



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT PLEASANTVILLE TOWERS

PREPARED FOR: **PLEASANTVILLE HOUSING
AUTHORITY**
156 NORTH MAIN STREET
PLEASANTVILLE, NJ 08232
ATTN: MR. VERNON LAWRENCE
EXECUTIVE DIRECTOR

PREPARED BY:



520 S. BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CONCORD-ENGINEERING.NET

CEG CONTACT: **KEVIN BLANKENBUEHLER**
PROJECT MANAGER
EMAIL: KBLANK@CEG-INC.NET

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I. EXECUTIVE SUMMARY

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

Pleasantville Housing Authority
Pleasantville Towers
140 North Main Street
Pleasantville, NJ 08232

Authority Contact Person: Vernon Lawrence, Executive Director
Facility Contact Person: Joe Culligan, Facilities Supervisor

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	\$ 83,265
Natural Gas	\$ 41,871
<hr/>	
Total	\$ 125,136

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

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	High Efficiency Heating Hot Water Boilers	\$154,667	\$8,816	17.5	42.5%
ECM #2	High Efficiency Domestic Hot Water Boilers	\$49,115	\$1,410	34.8	-42.6%
ECM #3	Variable Speed Hot Water Pumps	\$36,509	\$1,427	25.6	-41.4%
ECM #4	Lighting Upgrade	\$68,750	\$21,777	3.2	375.1%
ECM #5	Replace Unit Ventilators	\$10,000	\$1,100	9.1	65.0%
ECM #6	Energy Recovery Unit	\$95,900	\$3,336	28.7	-47.8%
ECM #7	Lighting Daylight Sensors	\$2,400	\$250	9.6	56.3%
ECM #8	Low Flow Shower Heads	\$4,900	\$3,182	1.5	874.1%
ECM #9	Energy Star Refrigerators	\$56,000	\$4,462	12.6	19.5%
ECM #10	VSD Domestic Cold Pumps	\$33,480	\$2,231	15.0	19.9%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	51.7 Parking Canopy PV	\$349,250	\$32,649	10.7	133.7%
Notes:	A. Cost takes into consideration applicable NJ Smart Start TM 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	High Efficiency Heating Hot Water Boilers	0.0	12812.0	6313.0
ECM #2	High Efficiency Domestic Hot Water Boilers	0.0	0.0	1294.0
ECM #3	Variable Speed Hot Water Pumps	0.0	7650.0	249.0
ECM #4	Lighting Upgrade	23.0	149952.0	-794.0
ECM #5	Replace Unit Ventilators	3.0	7283.0	0.0
ECM #6	Energy Recovery Unit	-4.0	-28884.0	7062.0
ECM #7	Lighting Daylight Sensors	1.0	1740.0	-12.0
ECM #8	Low Flow Shower Heads	0.0	0.0	251.4
ECM #9	Energy Star Refrigerators	0.0	29551.0	0.0
ECM #10	VSD Domestic Cold Pumps	0.0	14774.0	0.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	51.7 Parking Canopy PV	41.9	60844.0	0.0

The Energy Conservation Measures (ECMs) identified within the report represents the potential annual savings at the facility. It is recommended to consider all ECMs as part of the Authority's initiative to save energy, reduce emissions, and lower operating costs. 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. All of the ECM's presented in this report have been categorized into three groups defined as Short-term (or Fast) Paybacks ranging from 0 to 5 years, Medium-term Paybacks ranging from 5 to 10 years, and Long-term Paybacks of over 10 years to assist the Authority in prioritizing projects.

Short-term Payback Energy Conservation Measures:

The following Energy Conservation Measures (ECMs) identified with a simple payback of 0 to 5 years are considered very cost effective and should be considered a high priority for the Authority. It should be noted that in many cases ECM's lying in this range can be performed utilizing qualified "in house" staff that can further reduce the payback period. It is recommended if the Authority proceeds with "in house" installation they review equipment being purchased to ensure the energy efficiency equipment standards outlined in this report are met or exceeded.

- ECM #4 – Lighting Upgrade
- ECM #8 – Low Flow Shower Heads

Medium-term Payback Energy Conservation Measures:

The following Energy Conservation Measures (ECMs) identified with a simple payback of 5 to 10 years are considered cost effective and should be considered by the Authority. In many cases these measures can provide significant savings, however the costs to implement are higher, stretching the payback beyond five years.

- ECM #5 – Replace Unit Ventilators
- ECM #7 – Lighting Daylight Sensors

Long-term Payback Energy Conservation Measures:

The following Energy Conservation Measures (ECMs) identified with a simple payback of over 10 years. The ECMs that have much longer paybacks are considered capital improvement ECMs. These typically have high installation costs that are more difficult to justify based solely on the energy savings associated with the improvement. Despite the long paybacks, these ECMs in many cases provide valuable and much needed infrastructure improvements for the facility. These ECMs include boiler upgrades, HVAC equipment upgrades, etc. It should also be noted that projects under a 15 year payback should be reviewed in the event the Authority wishes to move forward with an Energy Savings Improvement Program where these projects could be included that program.

- ECM #1 – High Efficiency Heating Hot Water Boilers
- ECM #2 – High Efficiency Domestic Hot Water Boilers

- ECM #3 - Variable Speed Hot Water Pumps
- ECM #6 – Energy Recovery Unit
- ECM #9 – Energy Star Refrigerators
- ECM #10 Variable Speed Domestic Cold Pumps

Renewable Energy Conservation Measures:

Pleasantville Towers has an estimated solar system potential of 51.7 kW DC that could generate 60,844 kilowatt-hours annually offsetting 11% of the total energy purchased from the grid. While solar is an economically viable option for the Authority to pursue, using either existing financing methods or alternative routes, such as a Power Purchase Agreement, the technical feasibility is currently in question. Given Atlantic Electric has currently closed this section of the grid to new applications for renewable energy development, any applications for this type of development will likely be rejected by the utility company to be interconnected with the grid. If the Authority is truly interested in pursuing renewable energy generation at its site we recommend reaching out to ACE prior to investing money into any necessary project development.

Energy Procurement Recommendations:

The Authority is currently not contracted with a third party supplier for electric and natural gas. CEG recommends they pursue contracting with a Third Party Supplier for commodity services in order to reduce energy costs.

Maintenance and Operational Recommendations:

In addition to the ECMs and REMs, 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, further recommendations per building our provided in the building reports:

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 windows and 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.
5. Verify all thermostats are utilizing setback and scheduling capabilities.

Implementation Strategy Moving Forward:

It is recommended the Authority strongly consider all projects with a simple payback of ten years and under for implementation. However consideration should be taken on projects over ten years as they may be necessary capital improvements such as the boilers, domestic boilers, new variable speed heating pumps, and variable speed domestic cold pumps.

Furthermore, although individual projects with a simple payback of 10 years and less are considered financially self sustaining, it is important to consider how multiple projects can be combined together. When ECMs are aggregated into a single project, the lower cost ECMs provides valuable savings to offset the higher cost ECMs. Likewise when multiple facilities are aggregated together into a single entity energy efficiency project, the same benefits are seen on a larger scale.

The combination of all projects into one large energy efficiency project provides the Authority with the opportunity to implement all ECMs identified within this report with an overall simple payback of 10.36 years. This option allows the Authority to implement much needed infrastructure improvements such new condensing boilers, new domestic boilers and storage tank, air conditioning units, and high efficiency lighting and lighting controls. It is suggested that the Authority consider using the Pay for Performance Program to receive additional incentive dollars above the standard NJ Smart Start Program, a preliminary estimate of potential incentive has been provided in the summary table below. The total Entity Project Summary table below shows the savings, costs, incentives and paybacks for all recommended ECMs at the facility. (Note Renewable Energy Measures are not included in this summary table).

Table 3
Combined Project Summary

COMBINED ECM PROJECT APPROACH			
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS
ECM #1	High Efficiency Heating Hot Water Boilers	\$158,667	\$8,816
ECM #2	High Efficiency Domestic Hot Water Boiler	\$49,813	\$1,410
ECM #3	Variable Speed Hot Water Pumps	\$36,167	\$1,427
ECM #4	Lighting Upgrade	\$68,750	\$21,777
ECM #5	Replace Unit Ventilators	\$10,000	\$1,100
ECM #7	Lighting Daylight Sensors	\$2,400	\$250
ECM #10	VSD Domestic Cold Pumps	\$33,480	\$2,231
	Recommended ECM's Cost	\$359,277	\$37,011
	Additional Project Costs /Contingency (25%	\$89,819	
	Total Project Cost	\$449,096	
	Potential P4P Program Incentives	\$65,722	
	Net ECM Costs	\$383,374	
	Project Simply Payback	10.36	

Overall Assessment:

Overall, the Pleasantville Towers are maintained and operating fairly efficiently. There are numerous ECMs that can be implemented to further reduce energy use and save on the facility's operating costs. The Authority should also strongly considering installing new heating boilers, heating hot water pumps, domestic hot water storage tank, and domestic cold water pumps as much of this equipment is well past its useful equipment life and operating inefficiently. The Authority is in a unique position to implement energy efficiency improvements and still include large capital projects. Since the total project is capable of being funded through the savings, CEG highly recommends the Authority take advantage of this opportunity.

II. INTRODUCTION

The comprehensive energy audit covers the 53,410 square foot Pleasantville Towers, which multi-family high rise that includes the following spaces laundry room, mechanical room, elevators, corridors, lobby, community room, offices, lounge, and eighty apartment units.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

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

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric (ACE) provides electricity to the facility under their Annual General Service rate structure. A Third Part Supplier (TPS) has not been contracted. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Gas provides natural gas to the facility under the General Service Gas (GSG) rate structure. A Third Part Supplier (TPS) has not been contracted. 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.

