LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: **CAPE MAY COUNTY MUNICIPAL UTILITY AUTHORITY**
SEVEN MILE MIDDLE REGIONAL WASTEWATER FACILITY ADMINISTRATION/WAREHOUSE & PROJECT CREW WAREHOUSE

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I. EXECUTIVE SUMMARY

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

Cape May County Municipal Utility Authority
- Seven Mile Middle Regional Waste Water Treatment Facility
- Administration / Warehouse Building & Project Crew Warehouse
98 Compost Road
Cape May Court House, 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	$ 538,555
Natural Gas	$ 19,965
Total	$ 558,519

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 ± 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	General Lighting Replacement	$14,205	$1,658	8.6	75.1%
ECM #2	Lighting Controls	$1,260	$247	5.1	194.0%
ECM #3	Domestic Water Heater Replacement	$10,662	$320	33.4	-64.0%
ECM #4	Replace Roof Top Unit	$21,565	$2,296	9.4	59.7%
ECM #5	Heating Upgrade to Inferred Heaters	$5,650	$2,075	2.7	450.9%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar 12.88 KW PV System	$115,920	$7,757	14.9	67.3%

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	General Lighting Replacement	3.6	11,153.3	-
ECM #2	Lighting Controls	-	1,729.7	-
ECM #3	Domestic Water Heater Replacement	-	-	201.0
ECM #4	Replace Roof Top Unit	6.2	16,059.0	-
ECM #5	Heating Upgrade to Inferred Heaters	-	1,215.0	1,284.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar 12.88 KW PV System	12.9	15,735.0	-

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 #1:** Lighting Upgrade
- **ECM #2:** Lighting Controls
- **ECM #5:** Heating Upgrade to Inferred Heaters

Although ECM #4 does not provide a payback less than 7 years, it is recommended to proceed with the installation of an efficient rooftop unit as suggested in ECM #4 (or equal) for the Administration building, since the existing rooftop unit is past its expected lifespan.

Implementation of ECM#3 by itself is not recommended and the water heater should be maintained or replaced as needed. However, if ECM#3 and ECM#5 were implemented together, the simple payback would be 6.16 years.

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 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse. CEG utilized a roof mounted solar array to house a substantial PV system. The recommended 12.88 kW PV system will produce approximately 15,735 kWh of electricity annually and will reduce the MUA's electrical consumption from the grid by 0.42%. The system's calculated simple payback of 14.9 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 available with this renewable energy measure.

Overall, the CMC MUA – 7 Mile Administration/Warehouse and Project Crew Building appears to be operating at a low to average efficiency level compared to other Energy Star buildings in the "Other" category in the region. The above average EUI number can be reconciled by

understanding there are other buildings and equipment at this plant that are not within the scope of this audit. The very large horsepower motors found within the plant and are on the campus meter will increase the power demand and power usage when multiple motors are required to operate simultaneously. With the implementation of the above recommended measures the CMC MUA will benefit from further energy savings at the 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse.

II. INTRODUCTION

The comprehensive energy audit covers the 11,360 square foot Seven Mile Admin. / Warehouse Bldg. & Project Crew Warehouse. The Administration and Warehouse includes the following spaces: offices, restroom, lab, break room, control room, Maintenance shop, electrical shop, mechanics shop, vehicle garage. The Project Crew building includes the following spaces: office and garage/shop.

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/ft^2/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:

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

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

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

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

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

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

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 Firm Transportation 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:

Description	Average
Electricity	14.3¢ / kWh
Natural Gas	$1.59 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider:	Atlantic City Electric		
Rate:	Annual General Service		
Meter No:	104532440		
Customer ID No:	0563 8759 9998		
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND**	**TOTAL BILL**
Jan-09	234,008	540.0	$30,627
Feb-09	232,091	509.8	$30,441
Mar-09	238,367	469.8	$31,293
Apr-09	233,714	465.5	$30,624
May-09	257,033	586.4	$33,245
Jun-09	333,880	681.5	$52,307
Jul-09	412,679	725.8	$64,901
Aug-09	410,169	763.6	$64,618
Sep-09	419,405	540.0	$66,056
Oct-09	317,885	639.4	$43,820
Nov-09	288,725	577.8	$39,305
Dec-09	379,887	638.3	$51,318
Totals	**3,757,843**	**763.6 Max**	**$538,555**
		AVERAGE DEMAND	**594.8 KW average**
		AVERAGE RATE	**$0.143 $/kWh**

