ENERGY AUDIT – FINAL REPORT

02/12/2010

BOROUGH OF COLLINGSWOOD
SCOTTISH RITE AUDITORIUM

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CEG PROJECT NO. 9C09083

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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	$ 54,692
Natural Gas	$ 1,458
Fuel Oil	$ 24,863
Total	$ 81,013

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	Boiler Upgrades	$59,567	$3,617	16.5	21.4%
ECM #2	Lighting Upgrade - General	$16,253	$6,198	2.6	313.7%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Photovoltaic System	$1,140,570	$100,664	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)	OIL (GALLONS)
ECM #1	Boiler Upgrades	N/A	N/A	1156.0
ECM #2	Lighting Upgrade - General	32	27670	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	126.7	197768	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. Although the Photovoltaic System payback is over 10 years, it is still recommended since the site is acceptable due the flat roof, societal benefits and as insurance against volatile fossil fuel energy markets. The following Energy Conservation Measures are recommended for the facility:

- **ECM #2: Lighting Upgrades**
- **REM #1: Photovoltaic Systems**

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 Scottish rite auditorium complex located at 315 White Horse Pike in Collingswood. The building includes a 1000 seat auditorium, and a 800 seat banquet hall. Also included is a three story mansion housing offices and meeting space.

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	16.2¢ / kWh
Natural Gas	$1.627 / Therm
Fuel Oil	$ 3.13 / Gallon

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE & G
Rate: Annual general
Meter No: 778010143
Customer ID No: 61-632-226-01
Third Party Utility n/a
TPS Meter / Acct No: n/a

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-08	29,920	134.4	$4,173
Feb-08	23,200	134.4	$3,594
Mar-08	27,840	137.6	$4,034
Apr-08	24,640	145.6	$3,696
May-08	24,320	139.2	$3,699
Jun-08	31,200	158.4	$6,552
Jul-08	28,160	155.2	$6,535
Aug-08	21,600	118.4	$5,398
Sep-08	23,200	123.2	$5,522
Oct-08	24,320	134.4	$4,493
Nov-08	31,200	44.8	$4,281
Dec-08	48,640	144.0	$2,714
Totals	**338,240**	**158.4 Max**	**$54,692**

