



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

**PREPARED FOR: CAPE MAY COUNTY
MUNICIPAL UTILITY AUTHORITY
SEVEN MILE MIDDLE REGIONAL
WASTEWATER FACILITY**

**STONE HARBOR MANOR PUMP STATION
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I. EXECUTIVE SUMMARY

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

Cape May County Municipal Utility Authority
 - 7 Mile Middle Regional Waste Water Treatment Facility
 - Stone Harbor Manor Pump Station
 1111 Stone Harbor Boulevard
 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	\$ 3,991
<hr/>	
Total	\$ 3,991

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

**Table 1
Financial Summary Table**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	General Lighting Upgrade	\$690	\$18	39.3	-61.8%
ECM #2	Pump Replacement	\$2,640	\$595	4.4	305.7%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	2.4 KW Wind Turbine	\$33,682	\$323	104.3	-80.8%
Notes: A. Cost takes into consideration applicable NJ Smart Start TM incentives. B. Savings takes into consideration applicable maintenance savings. C. ECM #1 based on differential cost between standard and premium efficiency motors to highlight the advantage of a premium efficiency motor.					

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)
ECM #1	General Lighting Upgrade	0.1	62.4
ECM #2	Pump Replacement	4.0	3,520.0
RENEWABLE ENERGY MEASURES (REM's)			
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION	
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)
REM #1	2.4 KW Wind Turbine	2.4	1,974.0

Concord Engineering Group (CEG) typically recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. This facility had two potential ECMs. Both of the ECMs had a very long simple payback period in excess of 30 years. It is recommended for both the lighting and the wet well pumps that they be maintained and repaired as needed.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. 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. Maintain all weather stripping on entrance doors.
2. Clean all light fixtures to maximize light output.

Renewable Energy Measures (REMs) were also reviewed for implementation at the CMC MUA– 7 Mile Stone Harbor Manor Pump Station. CEG analyzed a roof mounted solar array to house a substantial PV system. The available roof space is very limited to the extent that a PV panel is not feasible. The ground area at the site was looked at for possible use for a PV system. Again, the very limited site area does not allow placement of a PV panel making a solar photovoltaic system is not feasible for the CMC MUA Stone Harbor Manor Pump Station.

Overall, the CMC MUA– 7 Mile Stone Harbor Manor Pump Station appears to be operating at a below average to average efficiency level compared to other Energy Star buildings in the “other” category in the region. The 40 hp pump motors have a large power demand and the pump station has a very small building area. These two factors are the reasons for the higher than average power usage as noted in the EUI number and the appearance of efficiency less than average. There are no energy conservation measures that can be recommended for implemented at the 7 Mile Stone Harbor Manor Pump Station. Therefore, the pump station is running as efficiently as it can.

II. INTRODUCTION

The comprehensive energy audit covers the 279 square foot *Pump Station*, which includes the following spaces: Generator room, dry well and wet well.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

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

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric provides electricity to the facility under their Monthly 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.