Figure 1
Electricity Usage Profile

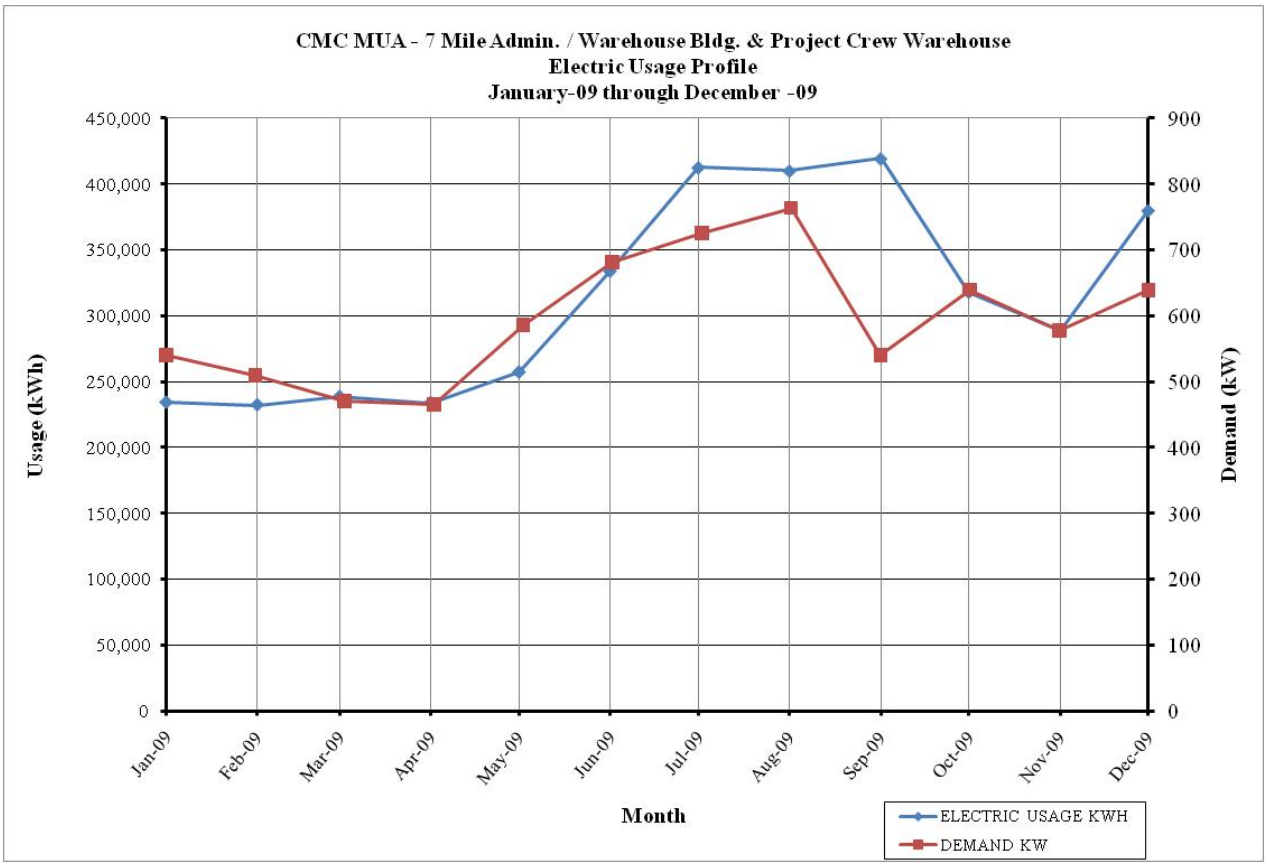
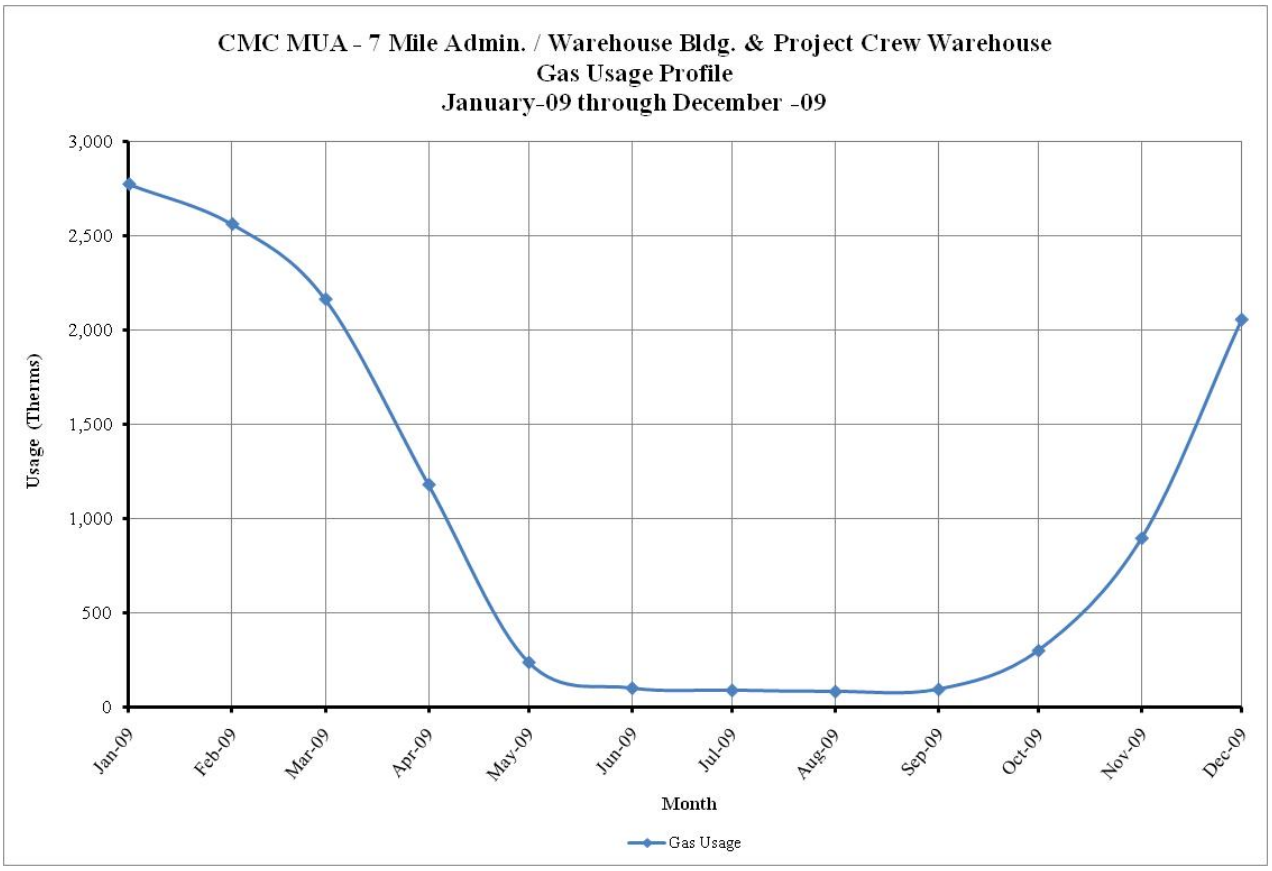


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	South Jersey Gas	
Rate:	Firm Transportation	GSG
Meter No:	295475	491213
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	2,772.50	$4,359.98
Feb-09	2,561.00	$4,046.65
Mar-09	2,163.07	$3,430.19
Apr-09	1,181.52	$1,893.09
May-09	239.66	$412.99
Jun-09	102.47	$186.75
Jul-09	91.09	$205.57
Aug-09	84.62	$172.86
Sep-09	96.36	$194.09
Oct-09	302.08	$488.73
Nov-09	897.08	$1,426.73
Dec-09	2,055.03	$3,146.89
Jan-10	**12,546.48**	**$19,964.52**
AVERAGE RATE:	**$1.59**	**$/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:

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

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

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	3,757,843.00			12,829,276	3.340	42,849,782
NATURAL GAS		12,546.48		1,254,648	1.047	1,313,616
TOTAL				14,083,924		44,163,398
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		52,260	SQUARE FEET			
BUILDING SITE EUI		*269.50*	kBtu/SF/YR			
BUILDING SOURCE EUI		*845.07*	kBtu/SF/YR			

As a comparison, data has been gathered by the US Department of Energy (DOE) for various facilities cataloguing the standard site and source energy utilization. This data has been published in the 2003 Commercial Building Energy Consumption Survey and is noted as follows for facilities of this type:

- Other (Office, Lab, Garage, Warehouse):
  104 kBtu/SF Site Energy, 213 kBtu/SF Source Energy, 56% electric usage.

Based on the information compiled for the studied facility, as compared to the national average the energy usage is approximately 259% higher than the baseline building site data. Normalizing the baseline site data for 91% electric, baseline site energy is 114.2 kBtu/SF and as compared to the national average the energy usage is approximately 227% higher than the baseline building site data.

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**
7 Mile Admin., Warehouse & Project Crew Building	N/A	N/A

The 7 Mile Admin., Warehouse & Project Crew Building falls under the "other" category which is not applicable for Energy Performance Rating. See the **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 11,360 SF Seven Mile Administration / Warehouse Bldg. & Project Crew Warehouse are one story facilities. The Administration/Warehouse is comprised of offices, restroom, lab, break room, control room, Maintenance shop, electrical shop, mechanics shop, vehicle garage. The Project Crew building has an office and garage/shop area.

The facility is occupied 60 hours a week. The typical hours of operation for this facility are between 8:00 am and 7:30 pm. The Administration and Warehouse exterior walls are brick and block construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the facility are double pane, ¼" clear glass with aluminum 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 a fiberglass roll roof system on concrete planks. The amount of insulation below the roofing is unknown. The building was built in 1987 with no additions since the original construction.

The project crew building is a metal building with minimal insulation. The amount of insulation within the wall and roof is unknown. There are no windows in the building. The building was built in 1987 with no additions since the original construction.

HVAC Systems

The Administration and Warehouse areas are heated by a Weil McLain water boiler, model ABL-688-WS. It has a 1703 MBH natural gas input, 1480.9 MBH net output. The boiler is twenty-three (23) years old, is in good condition and has twelve (12) years of ASHRAE expected useful service life remaining. There boiler has a Power Flame natural gas burner, model CR20G-15, having 2,200 MBH maximum input, ½ hp blower motor and is 80.2% efficient. The burner is 17 years old, is in fair condition and is two (2) years past the ASHRAE expected useful service life.

The warehouse area is served by hot water unit heaters that are fed from the Weil McLain Boiler. The unit heaters are twenty-three (23) years old, in fair condition and are three (3) years past their ASHRAE expected useful service life. The facility personnel state that the doors open 3 to 6 times a day and it takes a long time to heat back up. This is an ideal situation to install inferred radiant unit heaters. Inferred radiant heaters heat surfaces and objects so occupants feel warm even with frequent door openings.

The Administration building is served by a York model D2CE180A46C packaged roof top air conditioner. It is nine years old, is in fair condition, and has six (6) years of ASHRAE expected useful service life remaining.

