ENERGY AUDIT – FINAL REPORT

ACMUA
HORACE BRYANT HIGH LIFT PUMPING STATION

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CEG PROJECT NO. 9C09085

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I. EXECUTIVE SUMMARY

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

Atlantic City Municipal Utilities Authority
P.O. box 117
401 North Virginia Avenue
Atlantic City, NJ 08404-017

Municipal Contact Person: Neil Goldfine
Facility Contact Person: Claude Smith

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	$ 388,887
Natural Gas	$ 0
Total	$ 388,887

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' 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	Lighting Upgrade - General	$5,101	$596	8.6	65.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Photovoltaic System	$115,920	$9,909	11.7	-38.0%

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

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

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade - General	2.0	3925.0	N/A
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Photovoltaic System	12.9	21,100	N/A

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 - General

The largest energy user at this facility is the process pumps. CEG notes that these pumps have recently been retrofitted with variable frequency drives, with efficient motors to match the drives. As such, opportunities for an ECM regarding pump efficiency are not available.

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.

II. INTRODUCTION

The comprehensive energy audit covers the High Lift Pumping Station building. The building is approximately 5000 square feet and includes the following spaces: Pump room, Chlorine room, Electric room, Ammonia room, Fluoride room, Control room and an Employee Break and Restroom area.

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 (ACE) 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 (SJG) provides natural gas to the facility under the Basic General Supply Service (GSGH) 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

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

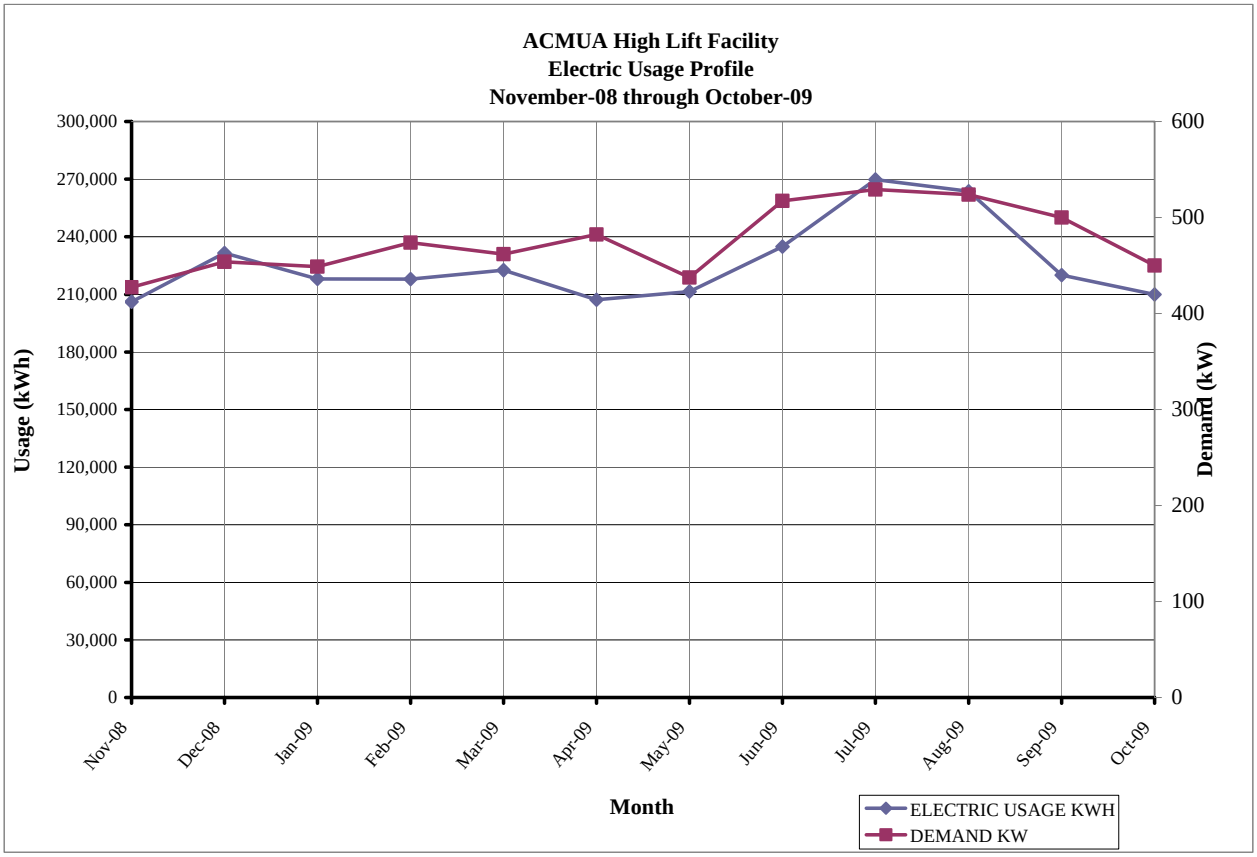
Utility Provider: Atlantic City Electric
Rate: Annual General
Meter No: 0519 7749 9998
Customer ID No:
Third Party Utility
TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Nov-08	206,114	427.3	$25,091
Dec-08	231,511	454.0	$28,227
Jan-09	218,005	448.9	$26,584
Feb-09	217,919	473.8	$26,585
Mar-09	222,575	461.9	$53,774
Apr-09	207,146	482.4	$25,425
May-09	211,436	437.4	$25,900
Jun-09	234,812	517.3	$34,644
Jul-09	269,830	529.2	$40,000
Aug-09	263,635	523.8	$39,018
Sep-09 estimate	220,000	500.0	$32,560
Oct-09 estimate	210,000	450.0	$31,080
Totals	**2,712,983**	**529.2 Max**	**$388,887**

