ENERGY AUDIT – FINAL REPORT

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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	$ 192,574
Natural Gas	$0
Total	$ 192,574

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	$358	$54	6.6	126.3%
ECM #2	Replace Rooftop Unit - Filtration Bldg	$8,733	$1,389	6.3	138.6%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Photovoltaic System	$507,150	$45,112	11.2	-29.3%

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

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

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade - General	0.4	403	N/A
ECM #2	Replace Rooftop Unit - Filtration Bldg	N/A	10,368	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	56	87,937	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
- **ECM #2:** Replace Rooftop Unit – Filtration Bldg/

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 two separate buildings, the Low Lift Pumping & Filtration Plant. The Low lift building is approximately 3000 square feet and includes the following spaces: Pump room, Chemical Holding Area, Sodium Hypochlorite Area and small office area. The Filtration building is approximately 5800 square feet and includes six filter tanks, a control room and a compressor room. The majority of the area is the filter tank 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	13.4¢ / kWh

Table 3
Electricity Billing Data

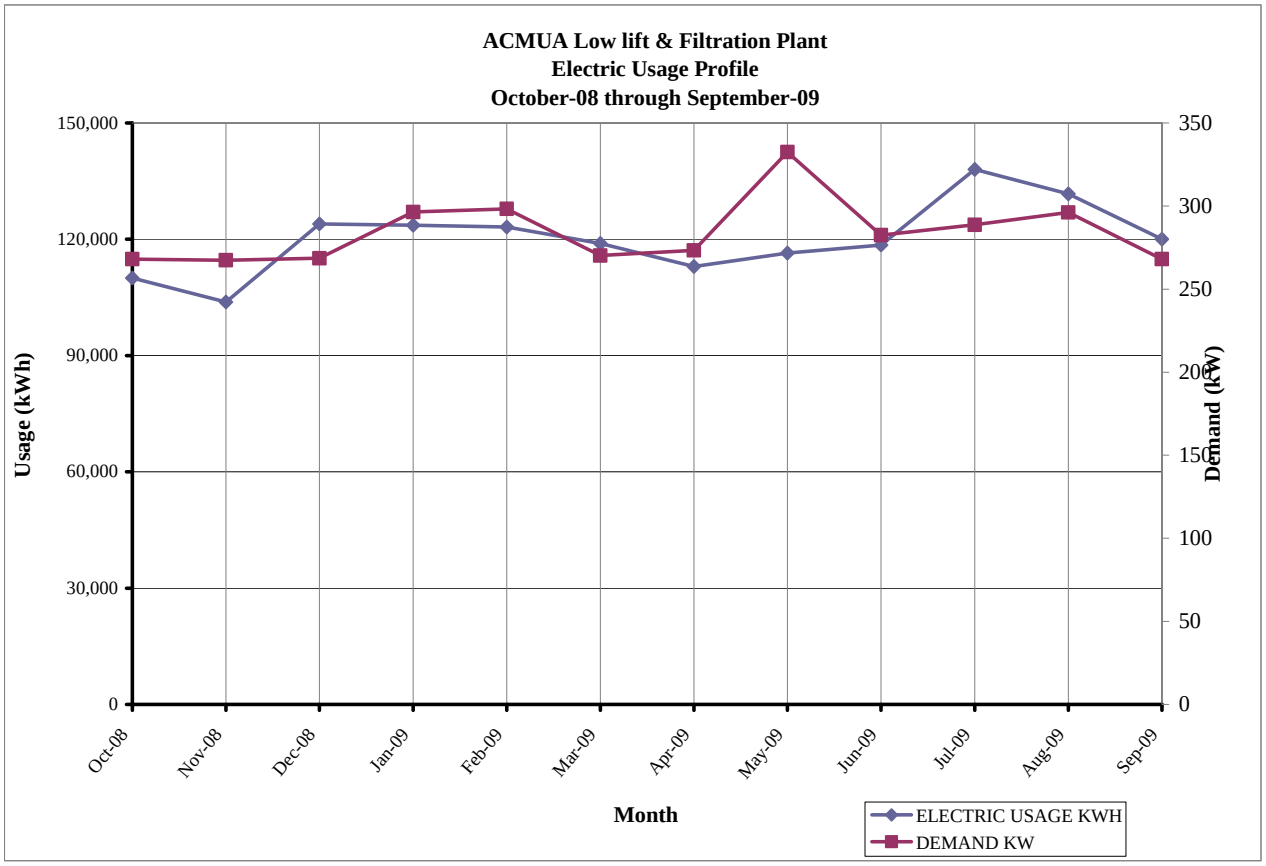
ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Annual General
Meter No: 0232 8219 9993
Customer ID No:
Third Party Utility
TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Oct-08 estimate	110,000	268.0	$13,765
Nov-08	103,845	267.4	$12,995
Dec-08	123,937	268.6	$15,406
Jan-09	123,583	296.4	$15,261
Feb-09	123,149	298.3	$15,236
Mar-09	118,909	270.2	$14,835
Apr-09	112,948	273.4	$14,125
May-09	116,436	332.4	$14,731
Jun-09	118,516	282.5	$17,783
Jul-09	138,049	288.7	$20,676
Aug-09	131,740	296.2	$19,761
Sep-09 estimate	120,000	268.0	$18,000
Totals	**1,441,112**	**332.4 Max**	**$192,574**