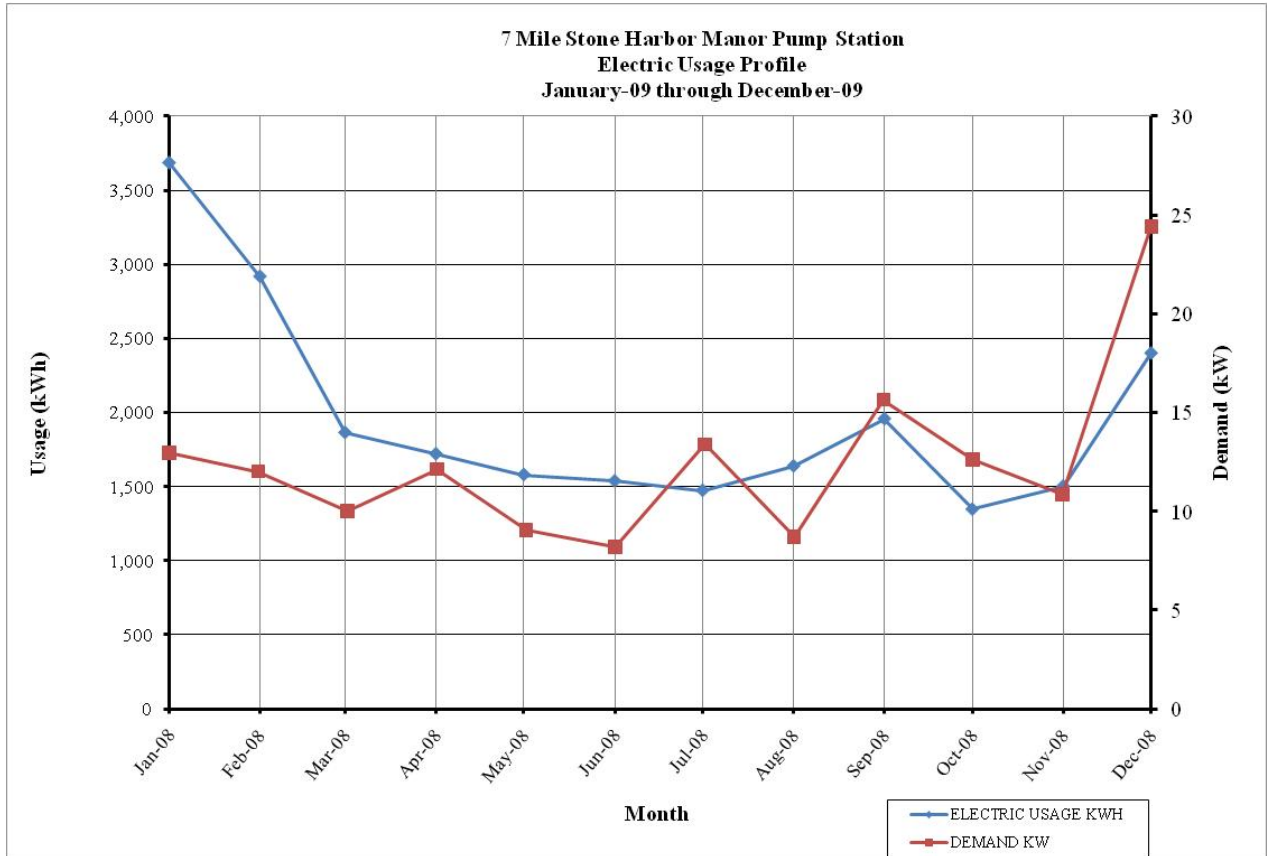
The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

<u>Description</u>	<u>Average</u>
Electricity	16.9¢ / kWh

**Table 3
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric			
Rate: Monthly General			
Meter No:		6363604	
Customer ID No: 0983 9919 9995			
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-08	3,685	13.0	\$570
Feb-08	2,918	12.0	\$460
Mar-08	1,864	10.0	\$305
Apr-08	1,720	12.1	\$278
May-08	1,580	9.1	\$263
Jun-08	1,537	8.2	\$298
Jul-08	1,473	13.4	\$294
Aug-08	1,638	8.7	\$326
Sep-08	1,957	15.6	\$289
Oct-08	1,346	12.6	\$240
Nov-08	1,502	10.9	\$258
Dec-08	2,400	24.4	\$410
Totals	23,620	24.4 Max	\$3,991
AVERAGE DEMAND		12.5 KW average	
AVERAGE RATE		\$0.169 \$/kWh	

**Figure 1
Electricity Usage Profile**



B. Energy Use Index (EUI)

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

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

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

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

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

**Table 4
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	23620.0			80,639	3.340	269,333
TOTAL				80,639		269,333
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	279 SQUARE FEET					
BUILDING SITE EUI	289.03 kBtu/SF/YR					
BUILDING SOURCE EUI	965.35 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 (Sewage Pumping Station):
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 278% higher than the baseline building site data. Normalizing the baseline site data for 100% electric, baseline site energy is 185.7 kBtu/SF and as compared to the national average the energy usage is approximately 156% 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 5
 ENERGY STAR Performance Rating**

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
7 Mile Stone Harbor Pump Station	N/A	N/A

The 7 Mile Stone Harbor Pump Station 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 279 SF Pumping Station is a one story facility comprised of a generator room, a drywell and next to the building is a wet well. The pump station operates 24/7 but is occupied ten (10) hours a week. Exterior walls are brick construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. There are no windows at this facility. The parapet and overhang is a plywood and fiberglass shingle roof system. The main portion of the roof is constructed of elastic sheet roofing on ½” fiberboard insulation on tapered EPS insulation on a concrete slab. The amount of insulation below the roofing is unknown. The building was built in 1987 with no additions since the original construction.