AVERAGE DEMAND 475.5 KW average

AVERAGE RATE $0.143 $/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:

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

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

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	2,712,983			9,262,124	3.340	30,935,494
NATURAL GAS		0.0		0	1.047	0
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				9,262,124		30,935,494
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		5,000	SQUARE FEET			
BUILDING SITE EUI		*1,852.42*	kBtu/SF/YR			
BUILDING SOURCE EUI		*6,187.10*	kBtu/SF/YR			

This facility exists to house utility pumping equipment. An EUI comparison to similar buildings is not possible as the majority of the total energy used is for the pumping process. The EUI results for this facility are “off the charts” and do not compare with typical ORNL building types.

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: ACMUAcity
Password: lgeaceg09019

Security Question: What city were you born in?
Security Answer: "Atlantic City"

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**
ACMUA Horace Bryant High Lift Pumping Station	N/A	N/A

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

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "Other" category. The "Other" category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Star Performance Rating cannot be calculated if more then 10% of a building is classified as "Other", or if the building is an office with less than 5,000 square feet of floor space.

Therefore, an Energy Star Performance Rating could not be calculated for this facility. Despite this, the Portfolio Manager also calculates the building Energy Use Intensity (EUI).

The EUI is also an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the municipality can strive to meet. CEG recommends that the ACMUA keep their Portfolio Manager account up to date to monitor the performance of the building.

V. FACILITY DESCRIPTION

The approximately 5000 square foot building serves as the main pumping station for Atlantic City Water Utility. It is a two story masonry structure comprised of a Pump room, Chlorine room, Electric room, Ammonia room, and Fluoride room on the first floor, and a Control room and an Employee Break / Restroom area on the second floor. Below the building is a lower level which includes two Wet Wells and a piping area where the main discharge pipe exits the building. The facility operates are 24 hours per day and does not shut down.

Exterior walls are brick construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The few 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 vinyl frames. The roof is flat. The amount of insulation below the roofing is unknown. The building was built in 1985 with no additions since the original construction.

Process Equipment

Water leaving this facility is ready for distribution to the City's potable water supply. The maximum capacity of the plant is 22 million gallons per day. The pumping plant consists of seven vertical well pumps. Four pumps are electric motor driven, two 350 HP, two 200 HP motors, each with variable speed drives (VFD). The VFD's were installed within the last 6 months. Efficiencies of these pumps with drives are already maximized, minimizing opportunities for ECM's.

The other three pumps are for emergency use only, with each direct coupled to an internal combustion engine. They are rarely needed, but operated 1 hour per week to exercise and test their capabilities.

HVAC Systems

The building's heating and cooling fuel source is electric.

