



# **ENERGY AUDIT – FINAL REPORT**

## **GLOUCESTER CITY PINE GROVE FIRE COMPANY**

**829 JERSEY AVE.**

**GLOUCESTER CITY, NJ 08030**

**ATTN: MR. JACK LIPSETT**

**CEG PROPOSAL No. 9C08131**

## **CONCORD ENGINEERING GROUP**



**520 SOUTH BURNT MILL ROAD**

**VOORHEES, NJ 08043**

**TELEPHONE: (856) 427-0200**

**FACSIMILE: (856) 427-6529**

**[WWW.CEG-INC.NET](http://WWW.CEG-INC.NET)**

**CONTACT: RAYMOND JOHNSON**

**Cell: (609) 760-4057**

**[rjohnson@ceg-inc.net](mailto:rjohnson@ceg-inc.net)**

**Table of Contents**

I. Executive Summary..... 3

II. Introduction..... 5

III. Method of Analysis..... 6

IV. Historic Energy Consumption/Cost..... 8

    a. Energy Usage / Tariffs

    b. Energy Use Index

    c. EPA Energy Star Benchmarking System

V. Facility Description..... 13

VI. Major Equipment List..... 15

VII. Energy Conservation Measures..... 16

VIII. Renewable / Distributed Energy Measures..... 25

IX. Energy Purchasing and Procurement Strategy..... 27

X. Installation Funding Options ..... 29

XI. Additional Recommendations..... 30

Appendix A – Detailed Energy Usage and Costing Data

Appendix B – Detailed Cost Breakdown per ECM

Appendix C – New Jersey Smart Start® Program Incentives

Appendix D – Statement of Energy Performance

Appendix E – Major Equipment List

Appendix F – Investment Grade Lighting Audit

Appendix G – Renewable / Distributed Energy Measures Calculations

**REPORT DISCLAIMER**

The information contained within this report, including any attachment(s), is intended solely for use by the named addressee(s). If you are not the intended recipient, or a person designated as responsible for delivering such messages to the intended recipient, you are not authorized to disclose, copy, distribute or retain this report, in whole or in part, without written authorization from Concord Engineering Group, Inc., 520 S. Burnt Mill Road, Voorhees, NJ 08043.

This report may contain proprietary, confidential or privileged information. If you have received this report in error, please notify the sender immediately. Thank you for your anticipated cooperation.

CONFIDENTIAL

## I. EXECUTIVE SUMMARY

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

Gloucester City  
Pine Grove Fire Company  
829 Jersey Ave.  
Gloucester City, NJ 08030

Municipal Contact Person: Jack Lipsett  
Facility Contact Person: Jim "Bowie" Johnson

This audit was performed in connection with the New Jersey Clean Energy Local Government Energy Audit Program. These energy audits are conducted to promote the office of Clean Energy's mission, 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	\$ 13,895
Natural Gas	\$ 8,958
Total	\$ 22,853

The potential annual energy cost savings are shown below in Table 1. Be aware that the measures are not additive because of the interrelation of several of the measures. The cost of each measure for this level of auditing is  $\pm 20\%$  until detailed engineering, specifications, and hard proposals are obtained.

**Table 1**  
**Energy Conservation Measures (ECM's)**

ECM NO.	DESCRIPTION	COST	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Lighting Upgrade	\$7,451	\$1,486	5	36.9%
2	Lighting Controls	\$770	\$276	2.8	37.8%
3	Roof Top Unit Replacement	\$18,000	\$818	22	(2.4%)
4	Window Replacement	\$4,000	\$172	23	(3.0%)

The estimated demand and energy savings are shown below in Table 2. The information in this table corresponds to the ECM's in Table 1.

**Table 2**  
**Estimated Energy Savings**

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	NAT GAS (THERMS)
1	Lighting Upgrade	5.76	7,821	-
2	Lighting Controls	-	1,454	-
3	Roof Top Unit Replacement	-	3,150	133
4	Window Replacement	-	469	50

Concord Engineering Group strongly recommends the implementation of all ECM's that provide a calculated simple payback at or under seven (7) years. The potential energy and cost savings from these ECM's are too great to pass upon. The following Energy Conservation Measures are recommended for Gloucester City's Pine grove Fire Co:

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

## II. INTRODUCTION

This comprehensive energy audit covers the 10,948 square foot Pine Grove Fire Company that includes members lounge, fire hall, restrooms and engine bays.

The first task was to collect and review one year's worth of utility energy data for electricity and natural gas. This information was used to analyze operational characteristics, calculate energy benchmarks for comparison to industry averages, estimate savings potential, and establish a baseline to monitor the effectiveness of implemented measures. A computer spreadsheet was used to enter, sum, and calculate benchmarks and to graph utility information (see Appendix A).

The Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft<sup>2</sup>/yr) and can be 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 annual consumption of all fuels to BTU's then dividing by the area (gross square footage) of the building. EUI is a good indicator of the relative potential for energy savings. A comparatively low EUI indicates less potential for large energy savings. Blueprints (where available) were obtained from the municipal and were utilized to calculate/verify the gross area of the facility.

After gathering the utility data and calculating the EUI, the next step in the audit process is obtaining Architectural and Engineering drawings (where available). By reviewing the Architectural and Engineering drawings, questions regarding the building envelope, lighting systems/controls, HVAC equipment and controls are noted. These questions are then compared to the energy usage profiles developed during the utility data gathering step. Furthermore, 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. After this information is gathered the next step in the process is the site visit.

The site visit was spent inspecting the actual systems and answering specific questions from the preliminary review. The building manager provided occupancy schedules, O & M practices, the building energy management program, and other information that has an impact on energy consumption.

The post-site work includes evaluation of the information gathered during the site visit, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on mechanical, lighting and building envelope improvements.

### III. METHOD OF ANALYSIS

CEG completed the preliminary audit tasks noted in Section II preparing for the site survey. The site survey is a critical input in deciphering where energy opportunities exist within a facility. The auditor walks the entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed using energy engineering calculations to calculate the anticipated energy usage for the proposed energy conservation measures (ECMs). The actual energy usage is entered directly from the utility bills provided by the Owner. The anticipated energy usage is compared to the actual usage to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not duplicative. The savings for each recommendation may actually be higher if the individual recommendations were installed instead of the entire project. For example, the lighting module calculates the change in wattage and multiplies it by the new operating hours instead of the existing operating hours (if there was a change in the hours at all). The lighting controls module calculates the change in hours and multiplies it by the new system wattage instead of the existing wattage. Therefore, if you chose to install the recommended lighting system but not the lighting controls, the savings achieved with the new lighting system would actually be higher because there would have been no reduction in the hours of use.

The same principal follows for heating, cooling, and temperature recommendations – even with fuel switching. If there are recommendations to change the temperature settings to reduce fuel use, then the savings for the heating/cooling equipment recommendations are reduced, as well.

Our thermal module calculates the savings for temperature reductions utilizing automated engineering calculations within Microsoft Excel™ spreadsheets. The savings are calculated in “output” values – meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel.

Thermal recommendations (insulation, windows, etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the “thermal load” is the thermal load after the other recommendations have been accounted for.

Lastly, installation costs, refer to Appendix B, are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers. The NJ SmartStart Building® program incentives (refer to Appendix C) are calculated for the appropriate ECM’s and subtracted from the installed cost prior to calculation of the simple payback. In addition, where applicable, maintenance cost savings are estimated and applied to the net savings. Simple return on

investment is calculated using the standard formula of the difference of gains minus investments, divided by the investments. Included within the gains are the annual energy savings, utility incentives and maintenance savings as a total sum. The calculation is completed assuming the project is 100% direct purchased by the Owner with an energy cost escalation of 2.4% for natural gas and 2.2% for electricity.

CONFIDENTIAL

#### IV. HISTORIC ENERGY CONSUMPTION/COST

##### A. Energy Usage / Tariffs

###### Electric

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Public Service Electric and Gas Company (PSE&G) provides electricity to the facility under the GLP rate. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. 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 most current rate structure available.