<u>Description</u>	<u>Average</u>
Electricity	15.1¢ / kWh
Natural Gas	\$1.09 / Therm

Table 4
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric Rate: AGS, MGS Meter No: 36135493, 80487704 Account # 0254 3139 9994, 0254 3139 9986 Third Party Utility N/A TPS Meter / Acct No: N/A			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-11	43,143	78.4	\$6,454
Feb-11	40,662	84.1	\$6,040
Jan-11	50,907	84.1	\$7,327
Dec-10	45,623	84.0	\$6,289
Nov-10	40,181	76.8	\$5,563
Oct-10	45,625	77.0	\$6,725
Sep-10	49,625	110.5	\$8,477
Aug-10	53,622	102.4	\$8,917
Jul-10	56,664	92.8	\$9,362
Jun-10	43,783	80.5	\$6,775
May-10	38,825	79.7	\$5,357
Apr-10	43,391	89.9	\$5,978
Totals	552,051	110.5 Max	\$83,265
AVERAGE DEMAND 86.7 KW average AVERAGE RATE \$0.151 \$/kWh			

Figure 1
Electricity Usage Profile

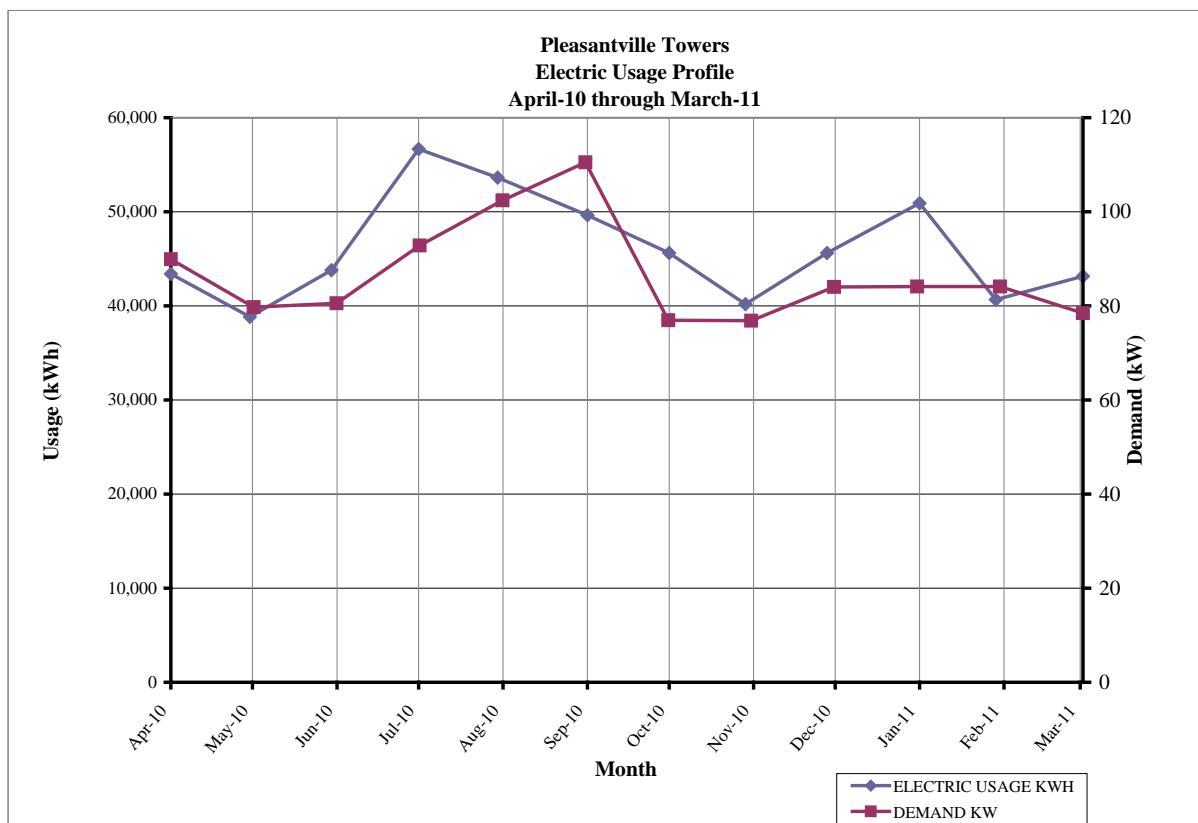
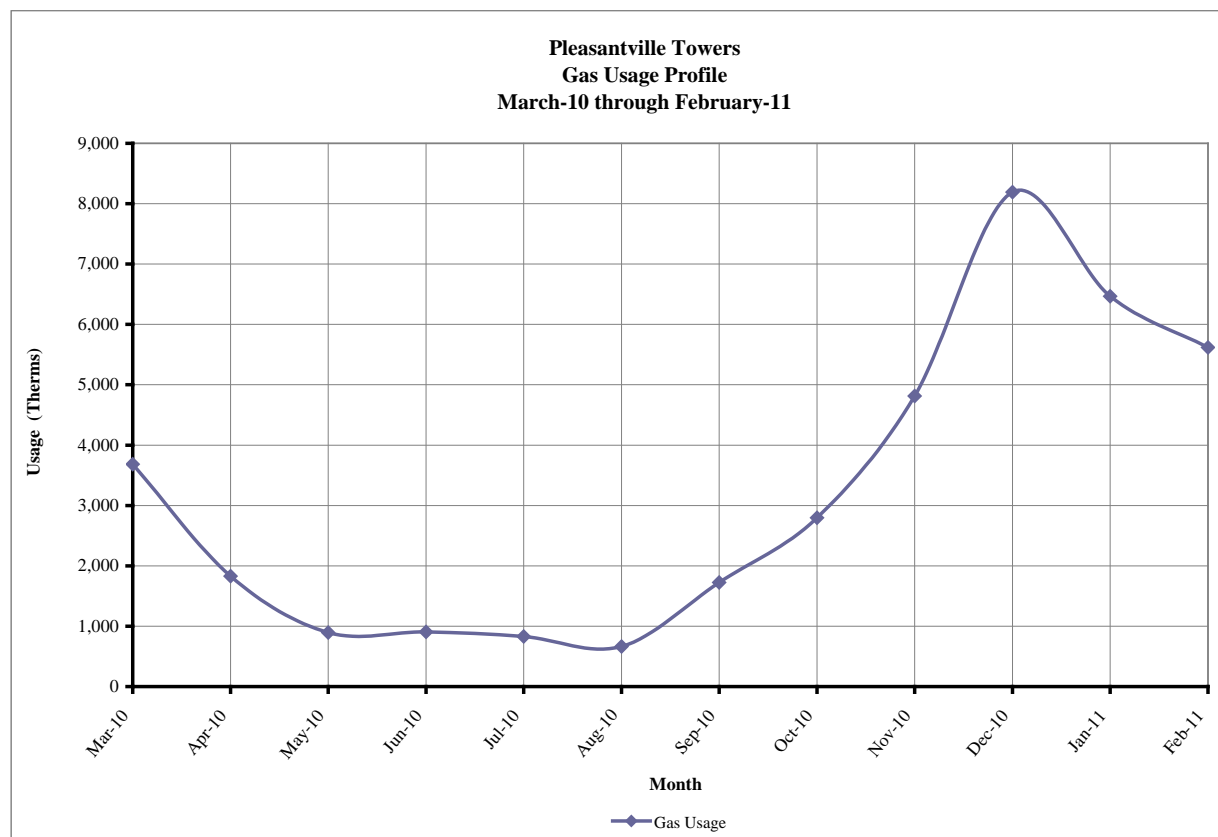


Table 5
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas Rate: GSG Meter No: 0503941 Point of Delivery ID: 1 08 36 0015 0 2 Third Party Utility Provider: N/A TPS Meter No: N/A		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Feb-11	5,617.69	\$6,153.27
Jan-11	6,465.36	\$7,282.45
Dec-10	8,192.00	\$9,182.38
Nov-10	4,813.62	\$5,308.67
Oct-10	2,798.25	\$3,019.76
Sep-10	1,723.68	\$1,818.64
Aug-10	665.60	\$689.76
Jul-10	831.06	\$912.19
Jun-10	907.28	\$967.00
May-10	894.36	\$922.80
Apr-10	1,828.06	\$1,845.36
Mar-10	3,683.34	\$3,769.15
TOTALS	38,420.30	\$41,871.43
AVERAGE RATE:	\$1.09	\$/THERM

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

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

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

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

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

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

Table 6
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu	RATIO	kBtu
ELECTRIC	552,051.0			1,884,702	3.340	6,294,905
NATURAL GAS		38,420.3		3,842,030	1.047	4,022,605
TOTAL				5,726,732		10,317,510
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	53,410 SQUARE FEET					
BUILDING SITE EUI	107.22 kBtu/SF/YR					
BUILDING SOURCE EUI	193.18 kBtu/SF/YR					

To date the US Department of Energy (DOE) has not published comparable energy use intensity data for Multi-Family type residences.

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: PleasantvilleHousing
 Password: lgeaceg2011
 Security Question: What city were you born in?
 Security Answer: "Pleasantville"

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 7
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Pleasantville Towers	N/A	N/A

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary. Energy Star currently has not created a performance rating system for Multi-Family residences.

V. FACILITY DESCRIPTION

The 56,290 SF Pleasantville Towers is a 9 story high-rise Multi-family housing facility consisting of eighty units. Exterior walls have a 4 inch brick veneer finish, air space gap, 6 inch concrete block, and ½ inch plaster construction with a U-Value of approximately 0.23 Btu/h-ft²-°F. Typical windows in the facility are double pane, ¼” coated glass with aluminum frames and are operable. The roof consists of built-up system with 8 inch concrete block base and gravel overlay top with a U-Value of approximately 0.088 Btu/h-ft²-°F. The building currently has no vacant apartments and is occupied throughout the entire year.

HVAC Systems

The tenants are provided heat only from hot water baseboard located in each unit controlled by a wall mounted thermostat. Air conditioning is provided by the tenant and consists of window air conditioning units, most if not all of the tenants have their own A/C units.

The corridors are heated only by a Trane Climate Changer Series rooftop unit with a hot water heating coil. The unit is 100% outdoor air which provides heated air during the winter months, and operates in fan only mode during the summer circulating air through the corridors.

The community room is conditioned with hot water baseboard for heating and has two ceiling recessed Sanyo air conditioning units rated at 3 tons with outdoor condensing units.

The NSP office is conditioned by a Sanyo wall mount unit rated at 1 ½ tons, and a Dunham-Bush packaged unit ventilator with built-in compressor for cooling and hot water heating coil.

The Tenant office is conditioned by a Sanyo wall mount unit rated at 1 ½ tons and a Dunham-Bush packaged unit ventilator with built-in compressor for cooling and hot water heating coil. The compressor for this unit no longer can provide cooling and is only utilized for heating and circulating air in the room.

Hot water heating is provided by two Cleaver Brooks natural gas fired boilers rated at 2,929 MBH of input capacity. The units are 1971 vintage and are well past their ASHRAE standard life expectancy. The hot water is circulated via three constant volume hot water pumps, two of the pumps operate continuously during heat season serving different risers in the building with the third being a common back up pump.

Exhaust System

Air is exhausted from the apartments through fifteen rooftop exhaust fans that operate 24/7.

HVAC System Controls

The hot water baseboard is controlled by wall mounted thermostats that operate a two way valve.

The Sanyo units operate off dedicated wall mounted digital thermostats that control each unit.