AVERAGE DEMAND 284.2 KW average
AVERAGE RATE $0.134 $/kWh

Figure 1
Electricity Usage Profile



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	1,441,112			4,919,956	3.340	16,432,654
NATURAL GAS		0.0		0	1.047	0
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				4,919,956		16,432,654
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		8,800	SQUARE FEET			
BUILDING SITE EUI		*559.09*	kBtu/SF/YR			
BUILDING SOURCE EUI		*1,867.35*	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.

B. 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: ACMUA city
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 Water filtration Plant	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 3000 square foot Low Lift building serves to pump water to the five sedimentation tanks next to the building. It is a single story masonry structure comprised of a Pump Room, Chemical Storage Area, Sodium Hypochlorite area and a small operator office.. The facility operates are 24 hours per day and does not shut down.

The approximately 5800 square feet Filtration Building includes six filter tanks, a control room and a compressor room. The majority of the area is the filter tank area. It is a single story structure. The facility operates are 24 hours per day and does not shut down.

Process Equipment

The pumping plant consists of three vertical well pumps. Two pumps, at 125 hp each are equipped with VFD's. A third 100 HP pump is constant volume. The VFD's were installed within the last 6 months. Efficiencies of these pumps with drives are already maximized, minimizing opportunities for ECM's.

HVAC Systems

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

Heating of the Low Lift building is accomplished with horizontal electric unit heaters. Three at 7.5 KW and two at 5 KW = 32.5 KW total. A small electric baseboard unit helps with comfort in the office.

The Filtration building is Heated and cooled with a Packaged Rooftop HVAC unit. The Rooftop unit is a 3 ton Lennox unit with electric resistance heat. The unit serves only the core control and compressor room area of the Facility. The remainder of the building houses the open filter tanks.

Lighting

Typical lighting throughout building is fluorescent tube fixtures with T-12 lamps and magnetic ballasts. Limited areas use compact fluorescent lamped fixtures. 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.

VII. 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.

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.

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

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.

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 = *((1)*-1&*2 lamp fixtures x $10)* = *10*
= *((2)*-3&4 *lamp fixtures x $20)* = *$40*
= *$50*

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$408
NJ Smart Start Equipment Incentive ($):	$50
Net Installation Cost ($):	$358
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$54
Total Yearly Savings ($/Yr):	$54
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.6
Simple Lifetime ROI	126.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$810
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	$286.65

ECM #2: Replace Rooftop Unit – Filtration Building

Description:

The existing rooftop unit is inefficient with an energy efficiency ratio (EER) of 10 when new. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 12.0 SEER for units of this type. The existing unit is 14 years old and is at the end service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for packaged air-conditioning units is 15 years.

