



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

**PREPARED FOR: CAPE MAY COUNTY
MUNICIPAL UTILITY AUTHORITY**

**ADMINISTRATION OFFICE BUILDING
1523 ROUTE 9 NORTH
SWAINTON, NJ 08210
ATTN: MR. JOSHUA PALOMBO
WASTEWATER ENGINEER**

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Table of Contents

I. EXECUTIVE SUMMARY 3

II. INTRODUCTION 8

III. METHOD OF ANALYSIS..... 9

IV. HISTORIC ENERGY CONSUMPTION/COST..... 11

 A. ENERGY USAGE / TARIFFS 11

 B. ENERGY USE INDEX (EUI)..... 16

 C. EPA ENERGY BENCHMARKING SYSTEM..... 18

V. FACILITY DESCRIPTION 19

VI. MAJOR EQUIPMENT LIST 21

VII. ENERGY CONSERVATION MEASURES..... 22

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES 30

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY 33

X. INSTALLATION FUNDING OPTIONS..... 36

XI. ADDITIONAL RECOMMENDATIONS 38

Appendix A – ECM Cost & Savings Breakdown

Appendix B – New Jersey Smart Start® Program Incentives

Appendix C – Portfolio Manager “Statement of Energy Performance”

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

Appendix F – Renewable / Distributed Energy Measures Calculations

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I. EXECUTIVE SUMMARY

This report presents the findings of the energy audit conducted for:

Cape May County Municipal Utility Authority
- Administration Office Building
1523 Route 9 North
Swainton, NJ 08210

Municipal Contact Person: Mr. Charles M. Norkis
Facility Contact Person: Mr. Joshua Palombo

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	\$ 42,413
Natural Gas	\$ 5,758
Total	\$ 48,172

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM's are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is $\pm 20\%$. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

**Table 1
Financial Summary Table**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Controls	\$6,490	\$565	11.5	30.6%
ECM #2	Replace Packaged AC Systems	\$54,000	\$7,960	6.8	121.1%
ECM #3	Replace Split Systems	\$32,210	\$1,921	16.8	-10.5%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	Solar 71.99 KW PV System	\$647,910	\$44,386	14.6	71.3%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Controls	0.0	3,510.0	0.0
ECM #2	Replace Packaged AC Systems	61.8	49,444.0	0.0
ECM #3	Replace Split Systems	0.0	11,930.0	0.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar 71.99 KW PV System	72.0	86,861.0	0.0

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #2:** Replace Packaged AC Systems

Although ECM #1 and #3 do not provide a payback less than 10 years, it is recommended to proceed with the installation of lighting controls as suggested in ECM #1 (or equal) and replacing the split system as suggested in ECM #3 (or equal). ECM #1 would provide a payback within the lifetime of the controls and save energy. ECM #3 would provide a payback within the lifetime of the unit and the existing split system is past its expected lifespan.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

Renewable Energy Measures (REMs) were also reviewed for implementation at the CMC MUA Administration Office Building. CEG utilized a roof mounted solar array to house a substantial PV system. The recommended 71.99 kW PV system will produce approximately 86,861 kWh of electricity annually and will reduce the Administration Office Building's electrical consumption from the grid by 32.92%. The system's calculated simple payback of 14.6 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options before deciding to not implement this renewable energy measure. CEG reviewed wind energy as an option and has determined that it is not a viable option due to inadequate wind speed as well as an electrical demand below the 200 kW threshold for purchase of a commercial wind turbine.

In addition to the above recommendations, based on the review of the facility's energy bills and discussions with the School District, the energy audit team recommends Retro-Commissioning of this facility to meet the following objectives:

- Bring existing HVAC equipment to its proper operational state including air and water distribution systems

- Reduce energy use and energy costs
- Improve indoor air quality
- Verify the installation and performance of identified system upgrades
- Address overall building energy use and demand and identify areas of highest energy use and demand
- Identify the location of the most comfort problems or trouble spots in the building
- Review current O&M practices

Through the implementation of a Retro-Commissioning Plan, the Administration Building will be able to continue with their vision of reducing energy usage and operating efficient facilities.

Overall, the Administration Office Building appears to be operating at a lower than average efficiency level compared to other offices in the region. With the implementation of the above recommended measures the CMC MUA will realize further energy savings at the Administration Office Building.

II. INTRODUCTION

The comprehensive energy audit covers the 19,000 square foot Administration Office Building, which includes the following spaces: entry waiting area, administration offices, break room, meeting room on the ground floor, basement storage, and second floor storage.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft²/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved. If multiple ECM's are recommended to be implemented, the combined savings is calculated and identified appropriately.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated base on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$\text{Simple Payback} = \left(\frac{\text{Net Cost}}{\text{Yearly Savings}} \right)$$

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

$$\text{Simple Lifetime ROI} = \frac{(\text{Simple Lifetime Savings} - \text{Net Cost})}{\text{Net Cost}}$$

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

$$\text{Internal Rate of Return} = \sum_{n=0}^N \left(\frac{\text{Cash Flow of Period}}{(1 + \text{IRR})^n} \right)$$

$$\text{Net Present Value} = \sum_{n=0}^N \left(\frac{\text{Cash Flow of Period}}{(1 + \text{DR})^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric provides electricity to the facility under their Annual General Service rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Gas provides natural gas to the facility under the Basic General Supply Service (BGSS) rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

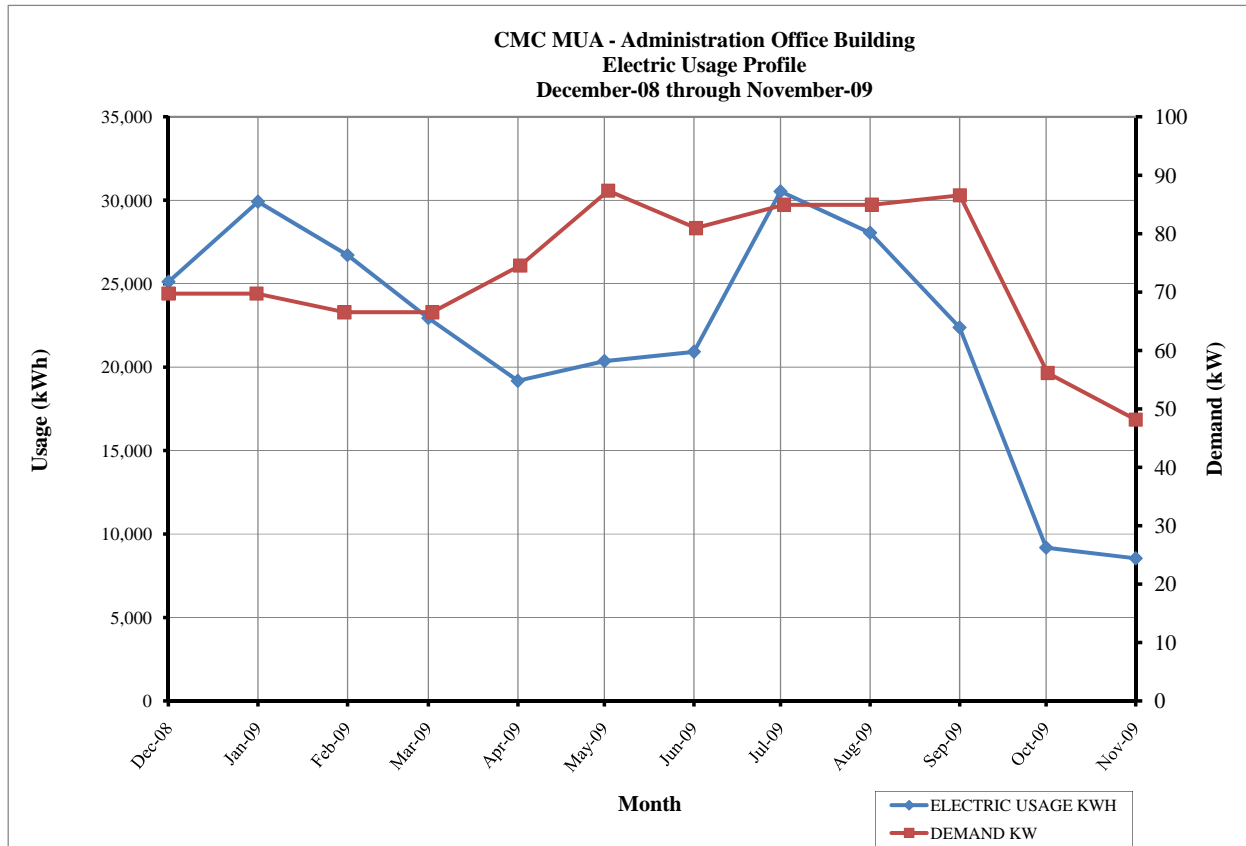
The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