AVERAGE DEMAND **130.8 KW average**
AVERAGE RATE **$0.162 $/kWh**

Figure 1
Electricity Usage Profile

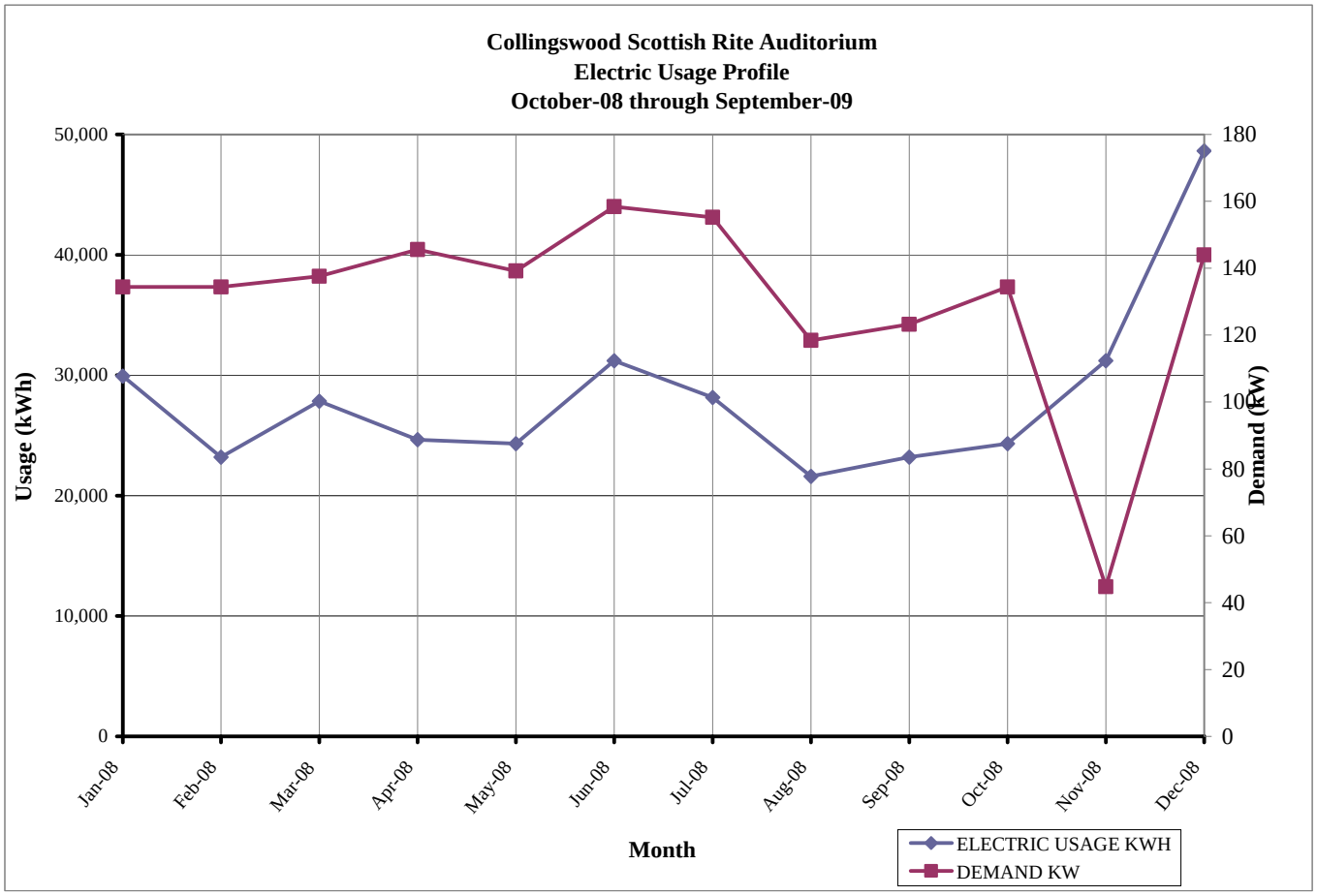


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY

Utility Provider: PSE & G
Rate: General Service gas
Account No: 61-632-226-01
Point of Delivery ID: 2804597
Third Party Utility Provider: n/a
TPS Meter No: n/a

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-08	106.42	$151.30
Feb-08	114.66	$171.35
Mar-08	29.21	$52.63
Apr-08	83.47	$138.64
May-08	62.54	$115.81
Jun-08	66.71	$129.32
Jul-08	66.84	$138.00
Aug-08	83.79	$146.10
Sep-08	69.13	$109.95
Oct-08	61.68	$92.85
Nov-08	60.69	$86.05
Dec-08	90.95	$126.02
TOTALS	**896.11**	**$1,458.02**
AVERAGE RATE:	**$1.627**	**$/THERM**

