ENERGY AUDIT – FINAL REPORT

02/12/2010

BOROUGH OF COLLINGSWOOD
FIRE DEPARTMENT BUILDING

16 AND 20 WEST COLLINGS AVENUE
COLLINGSWOOD, NJ 08108
ATTN: BRADFORD C. STOKES
ADMINISTRATOR

CEG PROJECT NO. 9C09083

CONCORD ENGINEERING GROUP

520 SOUTH BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CEG-INC.NET

CONTACT: MICHEAL FISCHETTE, PRINCIPAL
EMAIL: mfischette@ceg-inc.net

Table of Contents

I. EXECUTIVE SUMMARY 3

II. INTRODUCTION 7

III. METHOD OF ANALYSIS 8

IV. HISTORIC ENERGY CONSUMPTION/COST 10

A. ENERGY USAGE / TARIFFS 10

B. ENERGY USE INDEX (EUI) 15

C. EPA ENERGY BENCHMARKING SYSTEM 17

V. FACILITY DESCRIPTION 18

VI. MAJOR EQUIPMENT LIST 19

VII. ENERGY CONSERVATION MEASURES 20

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES 24

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY 27

X. INSTALLATION FUNDING OPTIONS 31

XI. ADDITIONAL RECOMMENDATIONS 32

Appendix A – ECM Cost & Savings Breakdown

Appendix B – New Jersey Smart Start® Program Incentives

Appendix C – Portfolio Manager "Statement of Energy Performance"

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

Appendix F – 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.

I. EXECUTIVE SUMMARY

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

Borough of Collingswood
678 Haddon Avenue
Collingswood, NJ 08108

Municipal Contact Person: Bradford C. Stokes, Administrator

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	$11,869
Natural Gas	$7,839
Total	$19,708

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 ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Upgrade - General	$3,805	$921	4.1	235.5%
ECM #2	Rooftop Unit Upgrade	$16,696	$2,226	7.5	166.7%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Photovoltaic System	$445,050	$39,279	11.3	120.6%

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

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

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade - General	4.1	5287.0	0.0
ECM #2	Rooftop Unit Upgrade	N/A	13824	N/A
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Photovoltaic System	49.5	77169	N/A

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

- **ECM #1: Lighting Upgrade - General**
- **ECM #2: Rooftop Unit Upgrade**

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

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

II. INTRODUCTION

The comprehensive energy audit covers the Borough of Collingswood's Fire house located at 16 & 20 West Collings Ave. in Collingswood. The building includes apparatus bays, sleeping areas, meeting space, offices and a kitchen & bar area.

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

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

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

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

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

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

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

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

Description	Average
Electricity	16.1¢ / kWh
Natural Gas	$1.377 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE & G
Rate: Annual general
Meter No: 226004588
Customer ID No: 61-518-164-04
Third Party Utility n/a
TPS Meter / Acct No: n/a

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-08	6,846	16.1	$910
Feb-08	1,902	16.1	$298
Mar-08	6,342	16.1	$840
Apr-08	3,636	16.1	$468
May-08	5,166	14.3	$748
Jun-08	7,584	16.1	$1,557
Jul-08	10,356	13.7	$1,040
Aug-08	8,664	13.1	$1,825
Sep-08	8,442	15.5	$1,827
Oct-08	2,202	14.4	$450
Nov-08	5,850	16.1	$946
Dec-08	6,816	16.1	$961
Totals	**73,806**	**16.1 Max**	**$11,869**