<u>Description</u>	<u>Average</u>
Electricity	16.1¢ / kWh
Natural Gas	\$1.45 / Therm

**Table 3
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric			
Rate: Annual General Service			
Street and Private Lighting			
Meter No: was 1272836, now 1620856			
Customer ID No: 028 6599 9998		0280 6599 9972	
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Dec-08	25,114	69.8	\$3,440
Jan-09	29,915	69.8	\$3,910
Feb-09	26,706	66.6	\$3,576
Mar-09	22,939	66.6	\$3,138
Apr-09	19,177	74.6	\$2,804
May-09	20,367	87.4	\$2,987
Jun-09	20,923	81.0	\$3,600
Jul-09	30,528	85.0	\$5,156
Aug-09	28,048	85.0	\$4,727
Sep-09	22,376	86.6	\$3,945
Oct-09	9,184	56.2	\$3,532
Nov-09	8,545	48.2	\$1,598
Totals	263,822	87.4 Max	\$42,413
AVERAGE DEMAND		73.0 KW average	
AVERAGE RATE		\$0.161 \$/kWh	

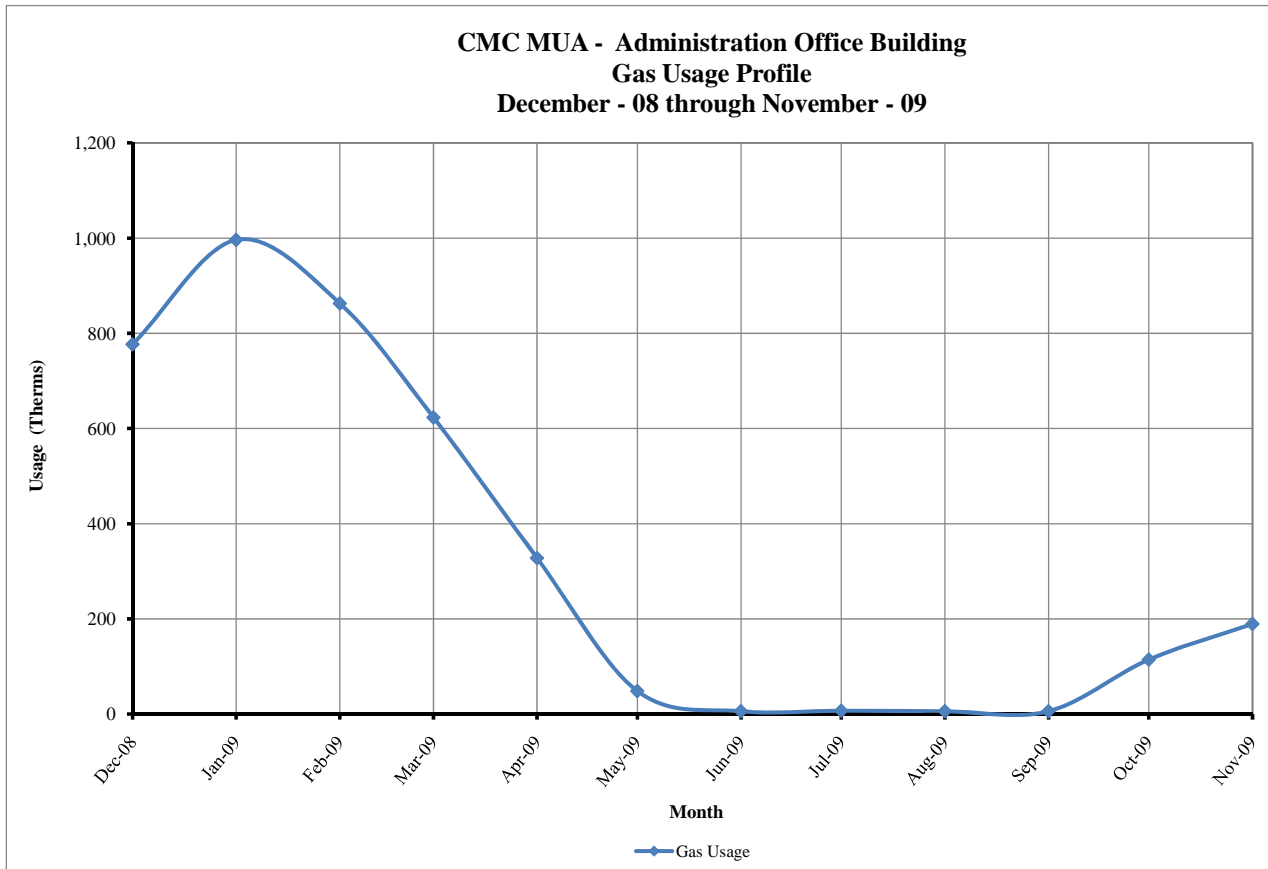
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG		
Meter No: 310548		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Dec-08	777.00	\$1,190.74
Jan-09	996.48	\$1,508.38
Feb-09	862.99	\$1,306.14
Mar-09	623.33	\$947.99
Apr-09	327.86	\$508.47
May-09	48.55	\$92.23
Jun-09	6.21	\$26.79
Jul-09	7.25	\$30.86
Aug-09	6.19	\$27.40
Sep-09	6.15	\$27.59
Oct-09	114.69	-\$169.72
Nov-09	189.63	\$261.52
TOTALS	3,966.33	\$5,758.39
AVERAGE RATE:	\$1.45	\$/THERM

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$\text{Building Site EUI} = \frac{(\text{Electric Usage in kBtu} + \text{Gas Usage in kBtu})}{\text{Building Square Footage}}$$

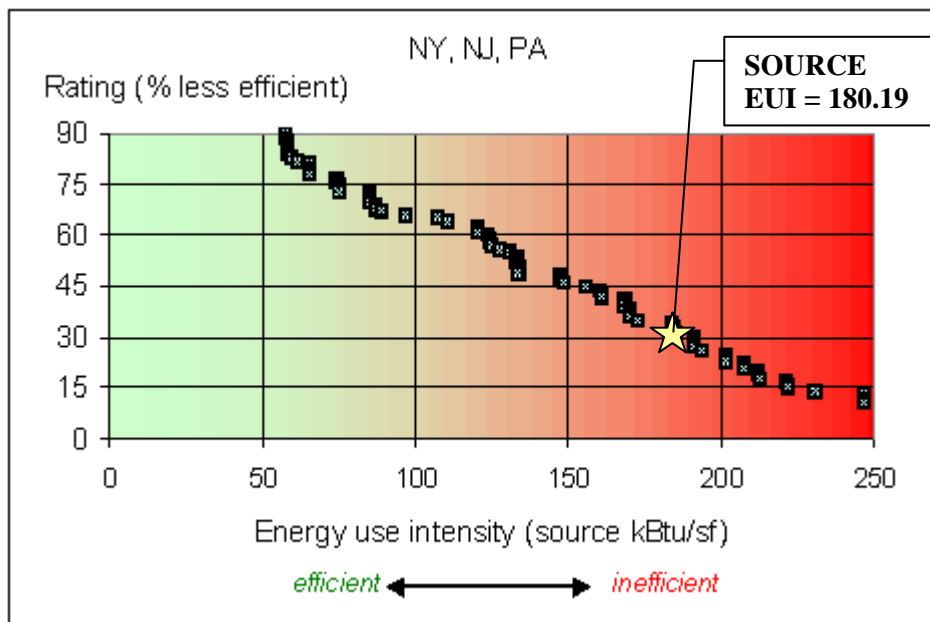
$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Gas Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY kBtu	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons			
ELECTRIC	263,822.00			900,688	3.340	3,008,299
NATURAL GAS		3,966.33		396,633	1.047	415,275
FUEL OIL			-	0	1.010	0
PROPANE			-	0	1.010	0
TOTAL				1,297,321		3,423,574
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	19,000 SQUARE FEET					
BUILDING SITE EUI	68.28 kBtu/SF/YR					
BUILDING SOURCE EUI	180.19 kBtu/SF/YR					

Figure 3 below depicts a national EUI grading for the source use of Office Buildings.