The Dunham-Bush unit ventilators are controlled via unit mounted controls with dial temperature control and fan speed settings.

Domestic Hot Water

The building has two means of supply domestic hot water to the building. Originally the main boilers supplied domestic hot to a 1,175 gallon storage tank located in the boiler room. An additional A.O. Smith domestic hot water boiler was added to supply domestic hot water during the summer months in order to shut down the larger Cleaver Brooks boilers. It was noted that currently the A.O. Smith boiler now acts as the lone domestic hot water boiler year round and the main heating boilers are no longer utilized for this purpose.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-12 lamps and magnetic ballasts. Storage rooms and closets lit with a mixture of incandescent lamps. The typical apartment consists of a T12 fluorescent fixture in the kitchen, 18" T12 vanity light in the bathroom, and 60 watt incandescent lamps in the bedroom, breakfast area, and hall. The exterior lighting consists of metal halide pole lamps, wall packs, and floor lamps located in the parking lot and on and around the building exterior. Further detail of the lighting survey is provided in the Lighting Appendix.

VI. MAJOR EQUIPMENT LIST

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

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: High Efficiency Heating Boilers

Description:

The building is heated by two natural gas fired Cleaver Brooks boilers rated at 2,929 MBH that are over 40 years old. It is estimated the boilers currently operate at approximately 70% efficient. The boilers supply hot water to the baseboard heating located in each apartment and the first floor common areas, as well as the rooftop heating and ventilating unit, and small hot water unit heaters located in the first floor equipment spaces.

This ECM proposes replacing the existing Cleaver Brooks boilers with two new HydroTherm KN-20 natural gas fired boilers rated at 2,000 MBH each. Based on the energy simulation model the existing building only requires at design peak approximately 1,900 MBH of heating capacity. The existing boilers were also originally sized to handle the domestic hot water load that is now being supplied by a separate unit. Given these factors we expect that the new heating plant capacity of 4,000 MBH compared with the existing of 5,858 MBH is more than adequate to supply heat to the building.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$158,667
NJ Smart Start Equipment Incentive (\$):	\$4,000
Net Installation Cost (\$):	\$154,667
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$8,816
Total Yearly Savings (\$/Yr):	\$8,816
Estimated ECM Lifetime (Yr):	25
Simple Payback	17.5
Simple Lifetime ROI	42.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$220,400
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	(\$1,152.69)

ECM #2: High Efficiency Domestic Hot Water Boilers

Description:

The existing Domestic Hot Water Boiler is an 80% efficient A.O. Smith natural gas fired boiler coupled with an old 1,175 gallon storage tank. The storage tank originally operated off the original Cleaver Brooks Boilers during the winter months and the A.O. Smith in the summer months, however the facility has recently been operating year round off the A.O. Smith and no longer utilizing the main boilers to heat domestic hot water.

The proposed ECM replaced the existing domestic boiler with a new high efficiency Bradford and White EF100T Series 399 MBH natural gas fired boiler rated up to 99% efficient in condensing mode. In addition the new boiler will be couple with a new Bradford and White 765 gallon jacketed and insulated hot water storage tank. The existing tank and boilers will be removed and the existing connection to the main boilers will be disconnected.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

The average domestic hot water load was estimated based on the summer natural gas utility bills and then extrapolated for the remaining months of the year. The average load was estimated at 175 MBH and applied to the following load percentage schedule in Trace.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$49,813
NJ Smart Start Equipment Incentive (\$):	\$698
Net Installation Cost (\$):	\$49,115
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,410
Total Yearly Savings (\$/Yr):	\$1,410
Estimated ECM Lifetime (Yr):	20
Simple Payback	34.8
Simple Lifetime ROI	-42.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$28,200
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	(\$28,137.51)

ECM #3: Variable Speed Hot Water Pumps

Description:

The hot water heating is circulated via three constant volume hot water pumps with one being a back up pump. The pumps are rated at 3 horsepower each at 45 FTHD and 150 GPM.

This ECM would install variable speed drive controls on the hot water pumps. This includes replacing the pump motor with new premium efficiency motors that are VSD compatible.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$36,617
NJ Smart Start Equipment Incentive (\$):	\$108
Net Installation Cost (\$):	\$36,509
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,427
Total Yearly Savings (\$/Yr):	\$1,427
Estimated ECM Lifetime (Yr):	15
Simple Payback	25.6
Simple Lifetime ROI	-41.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$21,405
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	(\$19,473.57)

ECM #4: Lighting Upgrade

Description:

The lighting is a mixture of older T12 technology fluorescent fixtures, incandescent lamps, and metal halide fixtures located in the common areas, apartments, and exterior of the building.

This ECM includes replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the owner on electrical costs due to the better performance of the lamp and ballasts. This ECM also replaced any older incandescent lamps with more efficient compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. Additional exterior metal halide lamps are retrofitted with lower wattage induction type lamps that provide the same lighting quality and foot candles at lower wattages.

Energy Savings Calculations:

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

Savings Calculations were also done utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The calculations were performed utilizing information collected in the lighting survey and in the Lighting Appendix that provided a lighting power density for the building of 0.89 watts per square-foot existing interior and 13 kilowatts of exterior lighting.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$68,750
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$68,750
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$21,777
Total Yearly Savings (\$/Yr):	\$21,777
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.2
Simple Lifetime ROI	375.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$326,655
Internal Rate of Return (IRR)	31%
Net Present Value (NPV)	\$191,222.41

ECM #5: Replace Self Contained Unit Ventilators

Description:

The Managers Office and Lounge currently have old Dunham-Bush self contained unit ventilators with direct expansion cooling and hot water heating coils. These units are well past their useful life and are highly inefficient.

This ECM recommends replacing the existing unit ventilators with new vertical fan coil units with a hot water heating coil and split system direct expansion cooling coil. Based on the existing design documents the Office requires a approximately 300 CFM unit with 12 MBH of cooling and 14 MBH of heating, and the Lounge requires approximately 400 CFM unit with 18 MBH of cooling and 16 MBH of heating. The basis of design for the new units is ENVIRO-TEC vertical floor fan coils model VF Series.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$10,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$10,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,100
Total Yearly Savings (\$/Yr):	\$1,100
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.1
Simple Lifetime ROI	65.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$16,500
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	\$3,131.73

ECM #6: Energy Recovery Unit

Description:

The existing 100% fresh air unit on the roof is a heating only unit that supplies air to the corridors which is pulled into the apartments and then exhausted out the roof. While the unit is heating only it still operated year round to circulate air through the corridors.

To heat raw outside air to a neutral supply temperature is very energy intensive process. The installation of an energy recovery unit takes conditioned exhaust air streams and passes it through an wheel medium that extracts sensible and latent energy from the exhaust air and transfers it to the raw outdoor air to precondition the outdoor air prior to the coil. In general these units range in efficiency from 50% to 80%+ in some instances and can significantly reduce the cost of conditioning supply air.

This ECM would install a SEMCO energy recovery wheel unit rated for 8,000 CFM. This would require all of the existing roof exhaust fans to be removed and ducted to the exhaust section of the recovery unit, and supply side of the energy recovery unit would then be directly ducted to the outdoor air intake of the existing rooftop Trane H&V unit.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$95,900
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$95,900
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,336
Total Yearly Savings (\$/Yr):	\$3,336
Estimated ECM Lifetime (Yr):	15
Simple Payback	28.7
Simple Lifetime ROI	-47.8%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$50,040
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	(\$56,075.05)

ECM #7: Lighting Daylighting Controls

Description:

Photocells are lighting controls that sense light levels and will turn the lights off when there is adequate daylight. These are mostly used outside, but they are becoming much more popular in energy-efficient office designs as well. The Elevator Lobby and many of the first floor common areas receive significant amounts of daylight and the overhead are still in operation.

This ECM would install sensors that would sense the amount of daylight in the space and then dim or turn off lighting fixtures wire to the sensor that are not required to be on, but still keep the minimum required light level in the space.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.6.5, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by Housing Authority regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,400
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$2,400
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$250
Total Yearly Savings (\$/Yr):	\$250
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.6
Simple Lifetime ROI	56.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,750
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$584.48

ECM #8: Low Flow Shower Heads**Description:**

The Apartments currently have approximately 3.0 gallon per minute shower heads. These shower heads not only increase the use of domestic cold water, but require more hot water to operate. Based on replacing these heads with new FiveStar 2.0 gallon per minute low flow shower heads, the following savings could be realized in reduced water consumption and water heating costs.

Energy Savings Calculations:

LOW FLOW SHOWER HEAD CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Number of Apartments	80	80	
Shower Heads per Apt.	1	1	
Rated Gallons per Minute (GPM)	3.0	2.0	
Usage per Day (minutes)	15	-	
Days per Year	365	-	
Hot Water/Cold Water Mix (%)	60%	-	
Annual Water Usage (Gallons)	1,314,000	876,000	438,000
Water Heating (mmBtu)	527.9	351.9	176
Boiler Efficiency	70%	70%	
Fuel Type	Gas	Gas	
Fuel Conversion (Btu/Fuel Unit)	100,000	100,000	
Fuel Usage (Fuel Units)	754.2	502.8	251
Natural Gas Cost (\$/therm)	\$1.09	-	
Water Cost (\$/1000 gal)	\$6.64	-	
ENERGY SAVINGS CALCULATIONS			
Natural Gas Usage (therm)	754.2	502.8	251.4
Water Usage (1,000 gallons)	1,314	876	438
Energy Cost (\$)	\$9,547	\$6,365	\$3,182
COMMENTS:	Calculations based on Oxygenics Five Star Shower Head Model 400 2.0 GPM		

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$4,900
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$4,900
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,182
Total Yearly Savings (\$/Yr):	\$3,182
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.5
Simple Lifetime ROI	874.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$47,730
Internal Rate of Return (IRR)	65%
Net Present Value (NPV)	\$33,086.51

ECM #9: Energy Star Refrigerators

Description:

Each apartment currently has one approximately 15 cubic-foot top freezer/bottom refrigerator supplied by the facility that are 11 years old. Substantial savings could be realized by upgrading the refrigerators to newer Energy Star rated models.

Based on the assumption that all of the apartments have a similar vintage refrigerator, 80 would be slated for replacement. The proposed swap out would be a one-for-one replacement with a unit of similar size and dimensions that has the most up-to-date Energy Star Rating. The model selected is a GE Model GTH16 15.5 cubic-foot top freezer/bottom refrigerator unit.