The main pump room does not require mechanical heating or cooling equipment. Reportedly, temperatures are acceptable without mechanical heating or cooling systems. This is likely due to continuous operations of large electric motors (heat for winter) and continuous flow of water through the open water wells (cooing for summer). A 10,000 cfm 100% outdoor air make-up air unit is operated only when the back-up engine driven pumps are operated. Two of the four rooftop exhaust fans operate in unison with the make-up air unit. The other two rooftop exhaust fans a re thermostatically controlled for summer ventilation. Reportedly, this mechanical ventilation system is not used as the space is ventilated in the summer by manually propping open the wall lovers.

The main Electric room is provided with a 3 ton Sanyo mini split system to provide summer cooling. The electrical switchgear dissipated enough to maintain temperature in the winter.

The Chlorine room is provided with exhaust fans and two electric unit heaters. One fan is for general ventilation (600 cfm) and the other serves as an emergency ventilation fan (7200 cfm). Wall louvers with motor operated dampers operate in unison with the fans.

A 2 ton rooftop unit exists to provide heating and cooling for the fluoride and ammonia rooms, however this system is not utilized. Heating and cooling is not needed in these spaces. Exhaust fan and wall intake louvers are provided for ventilation when required.

The 2nd floor, which includes the control room, is provided with a 5 ton capacity rooftop heat pump unit to provide heating and cooling. The unit is equipped with an auxiliary electric resistance heater for colder months as is typical for air-to-air heat pumps in northern climates. This unit was replaced last year and is in excellent condition. The unit is thermostatically controlled. A 2500 watt electric strip baseboard heater exists in the locker area. A 1500 watt electric wall heater provides heat for the restroom.

Domestic Hot Water

Domestic hot water for the restrooms and office lounge is provided by an electric hot water heater located in the pump room.

Lighting

Several fixture types are used to light the interior of the building. Typical lighting throughout the building uses primarily fluorescent tube fixtures with T-12 lamps and magnetic ballasts. The generator room is lit by metal halide fixtures, and a few areas use compact fluorescent lamps. Standard switching is utilized and there are no other types of lighting controls present.

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.

VI. ENERGY CONSERVATION MEASURES

The largest energy user at this facility is the process pumps. CEG notes that these pumps have recently been retrofitted with variable frequency drives, with efficient motors to match the drives. As such, opportunities for an ECM regarding pump efficiency are not available.

ECM #1: Lighting Upgrade - General

Description:

CEG recommends replacement of the existing T12 lamps and ballasts with the latest technology T8 lamps and high efficiency electronic ballasts. The new energy efficient T8 lamps will provide adequate lighting and will save electrical costs due to improved performance of the lamps and ballasts. Maintenance savings will be realized by reducing the 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 are approximately 20,000 burn-hours. The facility will need approximately 33% fewer lamp replacements per year.

Also, single electronic ballasts can operate up to four lamps, while the existing magnetic ballasts can only operate up to two lamps. The number of ballasts in the facility could be reduced by "tandem wiring" electronic ballasts. Single electronic ballasts may be wired to operate up to four lamps in two or more fixtures.

Lighting controls, including occupancy sensors, were evaluated but are not recommended as Energy Conservation Measures. The buildings usage, lamp burn hours and installation cost do not support the addition of lighting controls.

Existing egress fixture lamp replacement shall be excluded from this ECM so that the current egress light levels are maintained.

Energy Savings Calculations:

The Investment Grade Lighting Audit appendix outlines the proposed retrofits, costs, savings, and payback periods.

*Energy Savings = ((*Existing Lighting # of Usage Hrs/Yr*) x (*# of Fixtures*) x (*kW/Fixture*)) – ((*Proposed Lighting # of Usage Hrs/Yr*) x (*# of Fixtures*) x (*kW/Fixture*)) x *Electric Utility Rate per kWH.*

> *The # of Usage Hrs/Yr and kW/Fixture vary from room to room. Refer to Appendix for room-by-room itemization.

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: (1-2 lamp) = $10 per fixture; (3-4 lamp) = $20 per fixture.