Figure 3
Source Energy Use Intensity Distributions: Office Buildings



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than \$10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility’s yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

<https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login>

User Name: capemaymua
 Password: lgeaceg2009

 Security Question: What city were you born in?
 Security Answer: “cape may”

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

**Table 6
 ENERGY STAR Performance Rating**

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Administration Office Building	31	50

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 19,000 SF Administration Office Building is a two story facility comprised of an entry waiting area, administration offices, break room, meeting room on the ground floor, basement storage, and second floor storage. The typical hours of operation for this facility are between 7:00 am and 5:00 pm. The original part of the building has exterior walls stud construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the original building are in fair condition and appear to be maintained. The windows in the original building are double pane, 1/4" clear glass with wood frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is wood frame and sheathing with fiberglass shingle. The amount of insulation below the roofing is unknown. The original building was built before 1980.

Additions have been added to the original structure during the 1980s and 1990s. The original part of the building has exterior walls stud construction with vertical bead board and minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the addition are in fair condition and appear to be maintained. The windows in the addition are double pane, 1/4" clear glass, some with wood frames and some have aluminum frame. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is wood frame and sheathing with fiberglass shingle. The amount of insulation below the roofing is unknown.

HVAC Systems

The administration office is conditioned by seven (7) split system air conditioning systems and five (5) packaged air conditioning systems ranging from two (2) tons to ten (10) tons of nominal cooling capacity. The packaged systems distribute conditioned air to the offices through under floor ductwork to floor diffusers. The occupants complain of being too hot in the summer and too cold in the winter. The northwest system, there is evidence of partially obstructed air ducts and failed duct seams. These under floor distribution systems are not balanced and may not have any balancing dampers as the diffusers closest to the air handling unit have an excessive airflow and diffusers furthest away from the air handling unit have very little air flow for the similar size room.

The split systems distribute conditioned air to the offices and Meeting room through above ceiling ductwork to ceiling diffusers. These systems appear to have adequate duct sizing and balancing dampers and appeared to have properly sealed seams.

The computer room is conditioned by a cooling only ductless split system made by NCP model S240HP-22K-10-1. The computer room unit runs 24/7 to cool the administration office building servers. The unit is in good condition. There is a GE window air conditioner that is used in the summer when additional cooling is required. A model number could not be found but it does appear to be about a year old.

Electric baseboard heaters, original to the addition, are installed in the perimeter offices on the north half of the building and the northwest corridor and the meeting room.

The west entrance vestibule is heated via an electric wall heater.

Exhaust System

Air is exhausted from the toilet rooms by fractional horse power exhaust fans. The toilet room exhaust fan is operated through the light switch.

HVAC System Controls

The HVAC systems within the facility are controlled via local wall mounted remote thermostats. There are programmable thermostats in the office that serve the air handling units. Each electric baseboard heater is controlled by single stage bi-metal wall thermostat.

Domestic Hot Water

Domestic hot water for the northwest restroom is provided by a 6 gallon A.O. Smith electric hot water heater, capacity of 1500 Watts. The piping is in fair to poor condition and insulation is absent. The total amount of piping from the water heater to sink is less than 4 feet and contained in an under sink cabinet.

The domestic water heater serving the north men's room is a Tiny Titan model E1E2.5US with a capacity of 1350 watts. The domestic water heater serving the north women's room is a Tiny Titan model E1E2.5US with a capacity of 1350 watts. The piping is in fair condition and insulation is absent. The total amount of piping from the water heater to flexible hose is less than 1 foot and a flexible hose is used for final connection.

The domestic water heater serving the men's, women's and Janitor's closet is a 40 gallon Ruud model P2-40F1 with a capacity of 38 MBH natural gas input with 38.4 GPH recovery at 90°F. The domestic hot water piping insulation was not observed.

Lighting

Typical lighting throughout building is fluorescent tube fixtures with T-8 lamps and electronic ballasts. Storage rooms and closets lit with a mixture of incandescent lamps.

VI. MAJOR EQUIPMENT LIST

The equipment list is considered major energy consuming equipment and through energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Install Lighting Controls

Description:

A common occurrence in many facilities is lighting fixtures being left on unnecessarily. There has been a belief that it is better to keep the lights on rather than to continuously switch them on and off. The on/off dilemma was studied and it was determined that the best option is to turn the lights off whenever possible. Although this practice reduces the lamp life, the energy savings far outweigh the lamp replacement costs. To better control lighting according to occupancy and reduce lighting energy consumption, CEG recommends installing occupancy sensors. Private offices, file rooms, lounges, kitchens, conference rooms, etc. are good candidates for wall-mounted or ceiling mounted occupancy sensors. Dual technology sensors (ultrasonic and infrared) detect human motion and presence to ensure proper activation of lights. The basis of calculation is the SensorSwitch Model WSD wall switch and Model CM ceiling mount controls or equivalent.

Energy Savings Calculations:

To determine an estimated savings for lighting controls, CEG used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, conference rooms, the kitchen/lounge, small-sized mechanical rooms, storage rooms, data rooms, file rooms, etc. This energy conservation measure can be applied to fifty (50) areas throughout the facility which amounts to approximately 14,000 square feet of space. From the lighting survey for this site, CEG calculated the lighting power density (Watts/ft²) of these areas to be .96 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of the occupancy sensors:

$$10\% \times .96 \text{ Watts/SF} \times 14,000 \text{ SF} \times 2,600 \text{ hrs/yr.} = 3,510 \text{ kWh/year}$$

$$\text{Annual Energy Savings} = 3,510 \text{ kWh/yr.} \times \$ 0.161/\text{kWh} = \$565 / \text{yr}$$

The various types of sensors and quantities are as follows:

Wall Switches	47 Units
Ceiling Mounted Sensors	3 Units

The installed cost of each type of occupancy sensor including dimming ballast, rewiring, relays, J-Boxes, sensors, power packs, on/off photocells, inhibit photocells, etc. is as follows:

Wall Switches	\$160/Unit x 47 Units = \$7,520
Ceiling Mounted Sensors	\$240/Unit x 3 Units = \$720

TOTAL COST = \$8,240

From the **NJ Smart Start Appendix**, the installation of Occupancy Sensor Remote Mounted (OSR) lighting controls warrants a \$35 incentive per control. Fifty (50) sensors x \$35/sensor = \$1,750.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$8,240
NJ Smart Start Equipment Incentive (\$):	\$1,750
Net Installation Cost (\$):	\$6,490
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$565
Total Yearly Savings (\$/Yr):	\$565
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.5
Simple Lifetime ROI	30.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$8,475
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	\$254.93

ECM #2: Packaged AC System Replacement

Description:

There are several zones throughout the building that are conditioned by packaged system air conditioning units with gas furnaces providing for the heat load. The efficiency of the packaged systems vary due to replacements throughout the years. The cooling efficiencies of packaged system AC units range from 9.0 EER for older units up to 14.0 EER for the new energy efficient systems. The heating efficiencies of the furnaces usually fall around 80% AFUE. The existing unit capacities range from 3 tons to 6 tons per packaged system and 140 MBH to 175 MBH per furnace. The majority of these units are below today's standards for energy efficiency and are far beyond their ASHRAE service life of 15 years.

This ECM includes replacement of all packaged systems and furnaces with EER ratings of 11 or below and have been in use for more than 15 years. The packaged systems proposed have an average rating of 12 EER and a burner efficiency of 80%. The calculations are based on a weighted average for the existing system efficiencies of 11 EER. The proposed units is based on a one for one replacement of each packaged system based on Carrier Infinity® Series Packaged HYBRID HEAT® Dual Fuel System or equal. Since these dual fuel hybrid carrier systems can provide heat as well, the furnaces in the building will be removed.

