



# **LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT**

**PREPARED FOR:** **PLEASANTECH ACADEMY  
CHARTER SCHOOL –  
PLEASANTECH I  
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PLEASANTVILLE, NJ 08232  
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## I. EXECUTIVE SUMMARY

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

Pleasantech Academy Charter School -  
Pleasantech I  
535 Martin Luther King Boulevard  
Pleasantville, NJ 08232

Administrative and Facility Contact Person: Charmette Long-Vernon, M.B.A.

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	\$ 23,757
Natural Gas	\$ 9,390
Total	\$ 33,147

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**

<b>ENERGY CONSERVATION MEASURES (ECM's)</b>					
<b>ECM NO.</b>	<b>DESCRIPTION</b>	<b>NET INSTALLATION COST<sup>A</sup></b>	<b>ANNUAL SAVINGS<sup>B</sup></b>	<b>SIMPLE PAYBACK (Yrs)</b>	<b>SIMPLE LIFETIME ROI</b>
ECM #1	General Lighting Upgrade	\$15,770	\$6,462	2.4	514.6%
ECM #2	Lighting Controls	\$3,255	\$1,035	3.1	377.0%
ECM #3	Window Upgrade	\$59,936	\$347	172.7	-91.3%
ECM #4	Domestic Water Heater Replacement	\$6,820	\$104	65.4	-77.1%
ECM #5	Roof Top Unit Replacement	\$9,090	\$407	22.3	-32.8%
<b>RENEWABLE ENERGY MEASURES (REM's)</b>					
<b>ECM NO.</b>	<b>DESCRIPTION</b>	<b>NET INSTALLATION COST</b>	<b>ANNUAL SAVINGS</b>	<b>SIMPLE PAYBACK (Yrs)</b>	<b>SIMPLE LIFETIME ROI</b>
REM #1	Solar PV 40.25 KW System	\$362,250	\$23,222	15.6	60.3%

**Notes:** A. Cost takes into consideration applicable NJ Smart Start<sup>TM</sup> 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**

<b>ENERGY CONSERVATION MEASURES (ECM's)</b>				
<b>ECM NO.</b>	<b>DESCRIPTION</b>	<b>ANNUAL UTILITY REDUCTION</b>		
		<b>ELECTRIC DEMAND (KW)</b>	<b>ELECTRIC CONSUMPTION (KWH)</b>	<b>NATURAL GAS (THERMS)</b>
ECM #1	General Lighting Upgrade	13.3	34,810.0	-
ECM #2	Lighting Controls	2.3	5,881.2	-
ECM #3	Window Upgrade	-	22.8	323.8
ECM #4	Domestic Water Heater Replacement	-	-	73.4
ECM #5	Roof Top Unit Replacement	2.0	2,310.0	-
<b>RENEWABLE ENERGY MEASURES (REM's)</b>				
<b>ECM NO.</b>	<b>DESCRIPTION</b>	<b>ANNUAL UTILITY REDUCTION</b>		
		<b>ELECTRIC DEMAND (KW)</b>	<b>ELECTRIC CONSUMPTION (KWH)</b>	<b>NATURAL GAS (THERMS)</b>
REM #1	Solar PV 40.25 KW System	40.3	44,149.0	-

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #1:** Lighting Upgrade
- **ECM #2:** Lighting Controls

ECM#3 investigates four options for window upgrade. Energy savings will not provide a payback of installation costs. However, due to the poor condition of the existing glass block windows, they should be replaced. The proposed new window area is based on the option 1 estimate obtained by the school. The 720 square feet of new window (20 pair of single hung vertical slider) in place of 1350 square feet of existing glass block will have the unintended result of only 64% of the existing natural light being provided. Providing an equivalent amount of natural lighting would require 31 pair of windows as described in Option 4. Pleasantech Academy Charter School should consider installing the most efficient window as suggested in ECM #3 Option 4 (or equal).

Although ECM #4 does not provide a payback less than 10 years, it is recommended to proceed with the installation of an efficient domestic water heater as suggested in ECM #4 (or equal) for the school since the existing domestic water heaters are past their expected lifespan.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

Renewable Energy Measures (REMs) were also reviewed for implementation at the Memorial Elementary School. CEG utilized a roof mounted solar array to house a substantial PV system. The recommended 40.25 kW PV system will produce approximately 44,149 kWh of electricity annually and will reduce the schools electrical consumption from the grid by 32.7%. The system's calculated simple payback of 15.6 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends

the Owner review all funding options before deciding to not implement this renewable energy measure.

Overall, the Pleasantech Academy Charter School appears to be operating at a high efficiency level compared to other schools in the region. With the implementation of the above recommended measures the Pleasantech Academy Charter School will realize further energy savings at the Pleasantech I school.

## II. INTRODUCTION

The comprehensive energy audit covers the 15,580 square foot Pleasantech I elementary school *Building*, which includes the following spaces: classrooms, restrooms, multi-purpose room, kitchen, offices, nurse, tech lab and Faculty Lounge.

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

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft<sup>2</sup>/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 are based on Interest Rate of 3%.

#### IV. HISTORIC ENERGY CONSUMPTION/COST

##### A. Energy Usage / Tariffs

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

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric provides electricity to the facility under their Monthly General Service rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Gas provides natural gas to the facility under the BSC- Firm Transportation rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

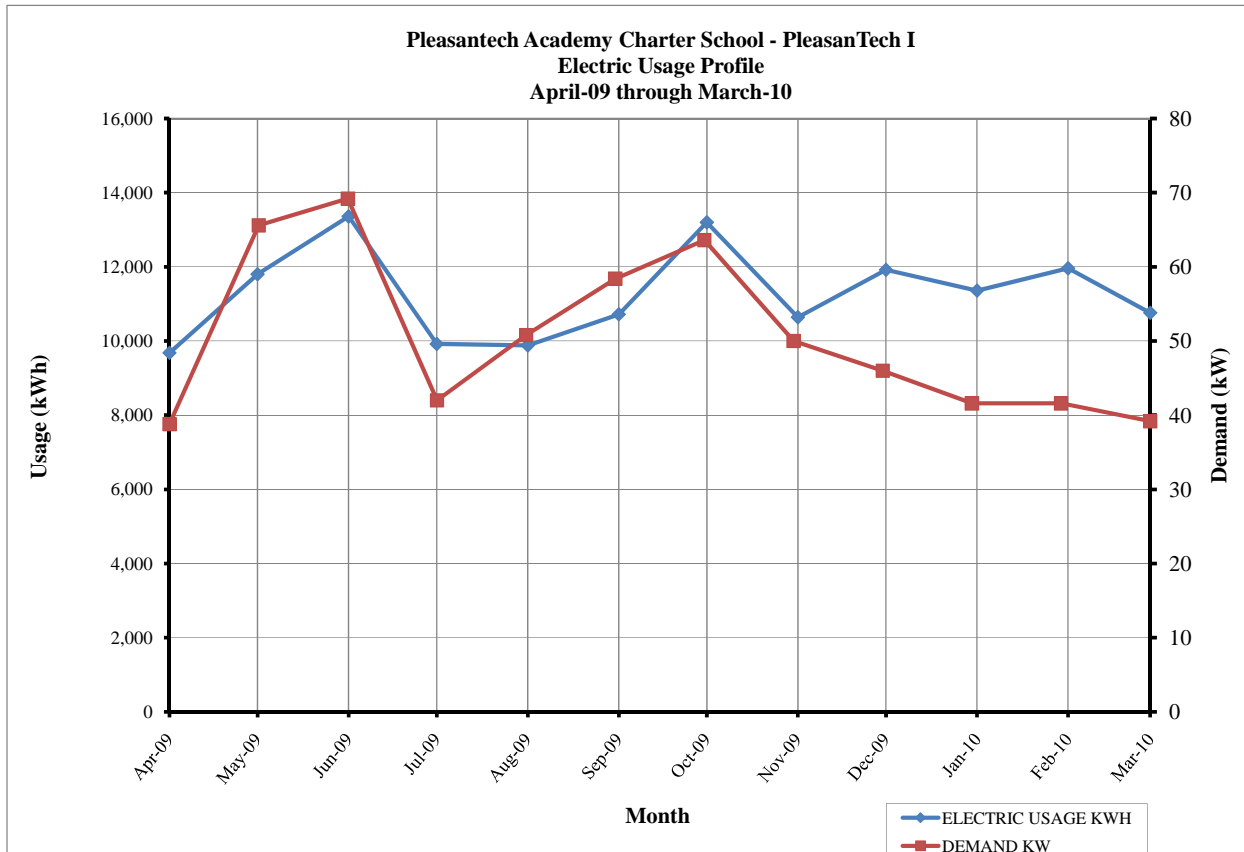
The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

<u>Description</u>	<u>Average</u>
Electricity	17.6¢ / kWh
Natural Gas	\$1.42 / Therm

**Table 3  
Electricity Billing Data**

<b>ELECTRIC USAGE SUMMARY</b>			
Utility Provider: Atlantic City Electric			
Rate: Monthly General			
Meter No: 07 369 749			
Customer ID No: 1391 9059 999			
Third Party Utility			
TPS Meter / Acct No:			
<b>MONTH OF USE</b>	<b>CONSUMPTION</b>	<b>DEMAND</b>	<b>TOTAL BILL</b>
Apr-09	9,680	38.8	\$1,555
May-09	11,800	65.6	\$1,868
Jun-09	13,360	69.2	\$2,434
Jul-09	9,920	42.0	\$1,947
Aug-09	9,880	50.8	\$1,938
Sep-09	10,720	58.4	\$2,103
Oct-09	13,200	63.6	\$2,362
Nov-09	10,640	50.0	\$1,846
Dec-09	11,920	46.0	\$2,011
Jan-10	11,360	41.6	\$1,930
Feb-10	11,960	41.6	\$1,976
Mar-10	10,760	39.2	\$1,788
<b>Totals</b>	<b>135,200</b>	<b>69.2 Max</b>	<b>\$23,757</b>
<b>AVERAGE DEMAND</b>		<b>50.6 KW average</b>	
<b>AVERAGE RATE</b>		<b>\$0.176 \$/kWh</b>	