Heating System

The building is heated by two electric propeller unit heaters with fractional horse power fan motors. The heaters are twenty-three (23) years old, are three (3) years past their ASHRAE expected useful service life and are in fair condition. The unit heaters should be maintained or replaced on an as needed basis as a maintenance project.

Exhaust System

Air is exhausted from the dry well through an exhaust fan with a fractional horse power fan motor.

HVAC System Controls

The unit heaters within the facility are controlled via local thermostat. The exhaust fan runs when manually switched in the winter. In the summer, the fan is switched automatically via the thermostat. There is no air conditioning at this facility.

Domestic Hot Water

There is no domestic water heater at this facility.

Process Equipment

There are two (2) 40 hp submersible sewage pumps located in the wet well. These pumps have 460 volt/ 3-phase motors, are twenty-three (23) years old, in fair to poor condition, and are at the end of their ASHRAE expected useful service life. These pumps have approximately 876 run hours a year placing the lifetime usage at approximately 20,150 hours. The expected life is approximated:

$$10 \text{ years} \times 2,000 \text{ hours/year} = 20,000 \text{ hours}$$

These pumps can be replaced with pumps having a more efficient motor. Refer to ECM #2.

Lighting

The lighting in the Seven Mile Stone Harbor Manor Pump Station is fluorescent fixtures with T-12 lamps and magnetic ballasts.

Emergency Generator

The Katolight emergency generator is rated at 150 KW, 187.5 KVA. The generator has a 1.5 KW block heater that cycles to warm the engine block. The generator is not used much. The generator is twenty three (23) years old, in fair condition and is three (3) years past the ASHRAE expected useful service life of reciprocating engines. The generator can be maintained / replaced as needed as a maintenance project. The engine block heater should be maintained as the manufacturer does not offer an alternative as to the fuel source for heating the engine block.

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 Stone Harbor Manor Pump Station is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts.

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.

Energy Savings Calculations:

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

NJ Smart Start[®] Program Incentives are calculated as follows:

From the **Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 w/electronic ballast (new fixture 1-2 lamp) = \$25 per fixture

New Fixture:

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\# \text{ of } 1-2 \text{ lamp fixtures} \times \$ 25) + (\# \text{ of } 3-4 \text{ lamp fixtures} \times \$ 30)$$

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (6 \times \$ 25) = \underline{\$150}$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{repackment } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (1 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$7$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$840
NJ Smart Start Equipment Incentive (\$):	\$150
Net Installation Cost (\$):	\$690
Maintenance Savings (\$/Yr):	\$7
Energy Savings (\$/Yr):	\$11
Total Yearly Savings (\$/Yr):	\$18
Estimated ECM Lifetime (Yr):	15
Simple Payback	39.3
Simple Lifetime ROI	-61.8%
Simple Lifetime Maintenance Savings	\$105
Simple Lifetime Savings	\$263
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	(\$480.49)

ECM #2: Install NEMA Premium Efficient Pump Motor

Description:

Replacing old pump motors with new efficient motor is a simple change that can provide substantial savings.

Existing electric motors equal to or greater than one horsepower ranged from 78 to 93% efficient. The improved efficiency of the NEMA premium efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace all motors equal to or greater than 1 HP with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. Using MotorMaster+, Version 4, the energy & cost savings were calculated for the fan/pump motors in this facility that are greater than or equal to 1 HP.