Energy Savings Calculations:

$$\text{Cooling Energy Usage} = \frac{\text{Cooling (Tons)} \times 12,000 \left(\frac{\text{Btu}}{\text{Ton hr}} \right) \times \text{Full Load Hrs.}}{1000 \left(\frac{\text{Wh}}{\text{kWh}} \right) \times \text{EER} \left(\frac{\text{Btu}}{\text{Wh}} \right)}$$

$$\text{Demand} = \frac{\text{Energy Savings (kWh)}}{\text{Hrs of Cooling}}$$

$$\text{Cooling Cost} = \text{Energy Usage (kWh)} \times \text{Ave Electric Cost} \left(\frac{\$}{\text{kWh}} \right)$$

$$\text{Bldg Heat Required} = \text{Existing Oil Use (Gal)} \times \text{Heating Eff. (\%)} \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg Heat Required (BTU)}}{\text{Heating Eff. (\%)} \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)}$$

$$\text{Energy Cost} = \text{Heating Gas Usage (Therms)} \times \text{Ave Fuel Cost} \left(\frac{\$}{\text{Therm}} \right)$$

ECM #2 AC SPLIT SYSTEM REPLACEMENT CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Packaged AC Units with Furnace Heat	Packaged Hybrid Heat Pumps with Gas Heat	
Number of Split Systems	5	5	
Tonnage per Split System Unit (Average)	3.6	3.6	
Weighted Ave Efficiency (EER)	10.6	11	
Equivalent Full Load Cooling Hrs	800	800	
BTUs per Ton (Btu/Hr/Ton)	12000	12000	
Watts per Kilo Watts (W/KW)	1000	1000	
Total Gas Usage per Utility Bills (Therms)	3966	3966	
Burner Efficiency (%)	80%	80%	
Gas Heat Value (BTU/Therm)	100000	100000	
Equivalent Building Heat Usage (MMBTUs)	317.28	317.28	
Electric Heating (kWh)	48,851	0	
Elec Cost (\$/kWh)	0.161	0.161	
Gas Cost (\$/Therm)	1.45	1.45	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Gas Energy (Therms)	3,966	3,966	0
Electric Energy (kWh)	65,153	15,709	49,444
Electric Demand (KW)	81.4	19.6	61.8
Gas Energy Cost (\$)	\$5,751	\$5,751	\$0
Electric Energy Cost (\$)	\$10,490	\$2,529	\$7,960
COMMENTS:			

Installation cost for five (5) packaged rooftop hybrid units is estimated to be \$54,000.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$54,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$54,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$7,960
Total Yearly Savings (\$/Yr):	\$7,960
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.8
Simple Lifetime ROI	121.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$119,400
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	\$41,025.96

ECM #3: AC Split System Condensing Units

Description:

Select rooms throughout the Administration Building have air conditioning by split system AC units. The efficiency of the split systems vary due to replacements throughout the years. The cooling efficiencies of split system AC units range from 9.0 EER for older units up to 14.0 EER for the new energy efficient systems. The existing unit capacities range from 1.5 tons to 6.0 tons per split system. The majority of these units are below today's standards for energy efficiency.

This ECM includes replacement of all split systems with EER rating of 10 or below. The split systems proposed have an average rating of 12.4 EER (approx 21 SEER.) The calculations are based on a weighted average for the existing system efficiencies of 9.2 EER. The proposed units is based on a one for one replacement of each split system based on Carrier Infinity 21 Series split systems model # 24ANA1 or equal.

Energy Savings Calculations:

$$EnergyUsage = \frac{Cooling(Tons) \times 12,000 \left(\frac{Btu}{Ton\ hr} \right) \times Full\ Load\ Hrs.}{1000 \left(\frac{Wh}{kWh} \right) \times EER \left(\frac{Btu}{Wh} \right)}$$

$$Demand = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

$$Cooling\ Cost = Energy\ Usage(kWh) \times Ave\ Electric\ Cost \left(\frac{\$}{kWh} \right)$$

ECM #3 AC SPLIT SYSTEM REPLACEMENT CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Split System Units	High Efficiency Window AC Units	
Number of Split Systems	4	4	
Tonnage per Split System Unit (Average)	6.3	6.3	
Weighted Ave Efficiency (EER)	9.5	18	
Equivalent Full Load Cooling Hrs	800	800	
BTUs per Ton (Btu/Hr/Ton)	12000	12000	
Watts per Kilo Watts (W/KW)	1000	1000	
Elec Cost (\$/kWh)	0.161	0.161	
Gas Cost (\$/Therm)	1.45	1.45	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Gas Energy (Therms)	0	0	0
Electric Energy (kWh)	25,263	13,333	11,930
Electric Demand (KW)	31.6	16.7	14.9
Gas Energy Cost (\$)	\$0	\$0	\$0
Electric Energy Cost (\$)	\$4,067	\$2,147	\$1,921
COMMENTS:			

Installation cost for typical 5 ton AC unit is estimated to be \$5,550.

From the NJ Smart Start[®] Program appendix, the packaged unit’s replacement falls under the category “Unitary AC” and warrants an incentive based on efficiency (EER) at or above 11.5 EER or 14.0 SEER. The incentives is calculated as follows:

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = \text{Units} < 5.4 \text{ Tons}, (\text{Tons} \times \$92/\text{Ton}) = (25 \times \$92) = \$2,300$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$22,200
NJ Smart Start Equipment Incentive (\$):	\$2,300
Net Installation Cost (\$):	\$19,900
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,921
Total Yearly Savings (\$/Yr):	\$1,921
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.4
Simple Lifetime ROI	44.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$28,815
Internal Rate of Return (IRR)	5%
Net Present Value (NPV)	\$3,032.77

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy measures (REM) for the municipality utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building and at grade. Flat roof and at grade, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around \$350, this value was used in our financial calculations. This equates to \$0.35 per kWh generated.

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. There is a roof area of 800 S.F. and a ground area of 4,300 S.F. for a total area of 5,100 S.F. that can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 71.99 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 86,861 KWh annually, reducing the overall utility bill by approximately 32.92% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today’s energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

Direct purchase involves the CMC MUA Administration Office paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

**Table 7
Financial Summary – Photovoltaic System**

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	SIMPLE PAYBACK	SIMPLE ROI	INTERNAL RATE OF RETURN
Direct Purchase	14.6 Years	6.8%	5.3%

*The solar energy measure is shown for reference in the executive summary Renewable Energy Measure (REM) table

Given the large amount of capital required by the CMC MUA Administration Office to invest in a solar system through a Direct Purchase CEG does not recommend the CMC MUA

Administration Office pursue this route. It would be more advantageous for the CMC MUA Administration Office to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the CMC MUA Administration Office at a reduced rate compared to their existing electric rate.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed is not adequate, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to The Electric, and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

The Electric Usage Profile shows increased usage in the heating season as well as the cooling season. This is not typical for an administration building with gas heat. The heating system in the administration building consists of natural gas heat as well as a significant portion of electric resistance heat. This heat system is responsible for the increased used in the winter months. The cooling season represents a typical load profile with increase usage from the building air conditioning systems. The electric demand is at its peak in the months of May through September representing the largest electric draw in the cooling season. The hours of operation of the administration building are typical for an office building. As a result the majority of the "full load hours" is spread over a relatively short period of time (occupied hours). This results in a poor load factor rating of approximately 35%. Load factor is the total usage divided by the demand times the total hours (KWH/KW*8760). This means that the full load electric draw for the facility is only used for 35% of the time. A higher load factor (rating of 50% or higher) along with a flat load profile will allow for more competitive energy prices when shopping for alternative suppliers.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months demonstrate very low consumption (complimenting the cooling electric load), May through September. There is an increase in consumption November through April. Gas fired furnaces for some of the zones in the administration office are responsible for the majority of the natural gas load. A base-load shaping (flat) will secure more competitive energy prices when procuring through an alternative energy source.