The Project Crew building is heated by two (2) inferred radiant tube heaters and one electric base board heater. The 2 KW base board heater serves the office, is twenty-three (23) years old, in fair condition and is three (3) years past its ASHRAE expected useful service life. The garage/shop

area is served by one (1) Roberts Gordon model CTHB-125, 125 MBH natural gas input inferred radiant heater and one (1) Re-Verber-ray (CMC MUA Asset tag# 3298) 125 MBH (assumed) natural gas input inferred radiant heater. Both inferred heaters are sixteen (16) years old, are in fair condition and are three (3) years past there ASHRAE expected useful service life. The heating system in this building should be maintained or replaced "in-kind" as needed.

The Project Crew building has a window air conditioner that serves the office. It is a GE model AGQ06LJG1, 6000 BTUH, 9.7 SEER unit. It is four (4) years old, is in good condition, and has eleven (11) years of ASHRAE expected useful service life remaining.

Exhaust System

Air is exhausted from the toilet rooms, lab hoods and the warehouse via roof mounted fractional horsepower exhaust fans. The exhaust systems run 24/7.

HVAC System Controls

The HVAC systems within the facility are controlled via local thermostats.

Domestic Hot Water

Domestic hot water for the Mechanics shop is provided by a 2 gallon Lochinvar model MTC002E electric water heater, capacity of 1500 Watts. It is six (6) years old, is in good condition, and has six (6) years of expected useful service life remaining.

Domestic hot water for the restrooms, break room and lab is provided by a 86 gallon A.O. Smith model BTC 179 920 with 179 MBH natural gas input and is rated for 162.7 GPH recovery at 100°F rise. It is seventeen (17) years old, is in fair to poor condition and is five (5) years past its expected useful service life. The domestic hot water piping insulation appeared to be in fair condition.

The Project Crew Domestic water heater for the utility sink is provided by a 12 gallon Bradford White model MII2UT6SS13 electric water heater, capacity of 1500 Watts. It is nine (9) years old, is in fair condition, and has three (3) years of expected useful service life remaining.

Lighting

The lighting in the Seven Mile Administration /warehouse and Project Crew Building is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts, T-8 lamps with electronic ballasts. There are a few storage rooms, original boiler room and closets with incandescent lighting and compact fluorescent fixtures. The work shop areas have metal halide and exterior areas have high pressure sodium 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: Lighting Upgrade - General

Description: General

The lighting in the Seven Mile Administration /warehouse and Project Crew Building is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts, T-8 lamps with electronic ballasts. There are a few storage rooms, original boiler room and closets with incandescent lighting and compact fluorescent fixtures. The work shop areas have metal halide and exterior areas have high pressure sodium lamps.

This ECM includes replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the owner on electrical costs due to the better performance of the lamp and ballasts. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes replacement of all incandescent lamps to compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix – ECM#1** outlines the proposed retrofits, costs, savings, and payback periods.

NJ Smart Start® Program Incentives are calculated as follows:

From the **Smart Start Incentive Appendix**, the following incentives are warranted:

Retrofit fluorescent T12 lamps and magnetic ballast with T-5 or T-8 lamps w/electronic ballast (1-4 lamp retrofitted) = $15 per fixture.

$$\text{Smart Start®}\ \textit{Incentive} = (\#\ \textit{of}\ 1-4\ \textit{lamp fixtures retrofitted} \times\ \$15)$$
$$\text{Smart Start®}\ \textit{Incentive} = (113 \times\ \$15) = \underline{\$1{,}695}$$

Replace HID metal halide 250w-399w fixture with new T-5 or T-8 lamps fixture w/electronic ballast = $50 per fixture.

$$\text{Smart Start®}\ Incentive = \left(T5 or T8\ lamp\ \ fixtures \times\ \$\ 50\right)$$
$$\text{Smart Start®}\ Incentive = \left(20 \times\ \$\ 50\right) = \underline{\$1{,}000}$$

Permanent delamping & new reflectors, T12 to T8 fluorescent lamps. Electronic ballast replacement is required for all delamped fixtures = $30 per fixture.

$$\text{Smart Start®}\ Incentive = \left(\#\ of\ \ delampped\ \ fixtures\ w/\ newreflector\ \&\ Elect.Ballast \times\ \$\ 30\right)$$

$$\text{Smart Start®}\ Incentive = \left(5 \times\ \$\ 30\right) = \underline{\$150}$$

Total Incentive:

$$\text{Total Smart Start®}\ Incentive = \$1{,}695 + \$1{,}000 + \$150 = \underline{\$2{,}845}$$

Replacement and Maintenance Savings are calculated as follows:

$$Savings = \left(reduction\ in\ lamps\ replaced\ \ per\ \ year\right) \times \left(repacment\ \$\ per\ lamp + Labor\ \$\ per\ lamp\right)$$

$$Savings = \left(9\ lamps\ \ per\ \ year\right) \times \left(\$2.00 + \$5.00\right) = \$63$$

From the Smart Start Incentive appendix, there is no incentive for replacing incandescent lamps with compact fluorescent lamps. The incentive is only available if the entire light fixture is replaced. In most cases, the existing fixtures can be re-lamped by the facility's staff to obtain the energy savings without the expense of a new fixture and the involvement of an electrician to install a new fixture.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$17,050
NJ Smart Start Equipment Incentive ($):	$2,845
Net Installation Cost ($):	$14,205
Maintenance Savings ($/Yr):	$63
Energy Savings ($/Yr):	$1,595
Total Yearly Savings ($/Yr):	$1,658
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.6
Simple Lifetime ROI	75.1%
Simple Lifetime Maintenance Savings	$945
Simple Lifetime Savings	$24,869
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	$5,587.14

ECM #2: Install Lighting Controls

Description:

In some areas the lighting is 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. This 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.

Lighting controls are available in many forms. Lighting controls can be as simplistic as an additional switch. Timeclocks are often used which allow the user to set an on/off schedule. Timeclocks range from a dial clock with on/off indicators to a small box the size of a thermostat with user programs for on/off schedule in digital format. Occupancy sensors detect motion and will switch the lights on when the room is occupied. They can either be mounted in place of the current wall switch, or they can be mounted on the ceiling to cover large areas. Lastly, photocells are a lighting control that sense light levels and will turn the lights off when there is adequate daylight. These are mostly used outside, but they are becoming much more popular in energy-efficient office designs as well.

To determine an estimated savings for lighting controls, we 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, labs, instrument rooms, conference rooms, restrooms, locker rooms, storage rooms, file rooms, electric and mechanics shops, etc.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix – ECM#2** outlines the proposed retrofits, costs, savings, and payback periods. The building is only occupied 60 hours a week and other areas are only a few hours a day. Ten percent of the expected power usage value (kWh/Yr) is the resultant energy savings due to installation of occupancy sensors:

Savings = 1,730 kWh x $0.143Wh = $247 / yr

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is $160/unit including material and labor. The SmartStart Buildings® incentive is $20 per control which equates to an installed cost of $140/unit. Total number of rooms to be retrofitted is 9. Total cost to install sensors is $140/ceiling unit x 9 units = $1,260.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,440
NJ Smart Start Equipment Incentive ($):	$180
Net Installation Cost ($):	$1,260
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$247
Total Yearly Savings ($/Yr):	$247
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.1
Simple Lifetime ROI	194.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,705
Internal Rate of Return (IRR)	18%
Net Present Value (NPV)	$1,688.67

ECM #3: Domestic Water Heater Replacement

Description:

The existing A.O. Smith model BTC-179-920 with an 86 gallon tank, 179,000 BTUH input natural gas heater with 80% thermal efficiency and a nameplate recovery rate of 162.7 gallon per hour.

This energy conservation measure will replace each of the existing water heater with a 98.5% thermal efficient Bradford White model EF-100T-199E-3N gas fired domestic hot water heater having 199 MBH input and 100-gallon storage capacity or equivalent.