This ECM would replace the rooftop unit with a more efficient unit. The existing equipment will be replaced with equipment having heating and cooling capacities equal to the existing units. The energy efficiency of the new equipment is based on a Lennox “Energence”, 3ton, 17 SEER, 12.8 EER with R-410A refrigerant.

Cooling Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12,000\ Btu/ton \div 1000\ W/kW]}{[(EER_{NEW} - EER_{OLD})]} \times Avg.\ Load\ Factor \times Hrs.\ of\ Cooling$$

Existing Rooftop Unit
Rated Capacity = 3 Tons
Unit Efficiency = 10 EER

Proposed High-Efficiency Rooftop Unit
Rated Capacity = 3 Tons
New Unit Efficiency = 12.8 EER
Cooling Season Hrs. of Operation = 1008 hrs/yr. (12 hrs/day, 7 days/wk, 12 weeks)
Average Cost of Electricity - $0.134/kWh

$$EnergySavings = \frac{[CoolingTons \times 12,000\ Btu/ton \div 1000 W/kW]}{[(EER_{NEW} - EER_{OLD})]} \times Avg.LoadFactor \times Hrs.ofCooling$$

$$EnergySavings = \frac{[3 CoolingTons \times 12,000\ Btu/ton \div 1000 W/kW]}{[(12.8 EER_{NEW} - 10 EER_{OLD})]} \times 0.80 \times 1008$$

$$= 10,368\ kWh/yr./Unit$$

Cost Savings = 10,368 kWh/Yr x $0.134/kWh = $1,389 / Yr.

NJ Smart Start rebate for this equipment is $92 per ton = $267

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$9,000
NJ Smart Start Equipment Incentive ($):	$267
Net Installation Cost ($):	$8,733
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,389
Total Yearly Savings ($/Yr):	$1,389
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.3
Simple Lifetime ROI	138.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$20,835
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	$7,848.79

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 4000 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 56.35 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 87,937 KWh annually, reducing the overall utility bill by approximately 6% 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	11.2 Years	8.9%	22.0%
Direct Purchase	11.2 Years	8.9%	8.0%

*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, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage.

For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to the Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

This report covers two facilities. The Low-lift building serves to pump water to the five sedimentation tanks next to the building. This facility operates 24 hours per day, 7 days per week and does not shut down. The Filtration building includes 6 filter tanks, a control room and a compressor room. This facility also operates 24 hours per day and does not shut down.

The Electric Usage Profile demonstrates a very flat and consistent load profile throughout the year. May has the highest peak and even at that this is a very steady load profile. All heating and cooling is electric. This combined with a 24 hour per day, 7 days a week operation, demonstrates the very flat load usage. Heating in the Low-lift facility is accomplished with horizontal electric unit heaters. The office also has a small electric base-board heater. The Filtration building is heated and cooled by a roof-top packaged HVAC unit. The capacity of this unit is 3 ton with electric resistance heat.

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. 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 $.1197 / 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 chargers.

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 (October 2008 through September 2009) and current electric rates, this facility could see an improvement in its electric costs of up to 12 % or over $20,000 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 ACMUA 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”.

X. INSTALLATION FUNDING OPTIONS

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

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

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

XI. ADDITIONAL RECOMMENDATIONS

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

A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

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 Low Lift & Filtration 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	$408	$0	$50	$358	$54	$0	$54	15	$810	$0	126.3%	6.6	12.51%	$286.65
ECM #2	Replace Rooftop Unit - Filtration Bldg	$6,000	$3,000	$267	$8,733	$1,389	$0	$1,389	15	$20,835	$0	138.6%	6.3	13.54%	$7,848.79
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Photovoltaic System	$507,150	$0	$0	$507,150	$14,334	$30,778	$45,112	25	$358,350	$769,450	-29.3%	11.2	7.40%	$278,391.92

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 Water Filtration Plant

Building ID: 1911775
For 12-month Period Ending: August 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: October 27, 2009

Facility
ACMUA Water Filtration Plant
1151 Main Street
Pleasantville, NJ 08232

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1979
Gross Floor Area (ft²): 0

