.5	610	240	240	5.3	1,259	52%	0.99	83.7%	283	976
47.5	611	240	240	5.3	1,261	57%	1.22	87.6%	333	928
42.5	656	258	258	5.3	1,354	61%	1.47	91.1%	417	937
37.5	1,023	402	402	5.3	2,111	66%	1.76	94.0%	753	1,358
32.5	734	288	288	5.3	1,515	70%	2.08	96.3%	623	892
27.5	334	131	131	5.3	689	75%	2.43	98.2%	325	364
22.5	252	99	99	5.3	520	80%	2.82	99.5%	280	240
17.5	125	49	49	5.3	258	84%	3.24	100.0%	159	99
12.5	47	18	18	5.3	97	89%	3.69	100.0%	68	29
7.5	22	9	9	5.3	45	93%	4.19	100.0%	36	9
2.5	13	5	5	5.3	27	98%	4.71	99.6%	24	3
-2.5	0	0	0	5.3	0	100%	4.99	99.0%	0	0
-7.5	0	0	0	5.3	0	100%	4.99	99.0%	0	0
TOTALS		**3,441**	**3,441**	**121**	**18,080**				**5,145**	**12,934**

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	12,900	kWh
Annual Savings	$ 1,700	
Install Variable Speed Drives	$ 7,500	
- Air Handling Fan Cost		
Simple Payback	4	Years

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-4B: 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	
Reprogram DDC system	1	ea	$ 100	$ 1,000		$ 110	$ 1,350	$ -	$ 1,460	
Electrical - misc.	1	ea	$ 150	$ 150		$ 165	$ 203	$ -	$ 368	
Duct pressure sensor/transmitter	1	ea	$ 500	$ 200		$ 550	$ 270	$ -	$ 820	

$ 5,678	Subtotal
$ 568	10% Contingency
$ 1,249	20% Contractor O&P
$ -	0% Engineering
$ 7,500	**Total**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-5: Re-commission Facility BAS and Integrate Existing HVAC Equipment

ECM Description Summary

33,000 Sq Footage

EXISTING CONDITIONS		
Existing Facility Total Electric usage	899,370	kWh
Existing Facility Total Gas usage	23,702	Therms
Existing Facility Cooling Electric usage	215,849	kWh[1]
Existing Facility Heating Natural Gas usage	18,014	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Usage	194,264	kWh
Proposed Facility Natural Gas Usage	16,212	Therms
SAVINGS		
Retro-Commissioning Electric Savings	21,585	**kWh**
Retro-Commissioning Natural Gas Savings	1,801	**Therms**
Total cost savings	$ 4,276	
Estimated Total Project Cost	$ 16,500	[4]
Simple Payback	3.9	**years**

Assumptions

1 24% of facility total electricity dedicated to Cooling; Source: E source, data from U.S. Energy Information Administration
2 76% of facility total natural gas dedicated to Heating; Source: E source, data from U.S. Energy Information Administration
3 10% Typical Savings associated with Retro-Commissioning of controls based on previous project experience
4 Based on $0.50 / Sq Ft recommissioning cost

ECM-6 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
Truman Hall

Demand Cost $/kW-month
$ 5.94

Energy Cost $/kWh
$ 0.13

Multipliers		
Material	Labor	Equipment
1.00	1.00	1.00

ECM-7: Install Modern Roof Top Exhaust Fans with Premium Efficiency Motors

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	1.00	0.75	70%	0.8	1.00	0.75	0.852	0.7	0.143	$ 10	8,760	1,249	$ 164	$ 174	$ 500	2.9
2	EF-2	N/A	0.33	0.75	70%	0.3	0.33	0.75	0.822	0.2	0.039	$ 3	8,760	345	$ 45	$ 48	$ 500	10.4
3	EF-3	N/A	0.25	0.75	70%	0.2	0.25	0.75	0.814	0.2	0.028	$ 2	8,760	244	$ 32	$ 34	$ 500	14.7
		Total	**1.58333**			**1.3**	**1.583**			**1.1**	**0.21**	**$ 15**		**1,838**	**$ 242**	**$ 257**	**$ 1,500**	

Cost Estimates

#	Unit Costs Materials	Unit Costs Labor	Unit Costs Equipment	Subtotal Costs Materials	Subtotal Costs Labor	Subtotal Costs Equipment	Subtotal Costs Total Cost	Remarks
1	$ 400	$ 100	$ -	$ 400	$ 100	$ -	$ 500	
2	$ 400	$ 100	$ -	$ 400	$ 100	$ -	$ 500	
3	$ 400	$ 100	$ -	$ 400	$ 100	$ -	$ 500	

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

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

ECM-9[B]: 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	23	LF	Cooling System Efficiency	1.2	kW/ton	Heating System Efficiency	82%	
Area of Exhaust Fans	12	SF	Ex Occupied Clng Temp.	74	*F	Heating On Temp.	60	*F
Existing Infiltration Factor	**13.8**	**cfm/SF**	Ex Unoccupied Clng Temp.	78	*F	Ex Occupied Htg Temp.	68	*F
Proposed Infiltration Factor	**3.0**	**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	$ 0.131	$/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	42.5	3	1	2	-12,015	-12,015	-2,414	-2,414	4	1	0	0
97.5	39.5	34	13	21	-9,612	-9,612	-1,931	-1,931	33	7	0	0
92.5	36.6	131	51	80	-7,289	-7,289	-1,464	-1,464	95	19	0	0
87.5	34.0	500	196	304	-5,207	-5,207	-1,046	-1,046	260	52	0	0
82.5	31.6	620	244	376	-3,284	-3,284	-660	-660	204	41	0	0
77.5	29.2	664	261	403	-1,362	0	-274	0	36	7	0	0
72.5	27.0	854	336	519	0	0	0	0	0	0	0	0
67.5	24.5	927	364	563	0	0	0	0	0	0	0	0
62.5	21.4	600	236	364	0	0	0	0	0	0	0	0
57.5	18.7	610	240	370	2,019	481	406	97	0	0	8	2
52.5	16.2	611	240	371	2,980	1,442	599	290	0	0	15	3
47.5	14.4	656	258	398	3,941	2,403	792	483	0	0	24	5
42.5	12.6	1,023	402	621	4,902	3,364	985	676	0	0	50	10
37.5	10.7	734	288	446	5,863	4,325	1,178	869	0	0	44	9
32.5	8.6	334	131	203	6,825	5,287	1,371	1,062	0	0	24	5
27.5	6.8	252	99	153	7,786	6,248	1,564	1,255	0	0	21	4
22.5	5.5	125	49	76	8,747	7,209	1,757	1,448	0	0	12	2
17.5	4.1	47	18	29	9,708	8,170	1,950	1,641	0	0	5	1
12.5	2.6	22	9	13	10,669	9,131	2,143	1,835	0	0	3	1
7.5	1.0	13	5	8	11,631	10,093	2,337	2,028	0	0	2	0
2.5	0.0	0	0	0	12,592	11,054	2,530	2,221	0	0	0	0
TOTALS		**8,760**	**3,441**	**5,319**					631	127	**207**	**42**

Existing Exhaust Infiltration	**178**	**cfm**
Proposed Exhaust Infiltration	**36**	**cfm**

Savings	**166**	**Therms**	**$ 132**
	504	**kWh**	**$ 66**
			$ 199

Window ID	Location	Quantity	Width (ft)	Height (ft)	Linear Feet (LF)	Area (SF)	Airflow (CFM)	Infiltration Rate (CFM/SF)	Infiltration (CFM)
EF-1	Building Exhaust	1	2.63	2.63	10.5	6.9	6700.0	19.45	134.0
EF-2	Mech & Electrical Room	1	1.83	1.83	7.3	3.4	1200.0	7.14	24.0
EF-3	Materials Lab	1	1.29	1.29	5.2	1.7	1000.0	11.99	20.0
Total		**3**	**5.75**	**5.75**	**23.0**	**11.9**	**8,900.0**	**13.85**	**178.0**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