Energy Savings Calculations:

ENERGY STAR REFRIGERATOR CALCULATION			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Number of Apartments	80	80	
Manufacturer	Westinghouse	GE	
Type	Top/Bottom	Top/Bottom	
Model	MRT15CNEW3	GTH16BBXLWW	
Size (Cu-Ft)	15	15	
Per Unit Electric Usage (kWh)	727	358	369
Electric Rate (\$/kWh)	\$0.151	\$0.151	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	58,160	28,609	29,551
Energy Cost (\$)	\$8,782	\$4,320	\$4,462
COMMENTS:	Calculations based Energy Star Website http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator		

Energy savings were calculated using Energy Stars refrigerator savings calculation website which can be found here:

<http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator>

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$56,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$56,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,462
Total Yearly Savings (\$/Yr):	\$4,462
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.6
Simple Lifetime ROI	19.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$66,930
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	(\$2,732.93)

ECM #10: Variable Speed Domestic Cold Water Pumps**Description:**

Domestic Water is supplied to the building via a set of two (2) 10 horsepower domestic water booster pumps. The pump skid is fairly old and the pump motors are standard efficiency motors. The pump set operates 24/7. Modern domestic water booster pump systems utilize variable frequency drives and advanced controls in order to vary flow based on the facility water demand.

This ECM replaces the existing domestic cold water booster pump set with a new variable flow domestic booster pump set. The new pump set includes new pumps, premium efficiency motors, variable frequency drives and controls. The basis for this ECM is Tiger Flow System variable flow domestic booster pump control system.

Energy Savings Calculations:

Variable Speed Drive savings were calculated with an Excel Spreadsheet using the Affinity Laws. It was assumed that one domestic water pump runs continuously for 8,760 hours per year with each pump operating for 4,380 hours per year at an average Load Factor of 65%. Savings were calculated based on the following percentage of hours at load.

LOAD SUMMARY		
% LOAD	PUMP #1	PUMP #2
100%	20%	20%
90%	15%	15%
80%	0%	0%
70%	30%	30%
60%	0%	0%
50%	15%	15%
40%	20%	20%
Total	100%	100%
Comments:	Each Pump Operates for 4380 hours per year	

Energy Savings Summary:

ECM #10 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$33,480
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$33,480
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,231
Total Yearly Savings (\$/Yr):	\$2,231
Estimated ECM Lifetime (Yr):	18
Simple Payback	15.0
Simple Lifetime ROI	19.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$40,158
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	(\$2,795.91)

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 Authority at Pleasantville Towers 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 Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are 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). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park vehicles under the array and no parking lot area is lost.

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 and site of Pleasantville Towers for the purposes of determining a potential for a photovoltaic system. CEG believes a ground mounted parking lot canopy system is best suited for this site. An area of 3,825 S.F. can be utilized for a PV system as depicted in the **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 51.7 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 60,844 KWh annually, reducing the overall utility bill by approximately 11.02% 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 15 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 SHARP NU-U235F2 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 parking lot space at 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 not generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

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

Table 8
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM		
PAYMENT TYPE	SIMPLE PAYBACK, Yrs.	NET PRESENT VALUE
Finance 100% - 15 yr	10.70	(\$11,981)

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

It should be noted that while a solar system was proposed, Atlantic Electric has currently closed this section of the grid to new applications for renewable energy development, and any applications for this type of development would be rejected by the utility company to be interconnected with the grid.

Wind Generation

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 of 6.0 m/s is adequate, but available space is very limited for the purchase of a commercial wind turbine at Pleasantville Towers. Therefore, wind energy has not been further recommended as a viable option.

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

Electricity:

The electricity usage profile demonstrates a steady year long load profile for a facility that is occupied year round. The profiles all show typical increases and decreases in usage due to changing of the seasons and the subsequent switch from cooling to heating.

The historical usage profile is beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to the relatively flat load profile. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the Atlantic City Electric's (AECO) BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months June – August have little consumption.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by the summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer a product structure to include either 1) a fixed basis rate with a market based Nymex/commodity rate or 2) a fixed basis rate with fixed Nymex/commodity winter rate (Nov – March) and market based Nymex/commodity rate for the summer months (April – October) for 100% of the facilities **metered** natural gas requirements are both recommended due to current market pricing.

Tariff Analysis:Electricity:

The facility receive electrical service through Atlantic City Electric (AECO) on MGS (Monthly General Service) and its main account on AGS (Annual General Service). The facility has not currently contracted a Third Party Supplier (TPS), and purchases it's electric through the utility's BGS (Basic Generation Service) rate structure.

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The utility, Atlantic City Electric will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. AECO's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, Market Transition, Transition Bond Charge, Non Utility Generation Charge, Societal Benefits Charge (SBC), Infrastructure Investment Charge, System Control Charge, Regulatory Assets Recovery Charge, and Regional Greenhouse Gas Initiative Charge.

Natural Gas:

The facilities currently receive natural gas distribution service through South Jersey Gas on rate schedules General Service Gas (GSG), and have not contracted a Third Party Supplier (TPS) to provide natural gas commodity supply service.

South Jersey Gas provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of natural gas BGSS charges from South Jersey Gas for rate schedule GSG.

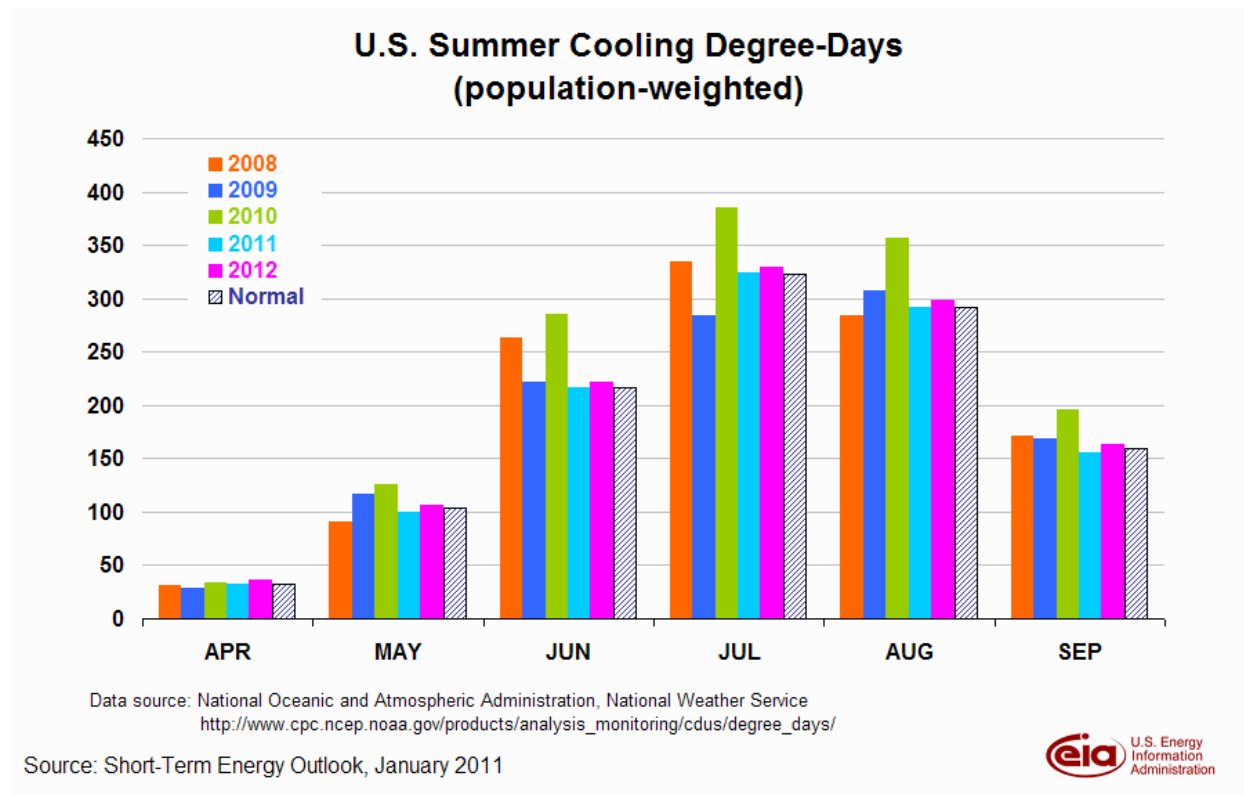
<http://www.southjerseygas.com/108/tariff/bgssrates.pdf>

The utility, South Jersey Gas is responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. South Jersey Gas's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, & Societal Benefits Charge (SBC).

Electric and Natural Gas Commodities Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2010, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technicals and trader sentiment. This market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.



Short Term Energy Outlook - US Energy Information Administration (1/11/2011):

U.S. Natural Gas Prices. The Henry Hub spot price averaged \$4.25 per MMBtu during December, an increase of about 54 cents from November's price of \$3.71 per MMBtu. EIA expects the higher forecast production during the first half of 2011 compared with the same period last year, combined with a decline in consumption, to moderate natural gas spot prices. The projected spot price falls to a low of \$3.73 per MMBtu in June then rises to \$4.61 in December, averaging \$4.02 per MMBtu for all of 2011, which is \$0.37 per MMBtu lower than the 2010 average and \$0.31 per MMBtu lower than in last month's *Outlook*. In 2012, the spot price rises to an average of \$4.50 per MMBtu.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for March 2011 delivery (for the 5-day period ending January 6) averaged \$4.39 per MMBtu, and the average implied volatility over the same period was 43 percent. This produced lower and upper bounds for the 95-percent confidence interval for March 2011 contracts of \$3.21 per MMBtu and \$6.02 per MMBtu, respectively. At this time last year, the natural gas March 2010 futures contract averaged \$5.73 per MMBtu and implied volatility averaged 57 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$3.88 per MMBtu and \$8.47 per MMBtu.

U.S. Electricity Retail Prices. EIA expects the U.S. retail price for electricity distributed to the residential sector during 2010 to average 11.6 cents per kilowatt-hour, about the same level as in 2009. EIA expects the U.S. residential price to increase only slightly over the forecast period--by 0.6 percent in 2011 and by 1.0 percent in 2012.

Recommendations:

1. CEG recommends the Authority consider contracting for a third party supplier for electric and natural gas at its facilities. It is likely the Authority could see significant savings on its electric and gas bill compared with purchasing from the utility. It should be noted that the Authority should consider hiring a consultant to assist in the procurement of bidding out its energy supply to a third party supplier, and that it is likely that the consultant will roll its fee into the purchase agreement with the supplier, thus requiring the Authority to pay no upfront costs.
2. CEG recommends that the Authority consider utilizing a third party utility billing-auditing service to further analyze historical utility invoices such as water, sewer, natural gas and electric for incorrect billings and rate tariff optimization services. This service can be based on a shared savings model with no cost to the Authority. The service could provide refunds on potential incorrect billings that may have been passed through by the utilities and paid by the Authority.