Tariff Analysis:Electricity:

This facility receives electrical service through Atlantic City Electric on their Annual General Service (AGS-Secondary) rate. This service classification is available for general service purposes on secondary voltages. This facility's rate is a three phase service at secondary voltages. For electric supply (generation), the customer has the option to purchase energy through the utility's Generation Charge or a Third Party Supplier (TPS). This facility utilizes the generation service provide through Atlantic City Electric (BGS), Therefore, they will pay according to the default service. The Delivery Service includes the following charges: Customer Charge, Distribution Charge (kW Demand), Reactive Demand Charge (kvar Demand, over 1/3 kW), Distribution Charge kWh, Non-utility Generation Charge, Societal benefits Charge kWh, Regulatory Assets Recovery Charge kWh, Transition Bond Charge kWh, Market Transition Charge Tax kWh, System Control Charge kWh, CIEP Standby Fee kWh, Transmission Demand Charge kW, Reliability Must Run Transmission Surcharge kWh, Transmission Enhancement Charge kWh, Basic Generation Service Charge kWh, Regional Greenhouse Gas Initiative Recovery Charge kWh, Infrastructure Investment Surcharge.

The Demand charges are based on a ratchet demand rate of 80% of the highest demand set in the months of June through September. The usage charges are based on a stepped rate structure. The demand charges for this rate structure are far less than the usage charges on a typical basis making this rate structure less dependent on demand versus usage. The steps for the usage charges are very small increments of change which result in fairly steady costs per kWh per month despite the changes in electrical usage and demand.

Natural Gas:

This facility receives natural gas service through South Jersey Gas Company on its General Service Gas rate. This is a firm delivery service (higher level of delivery) for general purposes where 1) customer does not qualify for any other rate schedule. Customers may either purchase gas supply from a Third Party (TPS) or from Public Services Basic Gas Supply Service default service as detailed in the rate schedule. This service has a much higher priority of delivery, based on the pipeline capacity. The "firm" service is the highest priority, and does not get interrupted.

This rate schedule has a Delivery Charge Mechanism which includes: Basic Gas Supply Service Charge, Capital Investment Recovery Charge, Transportation Initiation Charge, Societal Benefits Charge, Temperature Adjustment Charge, Balancing Service Charge, Economic Development Rate Charge, Conservation Incentive Program Charge, and Energy Efficiency Tracker Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS). Note: If the facility should choose to utilize a third party supplier (TPS) and the TPS not deliver, the customer may receive service from South Jersey Gas under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service. Should the TPS un-deliver to the utility on behalf of the client, the utility will automatically supply this default service to the client.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the County. Based on the latest electric utility bill, the average price per kWh (kilowatt hour) for the building based on 1-year historical average price is between \$0.1154/kWh and \$0.1226/kWh based on the utility information provided (this is the average “price to compare” if the client intends to shop for energy). The average price per decatherm for natural gas is \$ 8.398 / dth based on the utility information provided (this is the average “price to compare” if the client intends to shop for energy). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is relatively competitive. The County should consider procuring energy through alternative supply sources to shop for the most competitive prices.

CEG also recommends that the County schedule a meeting with the current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the County can learn more about the competitive supply process. Cape May County can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. The County should consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the information for ongoing demand-side management projects. Furthermore, special attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with the utility representative. The County should ask the utility representative about alternative billing options, such as consolidated billing when utilizing the service of a Third Party Supplier. Finally, if the supplier for energy (natural gas) is changed, closely monitor balancing, particularly when the contract is close to termination. This could be performed with the aid of an “energy advisor”.

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

- i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The “Energy Savings Improvement Program (ESIP)” law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.
- ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.
- iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as “power purchase agreements.” These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party’s work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.
- iv. *Pay For Performance* – *The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings with average demand loads above 200 KW. The facility’s participation in the program is assisted by an approved program partner. An “Energy Reduction Plan” is created with the facility and approved partner to show at least 15% reduction in the building’s current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.*

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project

Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

- 1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant \$0.10 per square foot between \$5,000 and \$50,000, and not to exceed 50% of the facility’s annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)*
 - 2. Project Implementation – Upon installation of the recommended measures along with the “Substantial Completion Construction Report,” the incentive will grant savings per KWH or Therm based on the program’s rates. Minimum saving must be 15%. (Example \$0.11 / kWh for 15% savings, \$0.12/ kWh for 17% savings, ... and \$1.10 / Therm for 15% savings, \$1.20 / Therm for 17% saving, ...) Increased incentives result from projected savings above 15%.*
 - 3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program’s rates. Minimum savings must be 15%. (Example \$0.07 / kWh for 15% savings, \$0.08/ kWh for 17% savings, ... and \$0.70 / Therm for 15% savings, \$0.80 / Therm for 17% saving, ...) Increased incentives result from verified savings above 15%.*
- v. *Direct Install Program – The New Jersey Clean Energy’s Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 80% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.*

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Administration Office Building

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Controls	\$8,240	\$0	\$1,750	\$6,490	\$565	\$0	\$565	15	\$8,475	\$0	30.6%	11.5	3.54%	\$254.93
ECM #2	Replace Packaged AC Systems	\$54,000	\$0	\$0	\$54,000	\$7,960	\$0	\$7,960	15	\$119,400	\$0	121.1%	6.8	12.07%	\$41,025.96
ECM #3	Replace Split Systems	\$34,510	\$0	\$2,300	\$32,210	\$1,921	\$0	\$1,921	15	\$28,815	\$0	-10.5%	16.8	-1.36%	(\$9,277.23)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar 71.99 KW PV System	\$647,910	\$0	\$0	\$647,910	\$13,985	\$30,401	\$44,386	25	\$1,109,650	\$760,025	71.3%	14.6	4.65%	\$124,989.97

- Notes:**
- 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
 - 2) The variable DR in the NPV equation stands for Discount Rate
 - 3) For NPV and IRR calculations: From n=0 to N periods where N is the lifetime of ECM and Cn is the cash flow during each period.



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SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

Water-Cooled Chillers	\$12 - \$170 per ton
Air-Cooled Chillers	\$8 - \$52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

Gas Absorption Chillers	\$185 - \$400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

\$1.00 per cfm – gas or electric	
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Electric Unitary HVAC

Unitary AC and Split Systems	\$73 - \$93 per ton
Air-to-Air Heat Pumps	\$73 - \$92 per ton
Water-Source Heat Pumps	\$81 per ton
Packaged Terminal AC & HP	\$65 per ton
Central DX AC Systems	\$40- \$72 per ton
Dual Enthalpy Economizer Controls	\$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	\$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	\$450 per ton, EER ≥ 16
	\$600 per ton, EER ≥ 18
	\$750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	\$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	\$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	\$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	\$300 - \$400 per unit, AFUE ≥ 92%

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per hp
Compressors	\$5,250 to \$12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	\$50 per unit
Gas-Fired Water Heaters > 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$15 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

Wall Mounted	\$20 per control
Remote Mounted	\$35 per control
Daylight Dimmers	\$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	\$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	\$75 per fixture controlled
Daylight Dimming	\$75 per fixture controlled
Daylight Dimming - office	\$50 per fixture controlled

Premium Motors

Three-Phase Motors	\$45 - \$700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	\$40 per electronic communicated motor

Other Equipment Incentives

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1- 2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%



STATEMENT OF ENERGY PERFORMANCE ADMINISTRATION OFFICE BUILDING

Building ID: 2261210
For 12-month Period Ending: November 30, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: March 31, 2010

Facility
ADMINISTRATION OFFICE BUILDING
1523 Route 9 North
Swainton, NJ 08210

Facility Owner
Cape May MUA
1523 Route 9 North
Swainton, NJ 08210

Primary Contact for this Facility
Josh Palombo
1523 Route 9 North
Swainton, NJ 08210

Year Built: 1980
Gross Floor Area (ft²): 19,000

Energy Performance Rating² (1-100) 31

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	900,161
Natural Gas (kBtu) ⁴	396,633
Total Energy (kBtu)	1,296,794