Smart Start Incentive = *(# of 1-2 lamp fixtures x $10) + (# of 3-4 lamp fixtures x $20)*

Smart Start Incentive = *((37)*-1&*2 lamp fixtures x $10) =* *370*
= *((16)*-3&4 *lamp fixtures x $20) =* *$320*
= *$690*

Maintenance Savings are calculated as follows:

Maintenance Savings = (reduction in lamps replaced per year) x (replacement $ per lamp + Labor $ per lamp)

Maintenance Savings = (5 *lamps per year*) x ($2.00 + $5.00) = $35

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,791
NJ Smart Start Equipment Incentive ($):	$690
Net Installation Cost ($):	$5,101
Maintenance Savings ($/Yr):	$35
Energy Savings ($/Yr):	$561
Total Yearly Savings ($/Yr):	$596
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.6
Simple Lifetime ROI	65.0%
Simple Lifetime Maintenance Savings	$525
Simple Lifetime Savings	$8,415
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	$2,014.01

VII. 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 20,100 KWh annually, reducing the overall utility bill by less than 1% 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.

CEG has reviewed financing options for the owner. Two options were studied and they are as follows: Self-financed and direct purchase without finance. Self-finance was calculated with 95% of the total project cost financed at a 7% interest rate over 25 years. Direct purchase involves the local government paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Both of these calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following are the payback periods for the respective method of payment:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**INTERNAL RATE OF RETURN**
Self-Finance	11.7 Years	8.9%	16.4%
Direct Purchase	11.7 Years	8.9%	7.5%

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

The resultant Internal Rate of Return indicates that if the Owner was able to "self-finance" the solar project, the project would be slightly more beneficial to the Owner. However, if the Owner was able to work out a Power Purchase Agreement with a third-party and agree upon a decent base energy rate for kilowatt hour production, the "direct purchase" option could also, prove to be a beneficial route.

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

VIII. 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:

This facility serves as the main pumping station for the Atlantic City Water Utility. Heating and Cooling for this facility is all electric sourced.
The Electric Usage Profile demonstrates a very flat and consistent load profile throughout the year. June through September has a slight increase in consumption as it typical with a summer cooling load. However it is noted that the main pump room does not require heating and cooling. This is due in part to the motors generating heat in the winter and the constant flow of water cooling in the summer. Heating and Cooling is provided by the following: The main Electric room contains a (3) ton Sanyo split system for summer cooling. The Chlorine room contains (2) electric unit heaters. A (2) ton rooftop unit exists in the fluoride and chlorine rooms but is not used. The second floor contains a (5) ton capacity rooftop heat pump to provide heating and cooling. This unit is equipped with an auxiliary electric resistance heater for colder months. Domestic hot-water for the restrooms and the lounge is provided by an electric hot water heater. All of these units provide for a steady and elevated load profile throughout the year. This facility receives electric Delivery service and Commodity service from Atlantic City Electric on an Annual General Service rate schedule. CEG will provide alternative supply recommendations. A flatter load profile of this type, will allow for more competitive energy prices when shopping for alternative energy suppliers.

Natural Gas:

There is no natural gas service at this location.

Tariffs:

Electricity:

This facility receives electrical Delivery and Commodity service through the utility Atlantic City Electric (ACE), on an AGS (Annual General Service) rate schedule classification.

This rate is available at any point of Company's system where facilities of adequate character and capacity exist for the entire electric service requirements of any customer contracting for annual service delivered at one point and metered at or compensated to the voltage of delivery.

This Delivery service includes the following charges: Delivery Service Charges, Distribution Demand Charges, Reactive Demand Charges, Distribution Rates, Non-Utility Generation Charges, Societal Benefits Charges, Regulatory Assets Recovery Charges, Transition Bond Charges, Market Transition Charge Tax, Transmission Demand Charge, Regional Greenhouse Gas Initiative Recovery Charge, and Infrastructure Investment Surcharge.

This facility receives electrical Commodity (supply) service through Atlantic City Electric on a BGS (Basic Generation Service) rate. Since the passing and implementation of the Electricity Discount and Energy Competition Act (EDECA) in 1999, there have been many changes brought about by the deregulation of the electric industry in New Jersey. Since that time, customers in New Jersey have been able to choose their electrical supplier. Customers who do not choose to switch to a Third Party Supplier (TPS), or who leave a TPS to return to their Electric Delivery Company are supplied with Basic Generation Service. Beside the commodity itself, BGS also has the following charges: System Control Charge, CIEP Standby Fee, Transmission Enhancement Charge and Basic Generation Service Charge.

This facility can use the service of a Third Party Supplier (TPS), which is an alternative to the utility, to receive its supply. This can be arranged for electricity or natural gas. Please see recommendations in this regard, below.