Demand Cost
$/kW-month
$ 5.94

Energy Cost
$/kWh
$ 0.80

Multipliers		
Material	Labor	Equipment
1.10	1.35	1.10

ECM-8: DHW Pumps

Savings Analysis

Cost Estimates

										New																				
			Existing	Load	Existing	Existing	Existing	Existing	New	Load	New	New	New	Demand	Demand	Annual	kW	kWh	$ kWh	Total $	Estimated	Payback	Unit Costs			Subtotal Costs				
#	Description	Location	HP	Factor	Hours	Efficiency$_a$	kW	kWh	HP$_b$	Factor	Efficiency$_a$	kW	kWh	Savings	Savings $	Hours	Savings	Savings	Savings	Savings	Cost	Years	Materials	Labor	Equipment	Materials	Labor	Equipment	Total Cost	Remarks
1			0.17	0.8	8760	0.600	0.2	1451.6	0.04	0.8	0.600	0.04	261.29	0.126	$ 9	6,570	0.13	1,190	$ 951	$ 960	$ 328	0.3	$ 175	$ 100	$ -	$ 193	$ 135	$ -	$ 328	

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 the same efficiency

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

ECM-9: Window Replacement

Existing: Windows are not energy efficiency single paned windows
Proposed: Install energy efficient vinyl windows

Linear Feet of window Edge	550.0 LF	Cooling System Efficiency	1.2 kW/ton	Heating System Efficiency	80%			
Area of window glass	700.0 SF	Ex Occupied Clng Temp.	74 *F	Heating On Temp.	60 *F			
Existing Infiltration Factor	**0.25 cfm/LF**	Ex Unoccupied Clng Temp.	78 *F	Ex Occupied Htg Temp.	68 *F			
Proposed Infiltration Factor	**0.10 cfm/LF**	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	60 *F			
Existing U Value	**1.00 Btuh/SF/°F**	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	$ 0.131	$/kWh		
Proposed U Value	**0.45 Btuh/SF/°F**			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	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load 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	49.1	0.0	0	0	-33,315	-30,515	-14,324	-13,064	0	0	0	0
97.5	42.5	3.0	1	2	-25,731	-22,931	-11,115	-9,855	7	3	0	0
92.5	39.5	34.0	13	21	-20,375	-17,575	-8,798	-7,538	63	27	0	0
87.5	36.6	131.0	51	80	-15,081	-12,281	-6,505	-5,245	175	75	0	0
82.5	34	500.0	196	304	-9,972	-7,172	-4,286	-3,026	414	176	0	0
77.5	31.6	620.0	244	376	-4,987	0	-2,117	0	121	52	0	0
72.5	29.2	664.0	261	403	0	0	0	0	0	0	0	0
67.5	27	854.0	336	519	0	0	0	0	0	0	0	0
62.5	24.5	927.0	364	563	0	0	0	0	0	0	0	0
57.5	21.4	600.0	236	364	8,909	2,121	3,931	936	0	0	36	16
52.5	18.7	610.0	240	370	13,152	6,364	5,803	2,808	0	0	69	30
47.5	16.2	611.0	240	371	17,394	10,606	7,675	4,680	0	0	101	45
42.5	14.4	656.0	258	398	21,637	14,849	9,547	6,552	0	0	144	63
37.5	12.6	1,023.0	402	621	25,879	19,091	11,419	8,424	0	0	278	123
32.5	10.7	734.0	288	446	30,122	23,334	13,291	10,296	0	0	239	105
27.5	8.6	334.0	131	203	34,364	27,576	15,163	12,168	0	0	126	56
22.5	6.8	252.0	99	153	38,607	31,819	17,035	14,040	0	0	109	48
17.5	5.5	125.0	49	76	42,849	36,061	18,907	15,912	0	0	61	27
12.5	4.1	47.0	18	29	47,092	40,304	20,779	17,784	0	0	25	11
7.5	2.6	22.0	9	13	51,334	44,546	22,651	19,656	0	0	13	6
2.5	1	13.0	5	8	55,577	48,789	24,523	21,528	0	0	8	4
-2.5	0	0.0	0	0	59,819	53,031	26,395	23,400	0	0	0	0
TOTALS		**8,760**	**3,441**	**5,319**					781	333	**1,209**	**533**

Existing Window Infiltration	**138**	**cfm**
Existing Window Heat Transfer	**700**	**Btuh/°F**
Proposed Window Infiltration	**55**	**cfm**
Proposed Window Heat Transfer	**315**	**Btuh/°F**

Savings	**675**	**Therms**	**$ 540**
	448	**kWh**	**$ 59**
			$ 598

Window ID	Facing Direction	Quantity	Width (ft)	Height (ft)	Linear Feet (LF)	Area (SF)	Infiltration Rate (CFM/LF)	U Value (Btuh/SF/°F)	Infiltration (CFM)	Heat Transfer (Btuh/°F)
1	N/A	25	4	7	550.0	700.0	0.25	1.00	137.5	700.0
Total		**25**	**4**	**7**	**550.0**	**700.0**	**0.25**	**1.00**	**137.5**	**700.0**

Camden County College Blackwood Campus- NJBPU
CHA Project #24364
Truman Hall

ECM-9: Window Replacement 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.		
						$ -	$ -	$ -	$ -	
4' x 7' x 4.5" Energy Efficient Vinyl Window	700	SF	$ 100		$ -	$ 77,000	$ -	$ -	$ 77,000	
						$ -	$ -	$ -	$ -	

$ 77,000	Subtotal
$ 7,700	10% Contingency
$ 16,940	20% Contractor O&P
$ -	0% Engineering
$ 101,600	**Total**

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
$63,120	**11.7**	**29,700**	**0**	**$4,740**	**0**	**$4,740**	**$2,620**	**13.3**	**12.8**

*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
$4,100	**0.0**	**26,900**	**0**	**$3,536**	**0**	**$3,536**	**$580**	**1.2**	**1.0**

*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
$67,255	**11.7**	**49,200**	**0**	**$7,303**	**0**	**$7,303**	**$3,200**	**9.2**	**8.8**

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

Energy Audit of Camden County College (Truman Hall)