Energy Savings Calculations:

Existing Natural Gas DW Heater
Rated Capacity = 179 MBH input; 86 gallons storage
Combustion Efficiency = 80%
Age & Radiation Losses = 20%
Thermal Efficiency = 60%

Proposed Natural Gas-Fired, High-Efficiency DW Heater
Rated Capacity = 199 MBH input; 100 gallons storage
Thermal Efficiency = 98.5%
Radiation Losses = 0.5%
Net Efficiency = 98%

Operating Data for Domestic Water Heater

ESTIMATED NATURAL GAS USAGE											
Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Efficiency (%)	Fuel	% of Connected Load	Annual Usage Therms
-	Boiler Room	Admin Bldg.	Weil McLain	1	ABL688 W S	87-2710 H	1703	80	NG	0.393	4932.3
-	Boiler Room	Weil McLain	Power Flame	1	CR2-G-15	9936569	2200	80.2	NG	0.508	6371.7
-	**Boiler Room**	**Admin Bldg**	**AO Smith**	**1**	**BTC 179 920**	**MF93-0277558-920**	**179**	**80**	**Nat. Gas**	**0.041**	**518.4**
-	Project Crew Warehouse	Project Crew Warehouse	Roberts-Gordon	1	0TH8-T25	S307-013-125-006A	125	80	Nat. Gas	0.029	362.0
-	Project Crew Warehouse	Project Crew Warehouse	Re-Verber-Ray	1	-	-	125	80	Nat. Gas	0.029	362.0

$$\text{Estimated Consumption} = \frac{179 MBH input}{4{,}332 MBH bldg input} x 12{,}546.48 Therms/year = 518.4 Therms/year$$

Energy Savings = Old Water Heater Energy Input x ((New Water Heater Efficiency – Old Water Heater) / New Water Heater Efficiency))

Energy Savings = 518.4 Therms x $\frac{(98\% - 60\%)}{(98\%)}$ = 201 Therms

Average Cost of Natural Gas = $1.59/Therm

Yearly Savings = 201 Therm x $1.59/ Therm = $319.59/year

Cost of one (1) Commercial Domestic Water Heater and Installation = $11,060

Smart Start Incentive = $2.00/MBh x (199) /installed MBh = $398.

Simple Payback = $11,060 / $320 = 34 years

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,060
NJ Smart Start Equipment Incentive ($):	$398
Net Installation Cost ($):	$10,662
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$320
Total Yearly Savings ($/Yr):	$320
Estimated ECM Lifetime (Yr):	12
Simple Payback	33.4
Simple Lifetime ROI	-64.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,835
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	($7,480.80)

ECM #4: High Efficiency Roof Top Air Conditioner

Description:

The Administration building is served by a York model D2CE180A46C cooling only roof top unit that has a nominal cooling capacity of 180,000 BTUH. The unit is approximately 30 years old, in poor condition and very inefficient (EER=8.5).

This ECM would replace the existing rooftop unit with a high-efficiency Trane Model TCD181E or equal with an efficiency of EER=12. The unit will have dual enthalpy controlled economizer.

Energy Savings Calculations:

Cooling Assumptions:

Total Cooling Capacity	= 15 Tons
Average Unit Efficiency	= 8.5 EER
New Unit Efficiency	= 12 EER
Average Cost of Electricity	= \$0.143/kWh
Average Annual Hours @ Full Load	= 2,600 Hours; ASHRAE 90.1-2007, Atlantic City, CDD65 = 5,169

Cooling Savings Calculation:

$$EnergySavings = \frac{Cooling(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)}\times\left(\frac{1}{EER_{OLD}}-\frac{1}{EER_{NEW}}\right)\times Cooling\ Hrs.$$

$$EnergySavings = \frac{15\ (Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)}\times\left(\frac{1}{8.5\left(\frac{Btu}{W}\right)}-\frac{1}{12\left(\frac{Btu}{W}\right)}\right)\times 2{,}600\ hours$$

$$= \underline{16{,}059\ kWh}$$

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

$$Demand\ Savings = \frac{16{,}059\ (kWh)}{2{,}600\ Hrs.} = \underline{6.18\ kW}$$

Total Annual Energy Cost Savings = 16,059 kWh x $0.143/kWh = $2,296 per year

Smart Start® *Incentive* = (*Number of Tons* × $79/*Ton*) = (15 × $79) = $1,185
Smart Start® *IncentiveDualEnthalpyControls* = ($250/*Unit*) = (1 × $250) = $250

Total Smart Start® *Incentive* = $1,185 + $250 = $1,435.

The total installed cost of a 15-Ton condenser rooftop unit with an ambient kit is $23,000.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$23,000
NJ Smart Start Equipment Incentive ($):	$1,435
Net Installation Cost ($):	$21,565
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,296
Total Yearly Savings ($/Yr):	$2,296
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.4
Simple Lifetime ROI	59.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$34,440
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$5,844.50

ECM #5: Engine Bay Heater Upgrade

Description:

The Maintenance workshop is heated by three (3) unit heaters equipped with hot water coils. The remote thermostat that controls this heating unit is set at 60ºF. These units do not provide adequate heating because of losses through the garage door when open. This style of heating unit only heats the air, not the surrounding walls and floors. In addition, these units are beyond their expected service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, these units should be replaced.

Our team recommends replacing the existing unit heaters with a low intensity infrared (IR) tube heating system. When compared to convective heating systems, IR heaters provide more efficient heating in large areas and warehouses for two reasons: they only heat people and objects (not air); they can be conveniently located and directed to provide heat to only a smaller section occupied by workers. Radiant heating turns the building and the objects inside into a thermal mass. This thermal mass will maintain its temperature for a long period of time as compared to the air, and will not be as affected by infiltration (the opening of the garage doors) as the air.

This ECM recommends the replacement of the Maintenance shop unit heaters that have met or exceeded their expected service life with Sterling Infrared Heaters or equivalent.

Energy Savings Calculations:

Maintenance Shop Heat Loss Calculations:

Based on the size of the existing heating unit and the use of engineering calculations, the heat loss for the Engine Bay has been calculated to be approximately 170,240 Btu/h (40 Btu/h per SF, 4,256 SF). The Base Building Heat Loss calculation is based on maintaining a 60 º F delta in temperature between indoor and outdoor ambient, respectively.

The heat loss that the warm-air system needs to overcome is actually greater than the base heat loss because infrared systems provides a higher mean radiant temperature (MRT) through warm floors, equipment, etc., and because stratification is lower than forced-air systems. Traditionally, warm air systems in industrial and commercial applications will usually require approximately 10 º F higher average air temperatures to provide equivalent comfort as provided by an infrared system. Due to this fact, the following is the calculation of the heat loss the warm air system will be required to meet:

$$\text{Heat Loss}_{WA} = (\text{Base Building Heat Loss} \times \text{Revised } \Delta T\ (70\ ^\circ F)) / \text{Standard } \Delta T\ (60\ ^\circ F)$$
$$= (170{,}240\ \text{Btu/h} \times 70\ ^\circ F) / (60\ ^\circ F)$$
$$= 198{,}613\ \text{Btu/h}$$

Estimated Fan Energy Savings:

Each of the three (3) unit heaters contain a small supply fan (approx. 1/6 HP) that runs each time the space calls for heating. Assuming that this motor is 80% efficient and the total run hours is 2,000 hours per year, this equates to an electrical savings of:

Fan Energy Savings = {0.746 kW/HP x Motor HP x Load Factor (0.75) x Hours of Operation x Cost of Electricity ($0.143)] ÷ Motor Efficiency

Total Fan energy Savings =1,215 kWh = $33

Natural Gas Energy Savings:

To estimate the amount of energy consumed by the existing unit heaters or the infrared heaters throughout the heating season, the Degree Day method of energy estimating is being utilized. The equation is as follows:

$$EnergyUsed = \frac{H_L \times HDD \times Hrs}{\Delta t \times Eff \times V}$$

Where:

H_L = Building Heat Loss, BTU/Hr. (Warm Air = 198,613 Btu/h, Infrared = 170,240 Btu/h)

HDD = number of Heating Degree Days as Specified Base Temperature
(Warm Air $HDD_{70^\circ F}$ = 6,132; Infrared $HDD_{60^\circ F}$ = 3,700 Atlantic City, NJ)

Hrs = Hours per Day

Δt = Design temperature difference, ° F (Warm Air = 70 ° F, Infrared = 60 ° F)

Eff = Efficiency of Energy Utilization (Existing NG Heater = 0.75, Vented Infrared Heater = 0.84)

V = Heating value of fuel, BTU/Therm (Natural Gas = 100,000 Btu = 1 Therm)

Estimated Energy Consumption – Gas Fired Air Handling Unit:

$$EnergyUsed = \frac{(198{,}613 Btu/h) \times (6{,}132^\circ F) \times 12h}{70^\circ F \times 75\% \times 100{,}000 Btu/Therm}$$

Energy Used = 2,784 Therms/Year

Estimated Energy Consumption – Infrared Heaters:

$$EnergyUsed = \frac{(170{,}240 Btu/h) \times (3{,}700°F) \times 12h}{60°F \times 84\% \times 100{,}000 Btu/Therm}$$

Energy Used = 1,500 Therms/Year

Energy Savings = 2,784 – 1,500 = 1,284 Therms per year

Cost Savings = 1,284 Therms/yr x $1.59/Therm = $2,042 per year

Total Energy Savings = Fan Energy Savings + Natural Gas Savings
= $33 + $2,042 = $2,075 per year

Also, incentives for the installation of the infrared heating system are not currently available and maintenance savings could not be adequately calculated because information was not available to baseline the savings.

The total implementation cost including material, labor, overhead and profit is estimated at approximately $5,650. It is pertinent to note, the labor cost includes installation of the infra-red heaters and required modifications of the existing natural gas piping.

Incentives for this ECM are not currently available and maintenance savings could not be adequately calculated because information was not available to baseline the savings.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,650
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,650
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,075
Total Yearly Savings ($/Yr):	$2,075
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.7
Simple Lifetime ROI	450.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$31,125
Internal Rate of Return (IRR)	36%
Net Present Value (NPV)	$19,121.22

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. Flat roof, 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. A roof area of 900 S.F. 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 12.88 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 15,735 KWh annually, reducing the overall utility bill by approximately 0.42% 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 – 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse 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	14.94 Years	6.7%	5.0%

*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 – 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse to invest in a solar system through a Direct Purchase CEG does not recommend the CMC MUA – 7 Mile Admin. / Warehouse Bldg. & Project Crew

Warehouse pursue this route. It would be more advantageous for the CMC MUA – 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse 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 – 7 Mile Admin. / Warehouse Bldg. & Project Crew Warehouse 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 based on each building (meter) basis. Cash incentives are available per kWh of electric usage.

CEG has reviewed the July 9, 2008 "Pre-Feasibility Study for the Development of Wind Energy: Seven Mile Regional Wastewater Treatment Facility" by DNV Global Energy Concepts Inc. The study concluded hub height wind speed is "poor to fair" and would be economically challenging due to installation costs. The study sites concerns such as: low wind speed, proximity to heliports and air port. A wind turbine at this facility "poses a significant concern" in regard to the FAA VORTAC unit nearby. The study cites concerns due to turbine location near the wetlands buffer and transition areas that may contain habitat suitable for threatened and endangered species.

Based on CEG's review of the applicability of wind energy for the facility, it was determined that wind energy is not a viable option to implement due to inadequate average wind speed, site limitations, expected height restrictions, communication concerns and biological concerns.

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 cooling season months July through September. This load profile is a result of increased activity due to the beach vacation season as well as the air conditioning loads throughout the building. The cooling season represents a typical load profile with increase usage from the building air conditioning systems and a decreased usage in the heating season. The electric demand is shows a steady increase in the months of June through August representing the largest electric draw in the cooling season. The hours of operation of the Admin / Warehouse are extended compared to a typical office building. As a result the "full load hours" is spread over a moderate period of time (occupied hours). The resulting load factor rating for the buildings is approximately 56%. 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 56% 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 October. There is an increase in consumption November through April. The heating system in the buildings consists of natural gas heat through the rooftop unit, boilers, and infrared heaters in the garage. The gas heating equipment is responsible for the majority of the natural gas load at the facilities. 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, "Firm Transportation Service". 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 $0.1226/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 $ 11.89 / 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 par 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 shown 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%.*

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

CMC MUA - & Mile Administration/Warehouse & Project Crew Warehouse

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	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 Svaing * 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)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	General Lighting Replacement	$17,050	$0	$2,845	$14,205	$1,595	$63	$1,658	15	$24,869	$945	75.1%	8.6	7.98%	$5,587.14
ECM #2	Lighting Controls	$1,440	$0	$180	$1,260	$247	$0	$247	15	$3,705	$0	194.0%	5.1	17.96%	$1,688.67
ECM #3	Domestic Water Heater Replacement	$11,060	$0	$398	$10,662	$320	$0	$320	12	$3,835	$0	-64.0%	33.4	-13.05%	($7,480.80)
ECM #4	Replace Roof Top Unit	$23,000	$0	$1,435	$21,565	$2,296	$0	$2,296	15	$34,440	$0	59.7%	9.4	6.52%	$5,844.50
ECM #5	Heating Upgrade to Inferred Heaters	$5,650	$0	$0	$5,650	$2,075	$0	$2,075	15	$31,125	$0	450.9%	2.7	36.38%	$19,121.22
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar 12.88 KW PV System	$115,920	$0	$0	$115,920	$2,250	$5,507	$7,757	25	$193,925	$137,675	67.3%	14.9	4.42%	$19,153.79

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* .

Concord Engineering Group, Inc.

520 BURNT MILL ROAD
VOORHEES, NEW JERSEY 08043
PHONE: (856) 427-0200
FAX: (856) 427-6508

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

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
7 MILE ADMIN & WAREHOUSE

Building ID: 2260824
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: March 30, 2010

Facility
7 MILE ADMIN & WAREHOUSE
98 Compost Road
Cape May Court House, 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: 1987
Gross Floor Area (ft²): 11,360

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	12,821,760
Natural Gas (kBtu)[4]	375,784,300
Total Energy (kBtu)	388,606,060

Energy Intensity[5]

Site (kBtu/ft²/yr)	34208
Source (kBtu/ft²/yr)	38404

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	21,944

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	25
National Average Source EUI	56
% Difference from National Average Source EUI	68479%
Building Type	Storage/Shipping/Non-Refrigerated Warehouse

Stamp of Certifying Professional

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
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	☑
Building Name	7 MILE ADMIN & WAREHOUSE	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Storage/Shipping/Non-Refrigerated Warehouse	Is this an accurate description of the space in question?		☐
Location	98 Compost Road, Cape May Court House, NJ 08210	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
7 MILE ADMIN & WAREHOUSE (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	11,360 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	5(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	60Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	19(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: 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))**
12/01/2009	12/31/2009	379,887.00
11/01/2009	11/30/2009	288,725.00
10/01/2009	10/31/2009	317,885.00
09/01/2009	09/30/2009	419,405.00
08/01/2009	08/31/2009	410,169.00
07/01/2009	07/31/2009	412,679.00
06/01/2009	06/30/2009	333,880.00
05/01/2009	05/31/2009	257,033.00
04/01/2009	04/30/2009	233,714.00
03/01/2009	03/31/2009	238,367.00
02/01/2009	02/28/2009	232,091.00
01/01/2009	01/31/2009	234,008.00
Electric Consumption (kWh (thousand Watt-hours))		**3,757,843.00**
Electric Consumption (kBtu (thousand Btu))		**12,821,760.32**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**12,821,760.32**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/01/2009	12/31/2009	379,887.00
11/01/2009	11/30/2009	288,725.00
10/01/2009	10/31/2009	317,885.00
09/01/2009	09/30/2009	419,405.00
08/01/2009	08/31/2009	410,169.00
07/01/2009	07/31/2009	412,679.00
06/01/2009	06/30/2009	333,880.00
05/01/2009	05/31/2009	257,033.00
04/01/2009	04/30/2009	233,714.00
03/01/2009	03/31/2009	238,367.00