Energy Savings Calculations:

Existing: A 40 HP wet well ejector pump motor with the following characteristics:

Existing Motor Efficiency = 80.5%
 Annual Hours of Operations = 876 (Average)
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = \$0.169 / kWh

Existing 40HP Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 40 \times 0.75 \times 876 \times 0.169] \div 0.805 = \$4116 / \text{Year}$

New NEMA Premium Motor Efficiency = 94.1%

New NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 40 \times 0.75 \times 876 \times 0.169\} \div 0.941 = \$3521 / \text{Year}$

Savings = \$4116 - \$3521 = \$595 / Year

Installed Cost of a 40 HP NEMA Premium® Efficiency Motor = \$6,600

Installed Cost of a 40 HP same (standard) efficiency motor = \$5,100

The SmartStart Building® incentive of 40hp is \$180/TEFC motor.

The cost premium of a premium efficient motor is \$6,600 - \$5,100 = \$1,500

Less the SmartStart Building® incentive \$1,500 - \$180 = \$1,320

Simple Payback for efficiency Premium = \$1,320 / \$595 = 2.2 Years

kWh saved = \$595 / \$0.169/kWh = 3,521 kWh (per motor)

kW saved = 3,521 kWh / 876 hrs./yr. = 4.0 kW (per motor)

The following table outlines the motor replacements efficiencies and savings for this facility:

NEMA Premium Efficient Motor Replacement						
Equipment Tag	Motor HP	Existing Efficiency	NEMA Premium Efficiency	kW Savings	kWh Savings	Cost Savings
Wetwell	40	80.5%	94.1%	4.02	3,520	\$595
Total Savings				4.0	3,520	\$595

The motors that are past their useful life and should be replaced are listed in the table above. Considering replacement cost alone would not provide an economical benefit. When considering efficiency upgrades, a comparison of cost difference between the standard efficiency and the premium efficiency motor should be evaluated. The following table outlines the recommended motor replacement plan for this facility based on the cost premium of the efficiency upgrade:

MOTOR REPLACEMENT PLAN							
Motor HP	QTY	ENCL. TYPE	No. of POLES	INSTALLED Cost **	TOTAL COST	TOTAL SAVINGS	Simple Payback
40	2	XPFC	4-Pole	\$1,320	\$2,640	\$1,189.69	2.2
Totals:					\$2,640	\$1,190	2.2

** Additional cost of a Premium Efficient motor (compared to existing efficiency) less the applicable rebate

This ECM utilizes differential cost in order to show the owner the advantage of replacing an aged, standard efficient motor with a new, premium efficient motor. The owner should review this option prior to rebuilding or replacing all malfunctioning motors.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,000
NJ Smart Start Equipment Incentive (\$):	\$360
Net Installation Cost (\$):	\$2,640
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$595
Total Yearly Savings (\$/Yr):	\$595
Estimated ECM Lifetime (Yr):	18
Simple Payback	4.4
Simple Lifetime ROI	305.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$10,710
Internal Rate of Return (IRR)	22%
Net Present Value (NPV)	\$5,543.34

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 CMC MUA Stone Harbor Manor Pump Station utilizing renewable technologies and concluded that there is not a potential for solar energy or wind energy at the CMC MUA Stone Harbor Manor Pump Station. The following are the conclusions that have been drawn:

- *Solar Energy Analysis:* The available roof space for the CMC MUA Stone Harbor Manor Pump Station is very limited and will not produce a great amount of kW to even come close to the building average demand of 12.5 kW. Based on CEG's calculations, the available roof area is approximately 15 SF which results in an array capable of producing 0.23 kW. The minimal production of this size array is not worth the investment cost for the Owner. Therefore, a solar photovoltaic system is not recommended for the CMC MUA Stone Harbor Manor Pump Station.
- *Wind Energy Analysis:* Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility; with an average annual wind speed of 5.81 meters per second at 30 meter height, it is sufficient enough to reach the cut in speed for most commercial sized wind turbines of 3.5 meters per second. The installation of 2.4 kilowatt Skystream Wind Turbine with a 15 meter hub height at the facility would be able to produce approximately 1,974 kWh for just one turbine. Although the power generation from one turbine is substantial, the turbine installation itself has an expected payback of over 30 years, being priced at approximately \$33,000 installed. Based on our calculations the following is the payback period:

Table 8
Financial Summary – Wind Turbine System

REM #2 - WINDTURBINES	
Installation Cost (\$):	\$40,000
NJ Smart Start Equipment Incentive (\$):	\$6,318
Net Installation Cost (\$):	\$33,682
Maintenance Savings (\$):	(\$60)
REC Revenue (\$/Yr):	\$49
Energy Savings (\$/Yr):	\$334
Total Yearly Savings (\$/Yr):	\$323
Estimated ECM Lifetime (Yr):	20
Simple Payback	104.26
Lifetime Energy Savings	\$6,674

For further wind analysis refer to the **Wind Analysis Calculation Appendix**.

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 Profile included within this report to reference the electricity usage load profile.

Electricity:

The Electric Usage Profile shows increased usage in the winter months between December and March. The usage is fairly steady for the remainder of the year. This profile is somewhat atypical since the vacation season and high tourist volume does not coincide with the highest usage months. The winter season represents the highest consumption. The baseline electric use for the facility is a result of the pumps housed in the building. This is the primary function of the facility; however increase electric load in the winter can be attributed to the electric resistance heat in the heating season. The electric demand is at its peak in the month of December. The higher demand for pumping energy in the summer is counter balanced by the higher demand for electric heat in the winter; therefore the overall demand profile for the facility is fairly steady except for months that experience simultaneous pump and electric heat use. The facility pumps run based on water treatment needs and as a result the full load operation is extremely short. This results in a very low load factor rating of approximately 11%. 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 11% 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.

Tariff Analysis:

Electricity:

This facility receives electrical service through Atlantic City Electric on their Monthly General Service (MGS-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 usage), 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 measurement of the highest demand set in any given month. The usage charges are based on a stepped rate structure. The demand charges for this rate structure are typically less than the usage charges on a typical basis making this rate structure less dependent on demand versus usage. However because of the extremely low load factor and high demand relative to the overall usage, the demand charges play a more significant role in the overall electric costs. The resulting cost for electricity is increased due to high fluctuations in electric draw (high demand).

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 is \$0.1276/kWh based on the utility information provided (this is the average “price to compare” if the client intends to shop for energy). Note this is the supply charges price to compare and therefore does not take into account the excessive demand (delivery) charges for the facility. The primary method for reducing electric delivery charges is by flattening the facility’s load provide and increase load factor. Regarding supply energy, these 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. 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. The County should ask the utility representative about alternative billing options, such as consolidated billing when utilizing the service of a Third Party Supplier. This could be performed with the aid of an “energy advisor”.

X. INSTALLATION FUNDING OPTIONS

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

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

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

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

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

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

XI. ADDITIONAL RECOMMENDATIONS

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

- A. Maintain all weather stripping on windows and doors.
- B. Clean all light fixtures to maximize light output.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Stone Harbor Manor Pumping Station

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	General Lighting Upgrade	\$840	\$0	\$150	\$690	\$11	\$7	\$18	15	\$263	\$105	-61.8%	39.3	-10.17%	(\$480.49)
ECM #2	Pump Replacement	\$3,000	\$0	\$360	\$2,640	\$595	\$0	\$595	18	\$10,710	\$0	305.7%	4.4	21.90%	\$5,543.34
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	2.4 KW Wind Turbine	\$40,000	\$0	\$6,318	\$33,682	\$334	(\$11)	\$323	20	\$6,460	-\$220	-80.8%	104.3	-12.31%	(\$28,876.58)

- Notes: 1) The variable C_n 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 C_n 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 STONE HARBOR PS

Building ID: 2261183
For 12-month Period Ending: December 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: March 30, 2010

Facility

7 MILE STONE HARBOR PS
1111 Stone Harbor Boulevard
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): 279

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	80,591
Natural Gas - (kBtu) ⁴	0
Total Energy (kBtu)	80,591

Energy Intensity⁵

Site (kBtu/ft ² /yr)	289
Source (kBtu/ft ² /yr)	965

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	12
---	----

Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	353%
Building Type	Other

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.

NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Building Name	7 MILE STONE HARBOR PS	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Other	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	1111 Stone Harbor Boulevard, Cape May Court House, NJ 08210	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		<input type="checkbox"/>
7 MILE STONE HARBOR PS (Other)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	279 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		<input type="checkbox"/>
Number of PCs	0(Optional)	Is this the number of personal computers in the space?		<input type="checkbox"/>
Weekly operating hours	10Hours(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.		<input type="checkbox"/>
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.		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	2,400.00
11/01/2009	11/30/2009	1,502.00
10/01/2009	10/31/2009	1,346.00
09/01/2009	09/30/2009	1,957.00
08/01/2009	08/31/2009	1,638.00
07/01/2009	07/31/2009	1,473.00
06/01/2009	06/30/2009	1,537.00
05/01/2009	05/31/2009	1,580.00
04/01/2009	04/30/2009	1,720.00
03/01/2009	03/31/2009	1,864.00
02/01/2009	02/28/2009	2,918.00
01/01/2009	01/31/2009	3,685.00
Electric Consumption (kWh (thousand Watt-hours))		23,620.00
Electric Consumption (kBtu (thousand Btu))		80,591.44
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		80,591.44
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	<input type="checkbox"/>

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility

7 MILE STONE HARBOR PS
1111 Stone Harbor Boulevard
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 STONE HARBOR PS	
Gross Floor Area Excluding Parking: (ft ²)	279
Year Built	1987
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

7 MILE STONE HARBOR PS	
Space Type	Other - Other
Gross Floor Area(ft ²)	279
Number of PCs ^o	0
Weekly operating hours ^o	10
Workers on Main Shift ^o	19

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	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)	289	289	0	N/A	104
Source (kBtu/ft ²)	965	965	0	N/A	213
Energy Cost					
\$/year	\$ 3,991.00	\$ 3,991.00	N/A	N/A	\$ 1,436.90
\$/ft ² /year	\$ 14.30	\$ 14.30	N/A	N/A	\$ 5.15
Greenhouse Gas Emissions					
MtCO ₂ e/year	12	12	0	N/A	4
kgCO ₂ e/ft ² /year	44	44	0	N/A	16

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

Notes:

o - This attribute is optional.

d - A default value has been supplied by Portfolio Manager.

MAJOR EQUIPMENT LIST

Concord Engineering Group

03 - 7 MILE STONE HARBOR PS

Pumps												
Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Volts	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Wetwell	Wetwell	-	2	-	-	40	480/3	-	1987	10	(-13)	Not Accessible

Unit Heaters and Cabinet Unit Heaters															
Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Heating Type	Heating Capacity (KW)	CFM	RPM / HP	GPM	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Pump Station	Drywell / Generator Room	Chromalox	2	LUH-D-12-43-32-00	669513-01-01	Electric	12.5	-	1800	-	1987	13	(-10)	

Emergency Generator													
Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	KW	KVA	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Generator room	Pump Station	Kato Light	1	D150FRH4	AD201167SML	150	187.5	277/480/3	1987	23	(-2)	

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 Stone Harbor Manor Pump Station

Address: 1111 Stone Harbor Boulevard

Cape May Court House, NJ 08210

Building SF: 279

"CMC MUA- 7 Mile Stone Harbor Manor Pump Station"

KWH COST: \$0.169

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
121.14	Generator Room	520	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.31	162.2	\$27.42	4	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	58	0.23	120.64	\$20.39	\$140.00	\$560.00	0.08	41.6	\$7.03	79.65
121.14	Dry Well	520	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	81.1	\$13.71	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	58	0.12	60.32	\$10.19	\$140.00	\$280.00	0.04	20.8	\$3.52	79.65
Totals			6	4			0.47	243.4	\$41.13	6	4			0.348	180.96	\$30.58		\$840.00	0.12	62.4	\$10.55	79.65