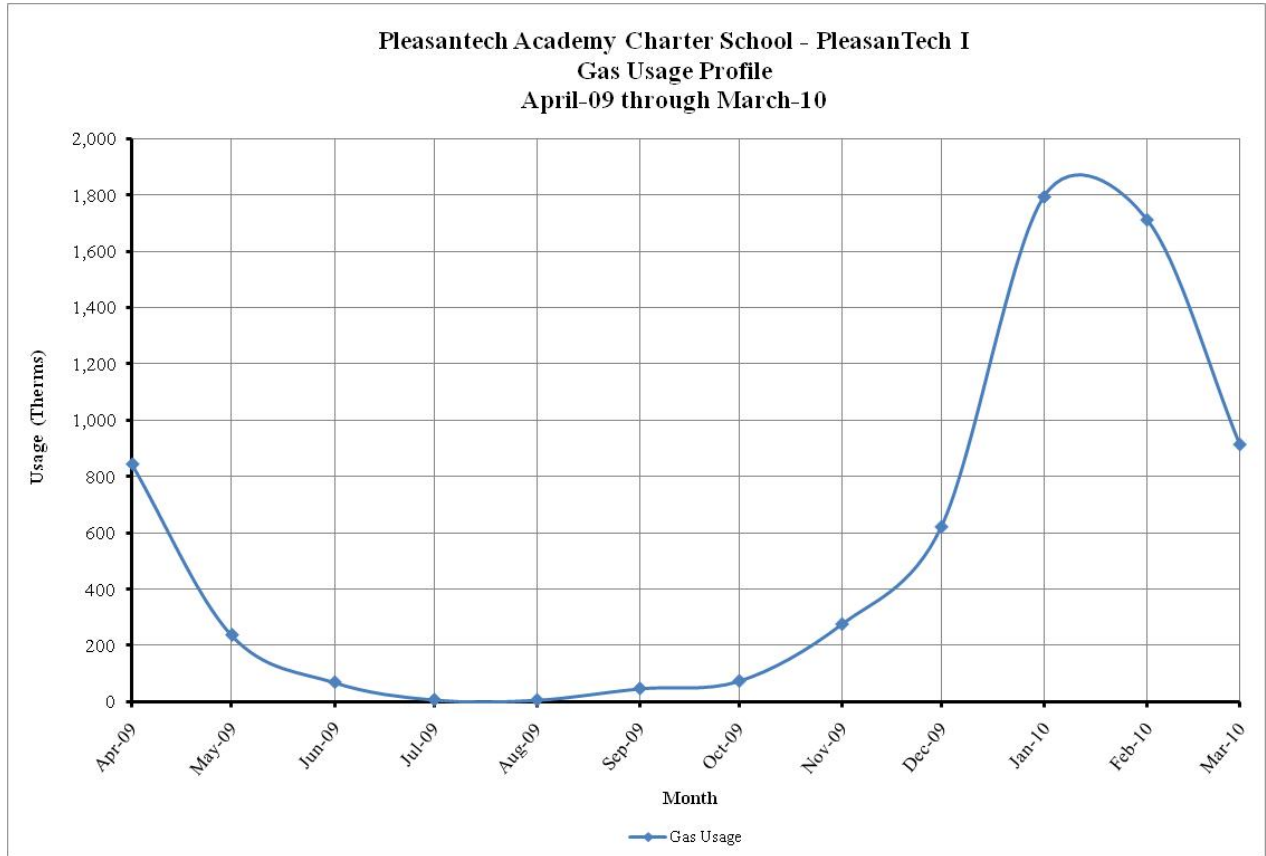
**Figure 1**  
**Electricity Usage Profile**



**Table 4  
Natural Gas Billing Data**

<b>NATURAL GAS USAGE SUMMARY</b>		
Utility Provider: South Jersey Gas		
Rate: BSC - Firm Transportation		
Meter No: 0535864		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
<b>MONTH OF USE</b>	<b>CONSUMPTION (THERMS)</b>	<b>TOTAL BILL</b>
Apr-09	844.39	\$1,225.45
May-09	237.59	\$359.74
Jun-09	69.35	\$117.77
Jul-09	7.25	\$31.03
Aug-09	6.19	\$27.01
Sep-09	47.15	\$80.67
Oct-09	73.73	\$113.82
Nov-09	275.73	\$373.04
Dec-09	621.34	\$816.40
Jan-10	1,794.17	\$2,532.96
Feb-10	1,712.49	\$2,510.07
Mar-10	914.17	\$1,202.06
<b>TOTALS</b>	<b>6,603.55</b>	<b>\$9,390.02</b>
<b>AVERAGE RATE:</b>	<b>\$1.42</b>	<b>\$/THERM</b>

**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:

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

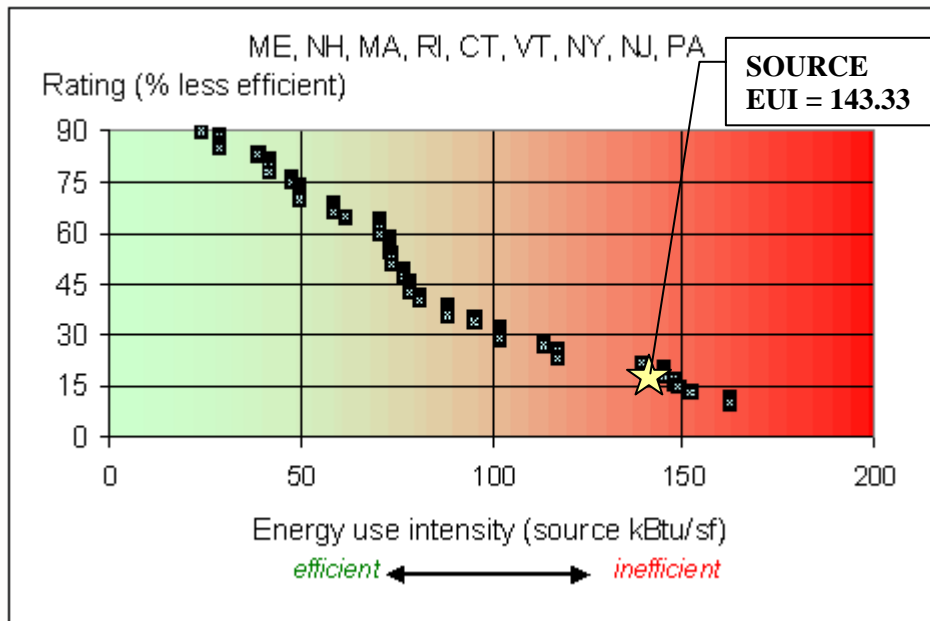
$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Gas Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

**Table 5  
Facility Energy Use Index (EUI) Calculation**

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	135,200.0	-	-	461,573	3.340	1,541,653
NATURAL GAS	-	6,603.6	-	660,355	1.047	691,392
TOTAL				1,121,928		2,233,045
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
<b>BUILDING AREA</b>	15,580 SQUARE FEET					
<b>BUILDING SITE EUI</b>	72.01 kBtu/SF/YR					
<b>BUILDING SOURCE EUI</b>	143.33 kBtu/SF/YR					

Figure 3 below depicts a national EUI grading for the source use of *Elementary School Buildings*.

**Figure 3  
Source Energy Use Intensity Distributions: Elementary School**



**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](http://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:           pleasantechacs  
 Password:           lgeaceg2010  
  
 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 6**  
**ENERGY STAR Performance Rating**

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Pleasantech I	88	50

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

## V. FACILITY DESCRIPTION

The 15,580 SF charter elementary school is a one story facility comprised of a classrooms, restrooms, multi-purpose room, kitchen, offices, nurse, tech lab and Faculty Lounge. The typical hours of operation for this facility are between 7:00 am and 6:00 pm. Exterior walls are block construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in very poor condition and appear to be maintained to the best of the maintenance staff's ability. Typical windows throughout the facility are 8"x8" nominal glass block that are mortared into place. Blinds are not utilized in the facility. The blinds can be valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a built-up roof with light color painted surface. The amount of insulation below the roofing is unknown. The building was built around 1950 with no additions since the original construction.

### HVAC Systems

The building is conditioned by twelve (12) constant volume, single zone roof top air conditioners made by York and by Ruud Air Conditioning Division. The packaged rooftop units include a gas heat exchanger to heat the primary supply air. Local programmable thermostats control each roof top unit. Conditioned air is distributed to the building through ductwork to ceiling diffusers.

### Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fan is operated manually based on the facility occupancy schedule.

### HVAC System Controls

The HVAC systems are controlled via programmable thermostats.

### Domestic Hot Water

Domestic hot water for the restrooms and kitchen is provided by two (2) Bradford White model MI5036EN10 hot water heaters each with a 50 gallon tank, 82 gallon first hour recovery, 40 MBH natural gas input and has an 80% thermal efficiency. The domestic hot water does not have a circulator pump. The domestic hot water piping is not insulated. The water heaters are twelve (12) years old, appear to be in poor condition and are at the end of their expected useful service life.

### Lighting

The lighting at the PleasanTech I campus is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts. There are a few storage rooms and closets with incandescent lighting fixtures. The exterior areas have high pressure sodium lamps.

## **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: Lighting Upgrade - General

#### Description: General

The lighting at the PleasanTech I campus is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts. There are a few storage rooms and closets with incandescent lighting fixtures. The exterior areas have high pressure sodium lamps.

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

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

#### Energy Savings Calculations:

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

NJ Smart Start<sup>®</sup> Program Incentives are calculated as follows:

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

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\# \text{ of } 1-4 \text{ lamp fixtures retrofitted} \times \$15)$$

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (180 \times \$15) = \$2,700$$

Total Incentive:

$$\text{Total Smart Start}^{\circledR} \text{ Incentive} = \$2700$$

Replacement and Maintenance Savings are calculated as follows:

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

$$\text{Savings} = (48 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$336$$

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

### Energy Savings Summary:

<b>ECM #1 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$18,470
<b>NJ Smart Start Equipment Incentive (\$):</b>	\$2,700
<b>Net Installation Cost (\$):</b>	\$15,770
<b>Maintenance Savings (\$/Yr):</b>	\$336
<b>Energy Savings (\$/Yr):</b>	\$6,126
<b>Total Yearly Savings (\$/Yr):</b>	\$6,462
<b>Estimated ECM Lifetime (Yr):</b>	15
<b>Simple Payback</b>	2.4
<b>Simple Lifetime ROI</b>	514.6%
<b>Simple Lifetime Maintenance Savings</b>	\$5,040
<b>Simple Lifetime Savings</b>	\$96,930
<b>Internal Rate of Return (IRR)</b>	41%
<b>Net Present Value (NPV)</b>	\$61,372.94

## ECM #2: Occupancy Sensors

### Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in storage rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe

for when to turn the lights off is approximately two minutes. If the lights are off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. Photocell control senses light levels and turn off or reduce lights when there is adequate daylight. Photocells are mostly used outside, but are becoming more popular in energy-efficient interior lighting designs as well.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the “Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways,” document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control - 20%-28%.