Energy Intensity⁵

Site (kBtu/ft ² /yr)	68
Source (kBtu/ft ² /yr)	180

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	158
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Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	56
National Average Source EUI	147
% Difference from National Average Source EUI	23%
Building Type	Office

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Certifying Professional

Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:

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

ENERGY STAR[®] Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) 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 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	<input checked="" type="checkbox"/>
Building Name	ADMINISTRATION OFFICE BUILDING	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Office	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	1523 Route 9 North, Swanton, NJ 08210	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		<input type="checkbox"/>
ADMINISTRATION OFFICE BUILDING (Office)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	19,000 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.		<input type="checkbox"/>
Weekly operating hours	50 Hours	Is this the total number of hours per week that the Office 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.		<input type="checkbox"/>
Workers on Main Shift	19	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. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		<input type="checkbox"/>
Number of PCs	10	Is this the number of personal computers in the Office?		<input type="checkbox"/>
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
11/01/2009	11/30/2009	8,545.00
10/01/2009	10/31/2009	9,184.00
09/01/2009	09/30/2009	22,376.00
08/01/2009	08/31/2009	28,048.00
07/01/2009	07/31/2009	30,528.00
06/01/2009	06/30/2009	20,923.00
05/01/2009	05/31/2009	20,367.00
04/01/2009	04/30/2009	19,177.00
03/01/2009	03/31/2009	22,939.00
02/01/2009	02/28/2009	26,706.00
01/01/2009	01/31/2009	29,915.00
12/01/2008	12/31/2008	25,114.00
Electric Consumption (kWh (thousand Watt-hours))		263,822.00
Electric Consumption (kBtu (thousand Btu))		900,160.66
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		900,160.66
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
11/01/2009	11/30/2009	189.63
10/01/2009	10/31/2009	114.69
09/01/2009	09/30/2009	6.15
08/01/2009	08/31/2009	6.19
07/01/2009	07/31/2009	7.25
06/01/2009	06/30/2009	6.21
05/01/2009	05/31/2009	48.55
04/01/2009	04/30/2009	327.86
03/01/2009	03/31/2009	623.33
02/01/2009	02/28/2009	862.99

01/01/2009	01/31/2009	996.48	APPENDIX C
12/01/2008	12/31/2008	777.00	Page 4 of 6
Gas Consumption (therms)		3,966.33	
Gas Consumption (kBtu (thousand Btu))		396,633.00	
Total Natural Gas Consumption (kBtu (thousand Btu))		396,633.00	
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>	

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE 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
ADMINISTRATION OFFICE BUILDING
1523 Route 9 North
Swainton, NJ 08210

Facility Owner
Cape May MUA
1523 Route 9 North
Swainton, NJ 08210

Primary Contact for this Facility
Josh Palombo
1523 Route 9 North
Swainton, NJ 08210

General Information

ADMINISTRATION OFFICE BUILDING	
Gross Floor Area Excluding Parking: (ft ²)	19,000
Year Built	1980
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

ADMINISTRATION OFFICE BUILDING	
Space Type	Office
Gross Floor Area(ft ²)	19,000
Weekly operating hours	50
Workers on Main Shift	19
Number of PCs	10
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 11/30/2009)	Baseline (Ending Date 11/30/2009)	Rating of 75	Target	National Average
Energy Performance Rating	31	31	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	68	68	41	N/A	56
Source (kBtu/ft ²)	180	180	108	N/A	147
Energy Cost					
\$/year	\$ 48,171.39	\$ 48,171.39	\$ 29,015.76	N/A	\$ 39,228.80
\$/ft ² /year	\$ 2.54	\$ 2.54	\$ 1.53	N/A	\$ 2.07
Greenhouse Gas Emissions					
MtCO ₂ e/year	158	158	95	N/A	129
kgCO ₂ e/ft ² /year	8	8	5	N/A	7

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"ADMINISTRATION OFFICE BUILDING"

Domestic Water Heater															
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Energy Factor	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Under sink North West restroom	North West Rest room	AO Smith	1	ELJF 6 910	MB92-0072230-910	1500 Watts	-	6	-	Electric	1992	12	(-6)	Maintain or replace as maintenance project
-	Janitor's Closet	South Rest rooms, Jan Clo.	RUIUD	1	P2-40F1	RULN1106403149	38 MBH	38.4 @ 90°F	40	0.59	NG	2006	12	8	

Air Handling Units																				
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
AH6	South Side	South Side	York	1	K3EU120A33A	NDVS173111	120	9	10 Ton	-	-	-	-	-	-	-	1988	15	(-7)	refer to Sterling heater for duct heat
AH3A	East Attic	East Offices	York	1	PSHSD20N1400IA	EFVP012268	60	9	5 Ton	-	-	-	-	-	-	-	1988	15	(-7)	Cooling Coil EMVSS44283, S/N M2HD060SA

Packaged AC units														
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Capacity	SEER	Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
SCAC1	East Court yard	East Middle Offices	Bard	1	P1136A?	-	3 Ton	11	R-22	208/230?	1983	15	(-12)	
SCAC2	West Courtyard	North side of West Offices	Bard	1	P1136A?	-	3 Ton	11	R-22	208/230?	1983	15	(-12)	
SCAC3	West Courtyard	West Middle Offices	Bard	1	P1136A?	-	3 Ton	11	R-22	208/230?	1983	15	(-12)	
SCAC4	West side	North West Offices	Bard	1	P1136A2	55H83309462	3 Ton	11	R-22	208/230/1	Jun-83	15	(-12)	
SCAC5	East Court yard	East Offices	Carrier	1	48TD007--511--	3997621282	6 Ton	9	R-22	208/230/3	1988	15	(-7)	

Duct Furnace															
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Heating Type	Heating Capacity (MBH)	CFM	RPM / HP	GPM	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Attic	East Offices - AH3A	-	1	-	-	NG	140	-	-	-	1988	18	(-4)	
-	Attic	South Offices - AH6	Sterling Radiator	1	CS-175	C8862821	NG	175	4316	-	-	1988	18	(-4)	

Split Systems and AC Condensers															
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Capacity	EER	Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes	
-	South Side	Computer room	NCP	1	S240HP-22K10-1	456285000641	21500	9.7	R-22	208/240/1	2005	15	10		
SPAC1	West Courtyard	North Offices	International Comfort Products	1	N2A348AKA30U	E084506521	5 Ton	10	R-22	208/230/1	Nov-08	15	13		
SPAC2A	East Court yard	East Offices	York	1	-	-	5 Ton	9	R-22	-	1988	15	(-7)		
SPAC4A	West side	2nd floor file room	Arcoaire	1	N2A369GH3300	E093107470	5 Ton	10	R-22	208/230/3	1993	15	(-2)		
SPAC5A	West side	South West Offices	-	1	38CKC060540	2401CC08889	5 Ton	10	R-22	208/230/3	1988	18	(-1)		
SPAC6	South side	South Offices	York	1	-	-	10 Ton	9	R-22	-	1988	15	(-7)		

Heating and Ventilation Units																
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Heating Coil	Capacity (Btu/h)	Fan HP	Fan RPM	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Attic East side	East Offices	York	1	PSHSD20N1400IA	EFVP012268	140	60	-	-	-	-	2002	15	7	Model PSHSD20N1400IA, Ser. EFVP012268

Instant Hot Water Heater																
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (W)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Men's Room	Men's Room	Titan	1	E1E2.5US	9830069443	1350	-	2.5	-	120/1	-	1998	12	0	Maintain or replace as maintenance project
-	Women's Room	Women's Room	Titan	1	E1E2.5US	9803044334	1350	-	2.5	-	120/1	-	1998	12	0	Maintain or replace as maintenance project

NOTE: IF AN ITEM IS LEFT BLANK, THE INFORMATION IS EITHER NOT AVAILABLE OR NOT APPLICABLE FOR THIS PIECE OF EQUIPMENT

Investment Grade Lighting Audit

CEG Job #: 9C09168
 Project: CMC MUA - Administration Office Building
 Address: 1532 Rt 9
 Swainton, NJ
 Building SF: 19,000

"Administration Office Building"