###### Natural Gas

Table 4 and Figure 2 show the natural gas energy usage for the surveyed fire house from January-08 to December-08. PSE&G supplies the natural gas to the facility under the GSGH rate. Below is the average unit cost for the utilities at this facility.

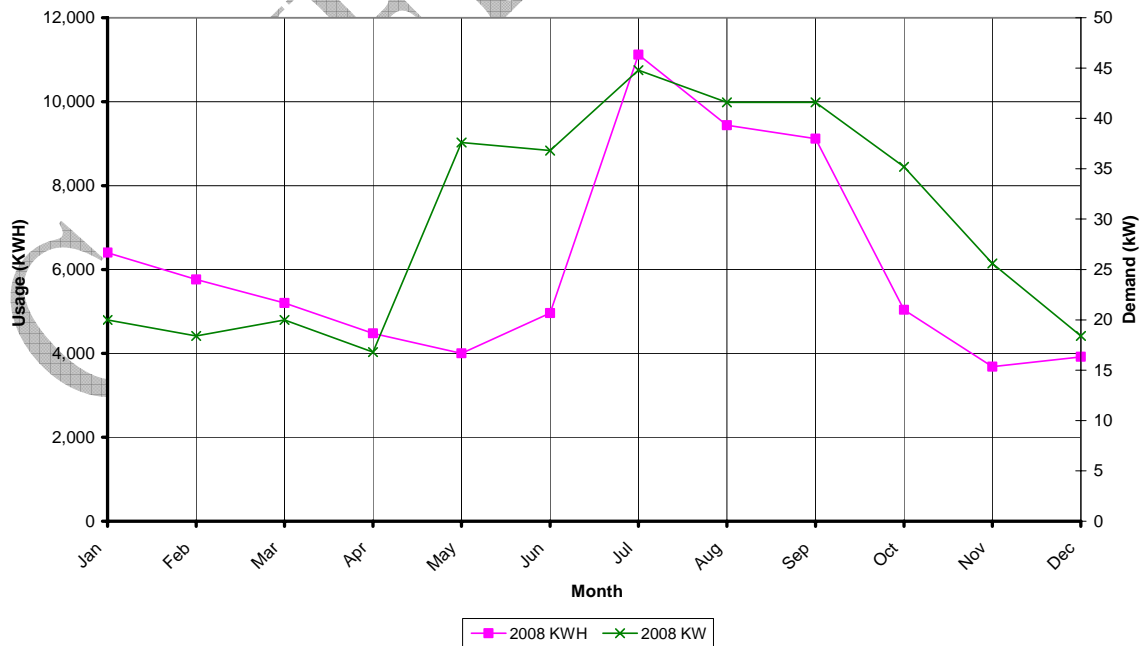
<u>Description</u>	<u>Average</u>
Electricity	19¢/kWh
Natural Gas	\$1.66/Therm

**Table 3  
Electricity Billing Data**

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	6,400	20	\$882
2/08	5,760	18	\$798
3/08	5,200	20	\$755
4/08	4,480	17	\$651
5/08	4,000	38	\$676
6/08	4,960	37	\$1,131
7/08	11,120	45	\$2,314
8/08	9,440	42	\$2,069
9/08	9,120	42	\$2,058
10/08	5,040	35	\$1,045
11/08	3,680	26	\$763
12/08	3,920	18	\$752
<b>Totals</b>	<b>73,120</b>	<b>45 Max</b>	<b>\$13,895</b>

**Figure 1  
Electricity Usage Profile**

Pine Grove Fire Co.  
Electric Usage Profile  
January through December of 2008

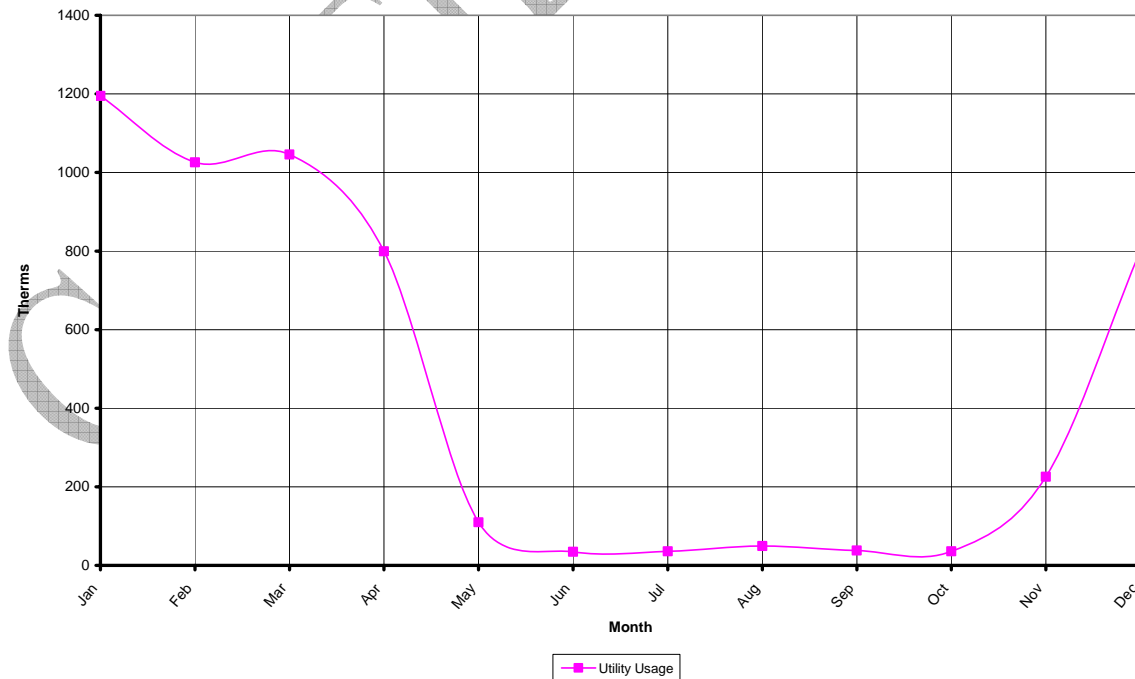


**Table 4  
Natural Gas Billing Data**

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	1,194.8	\$1,711
2/08	1,025.6	\$1,668
3/08	1,045.5	\$1,380
4/08	799.2	\$381
5/08	109.6	\$87
6/08	34.4	\$77
7/08	35.5	\$100
8/08	49.2	\$72
9/08	37.7	\$63
10/08	35.6	\$264
11/08	225.8	\$919
12/08	801.5	\$2,235
<b>Totals</b>	<b>5,394.4</b>	<b>\$8,958</b>

**Figure 2  
Natural Gas Usage Profile**

Pine Grove Fire Co.  
Gas Usage Profile  
January through December of 2008



B. Energy Use Index (EUI)

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. Their website allows the user to determine how well the client’s building energy use intensity (EUI) compares with similar facilities throughout the U.S. and in your specific region or state.

$$\text{Building EUI} = \frac{(\text{Electric Usage in kBtu / h} + \text{Gas Usage in kBtu / h} + \text{Heating Oil kBtu / h})}{\text{Building Square Footage}}$$