CHA Project No. 24364

ECM-5 Lighting Replacements

Cost of Electricity: **$0.131 $/kWh**

$5.94 $/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
180	Automotive Tehcnology - 1	31	T 32 R F 4 (ELE)	F44ILL	112	3.5	SW	2500	8,680	31	T 28 C F 4	F43SSILL	72	2.2	SW	2,500	5,580	3,100	1.2	$ 495.83	$ 3,557.25		7.2	7.2
111A	Electrical Room	8	4' 1-LAMP T-12	F41EL	32	0.3	SW	2500	640	8	F28T8	F41SSILL-R	23	0.2	SW	2,500	460	180	0.1	$ 28.79	$ -	$200	0.0	-6.9
180	Classroom 101 - A	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2500	2,520	9	T 28 C F 4	F43SSILL	72	0.6	SW	2,500	1,620	900	0.4	$ 143.95	$ 1,032.75		7.2	7.2
11A	Classroom 101- B	10	4' 2-LAMP T-12	F42EL	60	0.6	SW	2125	1,275	10	F32T8	F42ILL-R	52	0.5	SW	2,125	1,105	170	0.1	$ 28.05	$ 2,500.00		89.1	89.1
180	Automotive Tehcnology - 2	52	T 32 R F 4 (ELE)	F44ILL	112	5.8	SW	2125	12,376	52	T 28 C F 4	F43SSILL	72	3.7	SW	2,125	7,956	4,420	2.1	$ 729.20	$ 5,967.00		8.2	8.2
204	102 - A	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	SW	2125	5,279	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	SW	2,125	5,279	-	0.0	$ -	$ -	$300		
180	119	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2500	1,680	6	T 28 C F 4	F43SSILL	72	0.4	SW	2,500	1,080	600	0.2	$ 95.97	$ 688.50	$150	7.2	5.6
175A	Technician Office	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2125	272	4	4' 2-LAMP T-8	F42ILL	59	0.2	SW	2,125	502	(230)	(0.1)	$ (37.86)	$ -			
111A	Locker Room	6	4' 1-LAMP T-12	F41EL	32	0.2	SW	2125	408	6	F28T8	F41SSILL-R	23	0.1	SW	2,125	293	115	0.1	$ 18.93	$ -	$150	0.0	-7.9
11A	Vestibule	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255	2	F32T8	F42ILL-R	52	0.1	SW	2,125	221	34	0.0	$ 5.61	$ 500.00		89.1	89.1
35A	1st Floor Hallway	26	4' 3-LAMP T-8 (32W)	F43ILL	32	0.8	SW	2250	1,872	26	4' 3-LAMP T-8 (32W)	F43ILL	89	2.3	SW	2,250	5,207	(3,335)	(1.5)	$ (543.90)	$ -			
180	105 Classroom	24	T 32 R F 4 (ELE)	F44ILL	112	2.7	SW	2250	6,048	24	T 28 C F 4	F43SSILL	72	1.7	SW	2,250	3,888	2,160	1.0	$ 352.33	$ 2,754.00		7.8	7.8
11A	Janitor Closet	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	SW	2,125	442	68	0.0	$ 11.22	$ 1,000.00		89.1	89.1
11A	Elevator Room	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255	2	F32T8	F42ILL-R	52	0.1	SW	2,125	221	34	0.0	$ 5.61	$ 500.00		89.1	89.1
11A	Cooridor	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,148	9	F32T8	F42ILL-R	52	0.5	SW	2,125	995	153	0.1	$ 25.24	$ 2,250.00		89.1	89.1
11A	Women's Bathroom	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2000	720	6	F32T8	F42ILL-R	52	0.3	SW	2,000	624	96	0.0	$ 16.04	$ 1,500.00		93.5	93.5
11A	Men's Bathroom	8	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,020	8	F32T8	F42ILL-R	52	0.4	SW	2,125	884	136	0.1	$ 22.44	$ 2,000.00		89.1	89.1
11A	Room 123 Office	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	SW	2,125	442	68	0.0	$ 11.22	$ 1,000.00		89.1	89.1
180	Room 122	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2125	4,760	20	T 28 C F 4	F43SSILL	72	1.4	SW	2,125	3,060	1,700	0.8	$ 280.46	$ 2,295.00		8.2	8.2
11A	Room 124	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2125	765	6	F32T8	F42ILL-R	52	0.3	SW	2,125	663	102	0.0	$ 16.83	$ 1,500.00		89.1	89.1
180	Room 100 Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904	8	T 28 C F 4	F43SSILL	72	0.6	SW	2,125	1,224	680	0.3	$ 112.18	$ 918.00		8.2	8.2
180	Room 100 - A Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714	3	T 28 C F 4	F43SSILL	72	0.2	SW	2,125	459	255	0.1	$ 42.07	$ 344.25	$75	8.2	6.4
180	Room 100 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 28 C F 4	F43SSILL	72	0.1	SW	2,125	306	170	0.1	$ 28.05	$ 229.50		8.2	8.2
11A	Room 100 - C	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	SW	2,125	442	68	0.0	$ 11.22	$ 1,000.00		89.1	89.1
11A	Room 100 - D	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2500	600	4	F32T8	F42ILL-R	52	0.2	SW	2,500	520	80	0.0	$ 12.80	$ 1,000.00		78.2	78.2
11A	Men's Bathroom	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	SW	2,125	111	17	0.0	$ 2.80	$ 250.00		89.1	89.1
11A	Women's Bathroom	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	SW	2,125	111	17	0.0	$ 2.80	$ 250.00		89.1	89.1
162A	Room 100 - F	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	500	120	2	F28T8	F44SSILL-R	86	0.2	SW	500	86	34	0.1	$ 9.32	$ -	$50	0.0	-5.4
180	Room 100 - E	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 28 C F 4	F43SSILL	72	0.3	SW	2,125	612	340	0.2	$ 56.09	$ 459.00		8.2	8.2
11A	Room 100 - E	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2500	300	2	F32T8	F42ILL-R	52	0.1	SW	2,500	260	40	0.0	$ 6.40	$ 500.00		78.2	78.2
180	Room 125	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2500	5,600	20	T 28 C F 4	F43SSILL	72	1.4	SW	2,500	3,600	2,000	0.8	$ 319.89	$ 2,295.00	$500	7.2	5.6
180	Room 124 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2500	560	2	T 28 C F 4	F43SSILL	72	0.1	SW	2,500	360	200	0.1	$ 31.99	$ 229.50	$50	7.2	5.6
180	Room 129	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 28 C F 4	F43SSILL	72	0.3	SW	2,125	612	340	0.2	$ 56.09	$ 459.00		8.2	8.2
180	Room 129	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	1062.5	1,071	9	T 28 C F 4	F43SSILL	72	0.6	SW	1,063	689	383	0.4	$ 75.94	$ 1,032.75		13.6	13.6
180	Room 126	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 28 C F 4	F43SSILL	72	0.1	SW	2,125	306	170	0.1	$ 28.05	$ 229.50		8.2	8.2