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

REM #2 - WINDTURBINES	
Installation Cost (\$):	\$40,000
NJ Smart Start Equipment Incentive (\$):	\$6,318
Net Installation Cost (\$):	\$33,682
Maintenance Savings (\$):	(\$60)
REC Revenue (\$/Yr):	\$49
Energy Savings (\$/Yr):	\$334
Total Yearly Savings (\$/Yr):	\$323
Estimated ECM Lifetime (Yr):	20
Simple Payback	104.26
Lifetime Energy Savings	\$6,674

AVERAGE WIND SPEED IS TOO LOW

Location/Building	Average Wind Speed, m/s	Turbine #1 Generation, kWh	Electric Cost Offset	Annual Maint Cost	Wind REC Revenue	Total Annual Savings	Project Cost	Incentive	Net Project Cost	Simple Payback
7 Mile- Stone Harbor Manor Pump Station	5.249	1,974	\$334	\$60	\$49	\$323	\$40,000	\$6,318	\$33,682	104.26

Wind REC	\$0.0250									
Electric Cost	\$0.1690									
Wind Shear Exponent										
alpha	0.150									
Wind Data Height (m)	30									
Hub height (m)	15	50								0.3048 m per ft
Avg. Wind Speed	5.810	m/s								
Avg. Speed Adjust.	5.249	m/s								
Hours per Year	8,760									
Turbine Availability	95%									
AVERAGE WIND SPEED IS TOO LOW	8,322									
Electrical Losses	5%									

Wind Systems

Production Rebate Amount

Feasibility Study 50% of project costs up to \$50,000

1-16,000	\$3.20 per kWh	1,974	\$6,318.38
16,000-1,000,000	\$0.50 per kWh	0	\$0.00
			\$6,318.38

Incentive

POWER CURVE OF TURBINE BEING PROPOSED TO COMPUTER kW_e RATING BASED ON WIND SPEED

Power Curve Data	
Vm (m/s)	Power (kW _e)
0.00	0.00
3.50	0.08
5.00	0.20
6.00	0.40
7.50	0.80
10.00	2.00
12.50	2.40
15.00	2.40
18.50	2.00
23.00	2.00
25.00	1.80

Avg Speed
Power Rating

0.24974952

**Northwind NW100 - 100 kW Turbine
- 37 m Hub Height**

Power Curve Data			
Vm (m/s)	Power (kWe)		
1.00	(0.50)		
1.50	(0.55)		
2.00	(0.60)		
2.50	(0.65)		
3.00	(0.70)		
3.50	1.50		
4.00	3.70		
4.50	7.10		
5.00	10.50		
5.50	14.75		
6.00	19.00		
AVERAGE	24.20		
7.00	29.40		
7.50	35.20		
8.00	41.00		
8.50	47.65		
9.00	54.30		
9.50	60.55		
10.00	66.80		
10.50	72.25		
11.00	77.70		
11.50	82.05		
12.00	86.40		
12.50	89.60		
13.00	92.80		
13.50	95.05		
14.00	97.30		
14.50	98.65		
15.00	100.00		
15.50	100.40		
16.00	100.80		
16.50	100.70		
17.00	100.60		
17.50	100.20		
18.00	99.80		
18.50	99.60		
19.00	99.40		
19.50	99.00		
20.00	98.60		
20.50	98.20		
21.00	97.80		
21.50	97.55		
22.00	97.30		
22.50	97.30	24.00	98.00
23.00	97.30	24.50	98.85
23.50	97.65	25.00	99.70

**SkyStream - 2.4 kW -
30 ft Hub Height**

Power Curve Data	
Vm (m/s)	Power (kWe)
0.00	0.00
3.50	0.08
5.00	0.20
6.00	0.40
7.50	0.80
10.00	2.00
12.50	2.40
15.00	2.40
18.50	2.00
23.00	2.00
25.00	1.80

**Gale Vertical Axis
Turbine**

Power Curve Data	
Vm (m/s)	Power (kWe)
0.00	0.00
3.00	0.15
4.00	0.25
5.00	0.35
6.00	0.50
7.00	0.75
8.00	1.10
9.00	1.55
10.00	2.30
11.00	3.10
12.00	4.00
13.00	4.30
14.00	4.25
15.00	4.20
16.00	4.20
17.00	4.20
18.00	4.20
19.00	4.20
20.00	4.20