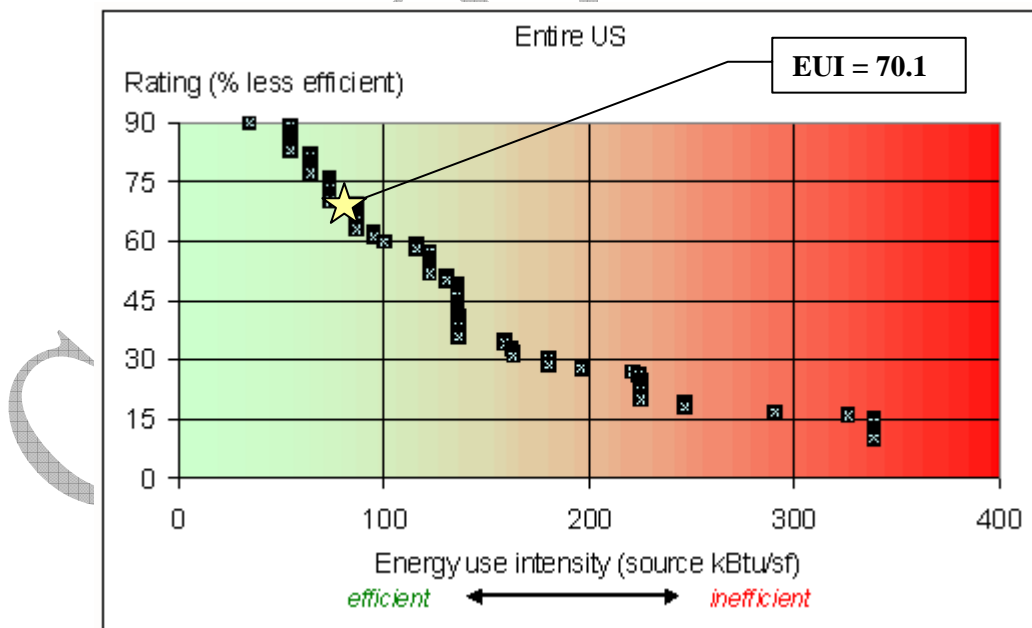
$$\begin{aligned} \text{Electric} &= ((73,120 \text{ kWh}) * (1000 \text{ W/kW}) * (3.414 \text{ Btu/h} / 1 \text{ W})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) \\ &= 249,631 \text{ kBtu/h} \end{aligned}$$

$$\text{Gas} = ((5394.4 \text{ therms}) * (100,000 \text{ Btu/h} / 1 \text{ Therm})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) = 539,440 \text{ kBtu/h}$$

$$\text{Building EUI} = \frac{(249,631 \text{ kBtu / h} + 539,440 \text{ kBtu / h})}{10,948 \text{ SF}} = \frac{789,071 \text{ kBtu / h}}{10,948 \text{ SF}}$$

Pine Grove Fire Company EUI = 72.1 kBtu/SF

**Figure 3**  
**Energy Use Intensity Distributions: Police and Fire Station**



### 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 you to track and assess 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 more emphasis is being placed throughout multiple arenas on carbon reduction, greenhouse gas emissions and other environmental impacts.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the municipal in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. The account can be accessed at the following address, the username and password are also listed below:

<https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login>

Username: Gloucestercity

Password: lgeaceg2009

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an “Other” category. The Gloucester City Fire Houses fall under this “Other” category. The “Other” category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Performance Rating cannot be calculated if more than 10% of a building is classified as “Other.” The majority of the Public Works Garage would be classified as “Other” and therefore cannot be given an Energy Performance Rating. Despite this Portfolio Manager calculates the building EUI. The EUI is an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the municipality can strive to meet. CEG strongly urges Gloucester City to keep their Portfolio Manager account up to monitor the performance of the building.

Refer to Appendix D for detailed energy benchmarking report entitled “STATEMENT OF ENERGY PERFORMANCE.”

## V. FACILITY DESCRIPTION

Gloucester City's Pine Grove Fire Company consists of engine bays, a hall, kitchen, bar and members lounge; totaling approximately 10,948 SF. The Pine Grove Fire House is a one story structure the front section of brick and block construction with the remainder of the building of block only construction. The first section of the facility was built in 1975 with a large addition in 1990. The windows are single pane, aluminum frame and crank style. Typically, the Fire house will be occupied by one or two people for a few hours a day during the week. Pine Grove is a volunteer fire company that only fully operates when an emergency occurs in their response area. Additionally, there is a hall portion that is periodically rented throughout the year.

### Heating System

The facility is heated via a traditional rooftop forced air heating system. Areas of the building are served by various air handling units mounted on the roof of the building. The zones are divided as follows:

**Engine Bay and Lounge:** The engine bay and lounge are served by a single RUUD Packaged rooftop unit. The unit heats the air with a gas fired heat exchanger. The unit is controlled by a standard non-programmable wall mounted thermostat.

**Front of Hall:** The half of the hall adjacent to the engine bay is served by an old General Electric packaged rooftop unit. This unit also contains a gas fired heat exchanger and is controlled by a standard programmable wall mounted thermostat. The owner operates this equipment either on or off based on occupancy. The owner operates this equipment either on or off based on occupancy. The equipment's thermostat did not contain programmed setback temperatures.

**Rear of Hall:** The remainder of the hall is served by four (4) RUUD packaged rooftop units. These units also contain gas fired heat exchanger and are controlled by a standard programmable wall mounted thermostat. The thermostat was set in the on/off operation mode and was not observed to be set-up with setbacks.

**Kitchen and Bar:** The kitchen and bar areas of the fire hall are served by two (2) RUUD packaged air handling units. These units also contain gas fired heat exchanger and are controlled by a standard non-programmable wall mounted thermostat.

### Domestic Hot Water

Domestic hot water for the restrooms and the kitchen is provided by two (2) 40 gallon Bradford White natural gas fired hot water heaters. Both units have an input capacity of 40 MBh and a recovery rate of 42 gallons an hour.

### Cooling System

The cooling system of the building is typical of a traditional rooftop forced air cooling system. All zones operate in the same manner as the heating described above. All packaged rooftop equipment on the roof of the facility contains standard DX cooling coil, compressor and

condenser section. Cooling temperature set-points are controlled the in the same manner as the heating controls are operated.

### Controls System

There are wall mounted thermostats located throughout the facility that control the various heating and air conditioning units. Controls in the facility are standard non programmable style wall mounted units. CEG's survey of the facility was conducted on a cool day and the inside air temperature was observed to be holding 60°F with no rooftop equipment running.

### Lighting

T-12 fluorescent lighting is prevalent throughout the facility. All areas of the facility are lit by 2-foot by 4-foot lay-in fixtures containing two (2) or four (4) 34 watt T12 lamps. All lights are controlled via standard wall switching; no lighting controls are present at the facility. During our site survey it was noted that several areas were illuminated within the facility in areas that were not in use.

In addition to the fluorescent lighting the members lounge contains many high-hats that contain incandescent flood bulbs. The lamps were typically 60 watts but varied from fixture to fixture. This style of lamp uses a large amount of electricity for the amount of light emitted, generating a lot of heat in the process. Lights are controlled via standard wall switching.

## VI. MAJOR EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial energy savings. In addition, 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 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 Appendix E for the Major Equipment List for this facility.

CONFIDENTIAL

## VII. ENERGY CONSERVATION MEASURES

### ECM #1: Lighting Upgrade

#### Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (34 Watt lamps) has a total wattage of about 154 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to about 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

CEG recommends a 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 electronic ballasts. In addition to functional cost savings, the fixture replacement will also provide operational cost savings. The operational cost savings will be realized through the lesser number of lamps that will be required to be replaced per year. The expected lamp life of a T8 lamp, approximately 30,000 burn-hours, in comparison to the existing T12 lamps, approximately 20,000 burn-hours, will provide the Owner with fewer lamps to replace per year. Based on the operating hours of this facility, approximately 1460 hours per year, the Owner will be changing approximately 25% less lamps per year.

#### Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in Appendix F that outlines the proposed retrofits, costs, savings, and payback periods.

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

From Appendix C, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-2 lamp) = \$25 per fixture; T-5 or T-8 (3-4 lamp) = \$30 per fixture.