AVERAGE DEMAND 15.3 KW average
AVERAGE RATE $0.161 $/kWh

Figure 1
Electricity Usage Profile

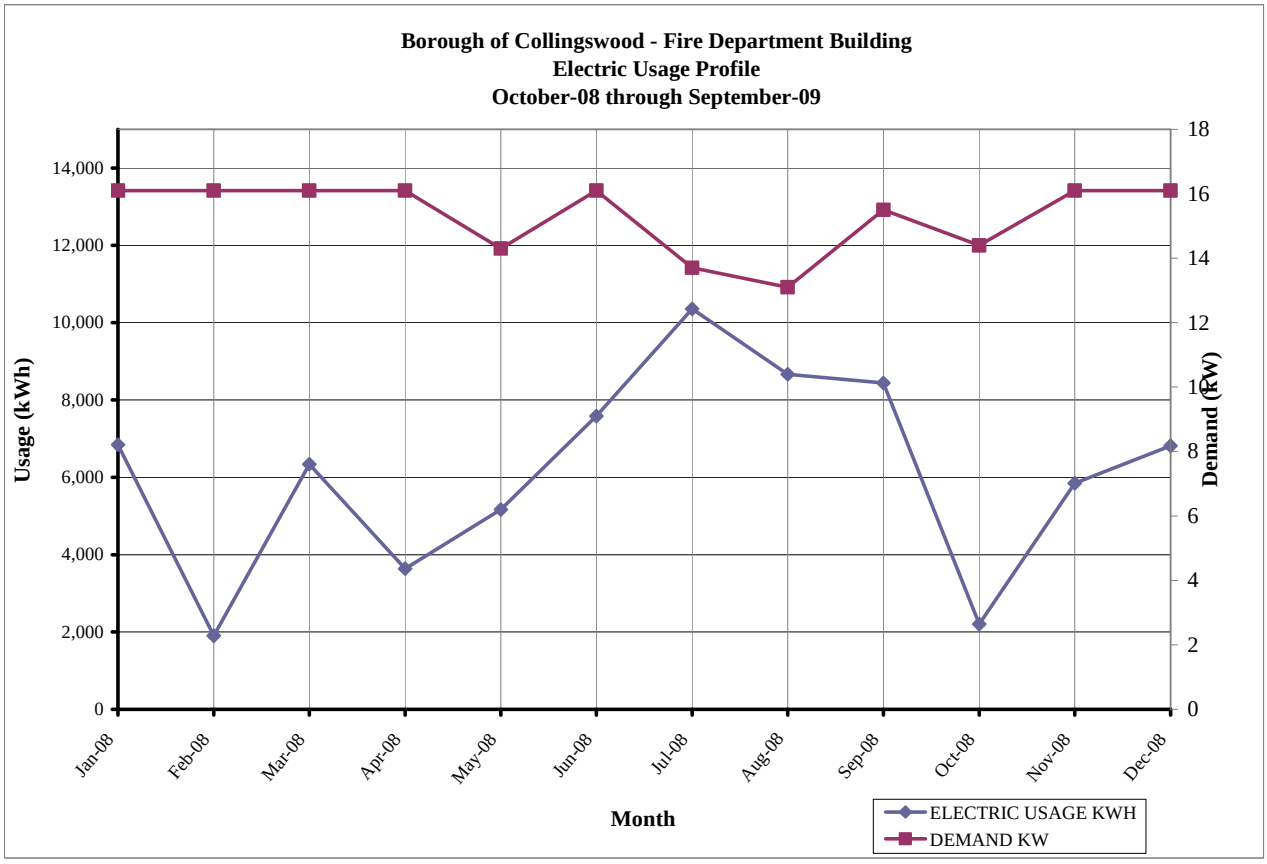


Table 4

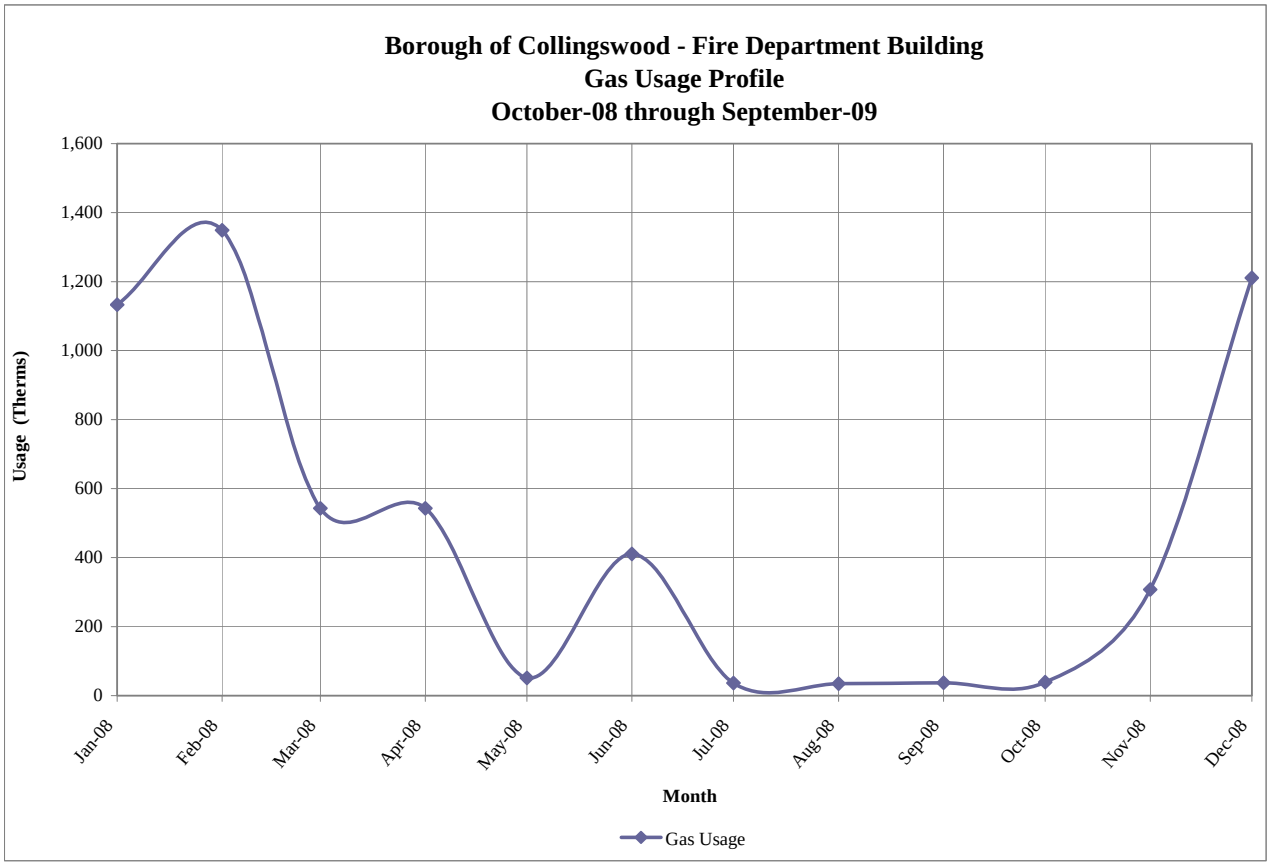
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY

Utility Provider: PSE & G
Rate: General Service gas
Account No: 61-518-164-04
Point of Delivery ID: meter 2913114
Third Party Utility Provider: n/a
TPS Meter No: n/a

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-08	1,133.10	$1,585.35
Feb-08	1,348.81	$1,962.28
Mar-08	543.08	$847.31
Apr-08	543.08	$847.31
May-08	51.08	$105.67
Jun-08	410.69	$94.18
Jul-08	36.55	$89.50
Aug-08	34.57	$77.09
Sep-08	36.66	$73.17
Oct-08	38.68	$72.46
Nov-08	307.64	$435.33
Dec-08	1,210.57	$1,649.16
TOTALS	**5,694.51**	**$7,838.80**
AVERAGE RATE:	**$1.377**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