02/01/2009	02/28/2009	232,091.00
01/01/2009	01/31/2009	234,008.00
Gas Consumption (therms)		**3,757,843.00**
Gas Consumption (kBtu (thousand Btu))		**375,784,300.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**375,784,300.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same 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
7 MILE ADMIN & WAREHOUSE
98 Compost Road
Cape May Court House, 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

7 MILE ADMIN & WAREHOUSE	
Gross Floor Area Excluding Parking: (ft^2)	11,360
Year Built	1987
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

7 MILE ADMIN & WAREHOUSE	
Space Type	Other - Storage/Shipping/Non-Refrigerated Warehouse
Gross Floor Area(ft^2)	11,360
Number of PCs[o]	5
Weekly operating hours[o]	60
Workers on Main Shift[o]	19

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2009)	**Baseline** (Ending Date 12/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	34208	34208	0	N/A	25
Source (kBtu/ft^2)	38404	38404	0	N/A	56
Energy Cost					
$/year	$ 1,077,110.00	$ 1,077,110.00	N/A	N/A	$ 787.17
$/$ft^2$/year	$ 94.82	$ 94.82	N/A	N/A	$ 0.07
Greenhouse Gas Emissions					
$MtCO_2e$/year	21,944	21,944	0	N/A	16
$kgCO_2e/ft^2$/year	1,932	1,932	0	N/A	1

More than 50% of your building is defined as Storage/Shipping/Non-Refrigerated Warehouse. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Storage/Shipping/Non-Refrigerated Warehouse. This building uses X% less energy per square foot than the CBECS national average for Storage/Shipping/Non-Refrigerated Warehouse.

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Cape May MUA - 7 Mile Administration Building and Warehouse"

Boiler

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Boiler Room	Admin Bldg.	Weil McLain	1	ABL688 W S	87-2710 H	1703	1358	80	NG	1987	35	12	

Boiler - Burner

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Boiler Room	Weil McLain	Power Flame	1	CR2-G-15	9936569	2200	80.2	NG	1993	21	4	

Boiler - Pumps

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Frame Size	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Boiler room	baseboard loop	Taco	1	1615C3N1 6.35	-	1/2	-	-	-	-	115/1	1993	10	(-7)	No rebate less than 1 hp. Repair/replace as needed as maintenance project
-	Boiler room	heater loop	Taco	1	1615C3E2 6.35	-	3/4	-	-	-	-	230/3	1993	10	(-7)	No rebate less than 1 hp. Repair/replace as needed as maintenance project

Domestic Water Heater

Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Mech. Shop	Mech. Shop	Lochinvar	1	MTC002E	XE4153734	1500 Watts	6	2	-	Electric	2004	12	6	
-	Boiler Room	Admin Bldg	AO Smith	1	BTC 179 920	MF93-0277558-920	179	162.7	86	80	Nat. Gas	1993	12	(-5)	
-	Project Crew Warehouse	Project Crew Warehouse	Bradford White	1	M1-12UT6SS13	XD3910924	1500 Watts	7	12	-	Electric	2001	12	3	

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
-	Roof	Building	York	1	D2CE180A46C	(S) NAKM009786	DX	8.5	15 Ton	-	-	-	-	-	460/3	-	30	15	(-15)	

Unit Heaters and Cabinet Unit Heaters

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
-	Project Crew Warehouse	Project Crew Warehouse	Roberts-Gordon	1	0TH8-T25	S307-013-125-006A	Inferred	125	-	-	-	1993	13	(-4)	Maintain/Replace as maintenance project as needec
-	Project Crew Warehouse	Project Crew Warehouse	Re-Verber-Ray	1	-	-	Inferred	125	-	-	-	1993	13	(-4)	CMC MUA Asset 3298, Maintain/Replace as maintenance project as needed

Window AC - Units

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	EER	Fan HP	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Project Crew Warehouse	office	GE	1	AGQ06LJG1	AL141615	6000	9.7	-	115/1	-	Jan-06	15	11	

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 – 7 Mile Administration, Warehouse & Project Crew
Address: 3959 Ocean Drive
Avalon, NJ 08202
Building SF: 11,360

"7 Mile Administration, Warehouse & Project Crew"

KWH COST: $0.143

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
					Admin. Building																	
242.21	Lab	3120	11	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed mnt., Prismatic Lens	104	1.14	3,569.3	$510.41	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
142.21	Insturment Room	3120	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	144	0.43	1,347.8	$192.74	3	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.26	804.96	$115.11	$100.00	$300.00	0.17	542.88	$77.63	3.86
142.21	Chemist	3120	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	144	0.29	898.6	$128.49	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	536.64	$76.74	$100.00	$200.00	0.12	361.92	$51.75	3.86
127.21	Corridor	3200	11	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.75	2,393.6	$342.28	11	3	3 Lamp, 17w T8, Elect. Ballast; retorfit	47	0.52	1654.4	$236.58	$100.00	$1,100.00	0.23	739.2	$105.71	10.41
122.21	Reception Area	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.07	212.16	$30.34	13.18
122.21	Superintendant's Office	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.07	212.16	$30.34	13.18
122.21	Director's Office	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.07	212.16	$30.34	13.18
122.21	Meeting Room/ Sr. Operator's Office	3120	6	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.45	1,404.0	$200.77	6	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.35	1085.76	$155.26	$100.00	$600.00	0.10	318.24	$45.51	13.18
122.21	MIP Room	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.07	212.16	$30.34	13.18
121.21		3120	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.14	424.3	$60.68	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	361.92	$51.75	$100.00	$200.00	0.02	62.4	$8.92	22.41
550	Men's Restroom/ Locker Room/Mud Rm	3120	2	1	Recessed Down Light, 60w A19 Lamp	60	0.12	374.4	$53.54	2	1	w CFL Lamp	26	0.05	162.24	$23.20	$20.00	$40.00	0.07	212.16	$30.34	1.32
127.21		3120	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.41	1,273.0	$182.03	6	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.28	879.84	$125.82	$100.00	$600.00	0.13	393.12	$56.22	10.67
126.15		3120	6	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.45	1,404.0	$200.77	6	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.35	1085.76	$155.26	$100.00	$600.00	0.10	318.24	$45.51	13.18