180	Room 129 Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1062.5	476	4	T 28 C F 4	F43SSILL	72	0.3	SW	1,063	306	170	0.2	$ 33.75	$ 459.00		13.6	13.6
11A	Room 129 - A	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	1062.5	574	9	F32T8	F42ILL-R	52	0.5	SW	1,063	497	76	0.1	$ 15.19	$ 2,250.00		148.2	148.2
11A	Stair Tower # 2	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	SW	2,125	442	68	0.0	$ 11.22	$ 1,000.00		89.1	89.1
180	Room 210 - A	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	500	112	2	T 28 C F 4	F43SSILL	72	0.1	SW	500	72	40	0.1	$ 10.96	$ 229.50		20.9	20.9
175A	2nd Floor Cooridor	30	4' 2-LAMP T-8 (32W)	F42ILL	32	1.0	SW	500	480	30	4' 2-LAMP T-8	F42ILL	59	1.8	SW	500	885	(405)	(0.8)	$ (110.97)	$ -			
35A	Room 209	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	SW	500	445	(285)	(0.6)	$ (78.09)	$ -			
180	Room 210	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618	11	T 28 C F 4	F43SSILL	72	0.8	SW	2,125	1,683	935	0.4	$ 154.25	$ 1,262.25		8.2	8.2
35A	Room 208	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	1062.5	408	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	SW	1,063	1,135	(727)	(0.7)	$ (144.28)	$ -			
180	Room 207	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2125	2,380	10	T 28 C F 4	F43SSILL	72	0.7	SW	2,125	1,530	850	0.4	$ 140.23	$ 1,147.50		8.2	8.2
180	Room 206	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	1062.5	1,190	10	T 28 C F 4	F43SSILL	72	0.7	SW	1,063	765	425	0.4	$ 84.37	$ 1,147.50	$70	13.6	12.8
180	Room 205	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2250	2,520	10	T 28 C F 4	F43SSILL	72	0.7	SW	2,250	1,620	900	0.4	$ 146.80	$ 1,147.50		7.8	7.8
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	2250	3,024	12	T 28 C F 4	F43SSILL	72	0.9	SW	2,250	1,944	1,080	0.5	$ 176.16	$ 1,377.00		7.8	7.8
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	500	560	10	T 28 C F 4	F43SSILL	72	0.7	SW	500	360	200	0.4	$ 54.80	$ 1,147.50		20.9	20.9
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	699	12	T 28 C F 4	F43SSILL	72	0.9	SW	520	449	250	0.5	$ 67.02	$ 1,377.00		20.5	20.5
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	520	582	10	T 28 C F 4	F43SSILL	72	0.7	SW	520	374	208	0.4	$ 55.85	$ 1,147.50		20.5	20.5
180	Room 202	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	699	12	T 28 C F 4	F43SSILL	72	0.9	SW	520	449	250	0.5	$ 67.02	$ 1,377.00	$300	20.5	16.1
35A	Room 201	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	SW	500	445	(285)	(0.6)	$ (78.09)	$ -			
180	Room 200	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	4380	4,415	9	T 28 C F 4	F43SSILL	72	0.6	SW	4,380	2,838	1,577	0.4	$ 232.90	$ 1,032.75		4.4	4.4
209A	Room 200	2	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	4380	280	2	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.1	SW	4,380	517	(237)	(0.1)	$ (34.94)	$ -			
209A	Office	3	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	8760	841	3	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.2	SW	8,760	1,551	(710)	(0.1)	$ (99.03)	$ -			
11A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	8760	1,577	3	F32T8	F42ILL-R	52	0.2	SW	8,760	1,367	210	0.0	$ 29.34	$ 750.00		25.6	25.6
11A	2nd Floor All Purpose	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	SW	2,125	111	17	0.0	$ 2.80	$ 250.00	$25	89.1	80.2
180	2nd Floor Sitting Area	5	T 32 R F 4 (ELE)	F44ILL	112	0.6	SW	2125	1,190	5	T 28 C F 4	F43SSILL	72	0.4	SW	2,125	765	425	0.2	$ 70.12	$ 573.75	$125	8.2	6.4
111A	2nd Floor Janitor	1	4' 1-LAMP T-12	F41EL	32	0.0	SW	500	16	1	F28T8	F41SSILL-R	23	0.0	SW	500	12	5	0.0	$ 1.23	$ -	$25	0.0	-20.3
111A	2nd Floor Mechanical Room	7	4' 1-LAMP T-12	F41EL	32	0.2	SW	500	112	7	F28T8	F41SSILL-R	23	0.2	SW	500	81	32	0.1	$ 8.63	$ -	$175	0.0	-20.3
209A	Stair Tower # 1	1	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.0	SW	8760	280	1	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.1	SW	8,760	517	(237)	(0.0)	$ (33.01)	$ -	$25		
11A	Stair Tower # 1	5	4' 2-LAMP T-12	F42EL	60	0.3	SW	500	150	5	F32T8	F42ILL-R	52	0.3	SW	500	130	20	0.0	$ 5.48	$ 1,250.00	$125	228.1	205.3
146	Exterior	3	High Bay MH 400	MH400/1	458	1.4	SW	3285	4,514	3	P 54 C F 4	FC20	20	0.1	SW	3,285	197	4,316	1.3	$ 660.99	$ 900.00	$75	1.4	1.2
9A	Exterior	2	High Bay MH 200 35 Feet High	MH200/1	232	0.5	SW	3285	1,524	2	FXLED78	FXLED78/1	78	0.2	SW	3,285	512	1,012	0.3	$ 154.94	$ 1,411.00	$50	9.1	8.8
141A	Exterior	1	HPS 200	HPS200/1	250	0.3	SW	8760	2,190	1	FXLED78	FXLED78/1	78	0.1	SW	8,760	683	1,507	0.2	$ 210.29	$ 114.75	$25	0.5	0.4
9A	Exterior	1	High Bay MH 200 35 Feet High	MH200/1	232	0.2	SW	8760	2,032	1	FXLED78	FXLED78/1	78	0.1	SW	8,760	683	1,349	0.2	$ 188.28	$ 705.50		3.7	3.7
142	Exterior	1	MH 100	MH100/1	128	0.1	SW	500	64	1	FXLED39	FXLED39/1	39	0.0	SW	500	20	45	0.1	$ 12.19	$ -	$25	0.0	-2.1
9A	Exterior	4	High Bay MH 200 35 Feet High	MH200/1	232	0.9	SW	2125	1,972	4	FXLED78	FXLED78/1	78	0.3	SW	2,125	663	1,309	0.6	$ 215.96	$ 2,822.00	$100	13.1	12.6
	Total	**544**				**50.1**			**103,919**	**544**			**4,411**	**38.4**				**74,264**	**29,700**	**11.7**	**$4,700**	**$63,120**	**$2,620**		
																		Demand Savings			**11.7**	**$836**			
																		kWh Savings			**29,700**	**$3,904**			
																		Total savings				**$4,740**		**13.3**	**12.8**