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

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

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

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

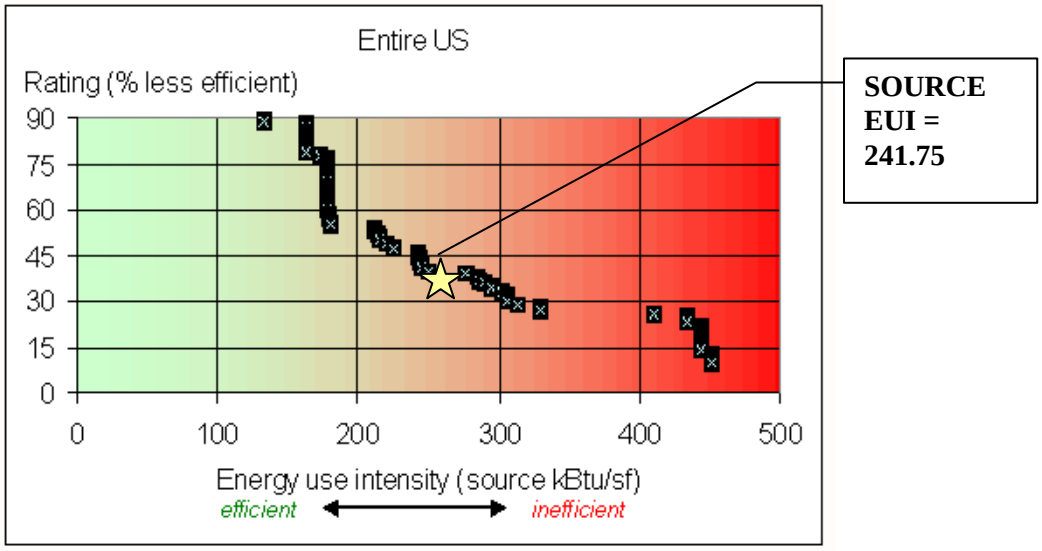
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	**BUILDING USE**			**SITE ENERGY**	**SITE-SOURCE RATIO**	**SOURCE ENERGY**
	kWh	**Therms**	**Gallons**	**kBtu**		**kBtu**
ELECTRIC	73806			251,974	3.340	841,592
NATURAL GAS		5695		569,451	1.047	596,215
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				821,424		1,437,807
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		24,600	SQUARE FEET			
BUILDING SITE EUI		*33.39*	kBtu/SF/YR			
BUILDING SOURCE EUI		*58.45*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of *Public Order and Safety Buildings*.

Figure 3
Source Energy Use Intensity Distributions: Public Order Buildings



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than $10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The porfolio manager data was set to to be shared with the TRC-LGEA account. 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: Collingswoodcity
Password: lgeaceg09023

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

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**
Collingswood Fire House	N/A	50

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

V. FACILITY DESCRIPTION

The facility is a two story 1928 vintage building with the first floor having apparatus bays and sleeping areas for staff. The second floor is meeting space, a kitchen and bar area. A 1979 addition is single story and includes an apparatus bay and offices for the department. The building floor area totals 10,704 square feet. Construction is masonary with a traditional red brick exterior walls. The roof is flat, and the membrane is a tar and paper type. The building is occupied 24/7, or 168 hours per week. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the facility are double pane, ¼" clear glass with aluminum frames.

HVAC Systems

The building's primary heating fuel is natural gas, cooling is electric-fired.

The primary source of heat for the building is a Wiel McLain Steam boiler located in the Boiler room. This gas-fired unit produces low pressure steam which is distributed to unit heaters, cast iron radiators and finned-tube baseboard units throughout the facility. The system is functional and appears to be well maintained. Additional heat is provided for the 1979 part of the building utilizing two rooftop units with gas-heat.

Cooling is provided by a combination of Rooftop units and window units. The meeting room, lounge and office areas are cooled with packaged rooftop units. Window AC units are provided for the chief's office, duty officer bedroom and the utility room. Cooling equipment is all of standard efficiency and at least 10 years old.

Domestic Hot Water

A gas-fired 50 gallon storage type hot water heater provides the facility with hot water. It is an American Water Heater brand, in good condition.

Lighting

The building uses primarily fluorescent tube fixtures, some containing T-12 lamps and magnetic ballasts, and some utilizing T-8 lamps and electronic ballasts. A limited number of compact fluorescent fixtures and incandescent fixtures are also used. Standard switching is utilized and there are no other types of lighting controls present.

The exterior lighting uses primarily high intensity discharge & weatherproof fluorescent wall mounted fixtures.

The buildings are located approximately thirty feet from a main street with well lighted street lights on both sides of the street.

VI. MAJOR EQUIPMENT LIST

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

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade - General

Description:

CEG recommends replacement of the existing T12 lamps and ballasts with the latest technology T8 lamps and high efficiency electronic ballasts. The new energy efficient T8 lamps will provide adequate lighting and will save electrical costs due to improved performance of the lamps and ballasts. Maintenance savings will be realized by reducing the number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which are approximately 20,000 burn-hours. The facility will need approximately 33% fewer lamp replacements per year.

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

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

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

From the Smart Start Incentive appendix, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: (1-2 lamp) = $10 per fixture; (3-4 lamp) = $20 per fixture.