Energy savings achieved for “Occupancy Sensors for Lighting Control” average 20%-28%. In order to present a conservative projection of actual energy savings resulting from the implementation of this ECM for energy management controls, savings are estimated at 10% of the total light energy controlled by occupancy sensors.

The **Investment Grade Lighting Audit Appendix** of this report includes a summary of the rooms recommended for lighting controls implementation as calculated in this ECM.

Light Energy = 58,812 kWh/Yr. occupancy sensor controlled lighting

### Energy Savings Calculations:

$$\text{Energy Savings} = 10\% \times \text{Occupancy Sensored Light Energy (kWh/Yr)}$$

$$\text{Energy Savings} = 10\% \times 58,812 \text{ (kWh)} = 5,881 \text{ (kWh)}$$

$$\text{Savings} = \text{Energy Savings (kWh)} \times \text{Ave Elec Cost} \left( \frac{\$}{\text{kWh}} \right)$$

$$\text{Savings} = 5,881 \text{ (kWh)} \times 0.176 \left( \frac{\$}{\text{kWh}} \right) = \$1035$$

Installation cost per dual-technology sensor (Basis: Sensor switch or equivalent) is \$160/unit including material and labor for a single switch application and \$225/unit for a double switch application.

$$\begin{aligned} \text{Installation Cost} &= \$160 \times 23 \text{ (single sw.) occupancy sensors} = \$3,680 \\ \text{Installation Cost} &= \$225 \times 2 \text{ (double sw.) occupancy sensors} = \underline{\$450} \\ &\text{Total} = \$4,130 \end{aligned}$$

NJ Smart Start<sup>®</sup> Program Incentives are calculated as follows:

From the **NJ Smart Start<sup>®</sup> Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive: occupancy = \$35 per sensor.

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = (\# \text{ of devices} \times \$35) = (25 \times \$35) = \underline{\$875}$$

### Energy Savings Summary:

<b>ECM #2 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$4,130
<b>NJ Smart Start Equipment Incentive (\$):</b>	\$875
<b>Net Installation Cost (\$):</b>	\$3,255
<b>Maintenance Savings (\$/Yr):</b>	\$0
<b>Energy Savings (\$/Yr):</b>	\$1,035
<b>Total Yearly Savings (\$/Yr):</b>	\$1,035
<b>Estimated ECM Lifetime (Yr):</b>	15
<b>Simple Payback</b>	3.1
<b>Simple Lifetime ROI</b>	377.0%
<b>Simple Lifetime Maintenance Savings</b>	\$0
<b>Simple Lifetime Savings</b>	\$15,525
<b>Internal Rate of Return (IRR)</b>	31%
<b>Net Present Value (NPV)</b>	\$9,100.76

### **ECM #3: Building Envelope Improvement - Window Upgrade**

#### **Description:**

The windows in the Pleasantech I building are nominal 8"x8" hollow glass block windows with mortar joints. These windows are below today's standards in insulation value and solar heat reflectivity. The age of the windows and construction methods contribute to the leakage rate of the building. These windows are in poor condition and there are a few broken glass blocks that allow water infiltration. These factors lead to increased energy use in the cooling and heating season. There is no external architectural shading for the windows except at the school entrance. Some shading is provided on the East and South elevations due to existing trees. The heating loss due to glass block with mortar joints can result in large energy consumption.

This ECM includes the replacement of all existing windows in the building with double pane windows and low emissivity glass. The proposed windows will include operable openings to allow occupant the option of natural ventilation. In addition, the double pane structure will significantly increase the insulation value compared to the existing glass block window structure.

Building envelope improvements may require a significant investment. Typically, the investment is recovered through energy savings however; the payback is generally quite protracted. For example, in a drafty building, adding insulation or upgrading the windows would improve comfort. Human comfort impacts productivity as uncomfortable or unhappy occupants will have a higher absentee rate and/or will require additional time from maintenance personnel as they search for stopgap solutions to the comfort problem.

#### **Energy Savings Calculations:**

For the following energy savings calculations, we obtained heating and cooling degree days from the Atlantic City weather data (ASHRAE 90.1-2007) and the window areas from survey measurements and photographs of this facility. Refer to the calculation summary below.

Heating Degree Days (HDD65) = 5,169°F – day/yr.

Cooling Degree Days (CDD65) = 3,198°F – day/yr.

Total window area to be retrofitted = 1,350 SF

New Window Area = 720 SF

New wall infill area = 630 SF (block w/stucco \$7,650)

Existing AC = 8.8 EER (average)

Hollow Glass Block:  $U_{\text{exist}} = 0.60 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

Masonry block, 2 core  $U_{\text{block}} = 0.54 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

Option 1: Contractor Proposed Single Hung vertical slider

Contractor Proposed Single Hung vertical slider, aluminum frame  $U_{new} = 0.62 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

Annual Energy Savings (Heating) =

$$\frac{24 \text{ hrs} * ((\text{Window Area}_{\text{exist}} * U_{\text{exist}}) - (\text{Window Area}_{\text{new}} * U_{\text{new}} + \text{Area}_{\text{newblock}} U_{\text{newblock}})) * \text{HDD}}{\text{HDD}}$$

$$= 24 * ((1,350 * 0.60) - (0.62 * 720 + 0.54 * 630)) * 5,169 = -17.5 \text{ MMBtu} = 29.03 \text{ Therms}$$

Annual Energy Savings (Cooling) =

$$\frac{24 \text{ hrs/day} * ((\text{Window Area}_{\text{exist}} * U_{\text{exist}}) - (\text{Window Area}_{\text{new}} * U_{\text{new}} + \text{Area}_{\text{newblock}} U_{\text{newblock}})) * \text{CDD}}{\text{Existing AC EER}}$$

$$\frac{24 * ((1,350 * 0.60) - (0.62 * 720 + 0.54 * 630)) * 3,198}{8.8} = 0.20 \text{ MMBTU} = 2.04 \text{ kWh}$$

$$\text{Total Energy Savings} = 29.03 \text{ Therms} * \$1.42 + 2.04 \text{ kWh} * \$0.176 = \$31$$

Upgraded Window Cost = \$46,589

Window infill cost = \$7,636

Total option 1 construction cost = \$54,225

Simple Payback for contractor recommended windows = none

Refer to the calculation summary below.

Option 2: Modified Contractor Proposed Single Hung vertical slider

The contractor selection can be modified with a low-e coating and using Argon between each glazing instead of air we have the following:

Modified Contractor Proposed Single Hung vert. slider, alum. frame  $U_{new} = 0.51 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

Option 3: Proposed Single Hung vertical slider (low U factor)

The proposed single hung vertical slider with a low-e coating and using Argon we have the following:

Proposed Single Hung vertical slider, alum. frame  $U_{new} = 0.41 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

Option 4: Proposed Single Hung vertical slider (low U factor)

The proposed single hung vertical slider with a low-e coating and using Argon for equivalent transmitted light we have the following:

Proposed Single Hung vertical slider, alum. frame  $U_{new} = 0.41 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$

**Calculation Summary:**

Option Number	Description	Annual Energy Savings Heating (Therms)	Annual Energy Savings Cooling (kWh)	Total Annual Energy Savings (\$)	Total Construction Cost (\$)
Existing	Existing Glass Block	0.0	0.0	0.0	-
1	Contractor Proposed	29.0	2.0	41.6	\$54,225
2	Contractor Proposed Modified	127.3	8.9	182.3	\$56,125
3	Proposed Low-E	216.6	15.2	310.2	\$59,936
4	Proposed Low-E, equal light	281.9	19.8	403.7	\$84,446

**Energy Savings Summary:**

<b>ECM #3 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$84,446
<b>NJ Smart Start Equipment Incentive (\$):</b>	\$0
<b>Net Installation Cost (\$):</b>	\$84,446
<b>Maintenance Savings (\$/Yr):</b>	\$0
<b>Energy Savings (\$/Yr):</b>	\$404
<b>Total Yearly Savings (\$/Yr):</b>	\$404
<b>Estimated ECM Lifetime (Yr):</b>	15
<b>Simple Payback</b>	209.2
<b>Simple Lifetime ROI</b>	-92.8%
<b>Simple Lifetime Maintenance Savings</b>	\$0
<b>Simple Lifetime Savings</b>	\$6,056
<b>Internal Rate of Return (IRR)</b>	-23%
<b>Net Present Value (NPV)</b>	<b>(\$79,626.66)</b>

ECM#3 investigates four options for window upgrade. Energy savings will not provide a payback of installation costs. However, due to the poor condition of the existing glass block windows, they should be replaced. The proposed new window area is based on the Option 1 estimate obtained by the school. The 720 square feet of new window (20 pair of single hung vertical slider) in place of 1350 square feet of existing glass block will have the unintended result of only 64% of the existing natural light being provided. Providing an equivalent amount of natural lighting would require 31 pair of windows as described in Option 4. Pleasantech Academy Charter School should consider installing the most efficient window as suggested in ECM #3 Option 4 (or equal).

## **ECM #4: Domestic Water Heater Replacement**

### **Description:**

There are two (2) existing Bradford White model MI5036EN10 each with a 50 gallon tank, 40,000 BTUH input natural gas heater with 80% thermal efficiency and a nameplate first hour available of 82 gallon and a recovery rate of 42 gallons per hour at 90°F rise.

This energy conservation measure will replace the two (2) existing water heater with one (1) 96% thermal efficient Bradford White model EF-60T-125E-3N gas fired domestic hot water heater having 125 MBH input and 60-gallon storage capacity or equivalent.