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (2 \times \$25) + (82 \times \$ 30) = \$2,510$$

Maintenance Savings are calculated as follows:

$$\text{Maintenance Savings} = (\# \text{ of lamps} \times \% \text{ reduction} \times \$ \text{ per lamp}) + \text{Installation Labor}$$

$$\text{Maintenance Savings} = (328 \times 25\% \text{ reduction} \times \$ 2.00) + (\$20 \times 82) = \$1,804$$

**Energy Savings Summary:**

<b>ECM #1 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$11,765
<b>NJ Smart Start Equipment Incentive (\$):</b>	(\$2,510)
<b>Maintenance Savings (\$):</b>	(\$1,804)
<b>Net Installation Cost (\$):</b>	\$7,451
<b>Total Energy Savings (\$ / yr):</b>	\$1,486
<b>Simple Payback (yrs):</b>	5.0
<b>Simple Return on Investment:</b>	36.9%

CONFIDENTIAL

## ECM #2: Lighting Controls

### Description:

In some areas the lighting is left on unnecessarily. Many times this is due to the idea that it is better to keep the lights on rather than to continuously switch them on and off. The on/off dilemma was studied and it was found that the best option is to turn the lights off whenever possible. Although this does reduce the lamp life, the energy savings far outweigh the lamp replacement costs. The cutoff for when to turn the lights off is around two minutes. If the lights can be off for only a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is all it would take. Occupancy sensors detect motion and will switch the lights on when the room is occupied. They can either be mounted in place of the current wall switch, or they can be mounted on the ceiling to cover large areas. Lastly, photocells are a lighting control that sense light levels and will turn the lights off when there is adequate daylight. These are mostly used outside, but they are becoming much more popular in energy-efficient office designs as well.

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all areas of the facility; (10,948 SF).

### Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft<sup>2</sup>) of the existing offices, locker rooms, storage rooms, small shops, etc. to be 0.91 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

$$\text{Savings} = 10\% \times 0.91 \text{ Watts/SF} \times 10,948 \text{ SF} \times 1460 \text{ hrs/yr.} = 1,454 \text{ kWh} \times \$0.19/\text{kWh}$$

$$\text{Savings} = \$276 / \text{yr}$$

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is \$75/unit including material and labor. The SmartStart Buildings® incentive is \$20 per control which equates to an installed cost of \$55/unit. Total number of rooms to be retrofitted is 15. Total cost to install sensors is \$55/unit x 14 units = \$770.

**Energy Savings Summary:**

<b>ECM #2 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$1,050
<b>NJ Smart Start Equipment Incentive (\$):</b>	(\$280)
<b>Maintenance Savings (\$):</b>	-
<b>Net Installation Cost (\$):</b>	\$770
<b>Total Energy Savings (\$ / yr):</b>	\$276
<b>Simple Payback (yrs):</b>	2.8
<b>Simple Return on Investment:</b>	37.8%

CONFIDENTIAL

### ECM #3: Rooftop Unit Replacement

#### Description:

This ECM will replace the aging General Electric (GE) packaged rooftop unit that serves the half of the hall adjacent to the engine bays. The current GE unit has a 240 MBh natural gas fired heat exchanger and is estimated to have a cooling capacity of ten (10) tons. Name plate data on this unit was incomplete and no useful information can be found on the unit.

The existing unit is well past its useful service life and is in need of replacement. Product information for the piece of equipment could not be found. In the absence of this information an estimate for the unit's efficiency was created. The estimate is based on the equipments life and typical efficiency of the era as well as CEG industry experience.

CEG recommends the replacement of the unit with a RUUD RKNB-Series Energy Star Compliant Model or equivalent.

#### Energy Savings Calculations:

Air Conditioning Energy Savings Calculation:

##### Existing Air Conditioning Units

Rated Capacity = 10 Tons

Condenser Unit Efficiency = 7.0 EER

Cooling Season Hrs. of Operation = 700 hrs/yr.

Average Cost of Electricity - \$0.19/kWh

##### Proposed High-Efficiency Air Conditioning Unit

Rated Capacity = 10 Tons

New Condenser Unit Efficiency = 11 EER

$$\text{Cooling Energy Savings} = \frac{[\text{Cooling Tons} \times 12,000 \text{ Btu/ton} \div 1000 \text{ W/kW}]}{[(\text{EER}_{\text{NEW}} - \text{EER}_{\text{OLD}})]} \times \text{Avg. Load Factor} \times \text{Hrs. of Cooling}$$

$$\text{Cooling Energy Savings} = \frac{[10 \text{ Cooling Tons} \times 12,000 \text{ Btu/ton} \div 1000 \text{ W/kW}]}{[(11 \text{ EER}_{\text{NEW}} - 7 \text{ EER}_{\text{OLD}})]} \times 0.15 \times 700 \text{ hrs} = 3,150 \text{ kWh/yr}$$

$$\text{Cooling Cost Savings} = (3,150 \text{ kWh}) * \$0.19/\text{kWh} = \underline{\$598 / \text{Yr.}}$$

## Natural Gas Fired Heat Exchanger Energy Savings Calculation:

Existing RTU Heat Exchanger:

Rated Capacity = 240 MBH Natural Gas  
 Net Efficiency = 75%

Replacement RTU Heat Exchanger:

High Efficiency RUUD Rooftop Unit

Rated Capacity = 225 MBH Natural Gas  
 Net Efficiency = 81%

Operating Data:

Average Cost of Natural Gas = \$1.66/Therm

Operating Hours during Heating Season: 750 hrs  
 (It was assumed that the unit operates for six (6) hrs a day for 4 months)

$$\text{Old Exchanger (Htx) Energy Input} = \frac{(\text{Existing Rated Capacity BTu/h}) \times (\text{Hours of Operation})}{(100,000 \text{ BTu/1 Therm Nat. Gas})}$$

$$\text{Old Exchanger (Htx) Energy Input} = \frac{(240,000 \text{ BTu/h}) \times (750 \text{ hrs})}{(100,000 \text{ BTu/1 Therm Nat. Gas})} = 1,800 \text{ therms}$$

Energy Savings = Old Heat Exchanger (Htx) Energy Input \* ((New Htx Efficiency – Old Htx Efficiency) / New Htx Efficiency)

$$\text{Heating Energy Savings} = \text{Old Heat Exchanger (Htx) Energy Input} \times \frac{(\text{New Htx Efficiency} - \text{Old Htx Efficiency})}{(\text{New Htx Efficiency})}$$

$$\text{Energy Savings} = 1,800 \text{ Therms} \times \frac{(0.81 - 0.75)}{(0.81)} = 133 \text{ Therms}$$

Heating Cost Savings = (133 therms) \* \$1.66/therm = \$220 / Yr.

Total Energy Saving = (Cooling Savings + Heating Savings)

Total Energy Savings = (\$598 + \$220) = \$818

**Energy Savings Summary:**

<b>ECM #3 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$18,000
<b>NJ Smart Start Equipment Incentive (\$):</b>	-
<b>Maintenance Savings (\$):</b>	-
<b>Net Installation Cost (\$):</b>	\$18,000
<b>Total Energy Savings (\$ / yr):</b>	\$818
<b>Simple Payback (yrs):</b>	22
<b>Simple Return on Investment:</b>	(2.4%)

\* Possible maintenance savings may occur from replacement of this unit but cannot be quantified in this report.

## ECM #4: Window Replacement

### Description:

The existing windows are building original and are typical of 1970's construction. All windows are Aluminum frame with a single pane of glass. This style of window is very energy inefficient and is in need of replacement. Window technology has improved greatly since the installation of these windows and large energy savings are possible through their replacement. The calculation that follows details the energy savings available through a window replacement.

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.

For the following energy savings calculations, we utilized heating and cooling degree days from the Philadelphia Airport weather data for the past 12 months and window areas from the site survey of the facility.

This ECM would replace all windows within the facility with Anderson Low-E, Double Pane replacement windows or equivalent.

### Energy Savings Calculations:

Heating Degree Days = 4,793°F – day/yr.

Cooling Degree Days = 1,532°F – day/yr.