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

Smart Start Incentive = *((31)*-1&*2 lamp fixtures x $10) = $310*
= ((16)-3&4 *lamp fixtures x $20) = 320*
= $630

Maintenance Savings are calculated as follows:

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

Maintenance Savings = *(10 lamps per year) x ($2.00 + $5.00) =$70*

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,435
NJ Smart Start Equipment Incentive ($):	$630
Net Installation Cost ($):	$3,805
Maintenance Savings ($/Yr):	$70
Energy Savings ($/Yr):	$851
Total Yearly Savings ($/Yr):	$921
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.1
Simple Lifetime ROI	263.1%
Simple Lifetime Maintenance Savings	$1,050
Simple Lifetime Savings	$12,765
Internal Rate of Return (IRR)	23%
Net Present Value (NPV)	$6,598.68

ECM #2: Rooftop Unit Upgrades

Description:

Primary cooling equipment cooling for the Fire Department consists of four(4) rooftop units. All are of standard efficiency and over 10 years old These units are inefficient by today's standards with an energy efficiency ratio (EER) of approximately 9 EER. Total capacity is of the four systems is 12 tons cooling.

This ECM would replace the Rooftop units with more efficient units. The existing equipment will be replaced with equipment having cooling capacities equal to the existing units. The average EER of the new cooling equipment will be 13. The energy efficiency of the new equipment is based on Lennox rooftop units, both with with R-410A refrigerant.

Cooling Energy Savings Calculations:

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

Existing Units
Rated Capacity = 12 Tons
Unit Efficiency = 9 EER

Proposed High-Efficiency Units
Rated Capacity = 12 Tons
New Unit Efficiency = 13.0 EER
Cooling Season Hrs. of Operation = 480 hrs/yr. (8 hrs/day, 5 days/wk, 12 weeks)
Average Cost of Electricity - $0.161/kWh

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

$$EnergySavings = \frac{[12CoolingTons \times 12,000\,Btu\,/\,ton \div 1000W\,/\,kW\,]}{[(13EER_{NEW} - 9EER_{OLD}\,)]} \times 0.80 \times 480$$

$$= 13{,}824\ kWh\,/\,yr.\,/\,Unit$$

Cost Savings = 13,824 kWh/Yr/ x $0.161/kWh = $2,226 / Yr.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$17,800
NJ Smart Start Equipment Incentive ($):	$1,104
Net Installation Cost ($):	$16,696
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,226
Total Yearly Savings ($/Yr):	$2,226
Estimated ECM Lifetime (Yr):	20
Simple Payback	7.5
Simple Lifetime ROI	166.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$44,520
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	$16,421.26

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 3500 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 49.45 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 77,169 KWh annually. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

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

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate

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

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

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

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**LIFETIME ROI**	**INTERNAL RATE OF RETURN**
Self-Finance	11.33 Years	120.6%	20.8%
Direct Purchase	11.33 Years	120.6%	7.9%

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

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

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

VIII. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profile for June 2007 through May 2008.

Electricity:

The Electric Usage Profile demonstrates a very erratic load profile throughout the year. The winter demonstrates a drop off in consumption in the month of February, followed by a peak in March. There is a slight drop off again before the summer in April with an escalation in usage continuing into the highest peak in July. This escalation of consumption in the summer is typical behavior of cooling (air conditioning load). In this facility cooling is provided by a combination of roof-top units and window units. This facility utilizes the Delivery service (GLP), and its Commodity service (BGS) from Public Service Electric and Gas Company (PSE&G). A base-load shaping is important because a flat consumption profile will yield more competitive pricing when shopping for a Third Party Supplier.

Natural Gas:

The Natural Gas Usage Profile demonstrates a fairly typical heating load (October –April), and complimentary cooling load (April –October). Consequently there is a clear separation between summer and winter loads consistent with Wholesale Energy Pricing. There is a small unexpected peak in June. Heating loads carry a much higher average cost because of the higher demand for natural gas during the winter. The primary source of heat for this facility is a Weil McLain Boiler. Low pressure steam is distributed to unit heaters, cast iron radiators and finned-tube baseboards throughout the facility. Domestic hot water is also natural gas fired with a 50 gallon hat water heater. Natural Gas Delivery service (GSGH) is supplied by Public Service Electric and Gas (PSE&G) while it receives its Commodity service from Woodruff Energy, the Third Party Supplier.

Tariff Analysis:

Electricity:

Collingswood receives electrical service through Public Service Electric and Gas Company (PSE&G) on a GLP (General Lighting and Power Service) rate schedule.

The GLP utility tariff is for Delivery service for general purposes at secondary distribution voltages. Customers may either purchase electric supply from a Third Party Supplier (TPS) or from Public Service's Basic Generation Service default service as detailed in this rate schedule. This facility is currently receiving Generation service from PSE&G's Basic Generation Service. The PSE&G Delivery service has the following charges: Service Charge, Distribution Charges, Societal Benefits Charges, Non-Utility Generation Charges, Securitization Transition Charges, System Control Charges, Customer Account Services Charges, Commercial and Industrial Energy Pricing Standby Fee (CIEP), Base Rate Distribution Kilowatt Adjustment Charge, Solar Pilot Recovery Charge and Capital Adjustment Charge.

A flat load profile will allow for a more competitive energy price when shopping for an "alternate energy source".

Natural Gas:

This facility receives utility service through Public Service Electric and Gas Company (PSE&G). This facility utilizes the Delivery Service (GSGH) from PSE&G while receiving Commodity service from a Third Party Supplier (TPS), Woodruff Energy.

This facility receives natural gas Delivery service through Public Service Electric and Gas Company (PSE&G) on a GSGH (General Service Gas-Heating) rate. The utility tariff rate (GSGH) is for General Service. This is a firm delivery service (higher level of delivery) for general purposes where 1) customer does not qualify for RSG (residential) and 2) customers usage does not exceed 3,000 therms in any month. 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.

The "firm" service described above has a much higher priority of delivery, based on the pipeline capacity. When the pipelines capacity was unbundled (much like the telecom service), it was divided into various levels of service. The "firm" service is the highest priority, and does not get interrupted.