Natural Gas:

There is no natural gas service at this location.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities. Good potential savings can be seen in the electric costs (there is no natural gas at this location). The average price per kWh (kilowatt hour) for this facility based on a historical 1-year weighted average fixed price from Atlantic City Electric is $.1150 / kWh (this is the “price to compare” when shopping for energy procurement alternatives). The “price to compare” is the netted cost of the energy (including other costs), that the customer will use to compare to Third Party Supply sources when shopping for alternative suppliers. For electricity this cost would not include the utility transmission and distribution charges.

Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. This facility could see improvement in its energy costs if it were to take advantage of these current market prices quickly, before energy prices increase. Based on electric supply from Atlantic City Electric and utilizing the historical consumption data provided (November 2008 through October 2009) and current electric rates, this facility could see an improvement in its electric costs of up to 17.5 % or over $60,000 annually. (Note: Savings were calculated using Average Annual Consumption and a variance to a Fixed Average One-Year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends advisory services to review these energy costs.

CEG recommends the school receive further advisement on these prices through an energy advisor. They should also consider having that energy advisor write an RFP (Request for Proposal) for energy procurement now, while energy costs are deflated.

CEG also recommends scheduling 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 ACMUA can learn more about the competitive supply process. The county can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. They should also 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 ACMUA 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”.

IX. 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.

X. 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.

E. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

ACMUA High Lift Building

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
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 #1	Lighting Upgrade - General	$5,791		$690	$5,101	$561	$35	$596	15	$8,415	$525	65.0%	8.6	8.00%	$2,014.01
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Photovoltaic System	$115,920	$0	$0	$115,920	$2,874	$7,035	$9,909	25	$71,850	$175,875	-38.0%	11.7	6.96%	$56,626.88

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 January, 2009:

Electric Chillers

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

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

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

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 - $30 per fixture, (depending on quantity)
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

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

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
ACMUA Horace Bryant High Lift Pumping Station

Building ID: 1911749
For 12-month Period Ending: July 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: October 27, 2009

Facility
ACMUA Horace Bryant High Lift Pumping Station
1151 Main Street
Pleasantville, NJ 08232

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1985
Gross Floor Area (ft²): 5,000

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	9,289,415
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	9,289,415

Energy Intensity[5]

Site (kBtu/ft²/yr)	1858
Source (kBtu/ft²/yr)	6205

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,415

Electric Distribution Utility
Atlantic City Electric Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	2813%
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.

Certifying Professional
N/A

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**

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	ACMUA Horace Bryant High Lift Pumping Station	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Other	Is this an accurate description of the space in question?		☐
Location	1151 Main Street, Pleasantville, NJ 08232	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		☐
ACMUA High Lift Pumping Station (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	5,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	5 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168 Hours(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	3 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co

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))**
06/15/2009	07/14/2009	220,000.00
05/15/2009	06/14/2009	263,635.00
04/15/2009	05/14/2009	269,830.00
03/15/2009	04/14/2009	234,812.00
02/15/2009	03/14/2009	211,436.00
01/15/2009	02/14/2009	207,146.00
12/15/2008	01/14/2009	222,575.00
11/15/2008	12/14/2008	217,919.00
10/15/2008	11/14/2008	218,005.00
09/15/2008	10/14/2008	231,511.00
08/15/2008	09/14/2008	206,114.00
Electric Consumption (kWh (thousand Watt-hours))		**2,502,983.00**
Electric Consumption (kBtu (thousand Btu))		**8,540,178.00**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**8,540,178.00**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity 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
ACMUA Horace Bryant High Lift Pumping Station
1151 Main Street
Pleasantville, NJ 08232

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

ACMUA Horace Bryant High Lift Pumping Station	
Gross Floor Area Excluding Parking: (ft^2)	5,000
Year Built	1985
For 12-month Evaluation Period Ending Date:	July 31, 2009

Facility Space Use Summary

ACMUA High Lift Pumping Station	
Space Type	Other - Other
Gross Floor Area(ft^2)	5,000
Number of PCs[o]	5
Weekly operating hours[o]	168
Workers on Main Shift[o]	3

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2009)	**Baseline** (Ending Date 07/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	1858	1858	0	N/A	104
Source (kBtu/ft^2)	6205	6205	0	N/A	213
Energy Cost					
$/year	$ 374,851.87	$ 374,851.87	N/A	N/A	$ 20,983.38
$/$ft^2$/year	$ 74.97	$ 74.97	N/A	N/A	$ 4.20
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,415	1,415	0	N/A	79
$kgCO_2e/ft^2$/year	283	283	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.