X. INSTALLATION FUNDING OPTIONS

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

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

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant \$0.10 per square foot between \$5,000 and \$50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)
 2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example \$0.11 / kWh for 15% savings, \$0.12/ kWh for 17% savings, ... and \$1.10 / Therm for 15% savings, \$1.20 / Therm for 17% saving, ...) Increased incentives result from projected savings above 15%.
 3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example \$0.07 / kWh for 15% savings, \$0.08/ kWh for 17% savings, ... and \$0.70 / Therm for 15% savings, \$0.80 / Therm for 17% saving, ...) Increased incentives result from verified savings above 15%.
- v. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to \$20,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - <http://njcleanenergy.com/commercial-industrial/programs/eeecbg-eligible-entities>. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

This incentive is provided in addition to the other NJ Clean Energy program funding. This program's incentive is considered the entity's capital and therefore can be applied to the LGEA program's requirements to implement the recommended energy conservation measures totaling at least 25% of the energy audit cost. Additional requirements of this program are as follows:

1. The entity must utilize additional funding through one or more of the NJ Clean Energy programs such as Smart Start, Direct Install, and Pay for Performance.
2. The EECBG funding in combination with other NJ Clean Energy programs may not exceed the total cost of the energy conservation measures being implemented.
3. Envelope measures are applicable only if recommended by the LGEA energy audit and if the energy audit was completed within the past 12 months.
4. New construction and previously installed measures are not eligible for the EECBG rebate.
5. Energy conservation measures eligible for the EECBG must fall within the list of approved energy conservation measures. The complete list of eligible measures and other program requirements are included in the “EECBG Complete Application Package.” The application package is available on the NJ Clean Energy website - <http://njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants>.

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. Verify all thermostats are utilizing setback and scheduling capabilities

XII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

- A. Cost Estimates noted within this report are based on industry accepted costing data such as RS MeansTM Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
- B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
- C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
 - a. operating hours
 - b. equipment type
 - c. control strategies
 - d. scheduling
- D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
- E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
- F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.

Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Pleasantville Towers 140 N. Main

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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	High Efficiency Heating Hot Water Boilers	\$81,355	\$77,312	\$4,000	\$154,667	\$8,816	\$0	\$8,816	25	\$220,400	\$0	42.5%	17.5	2.93%	(\$1,152.69)
ECM #2	High Efficiency Domestic Hot Water Boilers	\$31,573	\$18,240	\$698	\$49,115	\$1,410	\$0	\$1,410	20	\$28,200	\$0	-42.6%	34.8	-4.79%	(\$28,137.51)
ECM #3	Variable Speed Hot Water Pumps	\$14,594	\$22,023	\$108	\$36,509	\$1,427	\$0	\$1,427	15	\$21,405	\$0	-41.4%	25.6	-6.04%	(\$19,473.57)
ECM #4	Lighting Upgrade	\$68,750	\$0	\$0	\$68,750	\$21,777	\$0	\$21,777	15	\$326,655	\$0	375.1%	3.2	31.13%	\$191,222.41
ECM #5	Replace Unit Ventilators	\$5,000	\$5,000	\$0	\$10,000	\$1,100	\$0	\$1,100	15	\$16,500	\$0	65.0%	9.1	7.03%	\$3,131.73
ECM #6	Energy Recovery Unit	\$52,900	\$43,000	\$0	\$95,900	\$3,336	\$0	\$3,336	15	\$50,040	\$0	-47.8%	28.7	-7.21%	(\$56,075.05)
ECM #7	Lighting Daylight Sensors	\$1,800	\$600	\$0	\$2,400	\$250	\$0	\$250	15	\$3,750	\$0	56.3%	9.6	6.18%	\$584.48
ECM #8	Low Flow Shower Heads	\$3,600	\$1,300	\$0	\$4,900	\$3,182	\$0	\$3,182	15	\$47,730	\$0	874.1%	1.5	64.90%	\$33,086.51
ECM #9	Energy Star Refrigerators	\$56,000	\$0	\$0	\$56,000	\$4,462	\$0	\$4,462	15	\$66,930	\$0	19.5%	12.6	2.32%	(\$2,732.93)
ECM #10	VSD Domestic Cold Pumps	\$19,800	\$13,680	\$0	\$33,480	\$2,231	\$0	\$2,231	18	\$40,158	\$0	19.9%	15.0	1.99%	(\$2,795.91)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	51.7 Parking Canopy PV	\$349,250	\$0	\$0	\$349,250	\$9,187	\$23,462	\$32,649	25	\$816,225	\$586,550	133.7%	10.7	7.98%	\$219,271.86

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*.

APPENDIX B



Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February 15, 2011:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2007

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

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

Ground Source Heat Pumps

Closed Loop	\$450 per ton, EER \geq 16 \$600 per ton, EER \geq 18 \$750 per ton, EER \geq 20
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Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per VFD rated hp
Compressors	\$5,250 to \$12,500 per drive
Cooling Towers \geq 10 hp	\$60 per VFD rated hp

Natural Gas Water Heating

Gas Water Heaters \leq 50 gallons, 0.67 energy factor or better	\$50 per unit
Gas-Fired Water Heaters $>$ 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
HID \geq 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID \geq 100w Replacement with new HID \geq 100w	\$70 per fixture

Prescriptive Lighting - LED

LED New Exit Sign Fixture	
Existing Facility < 75 kw	\$20 per fixture
Existing Facility > 75 kw	\$10 per fixture
LED Display Case Lighting	\$30 per display case
LED Shelf-Mtd. Display & Task Lights	\$15 per linear foot
LED Portable Desk Lamp	\$20 per fixture
LED Wall-wash Lights	\$30 per fixture
LED Recessed Down Lights	\$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	\$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	\$150 per fixture
LED High-Bay-Aisle Lighting	\$150 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Linear Panels (2x2 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1- 2007 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

APPENDIX C



STATEMENT OF ENERGY PERFORMANCE

Pleasantville Towers

Building ID: 2721081

For 12-month Period Ending: February 28, 2011¹

Date SEP becomes ineligible: N/A

Date SEP Generated: May 20, 2011

Facility

Pleasantville Towers
140 North Main Street
Pleasantville, NJ 08232

Facility Owner

N/A

Primary Contact for this Facility

N/A

Year Built: 1971**Gross Floor Area (ft²):** 53,410**Energy Performance Rating²** (1-100) N/A**Site Energy Use Summary³**

Electricity - Grid Purchase(kBtu)	1,881,780
Natural Gas (kBtu) ⁴	3,687,613
Total Energy (kBtu)	5,569,393

Energy Intensity⁵

Site (kBtu/ft ² /yr)	104
Source (kBtu/ft ² /yr)	190

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	463
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Electric Distribution Utility

Atlantic City Electric Co [Peppo Holdings Inc]

National Average Comparison

National Average Site EUI

National Average Source EUI

% Difference from National Average Source EUI

Building Type

Multifamily
Housing

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

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. Values represent energy intensity, annualized to a 12-month period.
5. 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) or a Registered Architect (RA) 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 or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Building Name	Pleasantville Towers	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Multifamily Housing	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	140 North Main Street, Pleasantville, NJ 08232	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		<input type="checkbox"/>
Pleasantville Towers (Multifamily Housing)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	53,410 Sq. Ft.	Does the square footage include all supporting functions such as residential units, common areas, elevators, storage areas, vent shafts, lobbies, boiler room and basement, etc? Interstitial (plenum) space between floors should be excluded from the total.		<input type="checkbox"/>
Number of units	80(Optional)	Is this the total number of occupied or unoccupied apartment units in the Multifamily Housing building? This should include apartments on every line of the building and of every floor plan type and the basement apartments. This should exclude storage or maintenance closets, boiler rooms, garbage compactor or receptacle rooms, management offices or laundry facilities.		<input type="checkbox"/>
Total Number of Bedrooms	80(Optional)	Is this the total number of bedrooms located in each individual apartment unit? This should include any additions to the original floor plan performed by the owner. This should exclude in-unit common areas being used as bedrooms by tenants.		<input type="checkbox"/>
Number of Floors	9(Optional)	Is this the total number of floors located within a Multifamily Housing Building? This number should include the total number of floors above the existing grade plane. This number should exclude interstitial space between floors or the roof.		<input type="checkbox"/>
Percent of gross floor area that is common space only	30%(Optional)	Is this the percentage of square footage that is devoted to occupied and unoccupied apartment units?		<input type="checkbox"/>
Laundry in each unit	0(Optional)	Is this the total number of laundry hookups located in each individual apartment unit? The laundry facility should be accounted for if the machine is inoperable, operable or if there is a laundry hookup available.		<input type="checkbox"/>
Laundry in common area	5(Optional)	Is this the number of laundry hookups located in a common area that are either coin-operated or subsidized by the building owner? The laundry facility should be accounted for if the machine is inoperable, operable or if there is a laundry hookup available.		<input type="checkbox"/>

Dishwashers in each unit	0(Optional)	Is this the total number of dishwashers located in individual apartment units? The dishwasher should be accounted for if the machine is inoperable, operable or if there is a dishwasher hookup available.		<input type="checkbox"/>
Percent Heated	100%(Optional)	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment? This includes the individual apartment units that are individually mechanically heated. The percent heated cannot be greater than 100%. The percent heated attribute is similar to the percent heated attribute for dormitories. The user should select from a drop-down-menu with options presented in bins of 10 (i.e. 0, 10, 20, 30?).		<input type="checkbox"/>
Percent Cooled	50%(Optional)	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment? This includes the individual apartment units that are individually mechanically cooled. The percent cooled cannot be greater than 100%. The percent cooled attribute is similar to the percent cooled attribute for dormitories. The user should select from a drop-down-menu with options presented in bins of 10 (i.e. 0, 10, 20, 30?).		<input type="checkbox"/>
Market Rate or Affordable Housing	N/A(Optional)	Select Affordable Housing when a Multifamily Housing building is regulated by a national, state or local housing agency and offers subsidized housing to lower and moderate income range households. Select Market Rate when a Multifamily Housing building has either no subsidized units or minimal units with allocated subsidies.		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co [Pepco Holdings Inc]