Total window area to be retrofitted = 130 SF

Existing AC = 9.2 EER (average EER of cooling equipment)

$$U_{\text{exist}} = 0.95 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$$

CEG recommends replacement of the existing single pane windows with Andersen 200 Series Narroline® Double-Hung Windows, Dual-Pane, Low-E, SmartSun® Glazing with Argon Gas Blend Window System with U-Factor = 0.28, Solar Heat Gain Coefficient = 0.21 and Visible Transmittance = 0.49 or equivalent.

$$U_{\text{new}} = 0.28 \text{ Btu/hr} - \text{ft}^2 - ^\circ\text{F}$$

$$\text{Annual Energy Savings Heating} = \frac{12 \frac{\text{hrs}}{\text{day}} \times \text{Window SF} \times (\text{U}_{\text{exist}} - \text{U}_{\text{new}}) \times \text{HDD}}{100,000 \text{ Btu} / 1 \text{ Therm}}$$

$$\text{Annual Energy Savings Heating} = \frac{12 \frac{\text{hrs}}{\text{day}} \times 130 \text{ SF} \times (0.95 - 0.28) \times 4,793 \text{ day/yr}}{(100,000 \text{ Btu} / 1 \text{ Therm})} = 50 \text{ Therms}$$

$$\text{Annual Energy Savings Cooling} = \frac{12 \frac{\text{hrs}}{\text{day}} \times \text{Window SF} \times (\text{U}_{\text{exist}} - \text{U}_{\text{new}}) \times \text{CDD}}{3,414 \text{ Btu} / 1 \text{ kWh}}$$

$$\text{Annual Energy Savings Heating} = \frac{12 \frac{\text{hrs}}{\text{day}} \times 130 \text{ SF} \times (0.95 - 0.28) \times 1,532 \text{ day/yr}}{3,414 \text{ Btu} / 1 \text{ kWh}} = 469 \text{ kWh}$$

7.0

Total Energy Savings = (Heating Savings + Cooling Savings)

Total Energy Savings = ((50 therms) x \$1.66/therm) + ((469 kWh) x (\$0.19/kWh)) = \$172

Upgraded Window Cost = \$4,000

**Energy Savings Summary:**

<b>ECM #4 - ENERGY SAVINGS SUMMARY</b>	
<b>Installation Cost (\$):</b>	\$4,000
<b>NJ Smart Start Equipment Incentive (\$):</b>	-
<b>Maintenance Savings (\$):</b>	-
<b>Net Installation Cost (\$):</b>	\$4,000
<b>Total Energy Savings (\$ / yr):</b>	\$172
<b>Simple Payback (yrs):</b>	23
<b>Simple Return on Investment:</b>	(3.0%)

## 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 technologies for Gloucester City, and concluded that there is potential for solar energy generation.

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 is 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 1,750 S.F. can be utilized for a PV system on the Fire House. A depiction of the area utilized is shown in Appendix G. Using this square footage it was determined that a system size of 27.6 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 43,071 KWh annually, reducing the overall utility bill by 58% percent. A detailed financial analysis can be found in Appendix G. 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.

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

<b>PAYMENT TYPE</b>	<b>SIMPLE PAYBACK</b>	<b>INTERNAL RATE OF RETURN</b>
Self-Finance	10.7 Years	17.6%
Direct Purchase	10.7 Years	7.4%

Wind energy production is another option available through the Renewable Energy Incentive Program. Small wind turbines can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG has reviewed the applicability of wind energy for Pine Grove Fire Company and has determined it is not a viable option. There is not enough free land available on the site to accommodate the installation of a wind turbine.

CONFIDENTIAL

## 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 Section IV, Figures 1 and 2 included within this report to reference the electricity and natural gas usage load profile for January 2008 through December 2008.

### Electricity:

Section IV, Figure 1 demonstrates a typical cooling profile, (April –October), complimenting the heating load. It is evident that there is a significant reduction in the On Peak Load from October 2008 to November 2008 and a substantial increase from June 2008 to July 2008. The Off Peak load is typical, with some expected increase in consumption during the June-September period. The base-load shaping is important because a flat consumption profile will yield more competitive pricing when trying to procure third party supply.

### Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load profile with major consumption occurring between December through March 2008.

### **Tariff Analysis:**

### Electricity:

Gloucester City receives electrical service through Public Service Electric and Gas Company (PSE&G) on a GLP (General Lighting and Power) rate. This utility tariff is for delivery service for general purposes at secondary distribution voltages. The rate schedule has a Delivery Charge, Societal Benefits Charge, Non-utility Generation Charge, Securitization Charge, System Control Charge, Customer Account Services Charge, Standby Fee, Base Rate Distribution Adjustment Charge, Solar Pilot Recovery Charge and RGGI Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS).

### Natural Gas:

Gloucester City receives natural gas service through Public Service Electric and Gas Company (PSE&G) on a GSG utility rate class for delivery and received commodity by a Third Party Supplier (TPS); Woodruff Energy. The GSG utility tariff is for delivery service for general purposes. This rate schedule has a Delivery Charge, Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. It is pertinent to note, since Gloucester City has elected to utilize a

TPS, if the TPS should not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

**Recommendations:**

CEG's recommendation pertains to Gloucester City's electric costs (mainly because Gloucester City does not have a large Natural Gas Critical Mass). CEG recognized the electric cost is competitive with current market prices for a single facility. However, there are opportunities available by aggregation of all facilities and procuring energy from third party suppliers.

CEG advises Gloucester City take a global approach that will be consistent for all facilities within the municipality. Gloucester City's "weighted average price" per kWh (kilowatt hour) for all buildings is approximately \$0.1225 per kWh (kWh is the common unit of electric measure). The weighted average price per dekatherm for natural gas is \$11.37/dth (Dth is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Gloucester City could realize savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (January through December 2008) and current electric rates, Gloucester City would see savings of over \$10,000 per year (Note: Savings were calculated using Gloucester City's Average Annual Consumption of 490,135 kWh and a variance of \$.02258 /kWh utilizing a fixed one-year commodity contract). Gloucester City should aggregate its entire electric load to gain the most optimal energy costs. CEG recommends advisory services for alternative sourcing and supply of energy on a "managed approach."

Lastly, CEG recommends that Gloucester City schedule a meeting with their current utility provider to review their utility charges and current tariff structure for electricity. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), Gloucester City will learn more about the competitive supply process. Gloucester City 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), and should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, Gloucester City should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

## X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the 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.

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.

- B. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- C. Maintain all weather stripping on windows and doors.
- D. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.
- E. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc.
- F. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.
- G. Recalibrate existing sensors serving the office spaces
- H. Install a Vending Miser system to turn off the vending machines in the lunch room when not in use.
- I. Clean all light fixtures to maximize light output.
- J. Confirm that outside air economizers on the rooftop units that serve the Office Areas are functioning properly to take advantage of free cooling.

# Electric Cost Summary

PSE&G - Electric (Rate - GLP)

## Pine Grove Fire Co

Account # 61 133 319 03

Meter # 728002272

**2008**

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0
KWH	6,400	5,760	5,200	4,480	4,000	4,960	11,120	9,440	9,120	5,040	3,680	3,920	73,120
KW	20	18	20	17	38	37	45	42	42	35	26	18	45
Monthly Load Factor	43%	47%	35%	37%	14%	19%	33%	31%	30%	19%	20%	29%	30%
Electric Delivery, \$	\$ 229	\$ 209	\$ 202	\$ 173	\$ 243	\$ 558	\$ 825	\$ 741	\$ 732	\$ 258	\$ 190	\$ 169	\$4,529
Delivery \$/kwh	\$0.036	\$0.036	\$0.039	\$0.039	\$0.061	\$0.112	\$0.074	\$0.078	\$0.080	\$0.051	\$0.052	\$0.043	\$0.062
Electric Supply, \$	\$ 653	\$ 589	\$ 553	\$ 477	\$ 433	\$ 574	\$ 1,488	\$ 1,328	\$ 1,327	\$ 788	\$ 573	\$ 583	\$9,366
Supply \$/kwh	\$0.102	\$0.102	\$0.106	\$0.107	\$0.108	\$0.116	\$0.134	\$0.141	\$0.145	\$0.156	\$0.156	\$0.149	\$0.128
Total Cost, \$	\$882	\$798	\$755	\$651	\$676	\$1,131	\$2,314	\$2,069	\$2,058	\$1,045	\$763	\$752	\$13,895
\$/KWH	\$0.138	\$0.139	\$0.145	\$0.145	\$0.169	\$0.228	\$0.208	\$0.219	\$0.226	\$0.207	\$0.207	\$0.192	<b>\$0.190</b>

Max

# Summary of Natural Gas Cost

PSE&G - Natural Gas (rate - GSGH)