KWH COST: \$0.161

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING							SAVINGS					
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
242.21	Reception Desk	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.15	Waiting Room	2600	4	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.24	624.0	\$100.46	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.15	201 Printer	2600	8	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.48	1,248.0	\$200.93	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11	215 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.15	205 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., White Diffuser	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.15	204 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., White Diffuser	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11		2600	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	251 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	206 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	210 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	249 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	237 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	254 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	252 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
10	Men's Restroom	2600	3	2	6'x4', 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
10	Women's Restroom	2600	3	2	6'x4', 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11	Women's Lounge	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.21	279 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	255 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	235 Office/File Room	2600	7	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1,947.4	\$313.53	7	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	244 Office	2600	6	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Recycling	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	262 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	208 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11	256 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	271 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	257 Conference Room C	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	246 Office	2600	6	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	206 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	263 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	264 Plan Room	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Plotter Room	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	216 Library	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	219 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.21	214 Library	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Copier Room	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	226 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	250 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	242 office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	220 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	236 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	260 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	253 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	Supplies	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	Computer Lab	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Computer Backup	2600	3	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	217 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	258 Office	2600	6	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	233 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
241.11	229 Office	2600	4	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	266 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	222 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Conference Room B	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.21	265 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	226 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Men's Restroom	2600	1	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$44.79	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Basement	400	4	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	99.2	\$15.97	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.14	Basement Stairs	400	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	24.8	\$3.99	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	212 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	211 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
10	Women's Restroom	2600	1	2	6"x4', 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21		2600	1	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$44.79	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11		2600	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Men's Restroom	2600	2	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$51.91	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Kitchen	2600	7	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.43	1,128.4	\$181.67	7	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.25	Meeting Room	2600	8	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	107	0.86	2,225.6	\$358.32	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.25		2600	8	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Recessed Mnt., White Diffuser	60	0.48	1,248.0	\$200.93	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
228.14	2nd Floor Storage Room	400	13	2	8' Channel, 2 Lamp, 59w T8, Elect. Ballast, Surface Mnt., No Lens	124	1.61	644.8	\$103.81	13	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
11	Attic	40	4	1	Porcelain Socket, (1) 60w A19 Lamp	60	0.24	9.6	\$1.55	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
15	Entrance	2600	5	1	LED Exit Sign	5	0.03	65.0	\$10.47	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
13	Closet	400	1	1	Porcelain Socket, (1) 26w CFL Lamp	26	0.03	10.4	\$1.67	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11		2600	31	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.92	4,997.2	\$804.55	31	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.21	Corridors	2600	13	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.39	3,616.6	\$582.27	13	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
14		8760	11	1	LED Exit Sign	5	0.06	481.8	\$77.57	11	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.21		2600	1	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.06	156.0	\$25.12	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			270	264			23.66	56,949.6	\$9,168.89	270	0			0	0	\$0.00		\$0.00	0.00	0.0	\$0.00	#DIV/0!

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacement calculations

CEG Job #: 9C09168
 Project: CMC MUA - Administration Office Building
 Address: 1532 Rt 9
 Swainton, NJ
 Building SF: 19000

"Administration Office Building"

KWH COST: **\$0.161**

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS										SAVINGS								
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
242.2	Reception Desk	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	107	0.21	0%	556.4	\$89.58	\$160.00	\$0.00	0.00	0	\$0.00	0.00
247.2	Waiting Room	2600	4	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.24	624.0	\$100.46	4	0	No Change	60	0.24	0%	624	\$100.46	\$160.00	\$0.00	0.00	0	\$0.00	0.00
247.2	201 Printer	2600	8	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.48	1,248.0	\$200.93	8	0	No Change	60	0.48	0%	1248	\$200.93	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.1	215 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	205 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., White Diffuser	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	204 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., White Diffuser	107	0.43	1,112.8	\$179.16	4	0	No Change	107	0.43	0%	1112.8	\$179.16	\$160.00	\$0.00	0.00	0	\$0.00	0.00
221.1		2600	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	0	No Change	62	0.06	0%	161.2	\$25.95	\$160.00	\$0.00	0.00	0	\$0.00	0.00
241.1	251 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	206 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	1	Dual Technology Occupancy Sensor	107	0.32	10%	751.14	\$120.93	\$160.00	\$160.00	0.00	83.46	\$13.44	11.91
241.1	210 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	249 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	237 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86

241.1	254 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	252 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
10	Men's Restroom	2600	3	2	6"x4', 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	1	Dual Technology Occupancy Sensor	62	0.19	10%	435.24	\$70.07	\$160.00	\$160.00	0.00	48.36	\$7.79	20.55
10	Women's Restroom	2600	3	2	6"x4', 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	1	Dual Technology Occupancy Sensor	62	0.19	10%	435.24	\$70.07	\$160.00	\$160.00	0.00	48.36	\$7.79	20.55
242.1	Women's Lounge	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	279 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	1	Dual Technology Occupancy Sensor	107	0.43	10%	1001.52	\$161.24	\$160.00	\$160.00	0.00	111.28	\$17.92	8.93
242.2	255 Office	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	1	Dual Technology Occupancy Sensor	107	0.43	10%	1001.52	\$161.24	\$160.00	\$160.00	0.00	111.28	\$17.92	8.93
242.2	235 Office/File Room	2600	7	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1,947.4	\$313.53	7	0	No Change	107	0.75	0%	1947.4	\$313.53	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	244 Office	2600	6	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	2	Dual Technology Occupancy Sensor	107	0.64	10%	1502.28	\$241.87	\$160.00	\$320.00	0.00	166.92	\$26.87	11.91
242.2	Recycling	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	262 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	208 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.1	256 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	271 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86

241.1	257 Conference Room C	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	1	Dual Technology Occupancy Sensor	107	0.32	10%	751.14	\$120.93	\$160.00	\$160.00	0.00	83.46	\$13.44	11.91
241.1	246 Office	2600	6	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	0	No Change	107	0.64	0%	1669.2	\$268.74	\$160.00	\$0.00	0.00	0	\$0.00	0.00
241.1	206 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	263 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	264 Plan Room	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	107	0.43	0%	1112.8	\$179.16	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	Plotter Room	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	216 Library	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	107	0.21	0%	556.4	\$89.58	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	219 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	214 Library	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	0	No Change	107	0.21	0%	556.4	\$89.58	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	Copier Room	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	226 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	1	Dual Technology Occupancy Sensor	107	0.32	10%	751.14	\$120.93	\$160.00	\$160.00	0.00	83.46	\$13.44	11.91
241.1	250 Office	2600	3	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	\$134.37	3	1	Dual Technology Occupancy Sensor	107	0.32	10%	751.14	\$120.93	\$160.00	\$160.00	0.00	83.46	\$13.44	11.91
241.1	242 office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	220 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86

241.1	236 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	260 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	253 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	Supplies	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	Computer Lab	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
221.1	Computer Backup	2600	3	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$77.86	3	0	No Change	62	0.19	0%	483.6	\$77.86	\$160.00	\$0.00	0.00	0	\$0.00	0.00
241.1	217 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	258 Office	2600	6	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	\$268.74	6	1	Dual Technology Occupancy Sensor	107	0.64	10%	1502.28	\$241.87	\$160.00	\$160.00	0.00	166.92	\$26.87	5.95
241.1	233 Office	2600	2	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
241.1	229 Office	2600	4	4	1x4, 4 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	1	Dual Technology Occupancy Sensor	107	0.43	10%	1001.52	\$161.24	\$160.00	\$160.00	0.00	111.28	\$17.92	8.93
242.2	266 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	222 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	Conference Room B	2600	4	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	\$179.16	4	0	No Change	107	0.43	0%	1112.8	\$179.16	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	265 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86