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	4,920,913
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	4,920,913

Energy Intensity[5]

Site (kBtu/ft²/yr)	
Source (kBtu/ft²/yr)	N/A

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	N/A

Electric Distribution Utility
Atlantic City Electric Co

National Average Comparison

National Average Site EUI	0
National Average Source EUI	0
% Difference from National Average Source EUI	0%
Building Type	

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 Water Filtration Plant	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type		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		☐
Low Lift & Filtration (Water Treatment and Distribution Utility)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Total Average Flow	10 MGD (million gallons per day)	Is this the total daily flow of water including ground water, surface water, and purchased water, measured in million gallons per day (MGD)? The average flow is likely to vary over time. This figure should reflect an annual average flow.		☐

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))**
07/15/2009	08/14/2009	131,740.00
06/15/2009	07/14/2009	138,049.00
05/15/2009	06/14/2009	118,516.00
04/15/2009	05/14/2009	116,436.00
03/15/2009	04/14/2009	112,948.00
02/15/2009	03/14/2009	118,909.00
01/15/2009	02/14/2009	123,149.00
12/15/2008	01/14/2009	123,583.00
11/15/2008	12/14/2008	123,937.00
10/15/2008	11/14/2008	103,845.00
09/15/2008	10/14/2008	110,000.00
Electric Consumption (kWh (thousand Watt-hours))		**1,321,112.00**
Electric Consumption (kBtu (thousand Btu))		**4,507,634.14**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**4,507,634.14**
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 Water Filtration Plant
1151 Main Street
Pleasantville, NJ 08232

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

ACMUA Water Filtration Plant	
Gross Floor Area Excluding Parking: (ft^2)	0
Year Built	1979
For 12-month Evaluation Period Ending Date:	August 31, 2009

Facility Space Use Summary

Low Lift & Filtration	
Space Type	Water Treatment and Distribution Utility
Total Average Flow	10

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 08/31/2009)	**Baseline** (Ending Date 08/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft2)	N/A	N/A	0	N/A	0
Source (kBtu/ft2)	N/A	N/A	N/A	N/A	0
Energy Cost					
$/year	$ 184,444.97	$ 184,444.97	N/A	N/A	N/A
$/ft2/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	N/A	N/A	N/A	N/A	N/A
$kgCO_2e/ft^2$/year	N/A	N/A	N/A	N/A	N/A

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

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

EQUIPMENT LIST - LOW LIFT PUMPING STATION

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
LLP #1	US ELECTRIC MOTOR	TITAN INVERTER DUTY #H06740	VERTICAL	150 HP	95	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	WITH VFD INSTALLED 2009
LLP #2	US ELECTRIC MOTOR	A.C SQUIRREL CAGE MACHINE #H06740	VERTICAL	150 HP	95	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	WITH VFD INSTALLED 2009
LLP #3	CONTINENTAL ELECTRIC CO, INC.	#TV445TP	VERTICAL	100 HP	95	PROCESS	PUMP ROOM	MAINTAINED ANNUALLY	NON VFD
EUH-1	CHROMALOX	LUH-07	ELECTRIC UNIT HEATER	7.5 KW	100%	CHEMICAL HOLDING TANK AREA	CHEMICAL HOLDING TANK AREA	APPROX. 5 YEARS	
EUH-2	CHROMALOX	LUH-07	ELECTRIC UNIT HEATER	7.5 KW	100%	CHEMICAL HOLDING TANK AREA	CHEMICAL HOLDING TANK AREA	APPROX. 5 YEARS	
EUH-3	CHROMALOX	LUH-07	ELECTRIC UNIT HEATER	7.5 KW	100%	PUMP ROOM	PUMP ROOM	APPROX. 5 YEARS	
EUH-4	-	-	ELECTRIC UNIT HEATER	-	-	PUMP ROOM	PUMP ROOM	APPROX. 5 YEARS	EHU-4 HAS BEEN REMOVED.
EUH-5	DAYTON	#3E341R	ELECTRIC UNIT HEATER	5 KW	100%	SODIUM HYPOCHLORITE STORAGE AREA	SODIUM HYPOCHLORITE STORAGE AREA	APPROX. 5 YEARS	
EUH-6	DAYTON	#2E639B	ELECTRIC UNIT HEATER	5 KW	100%	SODIUM HYPOCHLORITE STORAGE AREA	SODIUM HYPOCHLORITE STORAGE AREA	APPROX. 5 YEARS	
AC UNIT	WHITE-WESTINGHOUSE	WAC056T7A1	WINDOW AC	1 TON	-	OFFICE	OFFICE	APPROX. 5 YEARS	
EBB	GENERIC	-	ELECTIC BASEBOARD HEAT	3 L.F.	100%	OFFICE	OFFICE	APPROX. 5 YEARS	