Figure 2
Natural Gas Usage Profile

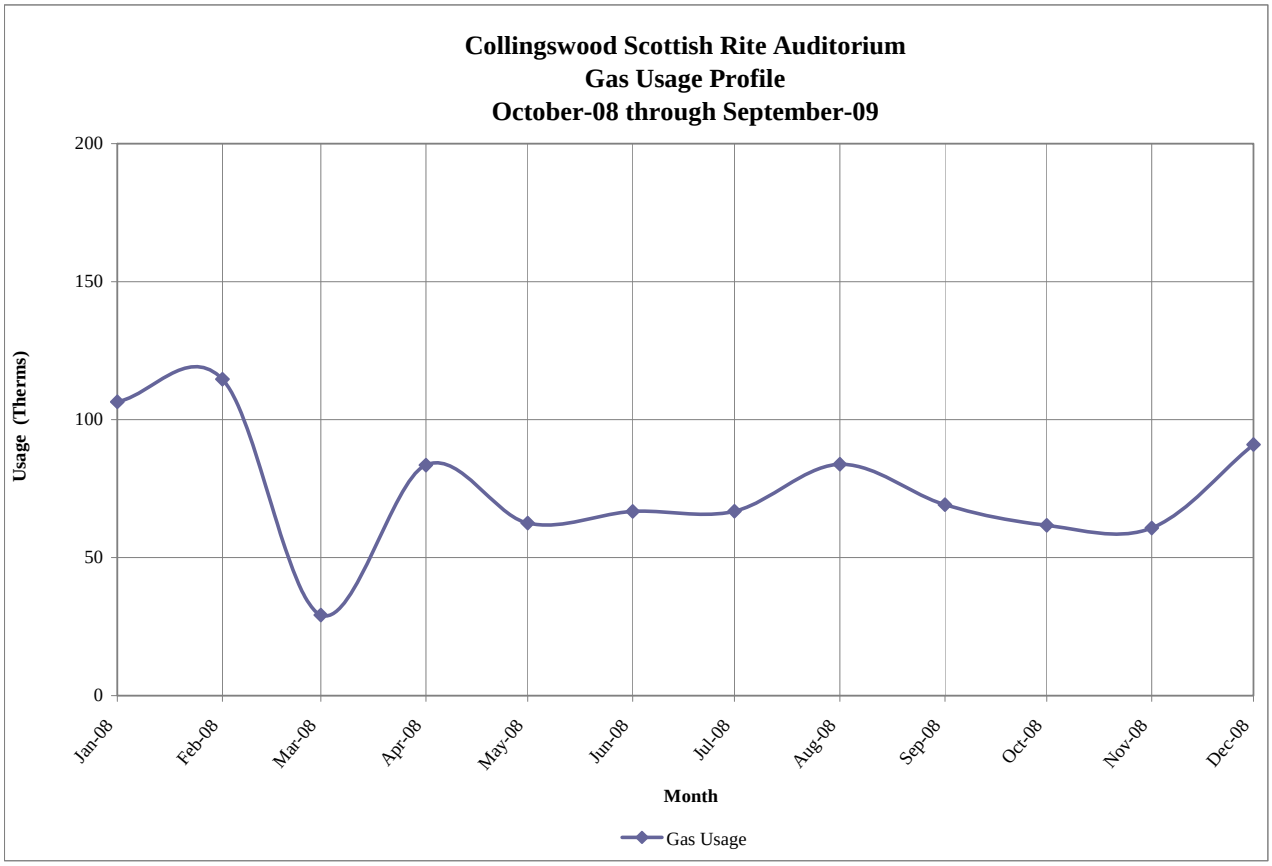


Table 5
Fuel Oil Billing Data

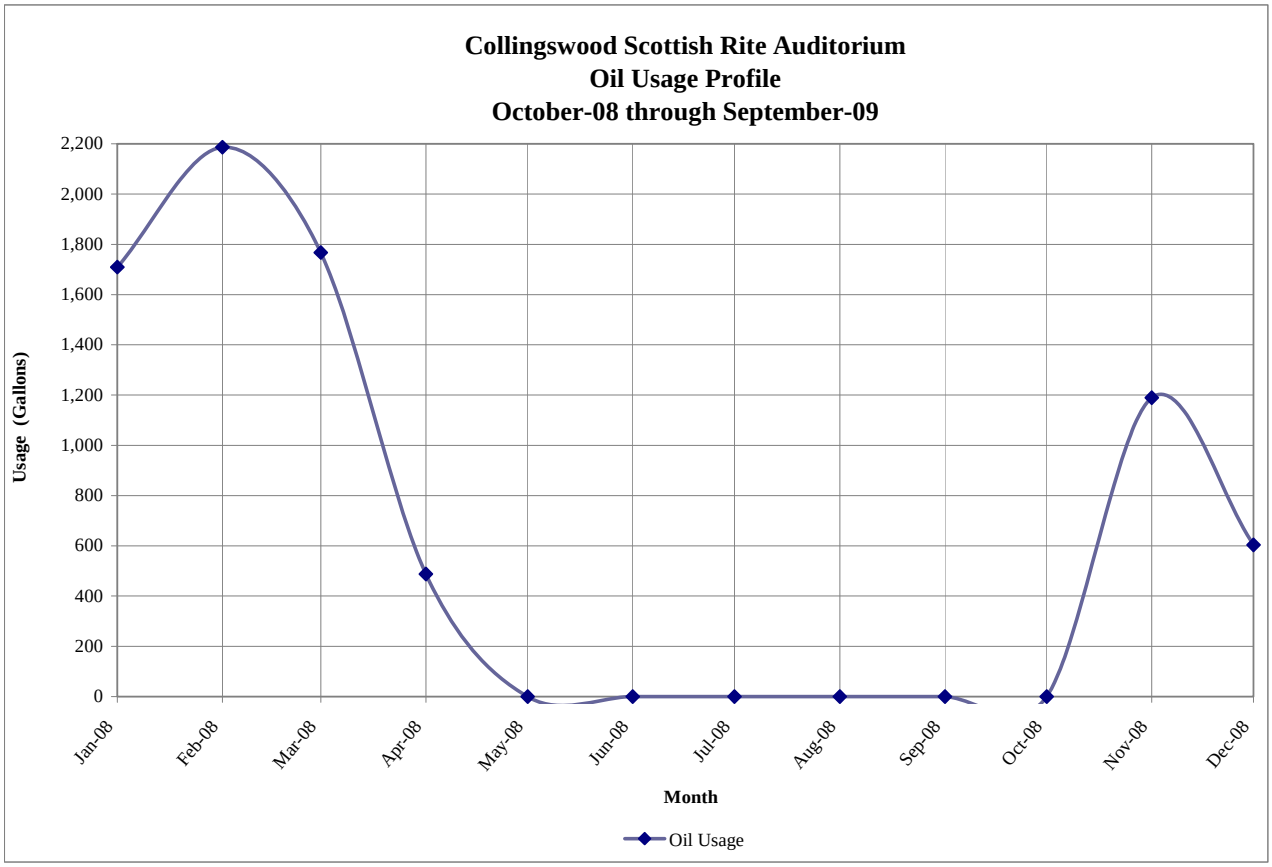
FUEL OIL USAGE SUMMARY

Utility Provider: Cundiff Oil Company
Rate: Dyed Fuel oil
Account No: C12430
Point of Delivery ID: n/a
Third Party Utility Provider: n/a
TPS Meter No: n/a