This rate schedule has a Delivery Charge Mechanism which includes: Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS). In this facility the supplier for the Commodity is Woodruff Energy. Note: Should the TPS 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. 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. CEG's has observed potential savings in the electricity and natural gas costs. The Boroughs' "weighted average price-to-compare" per kWh (kilowatt hour) for all buildings is $.1053/kWh (kWh is the common unit of electric measure). Primary electricity is consumed by the Water Treatment Facility.

The "price to compare" (electricity) is defined as the price that would be compared to the equivalent utility price extracting the utility transmission and distribution costs (wires charges). This would be a market based price that would be supplied by a Third Party Supplier (TPS) or an alternative supplier.

The average "price-to-compare" per decatherm for natural gas, based on the information provided, is $11.79/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. The Borough could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption and current electric rates, The Borough would see an improvement of over $80,000 or over 20% annually. Note: Savings were calculated using The Boroughs Average Annual Consumption of 3,286,856 kWh's and a variance of approximately $.0253/kWh and utilizing a fixed one-year commodity contract). Collingswood should aggregate its entire electric load to gain the most optimal energy costs and to base-load its usage. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with the natural gas costs and the contract with Woodruff Energy. CEG has experience with this pricing structure, and while we are working on some assumptions, we believe a segment of the natural gas cost is not competitive with current market prices. Based on the current market, Collingswood could see an improvement in its natural gas costs of over 30%. CEG recommends further advisement on these prices. The Borough should also consider procuring energy (natural gas) on its own. By procuring energy through the current contract, they are paying a premium. CEG recommends alternative sourcing strategies.

CEG recommends the use of an "energy advisor" for review and implementation of a formal energy procurement program. The current program (fixed price contracts) may not meet the needs of the Borough. The Borough needs to build a program that is budget driven. This can be accomplished with the use of an "energy advisor".

CEG recommends scheduling a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that might be available. Through its meeting with the Local Distribution Company (LDC), The Borough will learn more about the competitive supply process. The Borough can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. The Borough 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 South Brunswick pay attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, they 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.

Finally, if Collingswood frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

IX. INSTALLATION FUNDING OPTIONS

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

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

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

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

X. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Collingswood - Fire House

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade - General	$0	$4,435	$630	$3,805	$851	$70	$921	15	$12,765	$1,050	263.1%	4.1	22.85%	$6,598.68
ECM #2	Rooftop Unit Upgrade	$11,200	$6,600	$1,104	$16,696	$2,226	$0	$2,226	20	$44,520	$0	166.7%	7.5	11.93%	$16,421.26
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Photovoltaic System	$445,050	$0	$0	$445,050	$12,270	$27,009	$39,279	25	$306,747	$675,229	120.6%	11.3	7.31%	$238,921.39

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

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

	$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Collingswood Fire Department

Building ID: 1946355
For 12-month Period Ending: September 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 03, 2009

Facility
Collingswood Fire Department
16 & 20 West Collings Ave
Collingswood, NJ 08108

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1928
Gross Floor Area (ft²): 10,704

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	247,892
Natural Gas (kBtu)[4]	590,385
Total Energy (kBtu)	838,277

Energy Intensity[5]

Site (kBtu/ft²/yr)	78
Source (kBtu/ft²/yr)	135

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	69

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	-14%
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.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Name	Collingswood Fire Department	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	16 & 20 West Collings Ave, Collingswood, NJ 08108	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Collingswood Fire Department (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	10,704 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	4 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	17 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: Electric (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
08/15/2009	09/14/2009	8,664.00
07/15/2009	08/14/2009	10,356.00
06/15/2009	07/14/2009	7,584.00
05/15/2009	06/14/2009	5,166.00
04/15/2009	05/14/2009	3,636.00
03/15/2009	04/14/2009	6,342.00
02/15/2009	03/14/2009	1,902.00
01/15/2009	02/14/2009	6,846.00
12/15/2008	01/14/2009	6,816.00
11/15/2008	12/14/2008	5,850.00
10/15/2008	11/14/2008	2,202.00
Electric Consumption (kWh (thousand Watt-hours))		**65,364.00**
Electric Consumption (kBtu (thousand Btu))		**223,021.97**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**223,021.97**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Natural Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
08/15/2009	09/14/2009	34.57
07/15/2009	08/14/2009	36.55
06/15/2009	07/14/2009	410.69
05/15/2009	06/14/2009	51.08
04/15/2009	05/14/2009	543.08
03/15/2009	04/14/2009	543.08
02/15/2009	03/14/2009	1,348.81
01/15/2009	02/14/2009	1,133.10
12/15/2008	01/14/2009	1,210.57
11/15/2008	12/14/2008	307.64
10/15/2008	11/14/2008	38.68

Natural Gas Consumption (therms)	**5,657.85**
Natural Gas Consumption (kBtu (thousand Btu))	**565,785.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**565,785.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Collingswood Fire Department
16 & 20 West Collings Ave
Collingswood, NJ 08108

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Collingswood Fire Department	
Gross Floor Area Excluding Parking: (ft^2)	10,704
Year Built	1928
For 12-month Evaluation Period Ending Date:	September 30, 2009

Facility Space Use Summary

Collingswood Fire Department	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	10,704
Number of PCs[o]	4
Weekly operating hours[o]	168
Workers on Main Shift[o]	17

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2009)	**Baseline** (Ending Date 09/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft2)	78	78	0	N/A	78
Source (kBtu/ft2)	135	135	0	N/A	157
Energy Cost					
$/year	$ 18,822.06	$ 18,822.06	N/A	N/A	$ 18,747.55
$/ft2/year	$ 1.76	$ 1.76	N/A	N/A	$ 1.75
Greenhouse Gas Emissions					
$MtCO_2e$/year	69	69	0	N/A	69
$kgCO_2e/ft^2$/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.