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))
01/20/2011	02/17/2011	40,640.00
12/17/2010	01/20/2011	50,880.00
11/17/2010	12/17/2010	45,600.00
10/20/2010	11/17/2010	40,160.00
09/20/2010	10/20/2010	45,600.00
08/18/2010	09/20/2010	49,600.00
07/20/2010	08/18/2010	53,600.00
06/18/2010	07/20/2010	56,640.00
05/19/2010	06/18/2010	43,760.00
04/20/2010	05/19/2010	38,800.00
03/19/2010	04/20/2010	43,360.00
Electric Consumption (kWh (thousand Watt-hours))		508,640.00
Electric Consumption (kBtu (thousand Btu))		1,735,479.68
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		1,735,479.68
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Natural Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
01/19/2011	02/16/2011	6,465.40
12/16/2010	01/19/2011	8,192.00
11/16/2010	12/16/2010	4,813.60
10/19/2010	11/16/2010	2,798.30
09/17/2010	10/19/2010	1,723.70
08/17/2010	09/17/2010	665.60
07/19/2010	08/17/2010	831.10
06/17/2010	07/19/2010	907.30
05/18/2010	06/17/2010	894.40
04/19/2010	05/18/2010	1,828.10
03/18/2010	04/19/2010	3,683.30

Natural Gas Consumption (therms)	32,802.80
Natural Gas Consumption (kBtu (thousand Btu))	3,280,280.00
Total Natural Gas Consumption (kBtu (thousand Btu))	3,280,280.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	<input type="checkbox"/>

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

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

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA 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
Pleasantville Towers
140 North Main Street
Pleasantville, NJ 08232

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Pleasantville Towers	
Gross Floor Area Excluding Parking: (ft ²)	53,410
Year Built	1971
For 12-month Evaluation Period Ending Date:	February 28, 2011

Facility Space Use Summary

Pleasantville Towers	
Space Type	Multifamily Housing
Gross Floor Area(ft ²)	53,410
Number of units ^o	80
Total Number of Bedrooms ^o	80
Number of Floors ^o	9
Percent of gross floor area that is common space only ^o	30
Laundry in each unit ^o	0
Laundry in common area ^o	5
Dishwashers in each unit ^o	0
Percent Heated ^o	100
Percent Cooled ^o	50
Market Rate or Affordable Housing ^o	N/A

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 02/28/2011)	Baseline (Ending Date 02/28/2011)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft ²)	104	104	0	N/A	N/A
Source (kBtu/ft ²)	190	190	0	N/A	N/A
Energy Cost					
\$/year	N/A	N/A	N/A	N/A	N/A
\$/ft ² /year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO ₂ e/year	463	463	0	N/A	N/A
kgCO ₂ e/ft ² /year	9	9	0	N/A	N/A

Because more than 50% of your building is Multifamily Housing, your building is designated as Multifamily Housing within Portfolio Manager. This type of building is not eligible for an energy performance rating and does not have a reference national average.

Notes:

o - This attribute is optional.

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

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville Housing Authority - 140 N. Main

Boilers

Tag	Boiler-1 & 2		
Unit Type	Cast Iron		
Qty	2		
Location	Boiler Room		
Area Served	Whole Building		
Manufacturer	Cleaver Brooks		
Model #	CB700-70		
Serial #	L-53660		
Input Capacity (MBH)	2,929,000		
Rated Output Capacity (MBH)	2,050,300		
Approx. Efficiency %	70%		
Fuel	Natural Gas		
Approx Age	40		
ASHRAE Service Life	30		
Remaining Life	(10)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville Housing Authority - 140 N. Main

Rooftop / AC Units

Tag	RTU-1	UV-1 & 2	AC-1 &2
Unit Type	H&V Fresh Air Unit	Self Contained UV	Ceiling Cooling Unit
Qty	1	2	2
Location	Roof	Office/Lounge	Indoor/Outdoor Unit
Area Served	Corridors	Office/Lounge	Community Room
Manufacturer	Trane	Dunham-Bush	Sanyo
Model #	TSCB014	N/A	C3622
Serial #	K06M41410A	N/A	0088463
Cooling Type	N/A	DX	DX
Cooling Capacity (Tons)	N/A	1.5	3
Cooling Efficiency (SEER/EER)	N/A	7.5 EER (est)	9.5 EER
Heating Type	Hot Water	N/A	N/A
Heating Input (MBH)	650	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	5	15	4
ASHRAE Service Life	15	15	15
Remaining Life	10	0	11
Comments	7.5 HP SF		

Rooftop / AC Units

Tag	AC-3 & 4		
Unit Type	Ductless Split		
Qty	2		
Location	Office		
Area Served	Office		
Manufacturer	Sanyo		
Model #	KHS1822		
Serial #	0004861		
Cooling Type	DX		
Cooling Capacity (Tons)	1.5		
Cooling Efficiency (SEER/EER)	9.5 EER		
Heating Type	N/A		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Approx Age	14		
ASHRAE Service Life	15		
Remaining Life	1		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville Housing Authority - 140 N. Main

Domestic Water Heaters

Tag	HWH-1		
Unit Type	Hot Water Boiler		
Qty	1		
Location	Boiler Room		
Area Served	Whole Building		
Manufacturer	A.O. Smith		
Model #	BTP370A104		
Serial #	1030M000972		
Size (Gallons)	81		
Input Capacity (MBH/KW)	370		
Recovery (Gal/Hr)	345.33		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	1		
ASHRAE Service Life	12		
Remaining Life	11		
Comments	Attached to 1175 gallon storage tank		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville Housing Authority - 140 N. Main

Pumps

Tag	HWP-3 & 4	HWP #6	DCW-1 & 2
Unit Type	Constant Volume	Constant Volume	Constant Volume
Qty	2	1	2
Location	Boiler Room	Boiler Room	Mechanical Room
Area Served			Whole Building
Manufacturer	B&G	B&G	N/A
Model #	215AB 7 BF	215AB 7 BF	N/A
Serial #	2194322	2194322	N/A
Horse Power	3	3	10
Flow	150 GPM @ 45 FTHD	150 GPM @ 45 FTHD	
Motor Info	Baldor	GE	Marathon
Electrical Power	208-230/460V 3P	208-230/460V 3P	208-230/460V 3P
RPM	1725	1725	1725
Motor Efficiency %	86.5%	86.5%	92%
Approx Age	1	15	15
ASHRAE Service Life	20	20	20
Remaining Life	19	5	5
Comments			

APPENDIX E

Investment Grade Lighting Audit

APPENDIX E
1 of 7

CEG Job #: 9C11010
Project: Pleasantville Housing Authority
Main Street
Pleasantville, NJ 08232
Bldg. Sq. Ft. 56,290

Towers

KWH COST: \$0.151

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS					
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback			
733	Shop	3000	2	1	150w MH Lo Bay - No Lens	188	0.38	1,128.0	\$170.33	2	4	2x4, 4 Lamp, 28w T8, Elect. Ballast, w/Wire Guard	102	0.20	612	\$92.41	\$200.00	\$400.00	0.17	516	\$77.92	5.13			
128.34		3000	3	2	8" Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.43	1,278.0	\$192.98	3	4	(2) 8' Lamps to (4) 4' Lamps - 28w T8, Elect Ballast; retrofit	102	0.31	918	\$138.62	\$100.00	\$300.00	0.12	360	\$54.36	5.52			
620		3000	1	1	60w A Lamp	60	0.06	180.0	\$27.18	1	1	(1) 18w CFL Lamp	18	0.02	54	\$8.15	\$20.00	\$20.00	0.04	126	\$19.03	1.05			
121.14	Shop Workbench	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	468.0	\$70.67	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.10	300	\$45.30	\$80.00	\$160.00	0.06	168	\$25.37	6.31			
733	Boiler Room	6000	7	1	150w MH Lo Bay - No Lens	188	1.32	7,896.0	\$1,192.30	7	4	2x4, 4 Lamp, 28w T8, Elect. Ballast, w/Wire Guard	102	0.71	4284	\$646.88	\$200.00	\$1,400.00	0.60	3612	\$545.41	2.57			
612		6000	3	1	Pendant Mnt., 100w A19 Lamp	100	0.30	1,800.0	\$271.80	3	1	(1) 26w CFL Lamp	26	0.08	468	\$70.67	\$20.00	\$60.00	0.22	1332	\$201.13	0.30			
612.1	Compactor Room	4000	1	1	Pendant Mnt., 100w A19 Lamp	100	0.10	400.0	\$60.40	1	2	1x4, 2 Lamp 28w T8, Elec. Ballast, Surface Mnt., No Lens; fixture	50	0.05	200	\$30.20	\$140.00	\$140.00	0.05	200	\$30.20	4.64			
122.21	Community Room	3000	12	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.94	2,808.0	\$424.01	12	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.60	1800	\$271.80	\$100.00	\$1,200.00	0.34	1008	\$152.21	7.88			
127.211	Kitchen	3000	4	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.18	528.0	\$79.73	4	2	Reballast & Relamp; (2) 17w T8, Elec. Ballast	33	0.13	396	\$59.80	\$80.00	\$320.00	0.04	132	\$19.93	16.05			
617	Kitchen Hood	2000	1	1	Hood Light w/Globe & Cage, 100w A Lamp	100	0.10	200.0	\$30.20	1	1	26w CFL Lamp	26	0.03	52	\$7.85	\$20.00	\$20.00	0.07	148	\$22.35	0.89			
142.21	Storage Closet	2000	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	312.0	\$47.11	1	3	3 Lamp, 28w T8, Elect. Ballast, Specular Reflector; retrofit	77	0.08	154	\$23.25	\$100.00	\$100.00	0.08	158	\$23.86	4.19			
122.21	Fire Command Center	4000	1	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	312.0	\$47.11	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.05	200	\$30.20	\$100.00	\$100.00	0.03	112	\$16.91	5.91			
127.211	Women's Restroom	3000	2	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.09	264.0	\$39.86	2	2	Reballast & Relamp; (2) 17w T8, Elec. Ballast	33	0.07	198	\$29.90	\$80.00	\$160.00	0.02	66	\$9.97	16.05			
127.21	Men's Restroom	3000	1	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic	78	0.08	234.0	\$35.33	1	2	Reballast & Relamp; Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	147	\$22.20	\$100.00	\$100.00	0.03	87	\$13.14	7.61			
127.21	Handicapped Restroom	3000	2	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast,	78	0.16	468.0	\$70.67	2	2	Reballast & Relamp; Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	294	\$44.39	\$100.00	\$200.00	0.06	174	\$26.27	7.61			
1	Storage Closet	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	33.6	\$5.07	\$115.00	\$115.00	0.01	13.2	\$1.99	57.70			
127.21	Tenants' Office	2500	4	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic	78	0.31	780.0	\$117.78	4	2	Reballast & Relamp; Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	490	\$73.99	\$100.00	\$400.00	0.12	290	\$43.79	9.13			
142.21		2500	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	390.0	\$58.89	1	3	3 Lamp, 28w T8, Elect. Ballast, Specular Reflector; retrofit	77	0.08	192.5	\$29.07	\$100.00	\$100.00	0.08	197.5	\$29.82	3.35			
1		2500	1	1	32w Circuline Fluor.	39	0.04	97.5	\$14.72	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	70	\$10.57	\$115.00	\$115.00	0.01	27.5	\$4.15	27.69			
121.41	Tenants' Office Closet	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Wall Mnt., Prismatic	78	0.08	93.6	\$14.13	1	2	2 Lamp, 28w T8, Elect. Ballast; retrofit	50	0.05	60	\$9.06	\$80.00	\$80.00	0.03	33.6	\$5.07	15.77			
1	Tenants' Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	33.6	\$5.07	\$115.00	\$115.00	0.01	13.2	\$1.99	57.70			