EQUIPMENT LIST - FILTRATION BUILDING

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
BWP #1	US MOTOR	KB20047411-100R	VERTICAL	125 HP	-	FILTER BACKWASH	FILTER BUILDING BASEMENT	-	
BWP #1	US MOTOR	KB20047411-100R	VERTICAL	125 HP	-	FILTER BACKWASH	FILTER BUILDING BASEMENT	-	
RTU-1	LENNOX	CHA16-413-56	PACKAGED ROOFTOP ELECTRIC / ELECTRIC	33,100 BTUH COOLING, 10 KW HEAT	10 EER	CONTROL ROOM AREA	ROOF	1 YEAR	1995 VINTAGE, WITH ROOM THERMOSTSAT
PP-1	UNKNOWN	UNKNOWN	-	75 HP	-	BACKWASH PIT PUMPS	BACKWASH PIT	-	PUMPS BACKWASH WATER TO CLARIFIER
PP-2	UNKNOWN	UNKNOWN	-	75 HP	-	BACKWASH PIT PUMPS	BACKWASH PIT	-	PUMPS BACKWASH WATER TO CLARIFIER
PP-3	UNKNOWN	UNKNOWN	-	75 HP	-	BACKWASH PIT PUMPS	BACKWASH PIT	-	PUMPS BACKWASH WATER TO CLARIFIER