ACMUA Horace Bryant High Lift Building

EQUIPMENT LIST

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
HLP #1	GE MOTOR	5K509DT7002P	VERTICAL	350 HP	95.4	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	RECENTLY RETROFITTED WITH VARIABLE FREQUENCY DRIVE
HLP #2	GE MOTOR	5K509DT7002P	VERTICAL	350 HP	95.4	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	RECENTLY RETROFITTED WITH VARIABLE FREQUENCY DRIVE
HLP #3	GE MOTOR	5K4450P7015P	VERTICAL	200 HP	95	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	RECENTLY RETROFITTED WITH VARIABLE FREQUENCY DRIVE
HLP #4	GE MOTOR	5K4450P7015P	VERTICAL	200 HP	95	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	RECENTLY RETROFITTED WITH VARIABLE FREQUENCY DRIVE
HV-1	WESTINGHOUSE	-	100% OA HEATING & VENTILATING	10,000 CFM, 305 KW ELECTRIC HEAT	100%	PUMP ROOM	ROOFTOP	5 YEARS	POOR CONDITION
RTU-1	TRANE	WSC-060-E3R-OAOK-C	PACKAGED ROOFTOP HEAT PUMP W/AUX. ELECT. HEAT	5 TONS	10.1 SEER, 7 HSPF	2ND LEVEL INCLUDING CONTROL ROOM	ROOFTOP	15 YEARS	NEW, INSTALLED JUNE 2009
RTU-2	TRANE	PHE-B303-AA	PACKAGED ROOFTOP HEAT PUMP W/AUX. ELECT. HEAT	2 TONS	-	FLORIDE & AMONIA ROOMS	ROOFTOP	0 YEARS	1984 VINTAGE, NOT IN SERVICE
-	SANYO	KS3632	MINI SPLIT SYSTEM - INDOOR UNIT	3 TONS	10 EER	ELECTRIC ROOM	ELECTRIC ROOM	14 YEARS	NEW, LAST YEAR
-	SANYO	KS3632	MINI SPLIT SYSTEM - OUTDOOR UNIT	3 TONS	10 EER	ELECTRIC ROOM	OUTSIDE ON GRADE	14 YEARS	NEW, LAST YEAR
HWH	-	-	ELECTRIC HOT WATER HEATER	-	-	PUMP ROOM	ENTIRE BUILDING	5 YEARS	

ECM #1: Lighting Upgrade

Appendix E

ACMUA Horace Bryant High Lift Building

CEG Project #: 9C09085
Project Name : ACMUA Energy Audit
Address: 1151 Main St.
City, State: Pleasantville, NJ