Third Party Supplier - Woodruff Energy

## Pine Grove Fire Co

Account# 507-552 - Woodruff

Account# 61 133 319 03- PSE&G

Meter# 1807223

**2008**

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	
Therms (Burner Tip)	1194.8	1025.6	1045.5	799.2	109.6	34.4	35.5	49.2	37.7	35.6	225.8	801.5	5394.4
Total Distribution Cost	\$479	\$413	\$420	\$250	\$43	\$20	\$21	\$25	\$21	\$21	\$96	\$328	2,135
Cost per Therm	\$0.401	\$0.402	\$0.402	\$0.312	\$0.391	\$0.589	\$0.580	\$0.502	\$0.563	\$0.579	\$0.426	\$0.409	\$0.396
Total Commodity Cost	\$1,232	\$1,256	\$960	\$132	\$44	\$57	\$79	\$48	\$42	\$243	\$823	\$1,908	6,823
Cost per Therm	\$1.03	\$1.22	\$0.92	\$0.16	\$0.40	\$1.65	\$2.24	\$0.97	\$1.11	\$6.84	\$3.64	\$2.38	\$1.26
Total Cost	\$1,711	\$1,668	\$1,380	\$381	\$87	\$77	\$100	\$72	\$63	\$264	\$919	\$2,235	\$8,958
Cost per Therm	\$1.432	\$1.627	\$1.320	\$0.477	\$0.790	\$2.239	\$2.817	\$1.473	\$1.668	\$7.416	\$4.070	\$2.789	<b>\$1.661</b>

# DETAILED COST BREAKDOWN PER ECM

## CONCORD ENGINEERING GROUP

### PINE GROVE FIRE COMPANY

#### ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
Lighting Retrofit	LS	\$11,765	<u>\$0</u>	<u>\$0</u>	<u>\$11,765</u>
Total Cost			\$0	\$0	\$11,765
Utility Incentive - NJ Smart Start (\$30 per 3-4 lamp fixture)					<u>(\$2,510)</u>
Total Cost Less Incentive					\$9,255

#### ECM 2 LIGHTING CONTROLS

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
Dual - Technology Sensor	14	\$75	<u>\$1,050</u>	<u>\$0</u>	<u>\$1,050</u>
Total Cost			\$1,050	\$0	\$1,050
Utility Incentive - NJ Smart Start					<u>(\$280)</u>
Total Cost Less Incentive (\$20 per Sensor)					\$770

#### ECM 3 Rooftop Unit Replacement

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
New RUUD Rooftop unit	1	\$18,000	\$12,000	\$6,000	\$18,000
Total Cost			\$12,000	\$6,000	\$18,000
Utility Incentive - N/A					<u>\$0</u>
Total Cost Less Incentive					\$18,000

#### ECM 4 Window Replacement

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
New Anderson Windows	10	\$400	<u>\$200</u>	<u>\$200</u>	<u>\$4,000</u>
Total Cost			\$200	\$200	\$4,000
Utility Incentive - NJ Smart Start (\$73 per ton)					<u>\$0</u>
Total Cost Less Incentive					\$4,000

# Concord Engineering Group, Inc.



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

## SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of January, 2009:

### **Electric Chillers**

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

### **Gas Cooling**

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

### **Desiccant Systems**

	\$1.00 per cfm – gas or electric
--	----------------------------------

### **Electric Unitary HVAC**

Unitary AC and Split Systems	\$73 - \$93 per ton
Air-to-Air Heat Pumps	\$73 - \$92 per ton
Water-Source Heat Pumps	\$81 per ton
Packaged Terminal AC & HP	\$65 per ton
Central DX AC Systems	\$40- \$72 per ton
Dual Enthalpy Economizer Controls	\$250

### **Ground Source Heat Pumps**

Closed Loop & Open Loop	\$370 per ton
-------------------------	---------------

### **Gas Heating**

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

**Variable Frequency Drives**

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

**Natural Gas Water Heating**

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

**Premium Motors**

Three-Phase Motors	\$45 - \$700 per motor
--------------------	------------------------

**Prescriptive Lighting**

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 - \$30 per fixture, (depending on quantity)
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture

**Lighting Controls – Occupancy Sensors**

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

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

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

**Other Equipment Incentives**

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive



# STATEMENT OF ENERGY PERFORMANCE

## Pine Grove Fire Company

**Building ID:** 1773147  
**For 12-month Period Ending:** December 31, 2008<sup>1</sup>  
**Date SEP becomes ineligible:** N/A

**Date SEP Generated:** July 08, 2009

**Facility**  
 Pine Grove Fire Company  
 829 Jersey Ave.  
 Gloucester City, NJ 08030

**Facility Owner**  
 Gloucester City  
 512 Monmouth St.  
 Gloucester City, NJ 08030

**Primary Contact for this Facility**  
 Jack Lipsett  
 512 Monmouth St.  
 Gloucester City, NJ 08030

**Year Built:** 1975  
**Gross Floor Area (ft<sup>2</sup>):** 10,948

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

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

Natural Gas (kBtu) <sup>4</sup>	539,440
Electricity (kBtu)	249,485
Total Energy (kBtu)	788,925

**Energy Intensity<sup>5</sup>**

Site (kBtu/ft <sup>2</sup> /yr)	72
Source (kBtu/ft <sup>2</sup> /yr)	128

**Emissions (based on site energy use)**

Greenhouse Gas Emissions (MtCO <sub>2</sub> e/year)	67
---	----

**Electric Distribution Utility**

PSE&G - Public Service Elec & Gas Co

**National Average Comparison**

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-19%
Building Type	Fire Station/Police Station

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**

Raymond Johnson  
 520 South Burnt Mill Rd.  
 Voorhees, NJ 08043

**Notes:**

- 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.
- 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.
- Values represent energy consumption, annualized to a 12-month period.
- 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.
- Values represent energy intensity, annualized to a 12-month period.
- 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>	Pine Grove Fire Company	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
<b>Type</b>	Fire Station/Police Station	Is this an accurate description of the space in question?		<input type="checkbox"/>
<b>Location</b>	829 Jersey Ave., Gloucester City, NJ 08030	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"/>

Fire House (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
<b>Gross Floor Area</b>	10,948 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>Number of PCs</b>	1 (Optional)	Is this the number of personal computers in the space?		<input type="checkbox"/>
<b>Weekly operating hours</b>	12 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		<input type="checkbox"/>
<b>Workers on Main Shift</b>	N/A(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		<input type="checkbox"/>

## ENERGY STAR® Data Checklist for Commercial Buildings

### Energy Consumption

**Power Generation Plant or Distribution Utility:** PSE&G - Public Service Elec & Gas Co

Fuel Type: Electricity		
Meter: Electric (kWh) Space(s): Entire Facility		
Start Date	End Date	Energy Use (kWh)
12/01/2008	12/31/2008	3,920.00
11/01/2008	11/30/2008	3,680.00
10/01/2008	10/31/2008	5,040.00
09/01/2008	09/30/2008	9,120.00
08/01/2008	08/31/2008	9,440.00
07/01/2008	07/31/2008	11,120.00
06/01/2008	06/30/2008	4,960.00
05/01/2008	05/31/2008	4,000.00
04/01/2008	04/30/2008	4,480.00
03/01/2008	03/31/2008	5,200.00
02/01/2008	02/29/2008	5,760.00
01/01/2008	01/31/2008	6,400.00
<b>Electric Consumption (kWh)</b>		<b>73,120.00</b>
<b>Electric Consumption (kBtu)</b>		<b>249,485.44</b>
<b>Total Electricity Consumption (kBtu)</b>		<b>249,485.44</b>
<b>Is this the total Electricity consumption at this building including all Electricity meters?</b>		<input type="checkbox"/>

Fuel Type: Natural Gas		
Meter: Natural Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	801.50
11/01/2008	11/30/2008	225.80
10/01/2008	10/31/2008	35.60
09/01/2008	09/30/2008	37.70
08/01/2008	08/31/2008	49.20
07/01/2008	07/31/2008	35.50
06/01/2008	06/30/2008	34.40
05/01/2008	05/31/2008	109.60
04/01/2008	04/30/2008	799.20