### **Energy Savings Calculations:**

#### Existing Natural Gas DW Heater

Rated Capacity = 40 MBH input; 50 gallons storage (x 2 units)

Combustion Efficiency = 80%

Age & Radiation Losses = 5%

Thermal Efficiency = 75%

#### Proposed Natural Gas-Fired, High-Efficiency DW Heater

Rated Capacity = 125 MBH input; 60 gallons storage

Thermal Efficiency = 96%

Radiation Losses = 0.5%

Net Efficiency = 95.5%

Operating Data for Domestic Water Heater

ESTIMATED NATURAL GAS USAGE											
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Fuel	Input (MBh)	% of Total Input	Estimated Annual Therms	
-	Basement Mechanical Rm.	Kitchen, restrooms and Faculty Rm.	Bradford White	1	MI5036EN10	SF2147757-131E0222	NG	40	0.0259	170.97	
-	Basement Mechanical Rm.	Kitchen, restrooms and Faculty Rm.	Bradford White	1	MI5036LN10	SE1780695-131E0222	NG	40	0.0259	170.97	
1	Roof	Multi Purpose	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155601	NG	125	0.0809	534.27	
2	Roof	KB	RUUD AIR CONDITIONING DIV.	1	URKA-A060CK10E	1R6671ADAAF440211766	NG	100	0.0647	427.41	
3	Roof	SP ED / 1C / Girls RR	YORK	1	D2CG072N09925DBA	(S) NGKM088448	NG	125	0.0809	534.27	
4	Roof	KC / Boys	York Sunline 2000	1	D7CG048N09925A	NHGM099576	NG	125	0.0809	534.27	
5	Roof	KA	YORK	1	D7CG048N09925A	NHGM096806	NG	125	0.0809	534.27	
6	Roof	1A, 1B, 2D	YORK	1	D4CG060N103258	NMBM084789	NG	125	0.0809	534.27	
7	Roof	Faculty, Kitchen	York Sunline 2000	1	D7CG036N07925DBA	(S) NGKM088435	NG	100	0.0647	427.41	
8	Roof	Main Entrance, ASA	York Sunline 2000	1	D7CG048N09925A	NFGM072710	NG	125	0.0809	534.27	
9	Roof	3A, 3B	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155602	NG	125	0.0809	534.27	
10	Roof	Tech Lab, 3C	York Sunline 2000	1	D7CG060N07925DBA	(S) NGKM088353	NG	100	0.0647	427.41	
11	Roof	3D, 2A	York Sunline 2000	1	D7CG048N09925A	NCGM090171	NG	125	0.0809	534.27	
12	Roof	2B, 2C	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155606	NG	125	0.0809	534.27	
-	Kitchen	Hood	STOVE	1	4 BURNER W/ OVEN	-	NG	40	0.0259	170.97	
								Total Input MBH	<b>1,545</b>	1.0000	6603.55
								Total Input Therms	15.5		
								Total Gas Consumption Therms / yr.	6603.55		

$$\text{Estimated Consumption} = \frac{80\text{MBHinput}}{1,545\text{MBHbldginput}} \times 6,603.55\text{Therms} / \text{year} = 342\text{Therms} / \text{year}$$

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

$$\text{Energy Savings} = 342 \text{ Therms} \times \frac{(95.5\% - 75\%)}{(95.5\%)} = 73.4 \text{ Therms}$$

Average Cost of Natural Gas = \$1.42/Therm

$$\text{Yearly Savings} = 73.4 \text{ Therm} \times \$1.42 / \text{Therm} = \$104/\text{year}$$

Cost of one (1) Commercial Domestic Water Heater and Installation = \$7,070

Smart Start Incentive = \$2.00/MBh x (125) /installed MBh = \$250.

$$\text{Simple Payback} = (\$7,070 - \$250) / \$320 = 65.6 \text{ years}$$

**Energy Savings Summary:**

<b>ECM #4 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$7,070
<b>NJ Smart Start Equipment Incentive (\$):</b>	\$250
<b>Net Installation Cost (\$):</b>	\$6,820
<b>Maintenance Savings (\$/Yr):</b>	\$0
<b>Energy Savings (\$/Yr):</b>	\$104
<b>Total Yearly Savings (\$/Yr):</b>	\$104
<b>Estimated ECM Lifetime (Yr):</b>	15
<b>Simple Payback</b>	65.4
<b>Simple Lifetime ROI</b>	-77.1%
<b>Simple Lifetime Maintenance Savings</b>	\$0
<b>Simple Lifetime Savings</b>	\$1,563
<b>Internal Rate of Return (IRR)</b>	-15%
<b>Net Present Value (NPV)</b>	<b>(\$5,575.83)</b>

## ECM #5: High Efficiency Roof Top Air Conditioner

### Description:

Pleasantech I is conditioned by twelve (12) packaged roof top air conditioning units with natural gas heat. One (1) unit is past its ASHRAE expected useful service life. The unit is a York model D4CG060N103258 with a nominal cooling capacity of 59,000 BTUH and 125 MBH natural gas input and 103 MBH heating output. The unit is approximately 17 years old, in poor condition and very inefficient (SEER=10.0).

This ECM would replace the existing rooftop unit with a high-efficiency Trane Model TCD181E or equal with an efficiency of SEER=15. The unit will have dual enthalpy controlled economizer.

### Energy Savings Calculations:

#### Cooling Assumptions:

Total Cooling Capacity	= 59 MBH = 4.9 Tons
Existing Unit Efficiency	= 10.0 SEER De-rate 10% = 9 SEER
New Unit Efficiency	= 15 SEER
Average Cost of Electricity	= \$0.176/kWh
Average Annual Hours @ Full Load	= 1,155 Hours (33% of CDD50); ASHRAE 90.1-2007, Atlantic City, CDD50 = 3,198

#### Cooling Savings Calculation:

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

$$EnergySavings = \frac{5(Tons) \times 12,000 \left( \frac{Btu}{Ton\ hr} \right)}{1000 \left( \frac{Wh}{kWh} \right)} \times \left( \frac{1}{10 \left( \frac{Btu}{W} \right)} - \frac{1}{15 \left( \frac{Btu}{W} \right)} \right) \times 1,155\ hours$$

$$= \underline{2,310\ kWh}$$

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

$$\text{Demand Savings} = \frac{2,310 \text{ (kWh)}}{1,155 \text{ Hrs.}} = \underline{2.0 \text{ kW}}$$

Total Annual Energy Cost Savings = 2,310 kWh x \$0.176/kWh = \$407 per year

Smart Start® Incentive = (Number of Tons x \$ 92/Ton) = (5 x \$92) = \$460

Smart Start® IncentiveDualEnthalpyControls = (\$ 250 / Unit) = (1 x \$250) = \$250

Total Smart Start® Incentive = \$460 + \$250 = \$710.

The total installed cost of a 5-Ton packaged rooftop unit with natural gas heat is \$9,800.

### Energy Savings Summary:

<b>ECM #5 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$9,800
<b>NJ Smart Start Equipment Incentive (\$):</b>	\$710
<b>Net Installation Cost (\$):</b>	\$9,090
<b>Maintenance Savings (\$/Yr):</b>	\$0
<b>Energy Savings (\$/Yr):</b>	\$407
<b>Total Yearly Savings (\$/Yr):</b>	\$407
<b>Estimated ECM Lifetime (Yr):</b>	15
<b>Simple Payback</b>	22.3
<b>Simple Lifetime ROI</b>	-32.8%
<b>Simple Lifetime Maintenance Savings</b>	\$0
<b>Simple Lifetime Savings</b>	\$6,105
<b>Internal Rate of Return (IRR)</b>	-5%
<b>Net Present Value (NPV)</b>	(\$4,231.26)

## VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 2850 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 40.25 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 44,149 KWh annually, reducing the overall utility bill by approximately 32.65% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory

PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today’s energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

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

**Table 7  
Financial Summary – Photovoltaic System**

<b>FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM</b>			
<b>PAYMENT TYPE</b>	<b>SIMPLE PAYBACK</b>	<b>SIMPLE ROI</b>	<b>INTERNAL RATE OF RETURN</b>
Direct Purchase	15.6 Years	6.4%	4.7%

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

Given the large amount of capital required by the Pleasantech Academy Charter School to invest in a solar system through a Direct Purchase CEG does not recommend the Pleasantech Academy Charter School pursue this route. It would be more advantageous for the Pleasantech Academy Charter School to solicit Power Purchase Agreement (PPA) Providers who will own, operate,

and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the Pleasantech Academy Charter School at a reduced rate compared to their existing electric rate.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed is not adequate, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

## **IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY**

### **Load Profile:**

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

### Electricity:

The Electric Usage Profile demonstrates a fairly typical cooling load profile for a school. The early summer and early fall demonstrates increased consumption due to air conditioning loads coinciding with occupancy of school students. The air conditioning load is a result of the multiple rooftop units. The usage in the middle of the summer (July and August) is reduced since the facility is less occupied. The remainder of the year, the load profile is fairly steady which is typical for an education facility throughout the school season. Based on the load profile, this facility is able to manage cooling energy somewhat efficiently compared to Pleasantech II, where cooling appears to be utilized all summer. There is no spike in electric cooling in the heating season which indicates that there is not an extensive use of electric heat in the facility. The demand peaks for this facility in June and again in October indicating the largest electric draw at the beginning and end of the school year close to the summer months. Demand profile remains fairly steady throughout the remainder of the school year with reduced electric draw in the heating season. The load factor for this facility is 22%. Load factor is an indication of how long the facility is at full electric draw. 22% load factor means that the facility's electric draw is equivalent to the peak electric draw pulling power for 30% of the time. The higher the load factor, the more stable / steady the electric demand for the facility. A load factor above 50% in addition to a flat load profile will allow for more competitive energy prices when shopping for alternative suppliers.

### Natural Gas:

The natural gas load profile demonstrates a very typical heat load profile. The summer months demonstrate extremely low consumption June through October, however there is always some usage due to the hot water heaters keeping the tanks warm. There is an increase in consumption November through May. Natural gas is used by the gas fired rooftop units as the sole source of heat for the facility. Natural gas is also used for the domestic hot water heaters and a small residential style range used for cooking. A base-load shaping (flat profile) for natural gas will secure more competitive energy prices when procuring energy through alternative suppliers.

**Tariff Analysis:**Electricity:

This facility receives electrical service through Atlantic City Electric through their Monthly General Service (MGS-Secondary) rate. This service classification is available for general service purposes on secondary voltages. This rate is a three phase services at secondary voltages. For electric supply (generation), the customer has the option to purchase energy through the utility's Generation Charge or a Third Party Supplier (TPS). This facility utilizes the generation service provide through Atlantic City Electric (BGS), Therefore, they will pay according to the default service. The Delivery Service includes the following charges: Customer Charge, Distribution Charge (kW Demand), Reactive Demand Charge (kvar Demand, over 1/3 kW), Distribution Charge kWh, Non-utility Generation Charge, Societal benefits Charge kWh, Regulatory Assets Recovery Charge kWh, Transition Bond Charge kWh, Market Transition Charge Tax kWh, System Control Charge kWh, CIEP Standby Fee kWh, Transmission Demand Charge kW, Reliability Must Run Transmission Surcharge kWh, Transmission Enhancement Charge kWh, Basic Generation Service Charge kWh, Regional Greenhouse Gas Initiative Recovery Charge kWh, Infrastructure Investment Surcharge.