Date 9/23/2009
kWh Cost $0.143

			Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Existing Lighting Fixture Type	**Room Number**	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
		First Floor															
I	101	GENERATOR ROOM	1300	16	1L-MH-250w	4608	$856.63	16	Existing to remain	4608	0	0	$0.00		$0.00	$0.00	$0.00
B			1300	10	(2)34w T12 Lamps. 4' Fixture w/Mag. Ballast - 77w	770	$143.14	10	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	480	290	377	$53.91	14.7	$89.05	$890.50	$100.00
C	102	TANK ROOM	1300	8	(4)34w T12 Lamps. 4' Fixture w/Mag. Ballast - 154w	1232	$229.03	8	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 95w	760	472	614	$87.74	6.9	$95.55	$764.40	$160.00
J	103	ELECT PANEL RM	2600	8	(4)34w T12 Lamps. 4' Fixture w/Mag. Ballast - 154w	1232	$458.06	8	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 95w	760	472	1,227	$175.49	3.4	$95.55	$764.40	$160.00
H	104	STAIRS	2600	4	1L-CFL-20w pin-base	80	$29.74	4	Existing to remain	80	0	0	$0.00		$0.00	$0.00	$0.00
D	105	HOPPER RM	200	2	1L-CFL-26w pin-base	52	$1.49	2	Existing to remain	52	0	0	$0.00		$0.00	$0.00	$0.00
L	B-1	VALVE BASEMENT	1300	4	(2)60w T12 Lamps. 8' Industrial Fixture w/Elec. Ballast - 135w	540	$100.39	4	(2)55w Sylvania Lamps FO96 Sylvania Ballast QHE ISL-SC - 88w	352	188	244	$34.95	21.4	$197.20	$788.80	$40.00
		First Floor Summary		**52**		**8514**	**$1,818**	**52**		**7092**	**1422**	**2462.2**	**$352**	**7.8**		**$3,208**	**$460**
		SECOND FLOOR															
K	201	LANDING	2600	1	(2)35w T12 U-Tube Lamps. 2' Fixture w/Mag. Ballast - 77w	77	$28.63	1	(2)32w T8 Sylvania Lamps #FBO30 Sylvania Ballast #QHE 55w	52	25	65	$9.30	11.0	$112.30	$112.30	$10.00
K	202	CONTROL ROOM	2600	18	(2)35w T12 U-Tube Lamps. 2' Fixture w/Mag. Ballast - 77w	1386	$515.31	18	(2)32w T8 Sylvania Lamps #FBO30 Sylvania Ballast #QHE 55w	936	450	1,170	$167.31	11.0	$112.30	$2,021.40	$180.00
K	203	BREAK ROOM	2600	2	(2)35w T12 U-Tube Lamps. 2' Fixture w/Mag. Ballast - 77w	154	$57.26	2	(2)32w T8 Sylvania Lamps #FBO30 Sylvania Ballast #QHE 55w	104	50	130	$18.59	11.0	$112.30	$224.60	$20.00
K	204	LAB ROOM	2600	1	(2)35w T12 U-Tube Lamps. 2' Fixture w/Mag. Ballast - 77w	77	$28.63	1	(2)32w T8 Sylvania Lamps #FBO30 Sylvania Ballast #QHE 55w	52	25	65	$9.30	11.0	$112.30	$112.30	$10.00
K	205	TOILET ROOM	1300	1	(2)35w T12 U-Tube Lamps. 2' Fixture w/Mag. Ballast - 77w	77	$14.31	1	(2)32w T8 Sylvania Lamps #FBO30 Sylvania Ballast #QHE 55w	52	25	33	$4.65	22.0	$112.30	$112.30	$10.00
		Mezzanine Summary		**23**		**1771**	**$644**	**23**		**1196**	**575**	**1462.5**	**$209**	**11.3**		**$2,583**	**$230**
			Totals:	**75**		**10285**	**$2,463**	**75**		**8288**	**1997**	**3925**	**$561**	**9.1**		**$5,791**	**$690**
		COMMENTS:															

Project Name: LGEA Solar PV Project - ACMUA High lift Pumping Station
Location: Pleasantville, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$115,920
Annual kWh Production	20,100
Annual Energy Cost Reduction	$2,874
Annual SREC Revenue	$7,035
First Cost Premium	**$115,920**
Simple Payback:	**11.70** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	300	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$5,796	0	0	0	$0	0	0	(5,796)	0
1	$0	20,100	$2,874	$0	$7,035	$7,655	$1,685	$569	($5,227)
2	$0	19,999	$2,961	$0	$7,000	$7,534	$1,806	$620	($4,607)
3	$0	19,899	$3,049	$0	$6,965	$7,403	$1,937	$674	($3,932)
4	$0	19,800	$3,141	$0	$6,930	$7,263	$2,077	$731	($3,202)
5	$0	19,701	$3,235	$203	$6,895	$7,113	$2,227	$587	($2,614)
6	$0	19,602	$3,332	$202	$6,861	$6,952	$2,388	$651	($1,963)
7	$0	19,504	$3,432	$201	$6,827	$6,779	$2,561	$718	($1,246)
8	$0	19,407	$3,535	$200	$6,792	$6,594	$2,746	$787	($458)
9	$0	19,310	$3,641	$199	$6,758	$6,395	$2,945	$861	$402
10	$0	19,213	$3,750	$198	$6,725	$6,183	$3,157	$937	$1,339
11	$0	19,117	$3,863	$197	$6,691	$5,954	$3,386	$1,017	$2,356
12	$0	19,022	$3,979	$196	$6,658	$5,710	$3,630	$1,100	$3,457
13	$0	18,926	$4,098	$195	$6,624	$5,447	$3,893	$1,187	$4,644
14	$0	18,832	$4,221	$194	$6,591	$5,166	$4,174	$1,278	$5,922
15	$0	18,738	$4,348	$193	$6,558	$4,864	$4,476	$1,373	$7,295
16	$0	18,644	$4,478	$192	$6,525	$4,540	$4,800	$1,471	$8,766
17	$0	18,551	$4,612	$191	$6,493	$4,193	$5,147	$1,574	$10,340
18	$0	18,458	$4,751	$190	$6,460	$3,821	$5,519	$1,681	$12,021
19	$0	18,366	$4,893	$189	$6,428	$3,422	$5,918	$1,792	$13,813
20	$0	18,274	$5,040	$188	$6,396	$2,995	$6,345	$1,908	$15,721
21	$0	18,183	$5,191	$187	$6,364	$2,728	$5,833	$2,806	$18,527
22	$0	18,092	$5,347	$186	$6,332	$2,205	$4,800	$4,488	$23,015
23	$0	18,001	$5,507	$185	$6,300	$0	$0	$11,622	$34,637
24	$0	17,911	$5,673	$184	$6,269	$0	$0	$11,757	$46,394
25	$0	17,822	$5,843	$184	$6,238	$0	$0	$11,897	$58,291
	Totals:	383,463	$77,233	$3,128	$134,212	$115,983	$70,817	$81,450	$243,694
				Net Present Value (NPV)			**$11,099**		
				Internal Rate of Return (IRR)			**16.4%**		