03/01/2008	03/31/2008	1,045.50
02/01/2008	02/29/2008	1,025.60
01/01/2008	01/31/2008	1,194.80
<b>Natural Gas Consumption (therms)</b>		<b>5,394.40</b>
<b>Natural Gas Consumption (kBtu)</b>		<b>539,440.00</b>
<b>Total Natural Gas Consumption (kBtu)</b>		<b>539,440.00</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"/>

## Certifying Professional

(When applying for the ENERGY STAR, this must be the same 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**  
Pine Grove Fire Company  
829 Jersey Ave.  
Gloucester City, NJ 08030

**Facility Owner**  
Gloucester City  
512 Monmouth St.  
Gloucester City, NJ 08030

**Primary Contact for this Facility**  
Jack Lipsett  
512 Monmouth St.  
Gloucester City, NJ 08030

## General Information

Pine Grove Fire Company	
Gross Floor Area Excluding Parking: (ft <sup>2</sup> )	10,948
Year Built	1975
For 12-month Evaluation Period Ending Date:	December 31, 2008

## Facility Space Use Summary

Fire House	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft <sup>2</sup> )	10,948
Number of PCs <sup>o</sup>	1
Weekly operating hours <sup>o</sup>	12
Workers on Main Shift <sup>o</sup>	N/A

## Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 12/31/2008)	Baseline (Ending Date 12/31/2008)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft <sup>2</sup> )	72	72	0	N/A	78
Source (kBtu/ft <sup>2</sup> )	128	128	0	N/A	157
Energy Cost					
\$/year	\$ 22,851.00	\$ 22,851.00	N/A	N/A	\$ 24,734.64
\$/ft <sup>2</sup> /year	\$ 2.09	\$ 2.09	N/A	N/A	\$ 2.26
Greenhouse Gas Emissions					
MtCO <sub>2</sub> e/year	67	67	0	N/A	73
kgCO <sub>2</sub> e/ft <sup>2</sup> /year	6	6	0	N/A	6

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

Notes:

o - This attribute is optional.

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

**EXISTING EQUIPMENT LIST**

Concord Engineering Group  
"Pine Grove Fire Company"

**Domestic Hot Water Heater**

Location	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Vintage	Approx. Age	ASHRAE Service Life	Remaining Life
Front of Bldg Hall	Bradford White	1	M1407SLN10	MK53913G3	40	42	40	85%	Nat. Gas	1995	14	10	-4
	Bradford White	1	M1403S6EN128	TH16470043	40	42	40	85%	Nat. Gas	1999	10	10	0

**Air Handling Units**

Location	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling ETL (EER)	Cooling Capacity	Heating Coil	Input (MBh)	Output (MBh)	Heating ETL (%)	Fuel	Cooling ETL (%)	Volts	Phase	Amps	Vintage	Approx. Age	ASHRAE Service Life	Remaining Life
Roof	RUID	1	RRKA-A048CK13E	2G6851DaaF500611009	DX	9.2	4 Tons	Gas Furnace	135	109	81%	Nat. Gas	10 SEER	208-230	3	60	2006	3	15	12
Roof	General Electric	1	BGYC120B3A24	403606450	DX	7		Gas Furnace	240	180	75%	Nat. Gas			-	-	1975	34	15	-19
Roof	RUID	4	RRKA-A036K08E0	2G5538ADAAAF2205125 2G5538ADAAAF220505123 2G5538ADAAAF220510069 2G5538ADAAAF220505128	DX	9.2	2.5 Tons	Gas Furnace	80	-	81%	Nat. Gas	10 SEER	208-230	3	60	2005	4	15	11
Roof	RUID	1	URGG-10E30IKR	AYA4471AHA4AF1927828	DX	9	3 Tons	Gas Furnace	100	-	-	Nat. Gas	-	-	-	-	1990	19	15	-4
Roof	RUID	1	URGG-07E30IKR	AYA4467AHA4AF19238030	DX	9	2.5 Tons	Gas Furnace	75	-	-	Nat. Gas	-	-	-	-	1990	19	15	-4

**Kitchen Hood**

Location	Manufacturer	Qty	Model #	Serial #	Fan HP	Fan RPM	Volts	Phase	Amps	Vintage	Approx. Age	ASHRAE Service Life	Remaining Life
Kitchen Roof	Dayton	1	4C399C	-	1/3	1140	115	1	60	1990	19	25	6

**INVESTMENT GRADE LIGHTING AUDIT**

**CONCORD ENERGY SERVICES**

"Pine Grove Fire Company"

CEG Job #: 9C08131  
 Project: Gloucester Energy Audits  
 Address: 829 Jersey Ave.  
 City: Gloucester City  
 Building SF: 10,948

DATE: 05/27/2009  
 KWH COST: \$0.190

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS			
Line No.	Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Payback			
1	Engine Bays	10	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	1460	154	1.54	2248.4	\$427.20	10	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.91	1328.6	\$252.43	\$140.00	\$1,400.00	0.63	919.8	\$174.76	8.01			
2	Fire Hall	52	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	1460	154	8.01	11691.68	\$2,221.42	52	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	4.73	6908.72	\$1,312.66	\$140.00	\$7,280.00	3.28	4782.96	\$908.76	8.01			
3	Bathrooms	5	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	1460	154	0.77	1124.2	\$213.60	5	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.46	664.3	\$126.22	\$140.00	\$700.00	0.32	459.9	\$87.38	8.01			
4	Hall Bar	4	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	832	154	0.62	512.512	\$97.38	4	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.36	302.848	\$57.54	\$140.00	\$560.00	0.25	209.664	\$39.84	14.06			
5	Kitchen	4	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	832	154	0.62	512.512	\$97.38	4	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.36	302.848	\$57.54	\$140.00	\$560.00	0.25	209.664	\$39.84	14.06			
6	Hall Bathroom & Vestibule	6	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	832	154	0.92	768.768	\$146.07	6	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.55	454.272	\$86.31	\$140.00	\$840.00	0.38	314.496	\$59.75	14.06			
7	Front Vestibule	1	2'x4' 4-Lamp T-12 Magnetic Ballast Prism Lens	832	154	0.15	128.128	\$24.34	1	2'x4' 3-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	91	0.09	75.712	\$14.39	\$140.00	\$140.00	0.06	52.416	\$9.96	14.06			
8		12	Incandescent high-hat	1460	65	0.78	1138.8	\$216.37	12	Replace w/ 18W Compact Fluorescent	18	0.22	315.36	\$59.92	\$3.75	\$45.00	0.56	823.44	\$156.45	0.29			
9	Members Lounge	1	2'x4' 2-Lamp T-12 Magnetic Ballast Prism Lens	1460	78	0.08	113.88	\$21.64	1	2'x4' 2-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	61	0.06	89.06	\$16.92	\$120.00	\$120.00	0.02	24.82	\$4.72	25.45			
10	Storage	1	2'x4' 2-Lamp T-12 Magnetic Ballast Prism Lens	1460	78	0.08	113.88	\$21.64	1	2'x4' 2-Lamp T-8 Prism Lens Electronic Ballast Cooper Metalux	61	0.06	89.06	\$16.92	\$120.00	\$120.00	0.02	24.82	\$4.72	25.45			
<b>Totals</b>		96				13.56	18352.76	\$3,487.02	96		7.80	10530.78	\$2,000.85			\$11,765.00	5.76	7821.98	\$1,486.18	7.92			