The Demand charges are based on measured demand for each month. Monthly General Service does not include a ratchet demand rate. The usage charges are based on a stepped rate structure. MGS includes demand charges which are typically far less than the usage charges making this rate structure less dependent on demand versus usage. MGS is more applicable for facilities with higher (erratic) demand and lower usage. The steps for the usage charges are very small increments of change, which result in fairly steady costs per kWh per month despite the changes in electrical usage and demand. MGS rate structure has changes base on the changing seasons. Electric costs over all are approximately 15% higher in the summer months June through September than the winter months.

Natural Gas:

This facility receives natural gas service through South Jersey Gas Company on its General Service Gas rate, "Firm Transportation". This is a firm delivery service (higher level of delivery) for general purposes where 1) customer does not qualify for any other rate schedule. Customers may either purchase gas supply from a Third Party (TPS) or from Public Services Basic Gas Supply Service default service as detailed in the rate schedule. This service has a much higher priority of delivery, based on the pipeline capacity. The "firm" service is the highest priority, and does not get interrupted. The customer is currently purchasing natural gas from the third party supplier MXenergy.

This rate schedule has a Delivery Charge Mechanism which includes: Basic Gas Supply Service Charge, Capital Investment Recovery Charge, Transportation Initiation Charge, Societal Benefits Charge, Temperature Adjustment Charge, Balancing Service Charge, Economic Development Rate Charge, Conservation Incentive Program Charge, and Energy Efficiency Tracker Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS). Note: If the facility should choose to utilize a third

party supplier (TPS) and the TPS not deliver, the customer may receive service from South Jersey Gas under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service. Should the TPS un-deliver to the utility on behalf of the client, the utility will automatically supply this default service to the client.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

**Recommendations:**

CEG recommends a global approach that will be consistent with all facilities under the school system's ownership. Based on the latest electric utility bill, the average price per kWh (kilowatt hour) for the building based on 1-year historical average price is \$.1248/kWh (this is the average "price to compare" if the client intends to shop for energy). The average price per decatherm for natural gas is \$ 9.33 / Dth (this is the "price to compare" if the client intends to shop for energy, decatherm is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is fairly competitive. The owner should consider procuring energy through alternative supply sources to shop for the most competitive prices. CEG recommends that the owner receive further advisement on these prices through an energy advisor.

CEG also recommends that the owner schedule a meeting with the current utility providers to review their utility charges and current tariff structures for electricity and proposed natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the owner can learn more about the competitive supply process. Pleasantech can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at [www.nj.gov/bpu](http://www.nj.gov/bpu). The owner should consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the information for ongoing demand-side management projects. Furthermore, special attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with the utility representative. The owner should ask the utility representative about alternative billing options, such as consolidated billing when utilizing the service of a Third Party Supplier. Finally, if the supplier for energy (natural gas) is changed, closely monitor balancing, particularly when the contract is close to termination. This could be performed with the aid of an "energy advisor".

## X. INSTALLATION FUNDING OPTIONS

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

- i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and 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. *Direct Install Program* – The New Jersey Clean Energy’s Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 80% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to [www.njcleanenergy.com](http://www.njcleanenergy.com)) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.

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

## **XI. ADDITIONAL RECOMMENDATIONS**

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

**ECM COST & SAVINGS BREAKDOWN**  
CONCORD ENGINEERING GROUP

**Picasantech I**

<b>ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY</b>															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN	NET PRESENT VALUE
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	General Lighting Upgrade	\$11,082	\$7,388	\$2,700	\$15,770	\$6,126	\$336	\$6,462	15	\$96,930	\$5,040	514.6%	2.4	40.73%	\$61,372.94
ECM #2	Lighting Controls	\$2,478	\$1,652	\$875	\$3,255	\$1,035	\$0	\$1,035	15	\$15,525	\$0	377.0%	3.1	31.26%	\$9,100.76
ECM #3	Window Upgrade	\$84,446	\$0	\$0	\$84,446	\$404	\$0	\$404	15	\$6,056	\$0	-92.8%	209.2	-22.83%	(\$79,626.66)
ECM #4	Domestic Water Heater Replacement	\$7,070	\$0	\$250	\$6,820	\$104	\$0	\$104	15	\$1,563	\$0	-77.1%	65.4	-14.50%	(\$5,575.83)
ECM #5	Roof Top Unit Replacement	\$9,800	\$0	\$710	\$9,090	\$407	\$0	\$407	15	\$6,105	\$0	-32.8%	22.3	-4.61%	(\$4,231.26)
<b>REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY</b>															
REM #1	Solar PV 40.25 KW System	\$362,250	\$0	\$0	\$362,250	\$7,770	\$15,452	\$23,222	25	\$580,550	\$386,300	60.3%	15.6	4.01%	\$42,118.12

- Notes:**
- 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
  - 2) The variable DR in the NPV equation stands for Discount Rate
  - 3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period*.



# Concord Engineering Group, Inc.

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

## SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

### **Electric Chillers**

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

Energy Efficiency must comply with ASHRAE 90.1-2004

### **Gas Cooling**

Gas Absorption Chillers	\$185 - \$400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

### **Desiccant Systems**

\$1.00 per cfm – gas or electric
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### **Electric Unitary HVAC**

Unitary AC and Split Systems	\$73 - \$93 per ton
Air-to-Air Heat Pumps	\$73 - \$92 per ton
Water-Source Heat Pumps	\$81 per ton
Packaged Terminal AC & HP	\$65 per ton
Central DX AC Systems	\$40- \$72 per ton
Dual Enthalpy Economizer Controls	\$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	\$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

### **Ground Source Heat Pumps**

Closed Loop & Open Loop	\$450 per ton, EER ≥ 16
	\$600 per ton, EER ≥ 18
	\$750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

### Gas Heating

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

### Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per hp
Compressors	\$5,250 to \$12,500 per drive

### Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	\$50 per unit
Gas-Fired Water Heaters > 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

### Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$15 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
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	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

**Lighting Controls – Occupancy Sensors**

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

**Lighting Controls – HID or Fluorescent Hi-Bay Controls**

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

**Premium Motors**

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

**Other Equipment Incentives**

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1- 2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%



# STATEMENT OF ENERGY PERFORMANCE

## PleasantTech I

**Building ID:** 2296665  
**For 12-month Period Ending:** March 31, 2010<sup>1</sup>  
**Date SEP becomes ineligible:** N/A

**Date SEP Generated:** June 01, 2010

### Facility

PleasantTech I  
 535 Martin Luther King Boulevard  
 Pleasantville, NJ 08232

### Facility Owner

Pleasantech Academy Charter School  
 700 Black Horse Pike  
 Pleasantville, NJ 08232

### Primary Contact for this Facility

Charmette Long-Vernon  
 700 Black Horse Pike  
 Pleasantville, NJ 08232

**Year Built:** 1950

**Gross Floor Area (ft<sup>2</sup>):** 15,580

**Energy Performance Rating<sup>2</sup> (1-100)** 88

### Site Energy Use Summary<sup>3</sup>

Electricity - Grid Purchase(kBtu)	461,302
Natural Gas (kBtu) <sup>4</sup>	660,355
Total Energy (kBtu)	1,121,657

### Energy Intensity<sup>5</sup>

Site (kBtu/ft <sup>2</sup> /yr)	72
Source (kBtu/ft <sup>2</sup> /yr)	143

### Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO <sub>2</sub> e/year)	105
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### Electric Distribution Utility

Pepco - Atlantic City Electric Co

### National Average Comparison

National Average Site EUI	113
National Average Source EUI	224
% Difference from National Average Source EUI	-36%
Building Type	K-12 School

Stamp of Certifying Professional

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

### Meets Industry Standards<sup>6</sup> for Indoor Environmental Conditions:

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

### Certifying Professional

Michael Fischette  
 520 South Burnt Mill Road  
 Voorhees, NJ 08043

**Notes:**

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


## ENERGY STAR® Data Checklist for Commercial Buildings

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

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
<b>Building Name</b>	Pleasantech I	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
<b>Type</b>	K-12 School	Is this an accurate description of the space in question?		<input type="checkbox"/>
<b>Location</b>	535 Martin Luther King Boulevard, Pleasantville, NJ 08232	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
<b>Single Structure</b>	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"/>
Pleasantech I (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
<b>Gross Floor Area</b>	15,580 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		<input type="checkbox"/>
<b>Open Weekends?</b>	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		<input type="checkbox"/>
<b>Number of PCs</b>	53	Is this the number of personal computers in the K12 School?		<input type="checkbox"/>
<b>Number of walk-in refrigeration/freezer units</b>	1	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		<input type="checkbox"/>
<b>Presence of cooking facilities</b>	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		<input type="checkbox"/>
<b>Percent Cooled</b>	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
<b>Percent Heated</b>	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>
<b>Months</b>	9(Optional)	Is this school in operation for at least 8 months of the year?		<input type="checkbox"/>

<b>High School?</b>	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.	<b>APPENDIX C</b>	<b>Page 3 of 7</b> 
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## ENERGY STAR® Data Checklist for Commercial Buildings

### Energy Consumption

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

Fuel Type: Electricity		
<b>Meter: Electric - Pleasantech I (kWh (thousand Watt-hours))</b> <b>Space(s): Pleasantech I</b> <b>Generation Method: Grid Purchase</b>		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
03/01/2010	03/31/2010	10,760.00
02/01/2010	02/28/2010	11,960.00
01/01/2010	01/31/2010	11,360.00
12/01/2009	12/31/2009	11,920.00
11/01/2009	11/30/2009	10,640.00
10/01/2009	10/31/2009	13,200.00
09/01/2009	09/30/2009	10,720.00
08/01/2009	08/31/2009	9,880.00
07/01/2009	07/31/2009	9,920.00
06/01/2009	06/30/2009	13,360.00
05/01/2009	05/31/2009	11,800.00
04/01/2009	04/30/2009	9,680.00
<b>Electric - Pleasantech I Consumption (kWh (thousand Watt-hours))</b>		<b>135,200.00</b>
<b>Electric - Pleasantech I Consumption (kBtu (thousand Btu))</b>		<b>461,302.40</b>
<b>Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))</b>		<b>461,302.40</b>
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
<b>Meter: Natural Gas - Pleasantech I (therms)</b> <b>Space(s): Pleasantech I</b>		
Start Date	End Date	Energy Use (therms)
03/01/2010	03/31/2010	914.17
02/01/2010	02/28/2010	1,712.49
01/01/2010	01/31/2010	1,794.17
12/01/2009	12/31/2009	621.34
11/01/2009	11/30/2009	275.73
10/01/2009	10/31/2009	73.73
09/01/2009	09/30/2009	47.15
08/01/2009	08/31/2009	6.19
07/01/2009	07/31/2009	7.25
06/01/2009	06/30/2009	69.35

05/01/2009	05/31/2009	237.59	<b>APPENDIX C</b>
04/01/2009	04/30/2009	844.39	<b>Page 5 of 7</b>
<b>Natural Gas - Pleasantech I Consumption (therms)</b>		<b>6,603.55</b>	
<b>Natural Gas - Pleasantech I Consumption (kBtu (thousand Btu))</b>		<b>660,355.00</b>	
<b>Total Natural Gas Consumption (kBtu (thousand Btu))</b>		<b>660,355.00</b>	
<b>Is this the total Natural Gas consumption at this building including all Natural Gas meters?</b>		<input type="checkbox"/>	

<b>Additional Fuels</b>	
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"/>

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

## Certifying Professional

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

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Signature is required when applying for the ENERGY STAR.

# FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

**Facility**  
 PleasanTech I  
 535 Martin Luther King Boulevard  
 Pleasantville, NJ 08232

**Facility Owner**  
 Pleasantech Academy Charter School  
 700 Black Horse Pike  
 Pleasantville, NJ 08232

**Primary Contact for this Facility**  
 Charmette Long-Vernon  
 700 Black Horse Pike  
 Pleasantville, NJ 08232

## General Information

Pleasantech I	
Gross Floor Area Excluding Parking: (ft <sup>2</sup> )	15,580
Year Built	1950
For 12-month Evaluation Period Ending Date:	March 31, 2010

## Facility Space Use Summary

Pleasantech I	
Space Type	K-12 School
Gross Floor Area(ft <sup>2</sup> )	15,580
Open Weekends?	No
Number of PCs	53
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months <sup>o</sup>	9
High School?	No
School District <sup>o</sup>	Pleasantech Academy Charter School District

## Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 03/31/2010)	Baseline (Ending Date 03/31/2010)	Rating of 75	Target	National Average
Energy Performance Rating	88	88	75	N/A	50
Energy Intensity					
Site (kBtu/ft <sup>2</sup> )	72	72	88	N/A	113
Source (kBtu/ft <sup>2</sup> )	143	143	175	N/A	224
Energy Cost					
\$/year	\$ 33,148.02	\$ 33,148.02	\$ 40,602.76	N/A	\$ 51,925.30
\$/ft <sup>2</sup> /year	\$ 2.13	\$ 2.13	\$ 2.61	N/A	\$ 3.34
Greenhouse Gas Emissions					
MtCO <sub>2</sub> e/year	105	105	129	N/A	164
kgCO <sub>2</sub> e/ft <sup>2</sup> /year	7	7	9	N/A	11

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:

o - This attribute is optional.

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

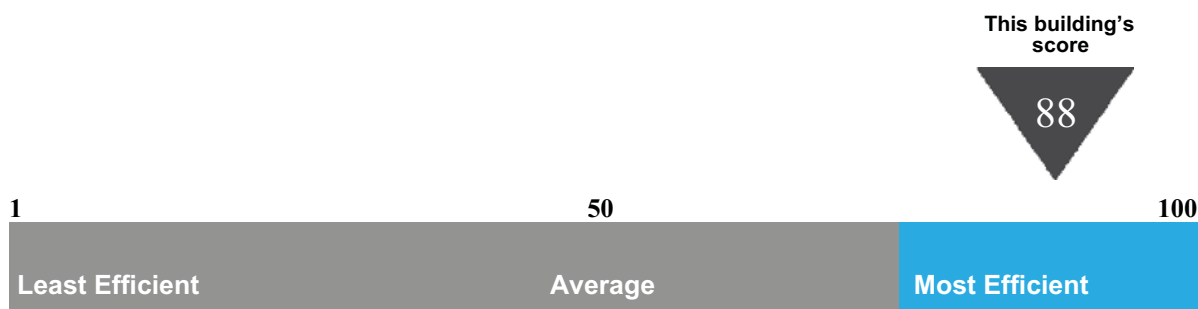
# Statement of Energy Performance

## 2010

PleasantTech I  
535 Martin Luther King Boulevard  
Pleasantville, NJ 08232

Portfolio Manager Building ID: 2296665

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit [energystar.gov/benchmark](http://energystar.gov/benchmark).



This building uses 143 kBtu per square foot per year.\*

\*Based on source energy intensity for the 12 month period ending March 2010

**Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.**

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at [energystar.gov](http://energystar.gov)

Date of certification



**MAJOR EQUIPMENT LIST**

**Concord Engineering Group**

**Pleasantech I**

Domestic Hot Water Heater															
Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	Service Life	Remaining Life	Notes
-	Basement Mechanical Rm.	Kitchen, restrooms and Faculty Rm.	Bradford White	1	MI5036EN10	SF2147757-131E0222	40	82	50	80	Natural Gas	Jun-98	12	0	
-	Basement Mechanical Rm.	Kitchen, restrooms and Faculty Rm.	Bradford White	1	MI5036LN10	SE1780695-131E0222	40	82	50	80	Natural Gas	May-98	12	0	

Air Handling Units																				
Tag	Location	Area Served (1)	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity (MBH)	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
1	Roof	Multi Purpose	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155601	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1999	15	4	
2	Roof	KB	RUUD AIR CONDITIONING DIV.	1	URKA-A060CK10E	1R6671ADAAF440211766	R-22	7.8	60	FURNACE	100	81	81.0%	NATURAL GAS	208/230 / 3	-	Nov-02	15	7	
3	Roof	SP ED / 1C / Girls RR	YORK	1	D2CG072N09925DBA	(S) NGKM088448	R-22	9.0	72	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	2001	15	6	
4	Roof	KC / Boys	York Sunline 2000	1	D7CG048N09925A	NHGM099576	R-22	9.0	47.4	FURNACE	125	99	80.0%	NATURAL GAS	208/230 / 3	-	1998	15	3	
5	Roof	KA	YORK	1	D7CG048N09925A	NHGM096806	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1998	15	3	
6	Roof	1A, 1B, 2D	YORK	1	D4CG060N103258	NMBM084789	R-22	9.0	59	FURNACE	125	103	80.0%	NATURAL GAS	208/230 / 3	-	1993	15	(-2)	
7	Roof	Faculty, Kitchen	York Sunline 2000	1	D7CG036N07925DBA	(S) NGKM088435	R-22	9.1	36	FURNACE	100	79	80.5%	NATURAL GAS	208/230 / 3	-	2001	15	6	
8	Roof	Main Entrance, ASA	York Sunline 2000	1	D7CG048N09925A	NFGM072710	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1998	15	3	
9	Roof	3A, 3B	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155602	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1999	15	4	
10	Roof	Tech Lab, 3C	York Sunline 2000	1	D7CG060N07925DBA	(S) NGKM088353	R-22	9.1	59	FURNACE	100	79	80.5%	NATURAL GAS	208/230 / 3	-	2001	15	6	
11	Roof	3D, 2A	York Sunline 2000	1	D7CG048N09925A	NCGM090171	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1998	15	3	
12	Roof	2B, 2C	York Sunline 2000	1	D7CG048N09925A	(S) NMHM155606	R-22	9.0	47.4	FURNACE	125	99	80.3%	NATURAL GAS	208/230 / 3	-	1999	15	4	

(1) Air Handling Unit area served based on approximate location of unit, thermostat and floor plan. Actual area served not confirmed.

Kitchen Hood														
Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Fan HP	Fan RPM	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Kitchen	Hood	FLO AIRE	1	DDV614	-	< 1	-	-	-	20	15	-5	Rebate only available for 1 hp and larger.

NOTE: IF AN ITEM IS LEFT BLANK, THE INFORMATION IS EITHER NOT AVAILABLE OR NOT APPLICABLE FOR THIS PIECE OF EQUIPMENT.

## Investment Grade Lighting Audit

CEG Job #: 9C10007

Project: PleasanTech Academy 1

535 Martin Luther King Blvd.

Pleasantville NJ, 08232

sq. ft. 15,580

PleasantTech - Lower

KWH COST: \$0.176

### 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
128.44	Mechanical Room	2600	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Wall Mnt., Clear Acrylic Lens	142	0.14	369.2	\$64.98	1	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	0.10	270.4	\$47.59	\$100.00	\$100.00	0.04	98.8	\$17.39	5.75
613		800	1	1	"Keyless" Socket, 100w A19 Lamp	100	0.10	80.0	\$14.08	1	1	(1) 26w CFL Lamp	26	0.03	20.8	\$3.66	\$20.00	\$20.00	0.07	59.2	\$10.42	1.92
142.21	Kitchen	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1,622.4	\$285.54	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	894.4	\$157.41	\$100.00	\$400.00	0.28	728	\$128.13	3.12
617		800	2	1	Hood Light w/Globe & Cage, 100w A19 Lamp	100	0.20	160.0	\$28.16	2	1	(1) 26w CFL Lamp	26	0.05	41.6	\$7.32	\$20.00	\$40.00	0.15	118.4	\$20.84	1.92
142.21	Faculty Lounge	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
142.21	#13 Classroom	2600	10	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.56	4,056.0	\$713.86	10	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.86	2236	\$393.54	\$100.00	\$1,000.00	0.70	1820	\$320.32	3.12
127.21	Men's Restroom	2600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.05	122.2	\$21.51	\$100.00	\$100.00	0.03	80.6	\$14.19	7.05
127.21	Women's Restroom	2600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.05	122.2	\$21.51	\$100.00	\$100.00	0.03	80.6	\$14.19	7.05
142.21	Boy's Restroom	2600	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1,216.8	\$214.16	3	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.26	670.8	\$118.06	\$100.00	\$300.00	0.21	546	\$96.10	3.12
142.21	Girl's Restroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	\$356.93	5	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.43	1118	\$196.77	\$100.00	\$500.00	0.35	910	\$160.16	3.12
142.21	Corridor	3600	14	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.18	7,862.4	\$1,383.78	14	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.20	4334.4	\$762.85	\$100.00	\$1,400.00	0.98	3528	\$620.93	2.25
142.21	#12 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$428.31	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$236.12	\$100.00	\$600.00	0.42	1092	\$192.19	3.12
142.21	#11 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$428.31	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$236.12	\$100.00	\$600.00	0.42	1092	\$192.19	3.12
142.21	Multi Purpose Room	2600	15	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6,084.0	\$1,070.78	15	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.29	3354	\$590.30	\$100.00	\$1,500.00	1.05	2730	\$480.48	3.12
142.21	Office	2600	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1,216.8	\$214.16	3	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.26	670.8	\$118.06	\$100.00	\$300.00	0.21	546	\$96.10	3.12
800	Office Restroom	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#1 Classroom	2600	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.25	3,244.8	\$571.08	8	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.69	1788.8	\$314.83	\$100.00	\$800.00	0.56	1456	\$256.26	3.12
602		8760	1	2	Incandescent Exit Sign	20	0.02	175.2	\$30.84	1	1	LED Exit Sign	5	0.01	43.8	\$7.71	\$65.00	\$65.00	0.02	131.4	\$23.13	2.81
121.11	MPR Office	2600	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.06	150.8	\$26.54	\$100.00	\$100.00	0.02	52	\$9.15	10.93