ECM #1: Lighting Upgrade

Appendix E

Pleasantville MUA-Water Filtration Plant

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

Date 9/23/2009
kWh Cost $0.134

			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															
A	101	LOW LIFT-HYDROCHLORIDE RM	2600	5	(2)95w T12HO Lamps. 8' Fixture w/Mag. Ballast - 190w	950	$330.98	5	Existing to remain	950	0	0	$0.00		$0.00	$0.00	$0.00
B			2600	1	(2)34w T12 Lamps. 4' Fixture w/Mag. Ballast - 77w	77	$26.83	1	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	48	29	75	$10.10	7.8	$89.05	$89.05	$10.00
C	102	LOW LIFT-OFFICE	2600	2	(4)34w T12 Lamps. 4' Fixture w/Mag. Ballast - 154w	308	$107.31	2	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 95w	190	118	307	$41.11	3.7	$95.55	$191.10	$40.00
A	103	LOW LIFT-SHOWER RM	1300	1	(2)95w T12HO Lamps. 8' Fixture w/Mag. Ballast - 190w	190	$33.10	1	Existing to remain	190	0	0	$0.00		$0.00	$0.00	$0.00
D	104	LOW LIFT-TOILET RM	650	1	1L-CFL-26w pin-base	26	$2.26	1	Existing to remain	26	0	0	$0.00		$0.00	$0.00	$0.00
D	105	LOW LIFT-PUMP RM	2600	8	1L-CFL-26w pin-base	208	$72.47	8	Existing to remain	208	0	0	$0.00		$0.00	$0.00	$0.00
A	101	FILTER BLDG-PANEL RM	1300	3	(2)95w T12HO Lamps. 8' Fixture w/Mag. Ballast - 190w	570	$99.29	3	Existing to remain	570	0	0	$0.00		$0.00	$0.00	$0.00
A	102	FILTER RM RIGHT	1300	2	(2)95w T12HO Lamps. 8' Fixture w/Mag. Ballast - 190w	380	$66.20	2	Existing to remain	380	0	0	$0.00		$0.00	$0.00	$0.00
F			1300	6	1L-Incand.-BR30-20w	120	$20.90	6	Existing to remain	120	0	0	$0.00		$0.00	$0.00	$0.00
G			1300	6	1L-CFL-26w pin-base	156	$27.18	6	Existing to remain	156	0	0	$0.00		$0.00	$0.00	$0.00
F		FILTER RM LEFT	1300	3	1L-Incand.-BR30-20w	60	$10.45	3	Existing to remain	60	0	0	$0.00		$0.00	$0.00	$0.00
G			1300	6	1L-CFL-26w pin-base	156	$27.18	6	Existing to remain	156	0	0	$0.00		$0.00	$0.00	$0.00
H	B-1	FILTER BLDG-SUB BASEMENT	1300	9	1L-CFL-20w pin-base	180	$31.36	9	Existing to remain	180	0	0	$0.00		$0.00	$0.00	$0.00
		First Floor Summary		**53**		**3381**	**$855**	**53**		**3234**	**147**	**382.2**	**$51**	**4.5**		**$280**	**$50**
		Mezzanine															
E	201	DEL PAC	100	3	1L-A-100w Edison-base	300	$4.02	3	32w Edison-base CFL	96	204	20	$2.73	46.6	$42.50	$127.50	$0.00
		Mezzanine Summary		**3**		**300**	**$4**	**3**		**96**	**204**	**20.4**	**$3**	**46.6**	**$43**	**$128**	**$0**
			Totals:	**56**		**3681**	**$860**	**56**		**3330**	**351**	**403**	**$54**	**6.6**	**$43**	**$408**	**$50**
		COMMENTS:															

Project Name: LGEA Solar PV Project - ACMUA Filtration Plant
Location: Pleasantville, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$507,150
Annual kWh Production	87,937
Annual Energy Cost Reduction	$14,334
Annual SREC Revenue	$30,778
First Cost Premium	**$507,150**
Simple Payback:	**11.24** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	300	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.163**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/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	$25,358	0	0	0	$0	0	0	(25,358)	0
1	$0	87,937	$14,334	$0	$30,778	$33,492	$7,371	$4,249	($21,108)
2	$0	87,497	$14,764	$0	$30,624	$32,959	$7,903	$4,525	($16,583)
3	$0	87,060	$15,207	$0	$30,471	$32,388	$8,475	$4,815	($11,768)
4	$0	86,624	$15,663	$0	$30,319	$31,775	$9,087	$5,119	($6,650)
5	$0	86,191	$16,133	$888	$30,167	$31,118	$9,744	$4,549	($2,100)
6	$0	85,760	$16,617	$883	$30,016	$30,414	$10,449	$4,887	$2,787
7	$0	85,331	$17,115	$879	$29,866	$29,659	$11,204	$5,240	$8,026
8	$0	84,905	$17,629	$875	$29,717	$28,849	$12,014	$5,608	$13,635
9	$0	84,480	$18,157	$870	$29,568	$27,980	$12,882	$5,993	$19,628
10	$0	84,058	$18,702	$866	$29,420	$27,049	$13,814	$6,394	$26,022
11	$0	83,638	$19,263	$861	$29,273	$26,050	$14,812	$6,812	$32,834
12	$0	83,219	$19,841	$857	$29,127	$24,979	$15,883	$7,248	$40,083
13	$0	82,803	$20,436	$853	$28,981	$23,831	$17,031	$7,702	$47,785
14	$0	82,389	$21,050	$849	$28,836	$22,600	$18,262	$8,175	$55,959
15	$0	81,977	$21,681	$844	$28,692	$21,280	$19,583	$8,666	$64,626
16	$0	81,567	$22,331	$840	$28,549	$19,864	$20,998	$9,177	$73,803
17	$0	81,160	$23,001	$836	$28,406	$18,346	$22,516	$9,709	$83,512
18	$0	80,754	$23,691	$832	$28,264	$16,719	$24,144	$10,261	$93,773
19	$0	80,350	$24,402	$828	$28,123	$14,973	$25,889	$10,835	$104,607
20	$0	79,948	$25,134	$823	$27,982	$13,102	$27,761	$11,430	$116,037
21	$0	79,549	$25,888	$819	$27,842	$11,937	$25,521	$15,454	$131,491
22	$0	79,151	$26,665	$815	$27,703	$9,646	$21,001	$22,906	$154,396
23	$0	78,755	$27,465	$811	$27,564	$0	$0	$54,218	$208,614
24	$0	78,361	$28,289	$807	$27,426	$0	$0	$54,908	$263,522
25	$0	77,969	$29,137	$803	$27,289	$0	$0	$55,624	$319,146
	Totals:	1,677,649	$385,152	$13,684	$587,177	$507,428	$309,823	$356,345	$1,802,077
				Net Present Value (NPV)			**$72,066**		
				Internal Rate of Return (IRR)			**22.0%**		