Energy Audit of Camden County College (Truman Hall)

CHA Project No. 24364

ECM-6 Install Occupancy Sensors

Cost of Electricity: **$0.131 $/kWh**

$5.94 $/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 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
180	Automotive Tehcnology - 1	31	T 32 R F 4 (ELE)	F44ILL	112	3.5	SW	2500	8,680.0	31	T 32 R F 4 (ELE)	F44ILL	112	3.5	None	2500	8,680.0	0.0	0.0	$0.00	$0.00	$0.00		
111A	Electrical Room	8	4' 1-LAMP T-12	F41EL	32	0.3	SW	2500	640.0	8	4' 1-LAMP T-12	F41EL	32	0.3	None	2500	640.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Classroom 101 - A	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2500	2,520.0	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	None	2500	2,520.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	Classroom 101- B	10	4' 2-LAMP T-12	F42EL	60	0.6	SW	2125	1,275.0	10	4' 2-LAMP T-12	F42EL	60	0.6	C-OCC	1200	720.0	555.0	0.0	$72.94				
180	Automotive Tehcnology - 2	52	T 32 R F 4 (ELE)	F44ILL	112	5.8	SW	2125	12,376.0	52	T 32 R F 4 (ELE)	F44ILL	112	5.8	C-OCC	1200	6,988.8	5,387.2	0.0	$708.05	$202.50	$35.00	0.2	0.2
204	102 - A	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	SW	2125	5,278.5	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	C-OCC	1200	2,980.8	2,297.7	0.0	$301.99				
180	119	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2500	1,680.0	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	None	2500	1,680.0	0.0	0.0	$0.00	$0.00	$0.00		
175A	Technician Office	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2125	272.0	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	OCC	1200	153.6	118.4	0.0	$15.56	$118.75	$20.00	7.6	6.3
111A	Locker Room	6	4' 1-LAMP T-12	F41EL	32	0.2	SW	2125	408.0	6	4' 1-LAMP T-12	F41EL	32	0.2	OCC	1200	230.4	177.6	0.0	$23.34	$118.75	$20.00	5.1	4.2
11A	Vestibule	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255.0	2	4' 2-LAMP T-12	F42EL	60	0.1	OCC	1200	144.0	111.0	0.0	$14.59	$118.75	$20.00	8.1	6.8
35A	1st Floor Hallway	26	4' 3-LAMP T-8 (32W)	F43ILL	32	0.8	SW	2250	1,872.0	26	4' 3-LAMP T-8 (32W)	F43ILL	32	0.8	C-OCC	1000	832.0	1,040.0	0.0	$136.69	$202.50	$35.00	1.5	1.2
180	105 Classroom	24	T 32 R F 4 (ELE)	F44ILL	112	2.7	SW	2250	6,048.0	24	T 32 R F 4 (ELE)	F44ILL	112	2.7	C-OCC	1000	2,688.0	3,360.0	0.0	$441.61	$202.50	$35.00	0.5	0.4
11A	Janitor Closet	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510.0	4	4' 2-LAMP T-12	F42EL	60	0.2	OCC	1200	288.0	222.0	0.0	$29.18	$118.75	$20.00	4.1	3.4
11A	Elevator Room	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255.0	2	4' 2-LAMP T-12	F42EL	60	0.1	OCC	1200	144.0	111.0	0.0	$14.59	$118.75	$20.00	8.1	6.8
11A	Cooridor	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,147.5	9	4' 2-LAMP T-12	F42EL	60	0.5	OCC	1200	648.0	499.5	0.0	$65.65	$118.75	$20.00	1.8	1.5
11A	Women's Bathroom	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2000	720.0	6	4' 2-LAMP T-12	F42EL	60	0.4	OCC	1000	360.0	360.0	0.0	$47.32	$118.75	$0.00	2.5	2.5
11A	Men's Bathroom	8	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,020.0	8	4' 2-LAMP T-12	F42EL	60	0.5	OCC	1200	576.0	444.0	0.0	$58.36	$118.75	$20.00	2.0	1.7
11A	Room 123 Office	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510.0	4	4' 2-LAMP T-12	F42EL	60	0.2	OCC	1200	288.0	222.0	0.0	$29.18	$118.75	$20.00	4.1	3.4
180	Room 122	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2125	4,760.0	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	OCC	1200	2,688.0	2,072.0	0.0	$272.33	$118.75	$20.00	0.4	0.4
11A	Room 124	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2125	765.0	6	4' 2-LAMP T-12	F42EL	60	0.4	OCC	1200	432.0	333.0	0.0	$43.77	$118.75	$20.00	2.7	2.3
180	Room 100 Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904.0	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	OCC	1200	1,075.2	828.8	0.0	$108.93	$118.75	$20.00	0.8	0.7
180	Room 100 - A Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714.0	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	OCC	1200	403.2	310.8	0.0	$40.85				
180	Room 100 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1200	268.8	207.2	0.0	$27.23	$118.75	$20.00	4.4	3.6
11A	Room 100 - C	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510.0	4	4' 2-LAMP T-12	F42EL	60	0.2	OCC	1200	288.0	222.0	0.0	$29.18	$118.75	$20.00	4.1	3.4
11A	Room 100 - D	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2500	600.0	4	4' 2-LAMP T-12	F42EL	60	0.2	None	2500	600.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	Men's Bathroom	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	$7.29	$118.75	$20.00	16.3	13.5
11A	Women's Bathroom	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	1000	60.0	67.5	0.0	$8.87	$118.75	$20.00	13.4	11.1
162A	Room 100 - F	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	500	120.0	2	4' 4-LAMP T-12	F44EL	120	0.2	None	500	120.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 100 - E	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	OCC	1200	537.6	414.4	0.0	$54.47	$118.75	$20.00	2.2	1.8
11A	Room 100 - E	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2500	300.0	2	4' 2-LAMP T-12	F42EL	60	0.1	None	2500	300.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 125	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2500	5,600.0	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	None	2500	5,600.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 124 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2500	560.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	None	2500	560.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 129	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	OCC	1200	537.6	414.4	0.0	$54.47	$118.75	$0.00	2.2	2.2
180	Room 129	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	1062.5	1,071.0	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	None	1062.5	1,071.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 126	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1200	268.8	207.2	0.0	$27.23	$118.75	$20.00	4.4	3.6
180	Room 129 Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1062.5	476.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	None	1062.5	476.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	Room 129 - A	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	1062.5	573.8	9	4' 2-LAMP T-12	F42EL	60	0.5	None	1062.5	573.8	0.0	0.0	$0.00	$0.00	$0.00		
11A	Stair Tower # 2	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510.0	4	4' 2-LAMP T-12	F42EL	60	0.2	OCC	1200	288.0	222.0	0.0	$29.18	$118.75	$20.00	4.1	3.4
180	Room 210 - A	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	500	112.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	None	500	112.0	0.0	0.0	$0.00	$0.00	$0.00		
175A	2nd Floor Cooridor	30	4' 2-LAMP T-8 (32W)	F42ILL	32	1.0	SW	500	480.0	30	4' 2-LAMP T-8 (32W)	F42ILL	32	1.0	None	500	480.0	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room 209	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160.0	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	None	500	160.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 210	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618.0	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	OCC	1200	1,478.4	1,139.6	0.0	$149.78	$118.75	$20.00	0.8	0.7
35A	Room 208	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	1062.5	408.0	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	None	1062.5	408.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 207	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2125	2,380.0	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	OCC	1200	1,344.0	1,036.0	0.0	$136.16	$118.75	$0.00	0.9	0.9
180	Room 206	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	1062.5	1,190.0	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	None	1062.5	1,190.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 205	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2250	2,520.0	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	None	2250	2,520.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	2250	3,024.0	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	None	2250	3,024.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	500	560.0	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	None	500	560.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	698.9	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	None	520	698.9	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	520	582.4	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	C-OCC	390	436.8	145.6	0.0	$19.14	$202.50	$35.00	10.6	8.8
180	Room 202	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	698.9	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	None	520	698.9	0.0	0.0	$0.00	$0.00	$0.00		
35A	Room 201	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160.0	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	None	500	160.0	0.0	0.0	$0.00	$0.00	$0.00		
180	Room 200	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	4380	4,415.0	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	None	4380	4,415.0	0.0	0.0	$0.00	$0.00	$0.00		
209A	Room 200	2	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	4380	280.3	2	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	None	4380	280.3	0.0	0.0	$0.00	$0.00	$0.00		
209A	Office	3	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	8760	841.0	3	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	None	8760	841.0	0.0	0.0	$0.00	$0.00	$0.00		
11A	2nd Floor Men'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	None	8760	1,576.8	0.0	0.0	$0.00	$0.00	$0.00		
11A	2nd Floor All Purpose	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	$7.29	$118.75	$20.00	1.6	1.3
180	2nd Floor Sitting Area	5	T 32 R F 4 (ELE)	F44ILL	112	0.6	SW	2125	1,190.0	5	T 32 R F 4 (ELE)	F44ILL	112	0.6	OCC	1200	672.0	518.0	0.0	$68.08				
111A	2nd Floor Janitor	1	4' 1-LAMP T-12	F41EL	32	0.0	SW	500	16.0	1	4' 1-LAMP T-12	F41EL	32	0.0	None	500	16.0	0.0	0.0	$0.00	$0.00	$0.00		
111A	2nd Floor Mechanical Room	7	4' 1-LAMP T-12	F41EL	32	0.2	SW	500	112.0	7	4' 1-LAMP T-12	F41EL	32	0.2	None	500	112.0	0.0	0.0	$0.00	$0.00	$0.00		
209A	Stair Tower # 1	1	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.0	SW	8760	280.3	1	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.0	None	8760	280.3	0.0	0.0	$0.00	$0.00	$0.00		
11A	Stair Tower # 1	5	4' 2-LAMP T-12	F42EL	60	0.3	SW	500	150.0	5	4' 2-LAMP T-12	F42EL	60	0.3	None	500	150.0	0.0	0.0	$0.00	$0.00	$0.00		
146	Exterior	3	High Bay MH 400	MH400/1	458	1.4	SW	3285	4,513.6	3	High Bay MH 400	MH400/1	458	1.4	OCC	1825	2,507.6	2,006.0	0.0	$263.66	$118.75	$20.00	0.5	0.4
9A	Exterior	2	High Bay MH 200 35 Feet High	MH200/1	232	0.5	SW	3285	1,524.2	2	High Bay MH 200 35 Feet High	MH200/1	232	0.5	OCC	1825	846.8	677.4	0.0	$89.04	$118.75	$20.00	1.3	1.1
141A	Exterior	1	HPS 200	HPS200/1	250	0.3	SW	8760	2,190.0	1	HPS 200	HPS200/1	250	0.3	None	8760	2,190.0	0.0	0.0	$0.00	$0.00	$0.00		
9A	Exterior	1	High Bay MH 200 35 Feet High	MH200/1	232	0.2	SW	8760	2,032.3	1	High Bay MH 200 35 Feet High	MH200/1	232	0.2	None	8760	2,032.3	0.0	0.0	$0.00	$0.00	$0.00		
142	Exterior	1	MH 100	MH100/1	128	0.1	SW	500	64.0	1	MH 100	MH100/1	128	0.1	None	500	64.0	0.0	0.0	$0.00	$0.00	$0.00		
9A	Exterior	4	High Bay MH 200 35 Feet High	MH200/1	232	0.9	SW	2125	1,972.0	4	High Bay MH 200 35 Feet High	MH200/1	232	0.9	OCC	1000	928.0	1,044.0	0.0	$137.22	$118.75	$0.00	0.9	0.9
	Total	**544**				**50.1**			**103,919**	**544**				**50**				**77,037**	**26,882**	**0**	**$3,533**	**$4,100**	**580**		
																		Demand Savings		**0.0**	**$0**			
																		kWh Savings		**26,900**	**$3,536**			
																		Total Savings			**$3,536**		**1.2**	**1.0**