MONTH OF USE	CONSUMPTION (Gallons)	TOTAL BILL
Jan-08	1,709.30	$5,094.06
Feb-08	2,186.30	$6,686.66
Mar-08	1,767.30	$6,227.94
Apr-08	488.20	$2,035.79
May-08	0.00	$0.00
Jun-08	0.00	$0.00
Jul-08	0.00	$0.00
Aug-08	0.00	$0.00
Sep-08	0.00	$0.00
Oct-08	0.00	$781.18
Nov-08	1,189.30	$2,842.08
Dec-08	603.60	$1,195.13
TOTALS	**7,944.00**	**$24,862.84**

AVERAGE RATE: **$3.130** **$/Gallon**

Figure 3
Fuel Oil Usage Profile



Energy Use Index (EUI)

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

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

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

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

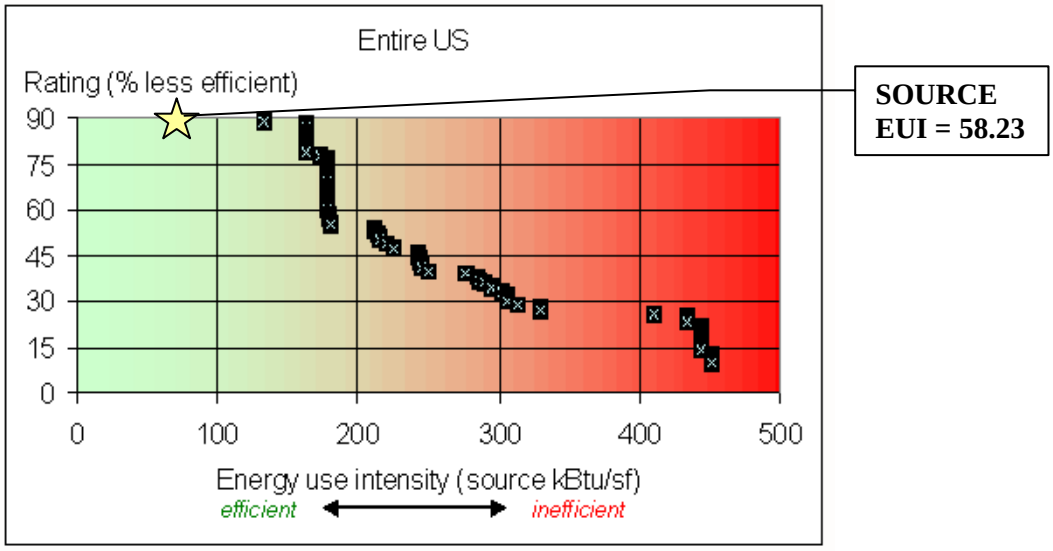
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	338240			1,154,751	3.340	3,856,870
NATURAL GAS		896		89,611	1.047	93,822
FUEL OIL			7944	1,104,216	1.010	1,115,258
PROPANE			0.0	0	1.010	0
TOTAL				2,348,578		5,065,950
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		87,000	SQUARE FEET			
BUILDING SITE EUI		*27.00*	kBtu/SF/YR			
BUILDING SOURCE EUI		*58.23*	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



B. EPA Energy Benchmarking System

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

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

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The 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 Scottish Rite Auditorium	N/A	50

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

V. FACILITY DESCRIPTION

The Borough of Collingswood's Scottish Rite Auditorium complex was originally constructed in 1930. A 2003 extension accompanied a renovation to include a new elevator, entrance and lobbies. The total facility floor area totals 87,000 square feet. It is an impressive large facility with high ceilings and many opulent features of 1920's architecture and interior design.

The three level main building includes a 1000 seat auditorium, and a 800 seat banquet hall. It's construction is heavy masonry with a brick and stone exterior. The third level theatre is first class with a full stage area complete with rigging, etc. The theatre is utilized sporadically for performances, and not at all during summer months due to a lack of air conditioning in this area. The banquet hall is booked almost every weekend primarily for weddings and similar social events.

Construction is masonry with traditional red brick exterior walls. The roof is flat, and the membrane is a tar and paper type. 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.

Also included is a 1850 vintage three story mansion housing offices and meeting space. This building is of typical wood frame house construction and includes vintage double hung wood windows and pitched shingle roofs. The mansion is generally occupied on a 9 to 5 , Mon – Fri. schedule.