Project Name: LGEA Solar PV Project - ACMUA Filtration Plant
Location: Pleasantville, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

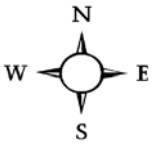
	Photovoltaic System - Direct Purchase
Total Construction Cost	$507,150
Annual kWh Production	87,937
Annual Energy Cost Reduction	$14,334
Annual SREC Revenue	$30,778
First Cost Premium	**$507,150**
Simple Payback:	**11.24** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.163**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$507,150	0	0	0	$0	(507,150)	0
1	$0	87,937	$14,334	$0	$30,778	$45,112	($462,038)
2	$0	87,497	$14,764	$0	$30,624	$45,388	($416,651)
3	$0	87,060	$15,207	$0	$30,471	$45,677	($370,973)
4	$0	86,624	$15,663	$0	$30,319	$45,981	($324,992)
5	$0	86,191	$16,133	$888	$30,167	$45,412	($279,580)
6	$0	85,760	$16,617	$883	$30,016	$45,749	($233,831)
7	$0	85,331	$17,115	$879	$29,866	$46,102	($187,728)
8	$0	84,905	$17,629	$875	$29,717	$46,471	($141,258)
9	$0	84,480	$18,157	$870	$29,568	$46,855	($94,402)
10	$0	84,058	$18,702	$866	$29,420	$47,257	($47,146)
11	$0	83,638	$19,263	$861	$29,273	$47,675	$529
12	$0	83,219	$19,841	$857	$29,127	$48,111	$48,640
13	$0	82,803	$20,436	$853	$28,981	$48,565	$97,205
14	$0	82,389	$21,050	$849	$28,836	$49,037	$146,242
15	$0	81,977	$21,681	$844	$28,692	$49,529	$195,771
16	$0	81,567	$22,331	$840	$28,549	$50,040	$245,811
17	$0	81,160	$23,001	$836	$28,406	$50,571	$296,382
18	$0	80,754	$23,691	$832	$28,264	$51,123	$347,505
19	$0	80,350	$24,402	$828	$28,123	$51,697	$399,202
20	$0	79,948	$25,134	$823	$27,982	$52,293	$451,495
21	$1	79,549	$25,888	$819	$27,842	$52,911	$504,406
22	$2	79,151	$26,665	$815	$27,703	$53,552	$557,958
23	$3	78,755	$27,465	$811	$27,564	$54,218	$612,176
24	$4	78,361	$28,289	$807	$27,426	$54,908	$667,084
25	$5	77,969	$29,137	$803	$27,289	$55,624	$722,708
Totals:		1,677,649	$385,152	$13,684	$587,177	$1,229,858	$958,645
				Net Present Value (NPV)		**$722,733**	
				Internal Rate of Return (IRR)		**8.0%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
ACMUA Filtration Bldg	4000	Sunpower SPR230	245	14.7	3,603	56.35	87,937	8,085	15.64



.= Proposed PV Layout

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