Energy Audit of Camden County College (Truman Hall)

CHA Project No. 24364

ECM-7 Lighting Replacements with Occupancy Sensors

Cost of Electricity: **$0.131 $/kWh**

$5.94 $/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)	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
180	Automotive Tehcnology - 1	31	T 32 R F 4 (ELE)	F44ILL	112	3.5	SW	2500	8,680	31	T 28 C F 4	F43SSILL	72	2.2	None	2,500	5,580	3,100	1.2	$ 495.83	$ 3,557.25	$ -	7.2	7.2
111A	Electrical Room	8	4' 1-LAMP T-12	F41EL	32	0.3	SW	2500	640	8	F28T8	F41SSILL-R	23	0.2	None	2,500	460	180	0.1	$ 28.79	$ -	$ 200	0.0	-6.9
180	Classroom 101 - A	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	2500	2,520	9	T 28 C F 4	F43SSILL	72	0.6	None	2,500	1,620	900	0.4	$ 143.95	$ 1,032.75	$ -	7.2	7.2
11A	Classroom 101- B	10	4' 2-LAMP T-12	F42EL	60	0.6	SW	2125	1,275	10	F32T8	F42ILL-R	52	0.5	C-OCC	1,200	624	651	0.1	$ 91.27	$ 2,702.50	$ 35	29.6	29.2
180	Automotive Tehcnology - 2	52	T 32 R F 4 (ELE)	F44ILL	112	5.8	SW	2125	12,376	52	T 28 C F 4	F43SSILL	72	3.7	C-OCC	1,200	4,493	7,883	2.1	$ 1,184.38	$ 5,967.00	$ -	5.0	5.0
204	102 - A	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	SW	2125	5,279	12	S 96 P F 2 (MAG) 8'	F82EHE	207	2.5	C-OCC	1,200	2,981	2,298	0.0	$ 301.99	$ -	$ 300	0.0	-1.0
180	119	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2500	1,680	6	T 28 C F 4	F43SSILL	72	0.4	None	2,500	1,080	600	0.2	$ 95.97	$ 688.50	$ 150	7.2	5.6
175A	Technician Office	4	4' 2-LAMP T-8 (32W)	F42ILL	32	0.1	SW	2125	272	4	4' 2-LAMP T-8	F42ILL	59	0.2	OCC	1,200	283	(11)	(0.1)	$ (9.17)	$ 118.75	$ 20		
111A	Locker Room	6	4' 1-LAMP T-12	F41EL	32	0.2	SW	2125	408	6	F28T8	F41SSILL-R	23	0.1	OCC	1,200	166	242	0.1	$ 35.71	$ 118.75	$ 170	3.3	-1.4
11A	Vestibule	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255	2	F32T8	F42ILL-R	52	0.1	OCC	1,200	125	130	0.0	$ 18.25	$ 618.75	$ 20	33.9	32.8
35A	1st Floor Hallway	26	4' 3-LAMP T-8 (32W)	F43ILL	32	0.8	SW	2250	1,872	26	4' 3-LAMP T-8 (32W)	F43ILL	89	2.3	C-OCC	1,000	2,314	(442)	(1.5)	$ (163.74)	$ 202.50	$ 35		
180	105 Classroom	24	T 32 R F 4 (ELE)	F44ILL	112	2.7	SW	2250	6,048	24	T 28 C F 4	F43SSILL	72	1.7	C-OCC	1,000	1,728	4,320	1.0	$ 636.22	$ 2,956.50	$ 35	4.6	4.6
11A	Janitor Closet	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	OCC	1,200	250	260	0.0	$ 36.51	$ 1,118.75	$ 20	30.6	30.1
11A	Elevator Room	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	255	2	F32T8	F42ILL-R	52	0.1	OCC	1,200	125	130	0.0	$ 18.25	$ 618.75	$ 20	33.9	32.8
11A	Cooridor	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,148	9	F32T8	F42ILL-R	52	0.5	OCC	1,200	562	586	0.1	$ 82.14	$ 2,368.75	$ 20	28.8	28.6
11A	Women's Bathroom	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2000	720	6	F32T8	F42ILL-R	52	0.3	OCC	1,000	312	408	0.0	$ 57.05	$ 1,618.75	$ -	28.4	28.4
11A	Men's Bathroom	8	4' 2-LAMP T-12	F42EL	60	0.5	SW	2125	1,020	8	F32T8	F42ILL-R	52	0.4	OCC	1,200	499	521	0.1	$ 73.01	$ 2,118.75	$ 20	29.0	28.7
11A	Room 123 Office	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	OCC	1,200	250	260	0.0	$ 36.51	$ 1,118.75	$ 20	30.6	30.1
180	Room 122	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2125	4,760	20	T 28 C F 4	F43SSILL	72	1.4	OCC	1,200	1,728	3,032	0.8	$ 455.53	$ 2,413.75	$ 20	5.3	5.3
11A	Room 124	6	4' 2-LAMP T-12	F42EL	60	0.4	SW	2125	765	6	F32T8	F42ILL-R	52	0.3	OCC	1,200	374	391	0.0	$ 54.76	$ 1,618.75	$ 20	29.6	29.2
180	Room 100 Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904	8	T 28 C F 4	F43SSILL	72	0.6	OCC	1,200	691	1,213	0.3	$ 182.21	$ 1,036.75	$ 20	5.7	5.6
180	Room 100 - A Office	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714	3	T 28 C F 4	F43SSILL	72	0.2	OCC	1,200	259	455	0.1	$ 68.33	$ 463.00	$ 75	6.8	5.7
180	Room 100 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 28 C F 4	F43SSILL	72	0.1	OCC	1,200	173	303	0.1	$ 45.55	$ 348.25	$ 20	7.6	7.2
11A	Room 100 - C	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	OCC	1,200	250	260	0.0	$ 36.51	$ 1,118.75	$ 20	30.6	30.1
11A	Room 100 - D	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2500	600	4	F32T8	F42ILL-R	52	0.2	None	2,500	520	80	0.0	$ 12.80	$ 1,000.00	$ -	78.2	78.2
11A	Men's Bathroom	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	OCC	1,200	62	65	0.0	$ 9.13	$ 368.75	$ 20	40.4	38.2
11A	Women's Bathroom	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	OCC	1,000	52	76	0.0	$ 10.49	$ 368.75	$ 20	35.1	33.2
162A	Room 100 - F	2	4' 4-LAMP T-12	F44EL	120	0.2	SW	500	120	2	F28T8	F44SSILL-R	86	0.2	None	500	86	34	0.1	$ 9.32	$ -	$ 50	0.0	-5.4
180	Room 100 - E	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 28 C F 4	F43SSILL	72	0.3	OCC	1,200	346	606	0.2	$ 91.11	$ 577.75	$ 20	6.3	6.1
11A	Room 100 - E	2	4' 2-LAMP T-12	F42EL	60	0.1	SW	2500	300	2	F32T8	F42ILL-R	52	0.1	None	2,500	260	40	0.0	$ 6.40	$ 500.00	$ -	78.2	78.2
180	Room 125	20	T 32 R F 4 (ELE)	F44ILL	112	2.2	SW	2500	5,600	20	T 28 C F 4	F43SSILL	72	1.4	None	2,500	3,600	2,000	0.8	$ 319.89	$ 2,295.00	$ 500	7.2	5.6
180	Room 124 - B	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2500	560	2	T 28 C F 4	F43SSILL	72	0.1	None	2,500	360	200	0.1	$ 31.99	$ 229.50	$ 50	7.2	5.6
180	Room 129	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 28 C F 4	F43SSILL	72	0.3	OCC	1,200	346	606	0.2	$ 91.11	$ 577.75	$ -	6.3	6.3
180	Room 129	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	1062.5	1,071	9	T 28 C F 4	F43SSILL	72	0.6	None	1,063	689	383	0.4	$ 75.94	$ 1,032.75	$ -	13.6	13.6
180	Room 126	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 28 C F 4	F43SSILL	72	0.1	OCC	1,200	173	303	0.1	$ 45.55	$ 348.25	$ 20	7.6	7.2