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127.21	Women's Restroom/ Locker Room	3120	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.14	424.3	$60.68	2	3	3 Lamp, 17w T8, Elect. Ballast; retorfit	47	0.09	293.28	$41.94	$100.00	$200.00	0.04	131.04	$18.74	10.67
122.21	Lunch Room	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.07	212.16	$30.34	13.18
550	Janitor's Closet	650	1	1	Recessed Down Light, 60w A19 Lamp	60	0.06	39.0	$5.58	1	1	w CFL Lamp	26	0.03	16.9	$2.42	$20.00	$20.00	0.03	22.1	$3.16	6.33
Garage and Work Shops																					
121.36	Electrical Shop	3120	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	0.54	1,697.3	$242.71	8	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.46	1447.68	$207.02	$100.00	$800.00	0.08	249.6	$35.69	22.41
127.21	Corridor	3200	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.34	1,088.0	$155.58	5	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.24	752	$107.54	$100.00	$500.00	0.11	336	$48.05	10.41
121.34	Workshop/ Garage	3120	15	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	1.02	3,182.4	$455.08	15	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.87	2714.4	$388.16	$100.00	$1,500.00	0.15	468	$66.92	22.41
746		3120	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3,681.6	$526.47	4	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Lo Bay	168	0.67	2096.64	$299.82	$220.00	$880.00	0.51	1584.96	$226.65	3.88
121.34	Compressor/ Vac Room	3120	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.27	848.6	$121.36	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.04	124.8	$17.85	22.41
121.34	Mechanic Shop	3120	11	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.75	2,333.8	$333.73	11	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.64	1990.56	$284.65	$100.00	$1,100.00	0.11	343.2	$49.08	22.41
121.34	1 Bay Garage	3120	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.27	848.6	$121.36	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	723.84	$103.51	$100.00	$400.00	0.04	124.8	$17.85	22.41
746		3120	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3,681.6	$526.47	4	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Lo Bay	168	0.67	2096.64	$299.82	$220.00	$880.00	0.51	1584.96	$226.65	3.88
128.46		3120	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.14	443.0	$63.35	1	0	Remove	0	0.00	0	$0.00	$100.00	$100.00	0.00	0	$0.00	0.00
121.46		3120	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Wall Mnt., Clear Acrylic Lens	68	0.07	212.2	$30.34	1	0	Remove	0	0.00	0	$0.00	$100.00	$100.00	0.00	0	$0.00	0.00
121.36	Boiler Room	1800	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	0.27	489.6	$70.01	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	417.6	$59.72	$100.00	$400.00	0.04	72	$10.30	38.85
765	Exterior	3600	6	1	400w HPS Flood	465	2.79	10,044.0	$1,436.29	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
Project Crew Building																					
746	Work Shop	3120	10	1	250w MH LoBay w/Prismatic Lens	295	2.95	9,204.0	$1,316.17	14	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Lo Bay	168	2.35	7338.24	$1,049.37	$220.00	$3,080.00	0.60	1865.76	$266.80	11.54
121.36		3120	17	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	1.16	3,606.7	$515.76	17	0	Remove	0	0.00	0	$0.00	$50.00	$850.00	0.00	0	$0.00	0.00
221.34	Storage/ Parts Area	3120	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	0.35	1,085.8	$155.26	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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141.14	Office	3120	2	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.28	886.1	$126.71	2	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	0.21	648.96	$92.80	$100.00	$200.00	0.08	237.12	$33.91	5.90
600	Garage	8760	2	1	LED Exit Sign	5	0.01	87.6	$12.53	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
731	Exterior	3600	2	1	150w HPS Wallpack	188	0.38	1,353.6	$193.56	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		178	66			19.82	63,006.8	$9,009.97	182	70			10.18	31451.3	$4,497.54		$17,050.00	3.61	11,153.3	$1,594.92	10.69

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 replacment calculations

CEG Job #: 9C09168
Project: CMC MUA – 7 Mile Administration, Warehouse & Project Crew
Address: 3959 Ocean Drive
Avalon, NJ 08202
Building SF: 11360

"7 Mile Administration, Warehouse & Project Crew"

KWH COST: $0.143

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
Admin. Building																							
242.21	Lab	3120	11	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed mnt., Prismatic Lens	104	1.14	3,569.3	$510.41	11	1	Dual Technology Occupancy Sensor	104	1.14	10%	3212.352	$459.37	$160.00	$160.00	0.00	356.928	$51.04	3.13
142.21	Insturment Room	3120	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	144	0.43	1,347.8	$192.74	3	1	Dual Technology Occupancy Sensor	144	0.43	10%	1213.056	$173.47	$160.00	$160.00	0.00	134.784	$19.27	8.30
142.21	Chemist	3120	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	144	0.29	898.6	$128.49	2	0	No Change	144	0.29	0%	898.56	$128.49	$160.00	$0.00	0.00	0	$0.00	0.00
127.21	Corridor	3200	11	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.75	2,393.6	$342.28	11	0	No Change	68	0.75	0%	2393.6	$342.28	$160.00	$0.00	0.00	0	$0.00	0.00
122.21	Reception Area	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	0	No Change	75	0.30	0%	936	$133.85	$160.00	$0.00	0.00	0	$0.00	0.00
122.21	Superintendant's Office	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	0	No Change	75	0.30	0%	936	$133.85	$160.00	$0.00	0.00	0	$0.00	0.00
122.21	Director's Office	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	0	No Change	75	0.30	0%	936	$133.85	$160.00	$0.00	0.00	0	$0.00	0.00
122.21	Meeting Room/ Sr. Operator's Office	3120	6	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.45	1,404.0	$200.77	6	1	Dual Technology Occupancy Sensor	75	0.45	10%	1263.6	$180.69	$160.00	$160.00	0.00	140.4	$20.08	7.97
122.21	MIP Room	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	0	No Change	75	0.30	0%	936	$133.85	$160.00	$0.00	0.00	0	$0.00	0.00
121.21		3120	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.14	424.3	$60.68	2	0	No Change	68	0.14	0%	424.32	$60.68	$160.00	$0.00	0.00	0	$0.00	0.00

550	Men's Restroom/ Locker Room/Mud Rm	3120	2	1	Recessed Down Light, 60w A19 Lamp	60	0.12	374.4	$53.54	2	0	No Change	60	0.12	0%	374.4	$53.54	$160.00	$0.00	0.00	0	$0.00	0.00
127.21		3120	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.41	1,273.0	$182.03	6	1	Dual Technology Occupancy Sensor	68	0.41	10%	1145.664	$163.83	$160.00	$160.00	0.00	127.296	$18.20	8.79
126.15		3120	6	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.45	1,404.0	$200.77	6	1	Dual Technology Occupancy Sensor	75	0.45	10%	1263.6	$180.69	$160.00	$160.00	0.00	140.4	$20.08	7.97
127.21	Women's Restroom/ Locker Room	3120	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.14	424.3	$60.68	2	0	No Change	68	0.14	0%	424.32	$60.68	$160.00	$0.00	0.00	0	$0.00	0.00
122.21	Lunch Room	3120	4	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	75	0.30	936.0	$133.85	4	0	No Change	75	0.30	0%	936	$133.85	$160.00	$0.00	0.00	0	$0.00	0.00
550	Janitor's Closet	650	1	1	Recessed Down Light, 60w A19 Lamp	60	0.06	39.0	$5.58	1	0	No Change	60	0.06	0%	39	$5.58	$160.00	$0.00	0.00	0	$0.00	0.00
Garage and Work Shops																							
121.36	Electrical Shop	3120	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	0.54	1,697.3	$242.71	8	1	Dual Technology Occupancy Sensor	68	0.54	10%	1527.552	$218.44	$160.00	$160.00	0.00	169.728	$24.27	6.59
127.21	Corridor	3200	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	68	0.34	1,088.0	$155.58	5	0	No Change	68	0.34	0%	1088	$155.58	$160.00	$0.00	0.00	0	$0.00	0.00
121.34	Workshop/ Garage	3120	15	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	1.02	3,182.4	$455.08	15	1	Dual Technology Occupancy Sensor	68	1.02	10%	2864.16	$409.57	$160.00	$160.00	0.00	318.24	$45.51	3.52
746		3120	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3,681.6	$526.47	4	0	No Change	295	1.18	0%	3681.6	$526.47	$160.00	$0.00	0.00	0	$0.00	0.00
121.34	Compressor/ Vac Room	3120	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.27	848.6	$121.36	4	0	No Change	68	0.27	0%	848.64	$121.36	$160.00	$0.00	0.00	0	$0.00	0.00
121.34	Mechanic Shop	3120	11	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.75	2,333.8	$333.73	11	1	Dual Technology Occupancy Sensor	68	0.75	10%	2100.384	$300.35	$160.00	$160.00	0.00	233.376	$33.37	4.79