**Investment Grade Lighting Audit**

142.21	#2 Classroom	2600	12	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	4,867.2	\$856.63	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	2683.2	\$472.24	\$100.00	\$1,200.00	0.84	2184	\$384.38	3.12
800	Closet	800	2	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.12	96.0	\$16.90	2	1	13w CFL Lamps	13	0.03	20.8	\$3.66	\$20.00	\$40.00	0.09	75.2	\$13.24	3.02
142.21	#3 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$428.31	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$236.12	\$100.00	\$600.00	0.42	1092	\$192.19	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#4 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	\$356.93	5	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.43	1118	\$196.77	\$100.00	\$500.00	0.35	910	\$160.16	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#5 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	\$356.93	5	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.43	1118	\$196.77	\$100.00	\$500.00	0.35	910	\$160.16	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#6 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	\$356.93	5	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.43	1118	\$196.77	\$100.00	\$500.00	0.35	910	\$160.16	3.12
602			8760	1	2	Incandescent Exit Sign	20	0.02	175.2	\$30.84	1	1	LED Exit Sign	5	0.01	43.8	\$7.71	\$65.00	\$65.00	0.02	131.4	\$23.13
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#7 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	\$356.93	5	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.43	1118	\$196.77	\$100.00	\$500.00	0.35	910	\$160.16	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#8 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$428.31	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$236.12	\$100.00	\$600.00	0.42	1092	\$192.19	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	Lobby	3600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	3,369.6	\$593.05	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1857.6	\$326.94	\$100.00	\$600.00	0.42	1512	\$266.11	2.25
142.21	Main Office	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
142.21	Nurse's Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1,622.4	\$285.54	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	894.4	\$157.41	\$100.00	\$400.00	0.28	728	\$128.13	3.12
800	School Store	2600	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	156.0	\$27.46	1	1	13w CFL Lamps	13	0.01	33.8	\$5.95	\$20.00	\$20.00	0.05	122.2	\$21.51	0.93
142.21	#9 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2,839.2	\$499.70	7	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.60	1565.2	\$275.48	\$100.00	\$700.00	0.49	1274	\$224.22	3.12
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#10 Computer Lab	2600	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.25	3,244.8	\$571.08	8	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.69	1788.8	\$314.83	\$100.00	\$800.00	0.56	1456	\$256.26	3.12
1221.11	Server Room	2600	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	156.0	\$27.46	1	1	13w CFL Lamps	13	0.01	33.8	\$5.95	\$20.00	\$20.00	0.05	122.2	\$21.51	0.93
142.21	#16 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$428.31	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$236.12	\$100.00	\$600.00	0.42	1092	\$192.19	3.12
142.21	#15 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2,839.2	\$499.70	7	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.60	1565.2	\$275.48	\$100.00	\$700.00	0.49	1274	\$224.22	3.12

**Investment Grade Lighting Audit**

800	Closet	800	1	1	Surface Mt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	#14 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	156	1.09	2,839.2	\$499.70	7	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.60	1565.2	\$275.48	\$100.00	\$700.00	0.49	1274	\$224.22	3.12
800	Closet	800	1	1	Surface Mt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48.0	\$8.45	1	1	13w CFL Lamps	13	0.01	10.4	\$1.83	\$20.00	\$20.00	0.05	37.6	\$6.62	3.02
142.21	Principal's Office	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
142.21	Work Room	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
142.21	Guidance Office 1	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
142.21	Guidance Office 2	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	156	0.31	811.2	\$142.77	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	447.2	\$78.71	\$100.00	\$200.00	0.14	364	\$64.06	3.12
127.21	Vestibule	3600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mt., Prismatic Lens	78	0.08	280.8	\$49.42	1	3	3 Lamp, 17w T8, Elect. Ballast; retorfit	47	0.05	169.2	\$29.78	\$100.00	\$100.00	0.03	111.6	\$19.64	5.09
725	Exterior	4200	5	1	150w HPS Wallpack	188	0.94	3,948.0	\$694.85	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	<b>Totals</b>		204				29.87	80,785	\$14,218	204			15.6	42,027	\$7,397		\$18,470	13.3	34,810	\$6,126	3.01	

CEG Job #: 9C10007  
 Project: Pleasantech Academy 1  
 Address: 535 Martin Luther King Blvd.  
 Pleasantville NJ, 08232  
 Building SF: 15,580

Pleasantech - Lower

KWH COST: \$0.176

**ECM #2: Lighting Controls**

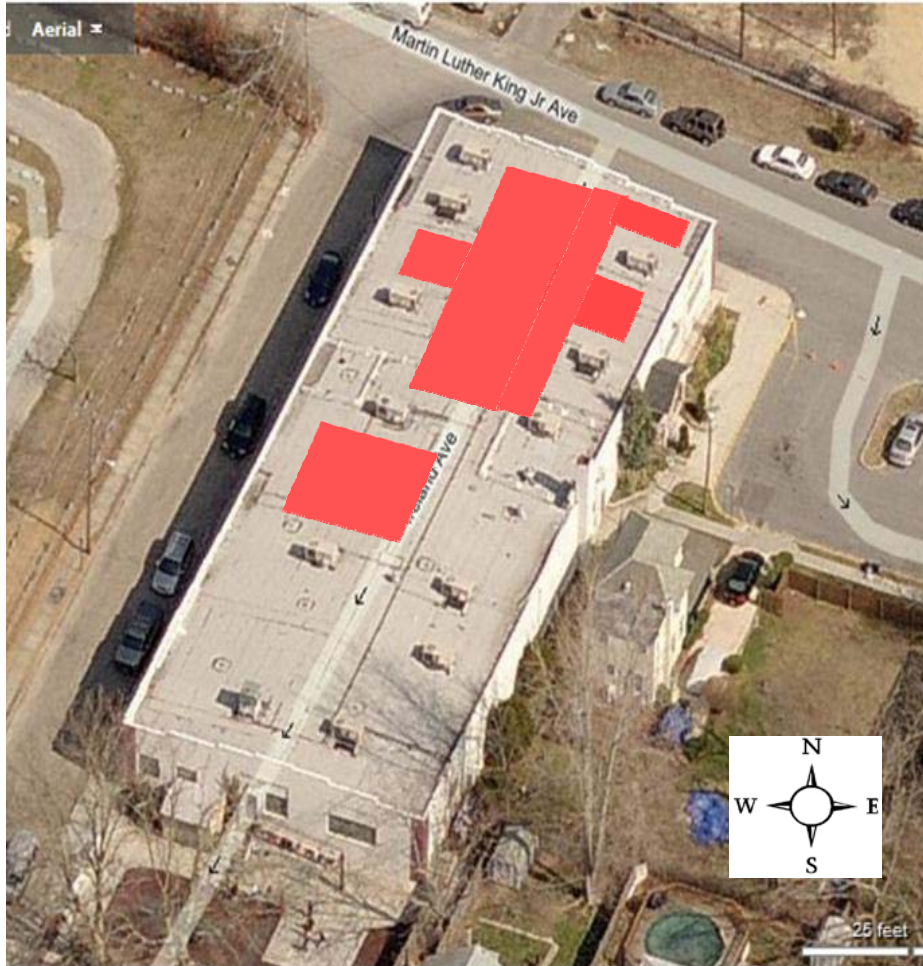
EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
128.4	Mechanical Room	2600	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Wall Mnt., Clear Acrylic Lens	142	0.14	369.2	\$64.98	1	0	No Change	142	0.14	0%	369.2	\$64.98	\$0.00	\$0.00	0.00	0	\$0.00	0.00
613		800	1	1	"Keyless" Socket, 100w A19 Lamp	100	0.10	80	\$14.08	1	0	No Change	100	0.10	0%	80	\$14.08	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Kitchen	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1622.4	\$285.54	4	1	Dual Technology Occupancy Sensor	156	0.56	10%	1460.16	\$256.99	\$160.00	\$160.00	0.06	162.24	\$28.55	5.60
617		800	2	1	Hood Light w/Globe & Cage, 100w A19 Lamp	100	0.20	160	\$28.16	2	0	No Change	100	0.20	0%	160	\$28.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Faculty Lounge	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	1	Dual Technology Occupancy Sensor	156	0.28	10%	730.08	\$128.49	\$160.00	\$160.00	0.03	81.12	\$14.28	11.21
142.2	#13 Classroom	2600	10	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.56	4056	\$713.86	10	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	156	1.40	10%	3650.4	\$642.47	\$225.00	\$225.00	0.16	405.6	\$71.39	3.15
127.2	Men's Restroom	2600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	0	No Change	78	0.08	0%	202.8	\$35.69	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.2	Women's Restroom	2600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	0	No Change	78	0.08	0%	202.8	\$35.69	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Boy's Restroom	2600	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1216.8	\$214.16	3	0	No Change	156	0.47	0%	1216.8	\$214.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Girl's Restroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	\$356.93	5	0	No Change	156	0.78	0%	2028	\$356.93	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Corridor	3600	14	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.18	7862.4	\$1,383.78	14	0	No Change	156	2.18	0%	7862.4	\$1,383.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#12 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$428.31	6	1	Dual Technology Occupancy Sensor	156	0.84	10%	2190.24	\$385.48	\$160.00	\$160.00	0.09	243.36	\$42.83	3.74
142.2	#11 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$428.31	6	1	Dual Technology Occupancy Sensor	156	0.84	10%	2190.24	\$385.48	\$160.00	\$160.00	0.09	243.36	\$42.83	3.74
142.2	Multi Purpose Room	2600	15	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6084	\$1,070.78	15	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	156	2.11	10%	5475.6	\$963.71	\$225.00	\$225.00	0.23	608.4	\$107.08	2.10
142.2	Office	2600	3	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1216.8	\$214.16	3	1	Dual Technology Occupancy Sensor	156	0.42	10%	1095.12	\$192.74	\$160.00	\$160.00	0.05	121.68	\$21.42	7.47