HVAC Systems

Fuel sources for this facility include natural gas, fuel oil and electricity. The main building's heating and air conditioning systems is a mixture of equipment added new in 2003 and older heating and ventilating systems.

The primary heating source is a 1900 MBH capacity Wiel McLain hot water boiler located in the boiler room. The boiler, installed in 2003 is in very good condition. The boiler can operate on either gas or oil, with oil reportedly used most often. Twp 10 HP circulators pump hot water to radiators, finned-tube baseboard heaters, fan-coils and air handlers throughout the facility.

Chilled water is produced for cooling by a single York 95 ton air cooled chiller located on grade. The chiller circulates a glycol fluid (for freeze protection) using two 7-1/2 HP pumps located in the lower mechanical room under the stage. The chilled fluid is piped to air handlers and fan coils to cool spaces on the 1st and 2nd floors, primarily the banquet hall space. The 3rd level Theatre does not have cooling capabilities and is shut down for the summer.

A large central station air handler, ductwork and controls were added in 2003 to provide year round temperature control of the banquet facility. The air handler has 12,200 cfm capacity, 9000 cfm outdoor air, chilled coil and hot water coil and fully automated controls. A similar unit, 4100 cfm 1005 outdoor air, handles make-up air and heating and cooling for the kitchen area.

In addition a 1930 vintage furnace and fan system provide heated ventilation air for the theatre. This system is oil fired and is still fully functional, although control is 100% manual. This furnace is unique and it is a novelty to see it still in use. The burner, a Carlin is not original equipment and is fully functional. Since this system is only activated prior to and during live performances and shows, its energy use is minimal, and any upgrades would not provide adequate energy cost payback.

The mansion building is heated hydraulically with a Wiel-Mclain 278 Mbh oil-fired boiler and associated pump, piping and vintage radiators. Cooling is provide with five(5) window AC units.

Domestic Hot Water

Three Bradford white brand domestic hot water heaters exist at the facility. An oil-fired 70 gallon storage type hot water heater located in the boiler room provides hot water for the kitchen & stage are bathrooms. Two 40 gallon, 1500 watt electric units exist serving the ballroom and theatre bathrooms, respectively. All three are in good condition, and should have 10+ years service life left.

Lighting

Theater Lighting

The theater uses primarily specialty incandescent fixtures. A limited number of compact fluorescent fixtures and fluorescent tube fixtures are used. Standard switching is utilized and there are dimming lighting controls for auditorium & ballroom.

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

The parking lot is lit with high intensity discharge fixtures mounted on light poles.

Ballroom Lighting

The ballroom uses primarily specialty incandescent fixtures and some fluorescent tube fixtures containing T-12 lamps and magnetic ballasts. The first and second floor ballroom lighting has been recently renovated. Standard switching is utilized and there are no other types of lighting controls present.

The exterior lighting uses primarily incandescent wall mounted fixtures.

VI. MAJOR EQUIPMENT LIST

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

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

VII. ENERGY CONSERVATION MEASURES

The HVAC systems serving the Banquet Facility, installed in 2003, are in good condition and we do not recommend any ECM's for these systems. They are in good working order, with modern controls and the design is energy wise.

Although the Theatre heating system is aged, we do not recommend any ECM's since the systems are used minimally, thus any energy savings would be out weighed by construction costs to a great extent.

ECM #1: Boiler Upgrades

Description:

The Main Building is heated by a Weil McLain1900 Mbh input hot water boiler which presently is about 78% efficient. The Mansion is heated by an oil fires Weil McLain 278 Mbh input witch is likewise about 78% efficient. As an alternative energy conservation measure, the Concord team recommends that these boilers be replaced by 93% efficient equipment, as manufacture red by Thermal Solutions rated at 2000 Mbh for main building, and a Weil MCLian "Ultra" for the mansion building..

Additional oil burning equipment includes the kitchen area hot water heater and the antique Theatre Furnace for the Theatre. We estimated and deleted oil use for these devices to calculate boiler oil consumption. The water heater and the furnace are both used minimally, during performances and events only, thus we do not recommend ECM's for these systems.

Energy Use Calculations:

Annual Oil Use = 7944 Gallons
Non-Boiler Annual Natural Gas Use = 12 months x 20 Gallons = 240 Gallons
Annual Boiler oil Use = 7944 Gallons – 240 gallons = 7704 Gallons
Avg. Cost of Fuel oil = $3.13 / gallon

Energy Savings Calculations:

Energy Savings = Old Boiler Energy Cost x ((New Boiler Efficiency – Old Boiler) / New Boiler Efficiency))
Energy Savings = 7704 x (0.93-0.78) = 1156 Gallons.
Energry Cost Savings = 1156 gallons x $3.13 / Gallon = $3617 / yr.