121.34	1 Bay Garage	3120	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	68	0.27	848.6	$121.36	4	0	No Change	68	0.27	0%	848.64	$121.36	$160.00	$0.00	0.00	0	$0.00	0.00
746		3120	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3,681.6	$526.47	4	0	No Change	295	1.18	0%	3681.6	$526.47	$160.00	$0.00	0.00	0	$0.00	0.00
128.46		3120	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.14	443.0	$63.35	1	0	No Change	142	0.14	0%	443.04	$63.35	$160.00	$0.00	0.00	0	$0.00	0.00
121.46		3120	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Wall Mnt., Clear Acrylic Lens	68	0.07	212.2	$30.34	1	0	No Change	68	0.07	0%	212.16	$30.34	$160.00	$0.00	0.00	0	$0.00	0.00
121.36	Boiler Room	1800	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	0.27	489.6	$70.01	4	0	No Change	68	0.27	0%	489.6	$70.01	$160.00	$0.00	0.00	0	$0.00	0.00
765	Exterior	3600	6	1	400w HPS Flood	465	2.79	10,044.0	$1,436.29	6	0	No Change	465	2.79	0%	10044	$1,436.29	$160.00	$0.00	0.00	0	$0.00	0.00
					Project Crew Building																		
746	Work Shop	3120	10	1	250w MH LoBay w/Prismatic Lens	295	2.95	9,204.0	$1,316.17	10	0	No Change	295	2.95	0%	9204	$1,316.17	$160.00	$0.00	0.00	0	$0.00	0.00
121.36		3120	17	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Clear Acrylic Lens	68	1.16	3,606.7	$515.76	17	0	No Change	68	1.16	0%	3606.72	$515.76	$160.00	$0.00	0.00	0	$0.00	0.00
221.34	Storage/ Parts Area	3120	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	0.35	1,085.8	$155.26	6	1	Dual Technology Occupancy Sensor	58	0.35	10%	977.184	$139.74	$160.00	$160.00	0.00	108.576	$15.53	10.31
141.14	Office	3120	2	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.28	886.1	$126.71	2	0	No Change	142	0.28	0%	886.08	$126.71	$160.00	$0.00	0.00	0	$0.00	0.00
600	Garage	8760	2	1	LED Exit Sign	5	0.01	87.6	$12.53	2	0	No Change	5	0.01	0%	87.6	$12.53	$160.00	$0.00	0.00	0	$0.00	0.00
731	Exterior	3600	2	1	150w HPS Wallpack	188	0.38	1,353.6	$193.56	2	0	No Change	188	0.38	0%	1353.6	$193.56	$160.00	$0.00	0.00	0	$0.00	0.00
	Totals		178	66			19.82	63,006.8	$9,009.97	178	9			19.824	0.9	$61,277.03			1440.00	0.0	1,729.73	$247.35	5.82

Project Name: LGEA Solar PV Project - 7 Mile Admin & Warehouse
Location: Avalon, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

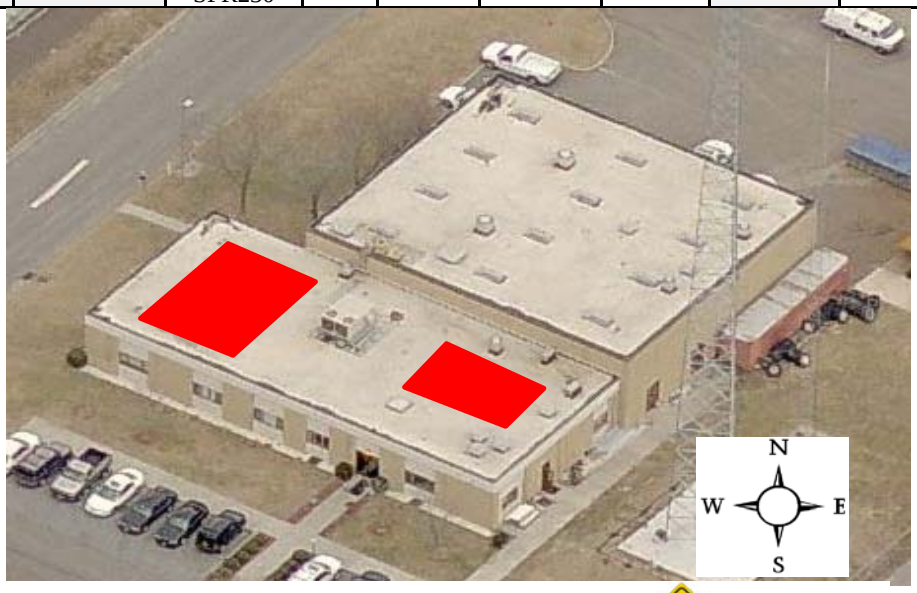
	Photovoltaic System - Direct Purchase
Total Construction Cost	$115,920
Annual kWh Production	15,735
Annual Energy Cost Reduction	$2,250
Annual SREC Revenue	$5,507
First Cost Premium	**$115,920**
Simple Payback:	**14.94** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$115,920	0	0	0	$0	(115,920)	0
1	$0	15,735	$2,250	$0	$5,507	$7,757	($108,163)
2	$0	15,656	$2,318	$0	$5,480	$7,797	($100,365)
3	$0	15,578	$2,387	$0	$5,452	$7,839	($92,526)
4	$0	15,500	$2,459	$0	$5,425	$7,884	($84,642)
5	$0	15,423	$2,533	$159	$5,398	$7,772	($76,870)
6	$0	15,346	$2,608	$158	$5,371	$7,821	($69,049)
7	$0	15,269	$2,687	$157	$5,344	$7,874	($61,176)
8	$0	15,192	$2,767	$156	$5,317	$7,928	($53,247)
9	$0	15,117	$2,850	$156	$5,291	$7,985	($45,262)
10	$0	15,041	$2,936	$155	$5,264	$8,045	($37,217)
11	$0	14,966	$3,024	$154	$5,238	$8,108	($29,109)
12	$0	14,891	$3,115	$153	$5,212	$8,173	($20,936)
13	$0	14,816	$3,208	$153	$5,186	$8,241	($12,694)
14	$0	14,742	$3,304	$152	$5,160	$8,312	($4,382)
15	$0	14,669	$3,403	$151	$5,134	$8,386	$4,004
16	$0	14,595	$3,506	$150	$5,108	$8,464	$12,468
17	$0	14,522	$3,611	$150	$5,083	$8,544	$21,012
18	$0	14,450	$3,719	$149	$5,057	$8,628	$29,640
19	$0	14,377	$3,831	$148	$5,032	$8,715	$38,354
20	$0	14,306	$3,946	$147	$5,007	$8,805	$47,159
21	$1	14,234	$4,064	$147	$4,982	$8,899	$56,059
22	$2	14,163	$4,186	$146	$4,957	$8,997	$65,056
23	$3	14,092	$4,311	$145	$4,932	$9,099	$74,154
24	$4	14,022	$4,441	$144	$4,908	$9,204	$83,358
25	$5	13,951	$4,574	$144	$4,883	$9,313	$92,671
	Totals:	370,653	$82,037	$3,174	$129,729	$208,591	($271,703)
				Net Present Value (NPV)		**$92,696**	
				Internal Rate of Return (IRR)		**5.0%**	

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
7 Mile Admin & Warehouse	900	Sunpower SPR230	56	14.7	823	12.88	15,735	1,848	15.64



PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	12.9 kW
DC to AC Derate Factor:	0.810
AC Rating:	10.4 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	0.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.58	837	1.05
2	3.33	988	1.24
3	4.31	1380	1.74
4	5.20	1572	1.98
5	5.85	1795	2.26
6	6.14	1747	2.20
7	6.06	1765	2.22
8	5.54	1622	2.04
9	4.85	1395	1.76
10	3.76	1139	1.44
11	2.65	798	1.01
12	2.23	699	0.88
Year	4.38	15735	19.83

.= Proposed PV Layout

Notes:

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