EQUIPMENT LIST

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
B-1	WEIL-McLAIN / POWERFLAME BURNER	BURNER #WJR30A-10	GAS-FIRED STEAM BOILER	1075 MBH	75%	OLD FIREHOUSE	OLD BOILER ROOM	-	CONDITION - FAIR
CP-1	SHIPCO	50FMV	STEAM CONDENSATE PUMP & RECIVER TANK	1/3 HP MOTOR, 12 GPM @ 20 PSIG	-	OLD FIREHOUSE	OLD BOILER ROOM	-	CONDITION - GOOD
HWH	MOR-FLO / AMERICAN WATER HEATER GROUP	G51-50T40-3NV	GAS-FIRED DOMESTIC HOT WATER HEATER	50 GALLON	80%	OLD FIREHOUSE	OLD BOILER ROOM	-	CONDITION - GOOD
AC	LG	LWHD1200FR	WINDOW AC UNIT	11,500 BTUH	-	DUTY OFFICER BEDROOM	DUTY OFFICER BEDROOM	-	CONDITION - VERY GOOD
UH	-	-	STEAM HORIZONTAL UNIT HEATER	-	-	APPERATUS BAY OLD SIDE	APPERATUS BAY OLD SIDE	-	CONDITION - FAIR / OLD
RADIATORS (3)	-	-	CAST IRON STEAM RADIATORS	-	-	MEETING ROOM	MEETING ROOM	-	CONDITION - FAIR / OLD
BASEBOARD HEATING	-	-	BASEBOARD HEAT	48 FT.	-	2ND FLOOR MEETING ROOM	2ND FLOOR MEETING ROOM	-	CONDITION - GOOD
UH	-	-	GAS-FIRED UNIT HEATER'	-	-	RESCUE BAY	RESCUE BAY	-	CONDITION - NEW
AC	LG	LWHD1500FR	WINDOW AC UNIT	15,000 BTUH	-	CHIEF'S OFFICE	CHIEF'S OFFICE	-	CONDITION - GOOD
AC	GE	ASH08FDS1	WINDOW AC UNIT	8,000 BTUH	-	UTILITY ROOM	UTILITY ROOM	-	
RTU-1	HEIL	47 MPC NPADC47AB02	ROOFTOP UNIT	3 TONS	9 EER	MEETING ROOM	ROOF	7 YEARS	CONDITION - GOOD
RTU-2	HEIL	47 MPC NPADC47AB02	ROOFTOP UNIT	3 TONS	9 EER	MEETING ROOM	ROOF	7 YEARS	CONDITION - GOOD
RTU-3	INTER-CITY PRODUCTS	PGAA42F1K1	ROOFTOP UNIT	100 MBH INPUT GAS, 3 TONS COOLING	78% HEATING, 8.5 EER COOLING	BAR AREA	ROOF	5 YEARS	CONDITION - FAIR
RTU-4	G-E	BYC036B112EO	ROOFTOP UNIT, GAS HEAT	3 TONS COOLING	9 EER	OFFICES & DAY ROOM / FIRE PREVENTION	LOWER ROOF	5 YEARS	CONDITION - FAIR

ECM #1: Lighting Upgrade

Appendix E

Fire Department Building

CEG Project #: 9C09083
Project Name : Borough of Collingswood Energy Audit
Address: 16 & 20 West Collings Ave
City, State: Collingswood, NJ 08108

Date 12/02/09
kWh Cost $0.161

	Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Fixture Location	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
First Floor															
Front Office	8760	1	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	77	$108.60	1	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	48	29	254	$40.90	1.9	$87.75	$87.75	$10.00
Front Office	8760	1	(2)21w T-12 Lamps. 2' x 2' Recessed Flat Prismatic Fixture w/Mag. Ballast - 42w	42	$59.24	1	(2)17w T8 Sylvania Lamps #FO17 Sylvania Ballast #QHE 29w	29	13	114	$18.33	4.0	$83.90	$83.90	$10.00
Second office	4380	1	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	77	$54.30	1	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	48	29	127	$20.45	3.8	$87.75	$87.75	$10.00
Bathroom #1	1093	1	(1)60w Incand. Lamp. Wall Mounted Fixture - 60w	60	$10.56	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	18	42	46	$7.39	1.5	$10.86	$10.86	$0.00
Supply Room	365	1	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	77	$4.52	1	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	48	29	11	$1.70	45.6	$87.75	$87.75	$10.00
Bathroom #2	730	1	(1)60w Incand. Lamp. Wall Mounted Fixture - 60w	60	$7.05	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	18	42	31	$4.94	2.2	$10.86	$10.86	$0.00
Bathroom #2	730	1	(1)32w Circuline Lamp. Ceiling Drum Fixture - 32w	27	$3.17	1	Existing to Remain	27	0	0	$0.00		$0.00	$0.00	$0.00
Break Room	6570	2	(2)34w T-12 Lamps. 2' x 4' Recessed Egg Crate Fixture w/Mag. Ballast - 77w	154	$162.90	2	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	96	58	381	$61.35	2.5	$87.75	$175.50	$20.00
Heater & Storage room	365	1	(1)15w CF Lamp. Porc. Keyless Fixture - 15w	12	$0.71	1	Existing to Remain	12	0	0	$0.00		$0.00	$0.00	$0.00

	Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Fixture Location	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
Small engine Room	2920	16	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	1232	$579.19	16	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	768	464	1,355	$218.14	5.7	$87.75	$1,404.00	$160.00
Big Engine Room	2920	24	(2)32w T-8 Lamp. Channel Strip Fixture - 59w	1416	$665.69	24	Existing to Remain	1416	0	0	$0.00		$0.00	$0.00	$0.00
4 Closets, Bedroom & Toilet	5110	1	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	77	$63.35	1	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	48	29	148	$23.86	3.3	$87.75	$87.75	$10.00
4 Closets, Bedroom & Toilet	5110	2	(1)32w Circuline Lamp. Ceiling Drum Fixture - 32w	54	$44.43	2	Existing to Remain	54	0	0	$0.00		$0.00	$0.00	$0.00
Crew Room	4380	5	(2)34w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 77w	385	$271.49	5	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	240	145	635	$102.25	3.8	$87.75	$438.75	$50.00
Vestibule - Stair	365	3	(2)34w T-12 Lamps. 1' x 4' Surface Plastic Wrap Fixture w/Mag. Ballast - 77w	231	$13.57	3	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 48w	144	87	32	$5.11	45.6	$87.75	$263.25	$30.00
2nd Floor Coat Room	365	2	(4)20w T-12 2' Linear Lamps. 2' x 4' Surface Mounted Fixture w/Mag. Ballast - 82w	164	$9.64	2	4-20w 2' Long Parallel 4' Long Plastic Surface	122	42	15	$2.47	71.1	$107.80	$215.60	$40.00
2nd Floor Meeting Room	1095	10	(4)40w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 154w	1540	$271.49	10	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 95w	950	590	646	$104.01	7.3	$95.55	$955.50	$200.00
2nd Floor Meeting Room	1095	8	(1)150w Incand. Lamp. Hi-Hat Fixture - 150w	1200	$211.55	8	42w Edison-base CFL	336	864	946	$152.32	0.0	$0.00	$0.00	$0.00
Toilet Rooms	1460	1	(4)20w T-12 2' Linear Lamps. 2' x 4' Surface Mounted Fixture w/Mag. Ballast - 82w	82	$19.27	1	4-20w 2' Long Parallel 4' Long Plastic Surface	61	21	31	$4.94	17.8	$107.80	$107.80	$20.00
Toilet Rooms	1460	1	(4)20w T-12 2' Linear Lamps. 2' x 4' Surface Mounted Fixture w/Mag. Ballast - 82w	82	$19.27	1	4-20w 2' Long Parallel 4' Long Plastic Surface	61	21	31	$4.94	17.8	$107.80	$107.80	$20.00
Kitchen	1460	2	(4)40w T-12 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Mag. Ballast - 154w	308	$72.40	2	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE 95w	190	118	172	$27.74	5.4	$95.55	$191.10	$40.00
Hose Room	365	4	(2)32w T-8 Lamp. Channel Strip Fixture - 59w	236	$13.87	4	Existing to Remain	236	0	0	$0.00		$0.00	$0.00	$0.00

	Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Fixture Location	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
Bar	208	8	(4)32w T-8 Lamps. 2' x 4' Recessed Flat Prismatic Fixture w/Elect. Ballast - 108w	864	$28.93	8	Existing to Remain	864	0	0	$0.00		$0.00	$0.00	$0.00
Bar	208	8	(1)100w Incand. Lamp. Wall Lantern Fixture - 100w	800	$26.79	8	32w Edison-base CFL	256	544	113	$18.22	4.8	$10.86	$86.88	$0.00
Bar	208	1	(3)100w Incand. Lamps. Chandelier Fixture - 300w	300	$10.05	1	32w Edison-base CFL	96	204	42	$6.83	4.8	$32.58	$32.58	$0.00
Bar	208	7	(1)150w Incand. Lamp. Hi-Hat Fixture - 150w	1050	$35.16	7	42w Edison-base CFL	294	756	157	$25.32	0.0	$0.00	$0.00	$0.00
First Floor Summary		**113**		**10607**	**$2,767**	**113**		**6480**	**4127**	**5287.0**	**$851**	**4.5**		**$4,435**	**$630**
COMMENTS:															

Project Name: LGEA Solar PV Project - Collingswood Fire Department
Location: Collingswood, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$445,050
Annual kWh Production	77,169
Annual Energy Cost Reduction	$12,270
Annual SREC Revenue	$27,009
First Cost Premium	**$445,050**
Simple Payback:	**11.33** Years

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 300
Average Energy Cost ($/kWh) **$0.159**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/kWh) $0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$22,253	0	0	0	$0	0	0	(22,253)	0
1	$0	77,169	$12,270	$0	$27,009	$29,391	$6,468	$3,420	($18,832)
2	$0	76,783	$12,638	$0	$26,874	$28,923	$6,936	$3,653	($15,179)
3	$0	76,399	$13,017	$0	$26,740	$28,422	$7,437	$3,898	($11,281)
4	$0	76,017	$13,408	$0	$26,606	$27,884	$7,975	$4,155	($7,127)
5	$0	75,637	$13,810	$779	$26,473	$27,308	$8,551	$3,645	($3,482)
6	$0	75,259	$14,224	$775	$26,341	$26,690	$9,169	$3,931	$449
7	$0	74,883	$14,651	$771	$26,209	$26,027	$9,832	$4,230	$4,678
8	$0	74,508	$15,090	$767	$26,078	$25,316	$10,543	$4,542	$9,220
9	$0	74,136	$15,543	$764	$25,948	$24,554	$11,305	$4,868	$14,088
10	$0	73,765	$16,009	$760	$25,818	$23,737	$12,122	$5,208	$19,297
11	$0	73,396	$16,490	$756	$25,689	$22,860	$12,999	$5,563	$24,860
12	$0	73,029	$16,984	$752	$25,560	$21,921	$13,938	$5,933	$30,794
13	$0	72,664	$17,494	$748	$25,432	$20,913	$14,946	$6,319	$37,113
14	$0	72,301	$18,019	$745	$25,305	$19,833	$16,026	$6,720	$43,833
15	$0	71,939	$18,559	$741	$25,179	$18,674	$17,185	$7,138	$50,971
16	$0	71,580	$19,116	$737	$25,053	$17,432	$18,427	$7,573	$58,544
17	$0	71,222	$19,690	$734	$24,928	$16,100	$19,759	$8,025	$66,569
18	$0	70,866	$20,280	$730	$24,803	$14,671	$21,188	$8,494	$75,063
19	$0	70,511	$20,889	$726	$24,679	$13,140	$22,719	$8,982	$84,045
20	$0	70,159	$21,515	$723	$24,556	$11,497	$24,362	$9,489	$93,534
21	$0	69,808	$22,161	$719	$24,433	$10,475	$22,396	$13,004	$106,538
22	$0	69,459	$22,826	$715	$24,311	$8,465	$18,430	$19,527	$126,065
23	$0	69,112	$23,510	$712	$24,189	$0	$0	$46,988	$173,052
24	$0	68,766	$24,216	$708	$24,068	$0	$0	$47,575	$220,628
25	$0	68,422	$24,942	$705	$23,948	$0	$0	$48,185	$268,813
	Totals:	1,472,223	$329,696	$12,008	$515,278	$445,294	$271,885	$312,710	$1,452,253