Project Name: LGEA Solar PV Project - Pine Grove Fire House Location: Gloucester City, NJ Description: Photovoltaic System 95% Financing											
<b>Simple Payback Analysis</b>											
Total Construction Cost: \$248,400 Annual kWh Production: 43,071 Annual Energy Cost Reduction: \$8,184 Annual SREC Revenue: \$15,075 First Cost Premium: \$248,400 Simple Payback Calculation: 10.7 Years											
<b>Life Cycle Cost Analysis</b>											
Analysis Period (years): 25 Financing Term (mths): 240 Average Energy Cost (\$/kWh): \$0.190 Financing Rate: 7.00%											
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow	Financing %:	Maintenance Escalation Rate:
0	\$12,420	0	0	0	\$0	0	0	(12,420)	0	95%	3.0%
1	\$0	43,071	\$8,184	\$0	\$15,075	\$16,341	\$5,614	\$1,304	(\$11,116)	3.0%	3.0%
2	\$0	42,640	\$8,429	\$0	\$14,924	\$15,935	\$6,020	\$1,399	(\$9,718)	3.0%	3.0%
3	\$0	42,214	\$8,682	\$0	\$14,775	\$15,500	\$6,455	\$1,502	(\$8,216)	3.0%	3.0%
4	\$0	41,792	\$8,942	\$0	\$14,627	\$15,033	\$6,921	\$1,615	(\$6,601)	3.0%	3.0%
5	\$0	41,374	\$9,211	\$213	\$14,481	\$14,533	\$7,422	\$1,524	(\$5,077)	3.0%	3.0%
6	\$0	40,960	\$9,487	\$211	\$14,336	\$13,996	\$7,958	\$1,657	(\$3,419)	3.0%	3.0%
7	\$0	40,551	\$9,772	\$209	\$14,193	\$13,421	\$8,534	\$1,801	(\$1,619)	3.0%	3.0%
8	\$0	40,145	\$10,065	\$207	\$14,051	\$12,804	\$9,151	\$1,954	\$335	3.0%	3.0%
9	\$0	39,744	\$10,367	\$205	\$13,910	\$12,143	\$9,812	\$2,118	\$2,453	3.0%	3.0%
10	\$0	39,346	\$10,678	\$203	\$13,771	\$11,433	\$10,521	\$2,292	\$4,745	3.0%	3.0%
11	\$0	38,953	\$10,998	\$201	\$13,633	\$10,673	\$11,282	\$2,476	\$7,221	3.0%	3.0%
12	\$0	38,563	\$11,328	\$199	\$13,497	\$9,857	\$12,098	\$2,672	\$9,893	3.0%	3.0%
13	\$0	38,178	\$11,668	\$197	\$13,362	\$8,983	\$12,972	\$2,879	\$12,771	3.0%	3.0%
14	\$0	37,796	\$12,018	\$195	\$13,229	\$8,045	\$13,910	\$3,097	\$15,868	3.0%	3.0%
15	\$0	37,418	\$12,378	\$193	\$13,096	\$7,039	\$14,915	\$3,327	\$19,195	3.0%	3.0%
16	\$0	37,044	\$12,750	\$191	\$12,965	\$5,961	\$15,994	\$3,570	\$22,765	3.0%	3.0%
17	\$0	36,673	\$13,132	\$189	\$12,836	\$4,805	\$17,150	\$3,824	\$26,589	3.0%	3.0%
18	\$0	36,306	\$13,526	\$187	\$12,707	\$3,565	\$18,389	\$4,092	\$30,681	3.0%	3.0%
19	\$0	35,943	\$13,932	\$185	\$12,580	\$2,236	\$19,719	\$4,372	\$35,053	3.0%	3.0%
20	\$0	35,584	\$14,350	\$183	\$12,454	\$810	\$21,144	\$4,666	\$39,720	3.0%	3.0%
21	\$1	35,228	\$14,780	\$181	\$12,330	\$687	\$19,438	\$4,966	\$46,523	3.0%	3.0%
22	\$2	34,876	\$15,224	\$180	\$12,207	\$470	\$15,996	\$5,271	\$57,308	3.0%	3.0%
23	\$3	34,527	\$15,680	\$178	\$12,084	\$0	\$0	\$5,587	\$84,895	3.0%	3.0%
24	\$4	34,182	\$16,151	\$176	\$11,964	\$0	\$0	\$5,938	\$112,834	3.0%	3.0%
25	\$5	33,840	\$16,635	\$174	\$11,844	\$0	\$0	\$6,305	\$141,139	3.0%	3.0%
<b>Totals:</b>									\$271,414	\$271,414	\$271,414
Net Present Value (NPV)									\$27,859	\$27,859	\$27,859
Internal Rate of Return (IRR)									17.6%	17.6%	17.6%

Project Name: LGEA Solar PV Project - Pine Grove Fire House							
Location: Gloucester City, NJ							
Description: Photovoltaic System							
<b>Simple Payback Analysis</b>							
		<b>Photovoltaic System</b>					
Total Construction Cost		\$248,400					
Annual kWh Production		43,071					
Annual Energy Cost Reduction		\$8,184					
Annual SREC Revenue		\$15,075					
First Cost Premium		<b>\$248,400</b>					
<b>Simple Payback Calculation:</b>		<b>10.7</b>					
		<b>Years</b>					
<b>Life Cycle Cost Analysis</b>							
Analysis Period (years):	25					Financing %:	0%
Financing Term (mths):	240					Maintenance Escalation Rate:	3.0%
Average Energy Cost (\$/kWh)	<b>\$0.190</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	\$248,400	0	0	0	\$0	(248,400)	0
1	\$0	43,071	\$8,184	\$0	\$15,075	\$23,258	(\$225,142)
2	\$0	42,640	\$8,429	\$0	\$14,924	\$23,353	(\$201,788)
3	\$0	42,214	\$8,682	\$0	\$14,775	\$23,457	(\$178,332)
4	\$0	41,792	\$8,942	\$0	\$14,627	\$23,569	(\$154,762)
5	\$0	41,374	\$9,211	\$213	\$14,481	\$23,478	(\$131,284)
6	\$0	40,960	\$9,487	\$211	\$14,336	\$23,612	(\$107,672)
7	\$0	40,551	\$9,772	\$209	\$14,193	\$23,755	(\$83,916)
8	\$0	40,145	\$10,065	\$207	\$14,051	\$23,909	(\$60,008)
9	\$0	39,744	\$10,367	\$205	\$13,910	\$24,072	(\$35,936)
10	\$0	39,346	\$10,678	\$203	\$13,771	\$24,246	(\$11,689)
11	\$0	38,953	\$10,998	\$201	\$13,633	\$24,431	\$12,741
12	\$0	38,563	\$11,328	\$199	\$13,497	\$24,626	\$37,368
13	\$0	38,178	\$11,668	\$197	\$13,362	\$24,833	\$62,201
14	\$0	37,796	\$12,018	\$195	\$13,229	\$25,052	\$87,253
15	\$0	37,418	\$12,378	\$193	\$13,096	\$25,282	\$112,534
16	\$0	37,044	\$12,750	\$191	\$12,965	\$25,524	\$138,059
17	\$0	36,673	\$13,132	\$189	\$12,836	\$25,779	\$163,837
18	\$0	36,306	\$13,526	\$187	\$12,707	\$26,046	\$189,884
19	\$0	35,943	\$13,932	\$185	\$12,580	\$26,327	\$216,211
20	\$0	35,584	\$14,350	\$183	\$12,454	\$26,621	\$242,832
21	\$1	35,228	\$14,780	\$181	\$12,330	\$26,929	\$269,760
22	\$2	34,876	\$15,224	\$180	\$12,207	\$27,251	\$297,011
23	\$3	34,527	\$15,680	\$178	\$12,084	\$27,587	\$324,598
24	\$4	34,182	\$16,151	\$176	\$11,964	\$27,938	\$352,537
25	\$5	33,840	\$16,635	\$174	\$11,844	\$28,305	\$380,842
<b>Totals:</b>		784,294	\$219,894	\$3,165	\$274,503	\$629,242	\$491,232
<b>Net Present Value (NPV)</b>						<b>\$242,857</b>	
<b>Internal Rate of Return (IRR)</b>						<b>7.4%</b>	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Pine Grove Fire Co.	1750	Sunpower SPR230	120	14.7	1,764	27.60	43,071	3,960	15.64



. = Proposed PV Layout

Notes:

1. Estimated kWh based on 4.68 hours full output per day per 365 day year. Actual kWh will vary day to day.