APPENDIX E
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EXISTING LIGHTING					PROPOSED LIGHTING												SAVINGS					
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
142.21	Laundry Room	6000	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	5,616.0	\$848.02	6	3	3 Lamp , 28w T8, Elect. Ballast, Specular Reflector; retrofit	77	0.46	2772	\$418.57	\$100.00	\$600.00	0.47	2844	\$429.44	1.40
1	NSP Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	33.6	\$5.07	\$115.00	\$115.00	0.01	13.2	\$1.99	57.70
1	NSP Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	33.6	\$5.07	\$115.00	\$115.00	0.01	13.2	\$1.99	57.70
1	NSP Office	2500	1	1	32w Circuline Fluor.	39	0.04	97.5	\$14.72	1	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.03	70	\$10.57	\$115.00	\$115.00	0.01	27.5	\$4.15	27.69
142.21		2500	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt.,	156	0.47	1,170.0	\$176.67	3	3	3 Lamp , 28w T8, Elect. Ballast, Specular Reflector; retrofit	77	0.23	577.5	\$87.20	\$100.00	\$300.00	0.24	592.5	\$89.47	3.35
127.211	1st Floor Lobby & Corridor	8760	22	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.97	8,479.7	\$1,280.43	22	2	Reballast & Relamp; (2) 17w T8, Elec. Ballast	33	0.73	6359.76	\$960.32	\$80.00	\$1,760.00	0.24	2119.92	\$320.11	5.50
121.16	Rear Vestibule	8760	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.08	683.3	\$103.18	1	2	2 Lamp, 28w T8, Elect. Ballast; retrofit	50	0.05	438	\$66.14	\$80.00	\$80.00	0.03	245.28	\$37.04	2.16
731	Front Vestibule	8760	3	1	150w HPS Fixture	188	0.56	4,940.6	\$746.04	3	1	80w Induction Lamp & Ballast; retrofit	80	0.24	2102.4	\$317.46	\$300.00	\$900.00	0.32	2838.24	\$428.57	2.10
127.15	Elevator Lobbies 2-9	8760	24	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Surface Mnt., White Lens	78	1.87	16,398.7	\$2,476.21	24	2	2x2, 2 Lamp, 32w T8 Elec. Ballast, Surface Mount, White "Cloud" Diffuser	58	1.39	12193.92	\$1,841.28	\$200.00	\$4,800.00	0.48	4204.8	\$634.92	7.56
2	Floors 2 thru 9 - Corridor	8760	88	2	2 Lamp, 40w & 32w Circuline Fluor.	83	7.30	63,983.0	\$9,661.44	88	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	2.46	21584.64	\$3,259.28	\$115.00	\$10,120.00	4.84	42398.4	\$6,402.16	1.58
1	2nd-9th Custodian Closet	3000	8	1	32w Circuline Fluor.	39	0.31	936.0	\$141.34	8	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.22	672	\$101.47	\$115.00	\$920.00	0.09	264	\$39.86	23.08
1	2nd-9th Trash Shute	8760	8	1	32w Circuline Fluor.	39	0.31	2,733.1	\$412.70	8	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.22	1962.24	\$296.30	\$115.00	\$920.00	0.09	770.88	\$116.40	7.90
725	Roof Wallpacks	4400	2	1	150w HPS Wallpack	188	0.38	1,654.4	\$249.81	2	1	80w Induction Lamp, Wall Pack	80	0.16	704	\$106.30	\$340.00	\$680.00	0.22	950.4	\$143.51	4.74
121.11	Penthouse	400	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.62	249.6	\$37.69	8	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.46	185.6	\$28.03	\$100.00	\$800.00	0.16	64	\$9.66	82.78
1	Stairwell South	8760	9	1	32w Circuline Fluor.	39	0.35	3,074.8	\$464.29	9	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.25	2207.52	\$333.34	\$115.00	\$1,035.00	0.10	867.24	\$130.95	7.90
2		8760	9	2	2 Lamp, 40w & 32w Circuline Fluor.	83	0.75	6,543.7	\$988.10	9	2	14" Round, (2)13w PLC Lamp, Surface Mount, White Lens	28	0.25	2207.52	\$333.34	\$115.00	\$1,035.00	0.50	4336.2	\$654.77	1.58
624	Top of Stairwell South	8760	1	3	1x1 (3) 100w A Lamp, Surface Mount																	

Investment Grade Lighting Audit

APPENDIX E
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ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback	
3520	Hall	1800	48	2	Ceiling Mount White Globe, (2) 60w A Lamp	120	5.76	10,368.0	\$1,565.57	48	2	13w CFL Lamps	26	1.25	2246.4	\$339.21	\$20.00	\$960.00	4.51	8121.6	\$1,226.36	0.78	
121.15	Kitchen	1800	48	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Diffuser	78	3.74	6,739.2	\$1,017.62	48	2	1x4, 2 Lamp, 28w T8, Elec. Ballast, Surface Mnt., White Diffuser	50	2.40	4320	\$652.32	\$130.00	\$6,240.00	1.34	2419.2	\$365.30	17.08	
619	Breakfast Area	1800	48	1	Wall Mnt. "Jelly Jar", (1) 60w A19 Lamp	60	2.88	5,184.0	\$782.78	48	1	Wall Mount, 13w PL 4 Pin Lamp	13	0.62	1123.2	\$169.60	\$70.00	\$3,360.00	2.26	4060.8	\$613.18	5.48	
100.1	Bathroom	1800	96	2	18" Vanity Light, 2-Lamp, 15w T12, Mag. Ballast, Wall Mnt., Glass Lens	34	3.26	5,875.2	\$887.16	96	1	2' Vanity Light, (2) 17w T8, Elec. Ballast	30	2.88	5184	\$782.78	\$80.00	\$7,680.00	0.38	691.2	\$104.37	73.58	
737	Exterior	4400	7	1	175w MH Pole Mnt Area Light, Polycarb Lens	210	1.47	6,468.0	\$976.67	7	2	120w Induction Lamp & Ballast; retrofit	120	0.84	3696	\$558.10	\$320.00	\$2,240.00	0.63	2772	\$418.57	5.35	
735		4400	3	1	175w MH, Wallpack	210	0.63	2,772.0	\$418.57	3	1	80w Induction Lamp, Wall Pack	80	0.24	1056	\$159.46	\$320.00	\$960.00	0.39	1716	\$259.12	3.70	
765		4400	3	1	400w MH Flood	465	1.40	6,138.0	\$926.84	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
767		4400	20	1	400w HPS "Shoebox" Fixture	460	9.20	40,480.0	\$6,112.48	20	1	Venture Lighting Optiwave Ballast V90U7421K and 320w MH Lamp	349	6.98	30712	\$4,637.51	\$160.00	\$3,200.00	2.22	9768	\$1,474.97	2.17	
725		4400	5	1	150w HPS Wallpack	188	0.94	4,136.0	\$624.54	5	1	80w Induction Lamp, Wall Pack	80	0.40	1760	\$265.76	\$340.00	\$1,700.00	0.54	2376	\$358.78	4.74	
Totals			703	92				260,523	\$39,339	703	105			31.1	128,977	\$19,476		\$68,750	31.6	125,408	\$18,937	3.63	

CEG Job #:
Project: Pleasantville Housing Authority
Address: Main Street
Pleasantville, NJ 08232
Building SF: 56,290

Towers

KWH COST: \$0.151

FALSE

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS												SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback		
733	Shop	3000	2	1	150w MH Lo Bay - No Lens	188	0.38	1128	\$170.33	2	0	No Change	188	0.38	0%	1128	\$170.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
128.34		3000	3	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.43	1278	\$192.98	3	0	No Change	142	0.43	0%	1278	\$192.98	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
620		3000	1	1	60w A Lamp	60	0.06	180	\$27.18	1	0	No Change	60	0.06	0%	180	\$27.18	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
121.14	Shop Workbench	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	468	\$70.67	2	0	No Change	78	0.16	0%	468	\$70.67	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
733	Boiler Room	6000	7	1	150w MH Lo Bay - No Lens	188	1.32	7896	\$1,192.30	7	0	No Change	188	1.32	0%	7896	\$1,192.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
612		6000	3	1	Pendant Mnt., 100w A19 Lamp	100	0.30	1800	\$271.80	3	0	No Change	100	0.30	0%	1800	\$271.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
612.1	Compactor Room	4000	1	1	Pendant Mnt., 100w A19 Lamp	100	0.10	400	\$60.40	1	0	No Change	100	0.10	0%	400	\$60.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
122.21	Community Room	3000	12	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.94	2808	\$424.01	12	0	No Change	78	0.94	0%	2808	\$424.01	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
127.211	Kitchen	3000	4	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.18	528	\$79.73	4	0	No Change	44	0.18	0%	528	\$79.73	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
617	Kitchen Hood	2000	1	1	Hood Light w/Globe & Cage, 100w A Lamp	100	0.10	200	\$30.20	1	0	No Change	100	0.10	0%	200	\$30.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
142.21	Storage Closet	2000	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	312	\$47.11	1	0	No Change	156	0.16	0%	312	\$47.11	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
122.21	Fire Command Center	4000	1	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	312	\$47.11	1	0	No Change	78	0.08	0%	312	\$47.11	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
127.211	Women's Restroom	3000	2	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.09	264	\$39.86	2	0	No Change	44	0.09	0%	264	\$39.86	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
127.21	Men's Restroom	3000	1	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	234	\$35.33	1	0	No Change	78	0.08	0%	234	\$35.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
127.21	Handicapped Restroom	3000	2	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.16	468	\$70.67	2	0	No Change	78	0.16	0%	468	\$70.67	\$0.00	\$0.00	0.00	0	\$0.00	0.00		