800	Office Restroom	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#1 Classroom	2600	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.25	3244.8	\$571.08	8	1	Dual Technology Occupancy Sensor	156	1.12	10%	2920.32	\$513.98	\$160.00	\$160.00	0.12	324.48	\$57.11	2.80
602		8760	1	2	Incandescent Exit Sign	20	0.02	175.2	\$30.84	1	0	No Change	20	0.02	0%	175.2	\$30.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.1	MPR Office	2600	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.08	202.8	\$35.69	1	0	No Change	78	0.08	0%	202.8	\$35.69	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#2 Classroom	2600	12	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	4867.2	\$856.63	12	1	Dual Technology Occupancy Sensor	156	1.68	10%	4380.48	\$770.96	\$160.00	\$160.00	0.19	486.72	\$85.66	1.87
800	Closet	800	2	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.12	96	\$16.90	2	0	No Change	60	0.12	0%	96	\$16.90	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#3 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$428.31	6	1	Dual Technology Occupancy Sensor	156	0.84	10%	2190.24	\$385.48	\$160.00	\$160.00	0.09	243.36	\$42.83	3.74
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#4 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	\$356.93	5	1	Dual Technology Occupancy Sensor	156	0.70	10%	1825.2	\$321.24	\$160.00	\$160.00	0.08	202.8	\$35.69	4.48
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#5 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	\$356.93	5	1	Dual Technology Occupancy Sensor	156	0.70	10%	1825.2	\$321.24	\$160.00	\$160.00	0.08	202.8	\$35.69	4.48
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#6 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	\$356.93	5	1	Dual Technology Occupancy Sensor	156	0.70	10%	1825.2	\$321.24	\$160.00	\$160.00	0.08	202.8	\$35.69	4.48
602		8760	1	2	Incandescent Exit Sign	20	0.02	175.2	\$30.84	1	0	No Change	20	0.02	0%	175.2	\$30.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#7 Classroom	2600	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	\$356.93	5	1	Dual Technology Occupancy Sensor	156	0.70	10%	1825.2	\$321.24	\$160.00	\$160.00	0.08	202.8	\$35.69	4.48
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#8 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$428.31	6	1	Dual Technology Occupancy Sensor	156	0.84	10%	2190.24	\$385.48	\$160.00	\$160.00	0.09	243.36	\$42.83	3.74
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00

142.2	Lobby	3600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	3369.6	\$593.05	6	0	No Change	156	0.94	0%	3369.6	\$593.05	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Main Office	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	0	No Change	156	0.31	0%	811.2	\$142.77	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Nurse's Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1622.4	\$285.54	4	1	Dual Technology Occupancy Sensor	156	0.56	10%	1460.16	\$256.99	\$160.00	\$160.00	0.06	162.24	\$28.55	5.60
800	School Store	2600	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	156	\$27.46	1	0	No Change	60	0.06	0%	156	\$27.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#9 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2839.2	\$499.70	7	1	Dual Technology Occupancy Sensor	156	0.98	10%	2555.28	\$449.73	\$160.00	\$160.00	0.11	283.92	\$49.97	3.20
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#10 Computer Lab	2600	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.25	3244.8	\$571.08	8	1	Dual Technology Occupancy Sensor	156	1.12	10%	2920.32	\$513.98	\$160.00	\$160.00	0.12	324.48	\$57.11	2.80
1221	Server Room	2600	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	156	\$27.46	1	0	No Change	60	0.06	0%	156	\$27.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#16 Classroom	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$428.31	6	1	Dual Technology Occupancy Sensor	156	0.84	10%	2190.24	\$385.48	\$160.00	\$160.00	0.09	243.36	\$42.83	3.74
142.2	#15 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2839.2	\$499.70	7	1	Dual Technology Occupancy Sensor	156	0.98	10%	2555.28	\$449.73	\$160.00	\$160.00	0.11	283.92	\$49.97	3.20
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	#14 Classroom	2600	7	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2839.2	\$499.70	7	1	Dual Technology Occupancy Sensor	156	0.98	10%	2555.28	\$449.73	\$160.00	\$160.00	0.11	283.92	\$49.97	3.20
800	Closet	800	1	1	Surface Mnt. 12" Globe, (1) 60w A19 Lamp	60	0.06	48	\$8.45	1	0	No Change	60	0.06	0%	48	\$8.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.2	Principal's Office	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	1	Dual Technology Occupancy Sensor	156	0.28	10%	730.08	\$128.49	\$160.00	\$160.00	0.03	81.12	\$14.28	11.21
142.2	Work Room	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	1	Dual Technology Occupancy Sensor	156	0.28	10%	730.08	\$128.49	\$160.00	\$160.00	0.03	81.12	\$14.28	11.21
142.2	Guidance Office 1	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	1	Dual Technology Occupancy Sensor	156	0.28	10%	730.08	\$128.49	\$160.00	\$160.00	0.03	81.12	\$14.28	11.21
142.2	Guidance Office 2	2600	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	\$142.77	2	1	Dual Technology Occupancy Sensor	156	0.28	10%	730.08	\$128.49	\$160.00	\$160.00	0.03	81.12	\$14.28	11.21
127.2	Vestibule	3600	1	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	280.8	\$49.42	1	0	No Change	78	0.08	0%	280.8	\$49.42	\$0.00	\$0.00	0.00	0	\$0.00	0.00
725	Exterior	4200	5	1	150w HPS Wallpack	188	0.94	3948	\$694.85	5	0	No Change	188	0.94	0%	3948	\$694.85	\$0.00	\$0.00	0.00	0	\$0.00	0.00
0	Totals	0	204	0			29.9	80,784.8	14,218.1	204.0	25		0	27.6		74,903.6	\$13,183.03		\$4,130.00	2.26	5,881.20	\$1,035.09	3.99

Project Name: LGEA Solar PV Project - Pleasantech I							
Location: Pleasantville, NJ							
Description: Photovoltaic System - Direct Purchase							
<b>Simple Payback Analysis</b>							
	<b>Photovoltaic System - Direct Purchase</b>						
Total Construction Cost	\$362,250						
Annual kWh Production	44,149						
Annual Energy Cost Reduction	\$7,770						
Annual SREC Revenue	\$15,452						
First Cost Premium	<b>\$362,250</b>						
Simple Payback:	<b>15.60</b> Years						
<b>Life Cycle Cost Analysis</b>							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	<b>\$0.176</b>			Energy Cost Escalation Rate:	3.0%		
Financing Rate:	0.00%			SREC Value (\$/kWh)	\$0.350		
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	\$362,250	0	0	0	\$0	(362,250)	0
1	\$0	44,149	\$7,770	\$0	\$15,452	\$23,222	(\$339,028)
2	\$0	43,928	\$8,003	\$0	\$15,375	\$23,378	(\$315,649)
3	\$0	43,709	\$8,243	\$0	\$15,298	\$23,541	(\$292,108)
4	\$0	43,490	\$8,491	\$0	\$15,222	\$23,712	(\$268,396)
5	\$0	43,273	\$8,745	\$446	\$15,145	\$23,445	(\$244,951)
6	\$0	43,056	\$9,008	\$443	\$15,070	\$23,634	(\$221,317)
7	\$0	42,841	\$9,278	\$441	\$14,994	\$23,831	(\$197,485)
8	\$0	42,627	\$9,556	\$439	\$14,919	\$24,037	(\$173,449)
9	\$0	42,414	\$9,843	\$437	\$14,845	\$24,251	(\$149,198)
10	\$0	42,202	\$10,138	\$435	\$14,771	\$24,474	(\$124,723)
11	\$0	41,991	\$10,443	\$433	\$14,697	\$24,707	(\$100,017)
12	\$0	41,781	\$10,756	\$430	\$14,623	\$24,949	(\$75,068)
13	\$0	41,572	\$11,078	\$428	\$14,550	\$25,200	(\$49,868)
14	\$0	41,364	\$11,411	\$426	\$14,477	\$25,462	(\$24,405)
15	\$0	41,157	\$11,753	\$424	\$14,405	\$25,734	\$1,329
16	\$0	40,951	\$12,106	\$422	\$14,333	\$26,017	\$27,346
17	\$0	40,746	\$12,469	\$420	\$14,261	\$26,311	\$53,656
18	\$0	40,543	\$12,843	\$418	\$14,190	\$26,615	\$80,271
19	\$0	40,340	\$13,228	\$416	\$14,119	\$26,932	\$107,203
20	\$0	40,138	\$13,625	\$413	\$14,048	\$27,260	\$134,463
21	\$1	39,938	\$14,034	\$411	\$13,978	\$27,601	\$162,064
22	\$2	39,738	\$14,455	\$409	\$13,908	\$27,954	\$190,018
23	\$3	39,539	\$14,889	\$407	\$13,839	\$28,320	\$218,338
24	\$4	39,342	\$15,335	\$405	\$13,770	\$28,700	\$247,038
25	\$5	39,145	\$15,795	\$403	\$13,701	\$29,093	\$276,130
<b>Totals:</b>		1,039,972	\$283,297	\$8,906	\$363,990	\$638,380	(\$1,077,804)
<b>Net Present Value (NPV)</b>						<b>\$276,155</b>	
<b>Internal Rate of Return (IRR)</b>						<b>4.7%</b>	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW <sub>DC</sub>	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Pleasantech I	2850	Sunpower SPR230	175	14.7	2,573	40.25	44,149	5,775	15.64



 = Proposed PV Layout

Notes:

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



AC Energy  
&  
Cost Savings



Pleasantech I - West facing

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	29.7 kW
DC to AC Derate Factor:	0.810
AC Rating:	24.0 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	290.0°
Energy Specifications	
Cost of Electricity:	0.2 \$/kWh

Results			
Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Energy Value (\$)
1	1.91	1313	2.31
2	2.70	1776	3.13
3	3.79	2763	4.86
4	4.83	3369	5.93
5	5.67	4003	7.05
6	6.02	3962	6.97
7	5.90	3962	6.97
8	5.20	3508	6.17
9	4.31	2850	5.02
10	3.07	2075	3.65
11	2.01	1293	2.28
12	1.63	1063	1.87
Year	3.93	31937	56.21



AC Energy  
&  
Cost Savings



Pleasantech I -East facing

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	10.6 kW
DC to AC Derate Factor:	0.810
AC Rating:	8.6 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	110.0°
Energy Specifications	
Cost of Electricity:	0.2 \$/kWh

Results			
Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Energy Value (\$)
1	2.27	586	1.03
2	3.02	726	1.28
3	4.07	1067	1.88
4	5.00	1245	2.19
5	5.72	1435	2.53
6	6.08	1427	2.51
7	5.97	1425	2.51
8	5.39	1294	2.28
9	4.60	1089	1.92
10	3.47	857	1.51
11	2.38	576	1.01
12	1.96	484	0.85
Year	4.17	12212	21.49