Net Present Value (NPV)	**$59,105**
Internal Rate of Return (IRR)	**20.8%**

Project Name: LGEA Solar PV Project - Collingswood Fire Department
Location: Collingswood, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

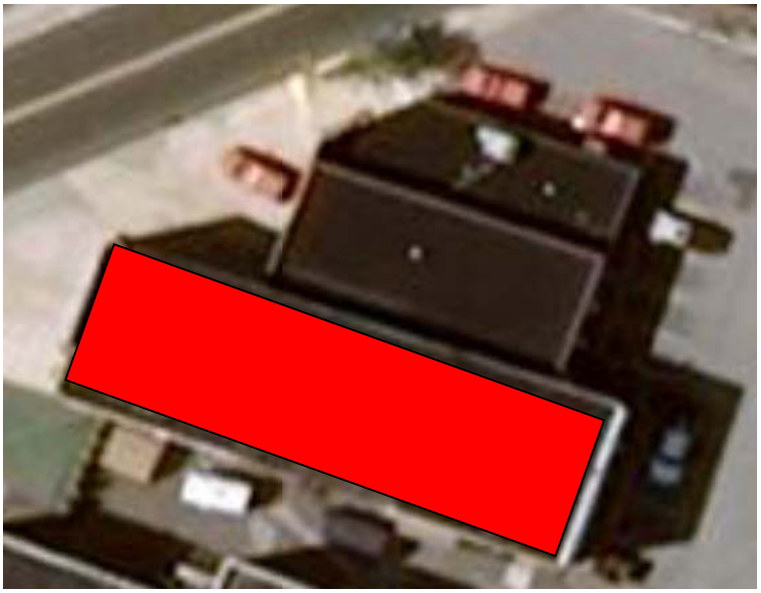
	Photovoltaic System - Direct Purchase
Total Construction Cost	$445,050
Annual kWh Production	77,169
Annual Energy Cost Reduction	$12,270
Annual SREC Revenue	$27,009
First Cost Premium	**$445,050**
Simple Payback:	**11.33** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.159**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$445,050	0	0	0	$0	(445,050)	0
1	$0	77,169	$12,270	$0	$27,009	$39,279	($405,771)
2	$0	76,783	$12,638	$0	$26,874	$39,512	($366,259)
3	$0	76,399	$13,017	$0	$26,740	$39,757	($326,502)
4	$0	76,017	$13,408	$0	$26,606	$40,014	($286,488)
5	$0	75,637	$13,810	$779	$26,473	$39,504	($246,985)
6	$0	75,259	$14,224	$775	$26,341	$39,790	($207,195)
7	$0	74,883	$14,651	$771	$26,209	$40,089	($167,106)
8	$0	74,508	$15,090	$767	$26,078	$40,401	($126,706)
9	$0	74,136	$15,543	$764	$25,948	$40,727	($85,979)
10	$0	73,765	$16,009	$760	$25,818	$41,067	($44,911)
11	$0	73,396	$16,490	$756	$25,689	$41,422	($3,489)
12	$0	73,029	$16,984	$752	$25,560	$41,792	$38,304
13	$0	72,664	$17,494	$748	$25,432	$42,178	$80,481
14	$0	72,301	$18,019	$745	$25,305	$42,579	$123,061
15	$0	71,939	$18,559	$741	$25,179	$42,997	$166,058
16	$0	71,580	$19,116	$737	$25,053	$43,432	$209,489
17	$0	71,222	$19,690	$734	$24,928	$43,884	$253,373
18	$0	70,866	$20,280	$730	$24,803	$44,353	$297,726
19	$0	70,511	$20,889	$726	$24,679	$44,841	$342,568
20	$0	70,159	$21,515	$723	$24,556	$45,348	$387,916
21	$1	69,808	$22,161	$719	$24,433	$45,874	$433,790
22	$2	69,459	$22,826	$715	$24,311	$46,421	$480,211
23	$3	69,112	$23,510	$712	$24,189	$46,988	$527,198
24	$4	68,766	$24,216	$708	$24,068	$47,575	$574,774
25	$5	68,422	$24,942	$705	$23,948	$48,185	$622,959
Totals:		1,472,223	$329,696	$12,008	$515,278	$1,068,009	$832,966
				Net Present Value (NPV)		**$622,984**	
				Internal Rate of Return (IRR)		**7.9%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Collingswood - Fire Department	3500	Sunpower SPR230	215	14.7	3,161	49.45	77,169	7,095	15.64



N
W E
S

.= Proposed PV Layout

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