180	Room 129 Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1062.5	476	4	T 28 C F 4	F43SSILL	72	0.3	None	1,063	306	170	0.2	$ 33.75	$ 459.00	$ -	13.6	13.6
11A	Room 129 - A	9	4' 2-LAMP T-12	F42EL	60	0.5	SW	1062.5	574	9	F32T8	F42ILL-R	52	0.5	None	1,063	497	76	0.1	$ 15.19	$ 2,250.00	$ -	148.2	148.2
11A	Stair Tower # 2	4	4' 2-LAMP T-12	F42EL	60	0.2	SW	2125	510	4	F32T8	F42ILL-R	52	0.2	OCC	1,200	250	260	0.0	$ 36.51	$ 1,118.75	$ 20	30.6	30.1
180	Room 210 - A	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	500	112	2	T 28 C F 4	F43SSILL	72	0.1	None	500	72	40	0.1	$ 10.96	$ 229.50	$ -	20.9	20.9
175A	2nd Floor Cooridor	30	4' 2-LAMP T-8 (32W)	F42ILL	32	1.0	SW	500	480	30	4' 2-LAMP T-8	F42ILL	59	1.8	None	500	885	(405)	(0.8)	$ (110.97)	$ -	$ -		
35A	Room 209	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	None	500	445	(285)	(0.6)	$ (78.09)	$ -	$ -		
180	Room 210	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618	11	T 28 C F 4	F43SSILL	72	0.8	OCC	1,200	950	1,668	0.4	$ 250.54	$ 1,381.00	$ 20	5.5	5.4
35A	Room 208	12	4' 3-LAMP T-8 (32W)	F43ILL	32	0.4	SW	1062.5	408	12	4' 3-LAMP T-8 (32W)	F43ILL	89	1.1	None	1,063	1,135	(727)	(0.7)	$ (144.28)	$ -	$ -		
180	Room 207	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2125	2,380	10	T 28 C F 4	F43SSILL	72	0.7	OCC	1,200	864	1,516	0.4	$ 227.76	$ 1,266.25	$ -	5.6	5.6
180	Room 206	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	1062.5	1,190	10	T 28 C F 4	F43SSILL	72	0.7	None	1,063	765	425	0.4	$ 84.37	$ 1,147.50	$ 70	13.6	12.8
180	Room 205	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	2250	2,520	10	T 28 C F 4	F43SSILL	72	0.7	None	2,250	1,620	900	0.4	$ 146.80	$ 1,147.50	$ -	7.8	7.8
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	2250	3,024	12	T 28 C F 4	F43SSILL	72	0.9	None	2,250	1,944	1,080	0.5	$ 176.16	$ 1,377.00	$ -	7.8	7.8
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	500	560	10	T 28 C F 4	F43SSILL	72	0.7	None	500	360	200	0.4	$ 54.80	$ 1,147.50	$ -	20.9	20.9
180	Room 204	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	699	12	T 28 C F 4	F43SSILL	72	0.9	None	520	449	250	0.5	$ 67.02	$ 1,377.00	$ -	20.5	20.5
180	Room 203	10	T 32 R F 4 (ELE)	F44ILL	112	1.1	SW	520	582	10	T 28 C F 4	F43SSILL	72	0.7	C-OCC	390	281	302	0.4	$ 68.15	$ 1,350.00	$ 35	19.8	19.3
180	Room 202	12	T 32 R F 4 (ELE)	F44ILL	112	1.3	SW	520	699	12	T 28 C F 4	F43SSILL	72	0.9	None	520	449	250	0.5	$ 67.02	$ 1,377.00	$ 300	20.5	16.1
35A	Room 201	10	4' 3-LAMP T-8 (32W)	F43ILL	32	0.3	SW	500	160	10	4' 3-LAMP T-8 (32W)	F43ILL	89	0.9	None	500	445	(285)	(0.6)	$ (78.09)	$ -	$ -		
180	Room 200	9	T 32 R F 4 (ELE)	F44ILL	112	1.0	SW	4380	4,415	9	T 28 C F 4	F43SSILL	72	0.6	None	4,380	2,838	1,577	0.4	$ 232.90	$ 1,032.75	$ -	4.4	4.4
209A	Room 200	2	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	4380	280	2	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.1	None	4,380	517	(237)	(0.1)	$ (34.94)	$ -	$ -		
209A	Office	3	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.1	SW	8760	841	3	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.2	None	8,760	1,551	(710)	(0.1)	$ (99.03)	$ -	$ -		
11A	2nd Floor Men's Bathroom	3	4' 2-LAMP T-12	F42EL	60	0.2	SW	8760	1,577	3	F32T8	F42ILL-R	52	0.2	None	8,760	1,367	210	0.0	$ 29.34	$ 750.00	$ -	25.6	25.6
11A	2nd Floor All Purpose	1	4' 2-LAMP T-12	F42EL	60	0.1	SW	2125	128	1	F32T8	F42ILL-R	52	0.1	OCC	1,200	62	65	0.0	$ 9.13	$ 368.75	$ 45	40.4	35.5
180	2nd Floor Sitting Area	5	T 32 R F 4 (ELE)	F44ILL	112	0.6	SW	2125	1,190	5	T 28 C F 4	F43SSILL	72	0.4	OCC	1,200	432	758	0.2	$ 113.88	$ 692.50	$ 125	6.1	5.0
111A	2nd Floor Janitor	1	4' 1-LAMP T-12	F41EL	32	0.0	SW	500	16	1	F28T8	F41SSILL-R	23	0.0	None	500	12	5	0.0	$ 1.23	$ -	$ 25	0.0	-20.3
111A	2nd Floor Mechanical Room	7	4' 1-LAMP T-12	F41EL	32	0.2	SW	500	112	7	F28T8	F41SSILL-R	23	0.2	None	500	81	32	0.1	$ 8.63	$ -	$ 175	0.0	-20.3
209A	Stair Tower # 1	1	2' 2-LAMP T-8 (32W)	FU2ILL	32	0.0	SW	8760	280	1	2' 2-LAMP T-8 (32W)	FU2ILL	59	0.1	None	8,760	517	(237)	(0.0)	$ (33.01)	$ -	$ 25		
11A	Stair Tower # 1	5	4' 2-LAMP T-12	F42EL	60	0.3	SW	500	150	5	F32T8	F42ILL-R	52	0.3	None	500	130	20	0.0	$ 5.48	$ 1,250.00	$ 125	228.1	205.3
146	Exterior	3	High Bay MH 400	MH400/1	458	1.4	SW	3285	4,514	3	P 54 C F 4	FC20	20	0.1	OCC	1,825	110	4,404	1.3	$ 672.51	$ 1,018.75	$ 95	1.5	1.4
9A	Exterior	2	High Bay MH 200 35 Feet High	MH200/1	232	0.5	SW	3285	1,524	2	FXLED78	FXLED78/1	78	0.2	OCC	1,825	285	1,240	0.3	$ 184.87	$ 1,529.75	$ 70	8.3	7.9
141A	Exterior	1	HPS 200	HPS200/1	250	0.3	SW	8760	2,190	1	FXLED78	FXLED78/1	78	0.1	None	8,760	683	1,507	0.2	$ 210.29	$ 114.75	$ 25	0.5	0.4
9A	Exterior	1	High Bay MH 200 35 Feet High	MH200/1	232	0.2	SW	8760	2,032	1	FXLED78	FXLED78/1	78	0.1	None	8,760	683	1,349	0.2	$ 188.28	$ 705.50	$ -	3.7	3.7
142	Exterior	1	MH 100	MH100/1	128	0.1	SW	500	64	1	FXLED39	FXLED39/1	39	0.0	None	500	20	45	0.1	$ 12.19	$ -	$ 25	0.0	-2.1
9A	Exterior	4	High Bay MH 200 35 Feet High	MH200/1	232	0.9	SW	2125	1,972	4	FXLED78	FXLED78/1	78	0.3	OCC	1,000	312	1,660	0.6	$ 262.09	$ 2,940.75	$ 100	11.2	10.8
	Total	**544**				**50.1**			**103,919**	**544**				**38.4**			**54,733**		**11.7**	**$7,300**	**67,255**	**3,200**		
																		Demand Savings			**11.7**	**$836**		
																		kWh Savings			**49,200**	**$6,466**		
																		Total Savings				**$7,303**		**9.2**	**8.8**

APPENDIX D

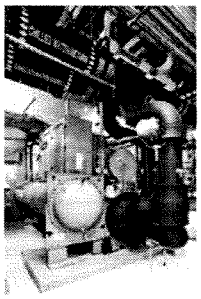
New Jersey Pay For Performance Incentive Program

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.