The SmartStart Buildings® incentive is $1.75 per MBH which equates to $3933.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$63,500
NJ Smart Start Equipment Incentive ($):	$3,933
Net Installation Cost ($):	$59,567
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,617
Total Yearly Savings ($/Yr):	$3,617
Estimated ECM Lifetime (Yr):	20
Simple Payback	16.5
Simple Lifetime ROI	21.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$72,340
Internal Rate of Return (IRR)	1%
Net Present Value (NPV)	($7,757.82)

ECM #2: 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.

CEG also recommends replacement of incandescent lamps with compact fluorescent lamps. Incandescent lamps use approximately 3 to 4 times the energy of compact fluorescent lamps. Maintenance savings will be realized by reducing the number of lamps replaced per year. The expected lamp life of a compact fluorescent lamp is approximately 6,000 to 15,000 burn-hours, in comparison to the existing incandescent lamps which are approximately 750 to 1,000 burn-hours. The facility will need approximately 75% fewer lamp replacements per year.

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 = *((11)*-1&*2 lamp fixtures x $10) = $110*
= ((15)-3&4 *lamp fixtures x $20) = $300*
= $410

Maintenance Savings are calculated as follows:

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

Maintenance Savings = *(245 lamps per year) x ($2.00 + $5.00) =$1,715*

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,663
NJ Smart Start Equipment Incentive ($):	$410
Net Installation Cost ($):	$16,253
Maintenance Savings ($/Yr):	$1,715
Energy Savings ($/Yr):	$4,483
Total Yearly Savings ($/Yr):	$6,198
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.6
Simple Lifetime ROI	472.0%
Simple Lifetime Maintenance Savings	$25,725
Simple Lifetime Savings	$67,245
Internal Rate of Return (IRR)	38%
Net Present Value (NPV)	$57,738.32

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 9000 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 127 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 197,768 KWh annually, reducing the overall utility bill by approximately 58.5% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

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

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

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

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

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

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**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.

Energy Conservation Measures:

REM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,140,570
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$1,140,570
Maintenance Savings ($/Yr):	$69,219
Energy Savings ($/Yr):	$31,445
Total Yearly Savings ($/Yr):	$100,664
Estimated ECM Lifetime (Yr):	25
Simple Payback	11.3
Simple Lifetime ROI	120.6%
Simple Lifetime Maintenance Savings	$1,730,470
Simple Lifetime Savings	$786,128
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$612,305.52

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.

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. The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profile.

Electricity:

The Electric Usage Profile demonstrates a fairly flat (consistent) load profile throughout the year. There is one exception for the month of November, which has a dramatic and steep drop off in usage. However for a facility of this type (Auditorium), with 1000 seats and an 800 seat banquet hall, and considering the age of this building, this is more typical. Additionally this facility is occupied 24/7 or 168 hours per week. In this facility cooling is provided by chilled water, which is supplied by a single York 95 ton air cooled chiller. Additional electric consumption is attributed to (2) two 40 gallon electric hot water heaters. This facility utilizes the Delivery service (LPLS), from Public Service Electric and Gas Company (PSE&G) and its Commodity service from PEPCO Energy Services. 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 very flat heating load throughout the year. This profile is very atypical for a natural gas heating load. The primary source of heat for this facility is provided by a Weil Mc Lein hot water boiler. This boiler can run on natural gas or fuel oil. The facility can switch to the most competitive fuel as needed. This provides a good hedge or arbitrage. Natural Gas Delivery service (GSG) 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:

This facility receives electrical service through Public Service Electric and Gas Company (PSE&G) on a LPLS (Large Power Lighting Service) rate schedule. This facility utilizes PEPCO Energy Services for its Commodity service.

The LPLS utility tariff is for delivery service for general purposes at secondary distribution voltages where the customers measured peak demand exceeds 150 kW in any given month and also at primary distribution voltages. Customers may either purchase electric supply from a

Third Party Supplier (TPS) of from PSE&G's Basic Generation Service default service as detailed in the rate schedule. The rate schedule has a Delivery Charge; Distribution kW and kWh 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).
This facility has chosen a Third Party Supplier (PEPCO Energy Services) for its Commodity requirements.

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 (GSG) 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 GSG (General Service Gas) rate. The utility tariff rate (GSG) 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.