242.2	226 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	Men's Restroom	2600	1	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$44.79	1	0	No Change	107	0.11	0%	278.2	\$44.79	\$160.00	\$0.00	0.00	0	\$0.00	0.00
221.1	Basement	400	4	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	99.2	\$15.97	4	0	No Change	62	0.25	0%	99.2	\$15.97	\$160.00	\$0.00	0.00	0	\$0.00	0.00
221.1	Basement Stairs	400	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	24.8	\$3.99	1	0	No Change	62	0.06	0%	24.8	\$3.99	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2	212 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
242.2	211 Office	2600	2	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$89.58	2	1	Dual Technology Occupancy Sensor	107	0.21	10%	500.76	\$80.62	\$160.00	\$160.00	0.00	55.64	\$8.96	17.86
10	Women's Restroom	2600	1	2	6"x4", 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	1	Dual Technology Occupancy Sensor	62	0.06	10%	145.08	\$23.36	\$160.00	\$160.00	0.00	16.12	\$2.60	16.55
242.2		2600	1	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$44.79	1	0		107	0.11	10%	250.38	\$40.31	\$160.00	\$0.00	0.00	27.82	\$4.48	0.00
221.1		2600	1	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	\$25.95	1	0		62	0.06	10%	145.08	\$23.36	\$160.00	\$0.00	0.00	16.12	\$2.60	0.00
221.1	Men's Restroom	2600	2	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$51.91	2	0	No Change	62	0.12	0%	322.4	\$51.91	\$160.00	\$0.00	0.00	0	\$0.00	0.00
221.1	Kitchen	2600	7	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.43	1,128.4	\$181.67	7	1	Dual Technology Occupancy Sensor	62	0.43	10%	1015.56	\$163.51	\$160.00	\$160.00	0.00	112.84	\$18.17	8.81
242.3	Meeting Room	2600	8	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	107	0.86	2,225.6	\$358.32	8	1	Dual Technology Occupancy Sensor	107	0.86	10%	2003.04	\$322.49	\$160.00	\$160.00	0.00	222.56	\$35.83	4.47
247.3		2600	8	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., White Diffuser	60	0.48	1,248.0	\$200.93	8	1	Dual Technology Occupancy Sensor	60	0.48	10%	1123.2	\$180.84	\$160.00	\$160.00	0.00	124.8	\$20.09	7.96
228.1	2nd Floor Storage Room	400	13	2	8' Channel, 2 Lamp, 59w T8, Elect. Ballast, Surface Mnt., No Lens	124	1.61	644.8	\$103.81	13	0	No Change	124	1.61	0%	644.8	\$103.81	\$160.00	\$0.00	0.00	0	\$0.00	0.00

11	Attic	40	4	1	Porcelain Socket, (1) 60w A19 Lamp	60	0.24	9.6	\$1.55	4	0	No Change	60	0.24	0%	9.6	\$1.55	\$160.00	\$0.00	0.00	0	\$0.00	0.00
15	Entrance	2600	5	1	LED Exit Sign	5	0.03	65.0	\$10.47	5	0	No Change	5	0.03	0%	65	\$10.47	\$160.00	\$0.00	0.00	0	\$0.00	0.00
13	Closet	400	1	1	Porcelain Socket, (1) 26w CFL Lamp	26	0.03	10.4	\$1.67	1	0	No Change	26	0.03	0%	10.4	\$1.67	\$160.00	\$0.00	0.00	0	\$0.00	0.00
221.1	Corridors	2600	31	2	1x4, 2 Lamp 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.92	4,997.2	\$804.55	31	0	No Change	62	1.92	0%	4997.2	\$804.55	\$160.00	\$0.00	0.00	0	\$0.00	0.00
242.2		2600	13	4	2x4, 4 Lamp 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.39	3,616.6	\$582.27	13	0	No Change	107	1.39	0%	3616.6	\$582.27	\$160.00	\$0.00	0.00	0	\$0.00	0.00
14		8760	11	1	LED Exit Sign	5	0.06	481.8	\$77.57	11	0	No Change	5	0.06	0%	481.8	\$77.57	\$160.00	\$0.00	0.00	0	\$0.00	0.00
247.2		2600	1	4	2x2, 4 lamp, 17w T8, Elect. Ballast, Surface Mnt., White Diffuser	60	0.06	156.0	\$25.12	1	0	No Change	60	0.06	0%	156	\$25.12	\$160.00	\$0.00	0.00	0	\$0.00	0.00
Totals			270	264			23.66	56,949.6	\$9,168.89	270	50			23.658		\$53,439.34			8000.00	0.0	3,510.26	\$565.15	14.16

Project Name: LGEA Solar PV Project - Admin office Building							
Location: Avalon, NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$647,910						
Annual kWh Production	86,861						
Annual Energy Cost Reduction	\$13,985						
Annual SREC Revenue	\$30,401						
First Cost Premium	\$647,910						
Simple Payback:	14.60						Years
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.161			Energy Cost Escalation Rate:	3.0%		
Financing Rate:	0.00%			SREC Value (\$/kWh)	\$0.350		
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	\$647,910	0	0	0	\$0	(647,910)	0
1	\$0	86,861	\$13,985	\$0	\$30,401	\$44,386	(\$603,524)
2	\$0	86,427	\$14,404	\$0	\$30,249	\$44,654	(\$558,871)
3	\$0	85,995	\$14,836	\$0	\$30,098	\$44,934	(\$513,936)
4	\$0	85,565	\$15,281	\$0	\$29,948	\$45,229	(\$468,707)
5	\$0	85,137	\$15,740	\$877	\$29,798	\$44,661	(\$424,046)
6	\$0	84,711	\$16,212	\$873	\$29,649	\$44,988	(\$379,058)
7	\$0	84,288	\$16,698	\$868	\$29,501	\$45,331	(\$333,727)
8	\$0	83,866	\$17,199	\$864	\$29,353	\$45,689	(\$288,039)
9	\$0	83,447	\$17,715	\$860	\$29,206	\$46,062	(\$241,976)
10	\$0	83,030	\$18,247	\$855	\$29,060	\$46,452	(\$195,525)
11	\$0	82,614	\$18,794	\$851	\$28,915	\$46,858	(\$148,666)
12	\$0	82,201	\$19,358	\$847	\$28,770	\$47,282	(\$101,384)
13	\$0	81,790	\$19,939	\$842	\$28,627	\$47,723	(\$53,662)
14	\$0	81,381	\$20,537	\$838	\$28,483	\$48,182	(\$5,479)
15	\$0	80,974	\$21,153	\$834	\$28,341	\$48,660	\$43,181
16	\$0	80,570	\$21,788	\$830	\$28,199	\$49,157	\$92,338
17	\$0	80,167	\$22,441	\$826	\$28,058	\$49,674	\$142,011
18	\$0	79,766	\$23,114	\$822	\$27,918	\$50,211	\$192,222
19	\$0	79,367	\$23,808	\$817	\$27,778	\$50,769	\$242,991
20	\$0	78,970	\$24,522	\$813	\$27,640	\$51,348	\$294,340
21	\$1	78,575	\$25,258	\$809	\$27,501	\$51,950	\$346,289
22	\$2	78,182	\$26,016	\$805	\$27,364	\$52,574	\$398,864
23	\$3	77,792	\$26,796	\$801	\$27,227	\$53,222	\$452,085
24	\$4	77,403	\$27,600	\$797	\$27,091	\$53,894	\$505,979
25	\$5	77,016	\$28,428	\$793	\$26,955	\$54,590	\$560,569
Totals:	2,046,093	2,046,093	\$509,869	\$17,523	\$716,133	\$1,208,479	(\$1,045,732)
Net Present Value (NPV)						\$560,594	
Internal Rate of Return (IRR)						5.3%	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Cape May Municipal Utilities Authority	5100	Sunpower SPR230	313	14.7	4,602	71.99	86,861	10,329	15.64



AC Energy & Cost Savings



Administration Building 5,100 S.F

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	72.0 kW
DC to AC Derate Factor:	0.810
AC Rating:	58.3 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	210.0°
Energy Specifications	
Cost of Electricity:	0.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.50	4514	7.27
2	3.27	5416	8.72
3	4.25	7605	12.24
4	5.17	8746	14.08
5	5.85	10023	16.14
6	6.12	9742	15.68
7	6.05	9831	15.83
8	5.50	8995	14.48
9	4.79	7711	12.41
10	3.68	6211	10.00
11	2.58	4302	6.93
12	2.17	3765	6.06
Year	4.33	86861	139.85

= Proposed PV Layout

Notes:

1. Estimated kWh based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.