Featured S
Mann Mi
NJ SmartS custom me study pr Globalcon
A and
SIGN UP
Follow Us:

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
Truman Hall

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)	33,000
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

Incentive #1		
Audit is funded by NJ BPU	$0.10	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$195,229	$34,781
Existing Usage (from utility)	899,370	23,702
Proposed Savings	540,648	2,470
Existing Total MMBtus	5,440	
Proposed Savings MMBtus	2,092	
% Energy Reduction	**38.5%**	
Proposed Annual Savings	$73,270	

	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	$0.11	$1.25
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.25

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$3,300
Incentive #2	$59,471	$3,088	$62,559
Incentive #3	$59,471	$3,088	$62,559
Total All Incentives	**$118,943**	**$6,175**	**$128,418**

Total Project Cost	$417,355

		Allowable Incentive
% Incentives #1 of Utility Cost*	1.4%	$3,300
% Incentives #2 of Project Cost**	15.0%	$62,559
% Incentives #3 of Project Cost**	15.0%	$62,559
Total Eligible Incentives***	**$128,418**	
Project Cost w/ Incentives	$288,937	

Project Payback (years)	
w/o Incentives	w/ Incentives
5.7	3.9

* 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)

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

- PROGRAMS
  - NJ SMARTSTART BUILDINGS
  - PAY FOR PERFORMANCE
  - 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
  - OIL, PROPANE & MUNICIPAL ELECTRIC CUSTOMERS
  - EDA PROGRAMS
  - TEACH
  - ARRA
- TECHNOLOGIES
- TOOLS AND RESOURCES
- PROGRAM UPDATES
- CONTACT US

Home » Commercial & Industrial » Programs

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).

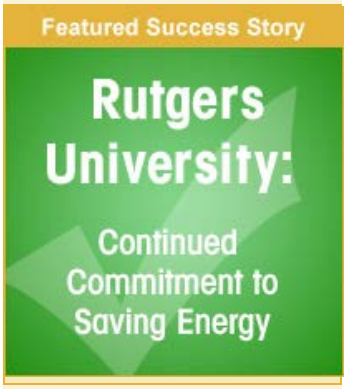
- Frankford Township School District
- Northern Hunterdon-Voorhees Regional High School
- Manalapan Township ***(180 MB** - Right Click, Save As)*

Program Updates

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

Other updates posted.

Featured Success Story



Follow Us:

APPENDIX F

Solar Photovoltaic Analysis

Camden County College
Truman Hall

Cost of Electricity	$0.131	/kWh
Electricity Usage	899,370	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
$360,000	**90.0**	**115,000**	**0**	**$15,065**	**0**	**$15,065**	**$0**	**$9,200**	**23.9**	**14.8**

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

Area Output*
2,198 m2
23,661 ft2

Perimeter Output*
281 m
923 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
12,267 ft2

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

8	watt/ft2	
98,139	DC watts	
90	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
115,000 annual kWh calculated in PV Watts program

% Offset Calc

Usage	899,370	(from utilities)
PV Generation	115,000	(generated using PV Watts)
% offset	13%	

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

AC Energy & Cost Savings

Cautions for Interpreting the Results

Truman Hall (Camden County College)

Station Identification

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

PV System Specifications

DC Rating:	90.0 kW
DC to AC Derate Factor:	0.830
AC Rating:	74.7 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0 °
Array Azimuth:	180.0 °

Energy Specifications

Cost of Electricity:	13.1 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.71	6307	826.22
2	3.50	7425	972.68
3	4.81	10881	1425.41
4	5.27	11251	1473.88
5	5.81	12489	1636.06
6	6.13	12347	1617.46
7	5.76	11878	1556.02
8	5.63	11565	1515.02
9	5.03	10224	1339.34
10	4.04	8802	1153.06
11	2.90	6276	822.16
12	2.46	5557	727.97
Year	4.51	115000	15065.00

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

Disclaimer and copyright notice.

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

APPENDIX G

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Truman Hall

Building ID: 3251881
For 12-month Period Ending: April 30, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 08, 2012

Facility
Truman Hall
College Drive
Blackwood, NJ 08012

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1974
Gross Floor Area (ft²): 32,990

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	2,043,127
Natural Gas (kBtu)[4]	6,600
Total Energy (kBtu)	2,049,727

Energy Intensity[4]

Site (kBtu/ft²/yr)	62
Source (kBtu/ft²/yr)	207

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	290

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	-15%
Building Type	College/University (Campus-Level)

Stamp of Certifying Professional

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

Certifying Professional
N/A

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**

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.

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

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	Truman Hall	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.		☐
Building (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	32,990 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: 83431473 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
03/26/2012	04/25/2012	44,435.40
02/26/2012	03/25/2012	43,271.48
01/26/2012	02/25/2012	49,257.61
12/26/2011	01/25/2012	42,257.61
11/26/2011	12/25/2011	43,441.20
10/26/2011	11/25/2011	47,468.87
09/26/2011	10/25/2011	45,959.27
08/26/2011	09/25/2011	59,431.43
07/26/2011	08/25/2011	57,061.27
06/26/2011	07/25/2011	60,345.64
05/26/2011	06/25/2011	57,002.46
83431473 Consumption (kWh (thousand Watt-hours))		**549,932.24**
83431473 Consumption (kBtu (thousand Btu))		**1,876,368.80**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,876,368.80**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: 411069 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
03/24/2012	04/23/2012	7.21
02/24/2012	03/23/2012	12.36
01/24/2012	02/23/2012	7.23
12/24/2011	01/23/2012	4.13
11/24/2011	12/23/2011	4.09
10/24/2011	11/23/2011	8.23
09/24/2011	10/23/2011	7.20
08/24/2011	09/23/2011	4.13
07/24/2011	08/23/2011	1.04
06/24/2011	07/23/2011	0.00
05/24/2011	06/23/2011	5.19

411069 Consumption (therms)	**60.81**
411069 Consumption (kBtu (thousand Btu))	**6,081.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**6,081.00**
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
Truman Hall
College Drive
Blackwood, NJ 08012

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Truman Hall	
Gross Floor Area Excluding Parking: (ft^2)	32,990
Year Built	1974
For 12-month Evaluation Period Ending Date:	April 30, 2012

Facility Space Use Summary

Building	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area (ft^2)	32,990
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 04/30/2012)	**Baseline** (Ending Date 04/30/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	62	62	0	N/A	104
Source (kBtu/ft²)	207	207	0	N/A	244
Energy Cost					
$/year	$ 67,494.75	$ 67,494.75	N/A	N/A	$ 112,980.11
$/ft²/year	$ 2.05	$ 2.05	N/A	N/A	$ 3.43
Greenhouse Gas Emissions					
$MtCO_2e$/year	290	290	0	N/A	485
$kgCO_2e/ft^2$/year	9	9	0	N/A	15

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 15% less 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.