X. INSTALLATION FUNDING OPTIONS

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

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

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

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

XI. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Collingswood - Scottish Rite Auditorium

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	Boiler Upgrades	$31,750	$31,750	$3,933	$59,567	$3,617	$0	$3,617	20	$72,340	$0	21.4%	16.5	1.47%	($7,757.82)
ECM #2	Lighting Upgrade - General	$0	$16,663	$410	$16,253	$4,483	$1,715	$6,198	15	$67,245	$25,725	472.0%	2.6	37.82%	$57,738.32
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Photovoltaic System	$1,140,570	$0	$0	$1,140,570	$31,445	$69,219	$100,664	25	$786,128	$1,730,470	120.6%	11.3	7.31%	$612,305.52

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.

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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 Scottish Rite Auditorium

Building ID: 1946415
For 12-month Period Ending: September 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 03, 2009

Facility
Collingswood Scottish Rite Auditorium
315 White Horse pike
Collingswood, NJ 08108

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1931
Gross Floor Area (ft²): 87,000

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,161,692
Fuel Oil (No. 2) (kBtu)	1,145,702
Natural Gas (kBtu)[4]	89,828
Total Energy (kBtu)	2,397,222

Energy Intensity[5]

Site (kBtu/ft²/yr)	28
Source (kBtu/ft²/yr)	59

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	266

Electric Distribution Utility
PSE&G - Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	-42%
Building Type	Social/Meeting

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 Scottish Rite Auditorium	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Social/Meeting	Is this an accurate description of the space in question?		☐
Location	315 White Horse pike, 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		☐
Scottish Rite Auditorium (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	87,000 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	10 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	30 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	5 (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	21,600.00
07/15/2009	08/14/2009	28,160.00
06/15/2009	07/14/2009	31,200.00
05/15/2009	06/14/2009	24,320.00
04/15/2009	05/14/2009	24,640.00
03/15/2009	04/14/2009	27,840.00
02/15/2009	03/14/2009	23,200.00
01/15/2009	02/14/2009	29,920.00
12/15/2008	01/14/2009	48,640.00
11/15/2008	12/14/2008	31,200.00
10/15/2008	11/14/2008	24,320.00

Electric Consumption (kWh (thousand Watt-hours))	**315,040.00**
Electric Consumption (kBtu (thousand Btu))	**1,074,916.48**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**1,074,916.48**
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	83.79
07/15/2009	08/14/2009	66.84
06/15/2009	07/14/2009	66.71
05/15/2009	06/14/2009	62.54
04/15/2009	05/14/2009	83.47
03/15/2009	04/14/2009	29.21
02/15/2009	03/14/2009	114.66
01/15/2009	02/14/2009	106.42
12/15/2008	01/14/2009	90.95
11/15/2008	12/14/2008	60.69
10/15/2008	11/14/2008	61.68

Natural Gas Consumption (therms)	**826.96**
Natural Gas Consumption (kBtu (thousand Btu))	**82,696.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**82,696.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Fuel Type: Fuel Oil (No. 2)

Meter: Fuel Oil (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
08/15/2009	09/14/2009	0.00
07/15/2009	08/14/2009	0.00
06/15/2009	07/14/2009	0.00
05/15/2009	06/14/2009	0.00
04/15/2009	05/14/2009	488.20
03/15/2009	04/14/2009	1,767.30
02/15/2009	03/14/2009	2,186.30
01/15/2009	02/14/2009	1,709.30
12/15/2008	01/14/2009	603.60
11/15/2008	12/14/2008	1,189.30
10/15/2008	11/14/2008	0.00

Fuel Oil Consumption (Gallons)	**7,944.00**
Fuel Oil Consumption (kBtu (thousand Btu))	**1,101,757.33**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))	**1,101,757.33**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) 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 Scottish Rite Auditorium
315 White Horse pike
Collingswood, NJ 08108

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Collingswood Scottish Rite Auditorium	
Gross Floor Area Excluding Parking: (ft^2)	87,000
Year Built	1931
For 12-month Evaluation Period Ending Date:	September 30, 2009

Facility Space Use Summary

Scottish Rite Auditorium	
Space Type	Other - Social/Meeting
Gross Floor Area(ft^2)	87,000
Number of PCs[o]	10
Weekly operating hours[o]	30
Workers on Main Shift[o]	5

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/ft^2)	28	28	0	N/A	52
Source (kBtu/ft^2)	59	59	0	N/A	102
Energy Cost					
$/year	$ 78,383.62	$ 78,383.62	N/A	N/A	$ 147,947.30
$/$ft^2$/year	$ 0.90	$ 0.90	N/A	N/A	$ 1.70
Greenhouse Gas Emissions					
$MtCO_2e$/year	266	266	0	N/A	502
$kgCO_2e/ft^2$/year	3	3	0	N/A	6