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS										SAVINGS									
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback	
1	Storage Closet	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	0	No Change	39	0.04	0%	46.8	\$7.07	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
127.21	Tenants' Office	2500	4	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.31	780	\$117.78	4	0	No Change	78	0.31	0%	780	\$117.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
142.21		2500	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	390	\$58.89	1	0	No Change	156	0.16	0%	390	\$58.89	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
1		2500	1	1	32w Circuline Fluor.	39	0.04	97.5	\$14.72	1	0	No Change	39	0.04	0%	97.5	\$14.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
121.41	Tenants' Office Closet	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Wall Mnt., Prismatic Lens	78	0.08	93.6	\$14.13	1	0	No Change	78	0.08	0%	93.6	\$14.13	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
1	Tenants' Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	0	No Change	39	0.04	0%	46.8	\$7.07	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
142.21	Laundry Room	6000	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	5616	\$848.02	6	0	No Change	156	0.94	0%	5616	\$848.02	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
1	NSP Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	0	No Change	39	0.04	0%	46.8	\$7.07	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
1	NSP Office Restroom	1200	1	1	32w Circuline Fluor.	39	0.04	46.8	\$7.07	1	0	No Change	39	0.04	0%	46.8	\$7.07	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
1	NSP Office	2500	1	1	32w Circuline Fluor.	39	0.04	97.5	\$14.72	1	0	No Change	39	0.04	0%	97.5	\$14.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
142.21		2500	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1170	\$176.67	3	0	No Change	156	0.47	0%	1170	\$176.67	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
127.21.1	1st Floor Lobby & Corridor	8760	22	2	2x2, 2 Lamp, 20w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	44	0.97	8479.68	\$1,280.43	22	0	No Change	44	0.97	0%	8479.68	\$1,280.43	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
121.16	Rear Vestibule	8760	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.08	683.28	\$103.18	1	0	No Change	78	0.08	0%	683.28	\$103.18	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
731	Front Vestibule	8760	3	1	150w HPS Fixture	188	0.56	4940.64	\$746.04	3	0	No Change	188	0.56	0%	4940.64	\$746.04	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
127.15	Elevator Lobbies 2-9	8760	24	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Surface Mnt., White Lens	78	1.87	16398.72	\$2,476.21	24	8	Daylight Sensor (Sensorswitch PP-20 & CM-PC or equal)	78	1.68	10%	14758.848	\$2,228.59	\$300.00	\$2,400.00	0.19	1639.872	\$247.62	9.69	
2	Floors 2 thru 9 - Corridor	8760	88	2	2 Lamp, 40w & 32w Circuline Fluor.	83	7.30	63983.04	\$9,661.44	88	0	No Change	83	7.30	0%	63983.04	\$9,661.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00	

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS											
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback								
1	2nd-9th Custodian Closet	3000	8	1	32w Circuline Fluor.	39	0.31	936	\$141.34	8	0	No Change	39	0.31	0%	936	\$141.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
1	2nd-9th Trash Shute	8760	8	1	32w Circuline Fluor.	39	0.31	2733.12	\$412.70	8	0	No Change	39	0.31	0%	2733.12	\$412.70	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
725	Roof Wallpacks	4400	2	1	150w HPS Wallpack	188	0.38	1654.4	\$249.81	2	0	No Change	188	0.38	0%	1654.4	\$249.81	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
121.11	Penthouse	400	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.62	249.6	\$37.69	8	0	No Change	78	0.62	0%	249.6	\$37.69	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
1	Stairwell South	8760	9	1	32w Circuline Fluor.	39	0.35	3074.76	\$464.29	9	0	No Change	39	0.35	0%	3074.76	\$464.29	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
2		8760	9	2	2 Lamp, 40w & 32w Circuline Fluor.	83	0.75	6543.72	\$988.10	9	0	No Change	83	0.75	0%	6543.72	\$988.10	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
624	Top of Stairwell South	8760	1	3	1x1 (3) 100w A Lamp, Surface Mount	300	0.30	2628	\$396.83	1	0	No Change	300	0.30	0%	2628	\$396.83	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
1	Stairwell North	8760	9	1	32w Circuline Fluor.	39	0.35	3074.76	\$464.29	9	0	No Change	39	0.35	0%	3074.76	\$464.29	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
2		8760	9	2	2 Lamp, 40w & 32w Circuline Fluor.	83	0.75	6543.72	\$988.10	9	0	No Change	83	0.75	0%	6543.72	\$988.10	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
Standard 1 BR (Unit 709) - 32 Units																															
121.15	Kitchen	1800	32	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Diffuser	78	2.50	4492.8	\$678.41	32	0	No Change	78	2.50	0%	4492.8	\$678.41	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
619	Breakfast Area	1800	32	1	Wall Mnt. "Jelly Jar", (1) 60w A19 Lamp	60	1.92	3456	\$521.86	32	0	No Change	60	1.92	0%	3456	\$521.86	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
3520	Bedroom	1800	32	2	Ceiling Mount White Globe, (2) 60w A Lamp	120	3.84	6912	\$1,043.71	32	0	No Change	120	3.84	0%	6912	\$1,043.71	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
100.1	Bathroom	1800	32	2	18" Vanity Light, 2-Lamp, 15w T12, Mag. Ballast, Wall Mnt., Glass Lens	34	1.09	1958.4	\$295.72	32	0	No Change	34	1.09	0%	1958.4	\$295.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
3520	Hall	1800	32	2	Ceiling Mount White Globe, (2) 60w A Lamp	120	3.84	6912	\$1,043.71	32	0	No Change	120	3.84	0%	6912	\$1,043.71	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
Studio Apt. (Unit 401) - 48																															
3520	Hall	1800	48	2	Ceiling Mount White Globe, (2) 60w A Lamp	120	5.76	10368	\$1,565.57	48	0	No Change	120	5.76	0%	10368	\$1,565.57	\$0.00	\$0.00	0.00	0	\$0.00	0.00								
121.15	Kitchen	1800	48	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Diffuser	78	3.74	6739.2	\$1,017.62	48	0	No Change	78	3.74	0%	6739.2	\$1,017.62	\$0.00	\$0.00	0.00	0	\$0.00	0.00								

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS																SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback	
619	Breakfast Area	1800	48	1	Wall Mnt. "Jelly Jar", (1) 60w A19 Lamp	60	2.88	5184	\$782.78	48	0	No Change	60	2.88	0%	5184	\$782.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
100.1	Bathroom	1800	96	2	18" Vanity Light, 2-Lamp, 15w T12, Mag. Ballast, Wall Mnt., Glass Lens	34	3.26	5875.2	\$887.16	96	0	No Change	34	3.26	0%	5875.2	\$887.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
737	Exterior	4400	7	1	175w MH Pole Mnt Area Light, Polycarb Lens	210	1.47	6468	\$976.67	7	0	No Change	210	1.47	0%	6468	\$976.67	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
735		4400	3	1	175w MH, Wallpack	210	0.63	2772	\$418.57	3	0	No Change	210	0.63	0%	2772	\$418.57	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
765		4400	3	1	400w MH Flood	465	1.40	6138	\$926.84	3	0	No Change	465	1.40	0%	6138	\$926.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
767		4400	20	1	400w HPS "Shoebox" Fixture	460	9.20	40480	\$6,112.48	20	0	No Change	460	9.20	0%	40480	\$6,112.48	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
725		4400	5	1	150w HPS Wallpack	188	0.94	4136	\$624.54	5	0	No Change	188	0.94	0%	4136	\$624.54	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
		Totals		703	92			64.1	260,522.8	\$39,339	703	8			63.9		258,883.0	\$39,091.33		\$2,400	0.19	1,640	\$248	9.69

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Total KW _{AC}	Panel Weight (41.9 lbs)	W/SQFT
Parking Lot	3825	SHARP NU-U235F2	220	17.5	3,859	51.70	60,844	41.9	9,218	13.40



 = Proposed PV Layout

Notes:

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

Project Name: LGEA Solar PV Project - Pleasantville Towers										
Location: Pleasantville, NJ										
Description: Photovoltaic System 100% Financing - 15 year										
Simple Payback Analysis										
		Photovoltaic System 100% Financing - 15 year								
Total Construction Cost		\$349,250								
Annual kWh Production		60,844								
Annual Energy Cost Reduction		\$9,187								
Average Annual SREC Revenue		\$23,462								
Simple Payback:		10.70						Years		
Life Cycle Cost Analysis										
Analysis Period (years):		15						Financing %:		100%
Discount Rate:		3%						Maintenance Escalation Rate:		3.0%
Average Energy Cost (\$/kWh)		\$0.151						Energy Cost Escalation Rate:		3.0%
Financing Rate:		6.00%						Average SREC Value (\$/kWh)		\$0.386
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	\$0	0	0	0	\$0	0	0	0	0	
1	\$0	60,844	\$9,187	\$0	\$33,464	\$20,552	\$14,814	\$7,286	\$7,286	
2	\$0	60,540	\$9,463	\$0	\$33,297	\$19,638	\$15,728	\$7,394	\$14,680	
3	\$0	60,237	\$9,747	\$0	\$30,119	\$18,668	\$16,698	\$4,499	\$19,179	
4	\$0	59,936	\$10,039	\$0	\$26,971	\$17,638	\$17,728	\$1,644	\$20,823	
5	\$0	59,636	\$10,341	\$614	\$26,836	\$16,545	\$18,821	\$1,197	\$22,020	
6	\$0	59,338	\$10,651	\$611	\$26,702	\$15,384	\$19,982	\$1,376	\$23,396	
7	\$0	59,041	\$10,970	\$608	\$23,617	\$14,152	\$21,214	(\$1,387)	\$22,008	
8	\$0	58,746	\$11,299	\$605	\$23,498	\$12,843	\$22,523	(\$1,173)	\$20,835	
9	\$0	58,452	\$11,638	\$602	\$20,458	\$11,454	\$23,912	(\$3,871)	\$16,964	
10	\$0	58,160	\$11,988	\$599	\$20,356	\$9,979	\$25,387	(\$3,622)	\$13,342	
11	\$0	57,869	\$12,347	\$596	\$17,361	\$8,413	\$26,953	(\$6,254)	\$7,088	
12	\$0	57,580	\$12,718	\$593	\$17,274	\$6,751	\$28,615	(\$5,968)	\$1,120	
13	\$0	57,292	\$13,099	\$590	\$14,323	\$4,986	\$30,380	(\$8,534)	(\$7,414)	
14	\$0	57,006	\$13,492	\$587	\$14,251	\$3,112	\$32,254	(\$8,210)	(\$15,623)	
15	\$0	56,721	\$13,897	\$584	\$11,344	\$1,123	\$34,243	(\$10,709)	(\$26,333)	
Totals:		881,399	\$170,876	\$6,590	\$339,872	\$181,241	\$349,250	(\$26,333)	\$139,372	
Net Present Value (NPV)							(\$11,981)			