Project Name: LGEA Solar PV Project - ACMUA High lift Pumping Station
Location: Pleasantville, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$115,920
Annual kWh Production	20,100
Annual Energy Cost Reduction	$2,874
Annual SREC Revenue	$7,035
First Cost Premium	**$115,920**
Simple Payback:	**11.70** **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	20,100	$2,874	$0	$7,035	$9,909	($106,011)
2	$0	19,999	$2,961	$0	$7,000	$9,960	($96,051)
3	$0	19,899	$3,049	$0	$6,965	$10,014	($86,036)
4	$0	19,800	$3,141	$0	$6,930	$10,071	($75,966)
5	$0	19,701	$3,235	$203	$6,895	$9,927	($66,038)
6	$0	19,602	$3,332	$202	$6,861	$9,991	($56,047)
7	$0	19,504	$3,432	$201	$6,827	$10,058	($45,990)
8	$0	19,407	$3,535	$200	$6,792	$10,127	($35,862)
9	$0	19,310	$3,641	$199	$6,758	$10,201	($25,662)
10	$0	19,213	$3,750	$198	$6,725	$10,277	($15,385)
11	$0	19,117	$3,863	$197	$6,691	$10,357	($5,028)
12	$0	19,022	$3,979	$196	$6,658	$10,440	$5,413
13	$0	18,926	$4,098	$195	$6,624	$10,527	$15,940
14	$0	18,832	$4,221	$194	$6,591	$10,618	$26,558
15	$0	18,738	$4,348	$193	$6,558	$10,713	$37,271
16	$0	18,644	$4,478	$192	$6,525	$10,811	$48,082
17	$0	18,551	$4,612	$191	$6,493	$10,914	$58,996
18	$0	18,458	$4,751	$190	$6,460	$11,021	$70,017
19	$0	18,366	$4,893	$189	$6,428	$11,132	$81,149
20	$0	18,274	$5,040	$188	$6,396	$11,248	$92,397
21	$1	18,183	$5,191	$187	$6,364	$11,368	$103,765
22	$2	18,092	$5,347	$186	$6,332	$11,493	$115,258
23	$3	18,001	$5,507	$185	$6,300	$11,622	$126,880
24	$4	17,911	$5,673	$184	$6,269	$11,757	$138,637
25	$5	17,822	$5,843	$184	$6,238	$11,897	$150,534
Totals:		383,463	$77,233	$3,128	$134,212	$266,454	$208,317
				Net Present Value (NPV)		**$150,559**	
				Internal Rate of Return (IRR)		**7.5%**	

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
ACMUA High Lift	900	Sunpower SPR230	56	14.7	823	12.88	20,100	1,848	15.64

N
W E
S

.= Proposed PV Layout

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