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

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

EQUIPMENT LIST - MANSION

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
B-1	WEIL McLAIN, CARLIN BURNER	378	OIL-FIRED CAST IRON SECTIONAL HOT WATER	278 MBH OUTPUT	78%	MANSION BUILDING	BASEMENT		CONDITION - GOOD
P-1 & 2	BELL & GOSSET	SERIES 100 / L79	IN-LINE CIRCULATOR	-	-	MANSION BUILDING	BASEMENT		CONDITION - GOOD
AC-1	GE	AGH18DHG1	WINDOW AC	1800 BTUH	-	FRONT OFFICE	FRONT OFFICE		CONDITION - GOOD
AC-2	EMERSON QUIETCOOL	8GC72	WINDOW AC	-	-	BACK OFFICE	BACK OFFICE		CONDITION - GOOD
AC-3	GE	AGM14ABG1	WINDOW AC	13,800 BTUH	-	2ND FLOOR OFFICE	2ND FLOOR OFFICE		CONDITION - GOOD
AC-4	PANASONIC	CW-XC104HU	WINDOW AC	9800 BTUH	-	2ND FLOOR BACK OFFICE	2ND FLOOR BACK OFFICE		CONDITION - GOOD
AC-5	MAYTAG	M7Y15F2A-D	WINDOW AC	-	-	1ST FLOOR LIVING ROOM	1ST FLOOR LIVING ROOM		CONDITION - GOOD
RADIATORS (23)	-	-	CAST IRON	VARIES	-	THROUGHOUT BLDG	THROUGHOUT BLDG		CONDITION - FAIR TO GOOD

EQUIPMENT LIST - BALLROOM & THEATRE

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
B-1	WEIL-McLAIN, POWERFLAME BURNER	88 SERIES 1 BOILER (888 SIZE), BURNER-WCR2-GO-20A	OIL / GAS-FIRED CAST IRIN HOT WATER BOILER	1900 MBH OUTPUT	78%	THEATRE & BALLROOM	BOILER ROOM	15 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
HWP-1 &2	PACO	10-25R3-130001-17 (10.25 IMP. DIA.)	HORIZONTAL CLOSE COUPLED CENTRIFUGAL	185 GPM @ 100 FT.HD., 10 HP MOTOR	-	THEATRE & BALLROOM	LOWER MECH ROOM UNDER STAGE	14 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
CH-1	YORK	YCAL-0104-EC46	AIR COOLED CHILLER (GYCOL)	95 TONS	9.9 EER	BALLROOM	OUTDOOR	14 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE, R-22 REFRIGERANT, HIGH EFFICIENCY MODEL
CWP-1 & 2	PACO	10-29597-180001-17	IN-LINE CENTRIFGAL	250 GPM @ 75 FT.HD., 7-1/2 HP MOTOR	-	BALLROOM	LOWER MECH ROOM UNDER STAGE	14 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
AHU-1	YORK	AP 305	HORIZONTAL AIR HANDLER, CHILLED COIL & HW COIL	12,200 CFM, 9000 CFM OA,25 HP FAN MOTER	-	BALLROOM	LOWER MECH ROOM UNDER STAGE	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
OLD FURNACE #2	AMERICAN HEATING & VENTILATING CO.	AMERICAN SUPER SOLAR HEATERS, EMERSON 1/3 HP BURNER	HOT AIR FURNACE, OIL FIRED	UNKNOWN	-	THEATRE	BOILER ROOM	0 YEARS	CONDITION - FAIR, VERY OLD 1930 VINTAGE, BURNER APPROX 20 YRS OLD
BLOWER FAN FOR FURNACE #2	STURTEVANT, BOSTON, MA	SIZE 10, DESIGN 3, S#209780	LARGE MULTI VANE FAN	20 HP MOTOR	-	THEATRE	BOILER ROOM	0 YEARS	CONDITION - FAIR, VERY OLD 1930 VINTAGE, BURNER APPROX 20 YRS OLD
MUA-1	YORK	AP 80	HORIZONTAL AIR HANDLER, CHILLED COIL & HW COIL	4100 CFM 4100 CFM OA, 5 HP MOTOR	-	KITCHEN	KITCHEN	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
FCU-1	YORK	13-YCHPB	FAN COIL, CHILLED COIL & HW COIL	1185 CFM, 30 MBH COOLING, 50 MBH HEATING	-	1ST FLOOR LOBBY	1ST FLOOR LOBBY	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
FCU-2	YORK	13-YCHPB	FAN COIL, CHILLED COIL & HW COIL	1185 CFM, 30 MBH COOLING, 50 MBH HEATING	-	2ND FLOOR LOBBY	2ND FLOOR LOBBY	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
SS-1 (INDOOR)	MITSUBISHI	PK18FK	MINI SPLIT SYSTEM AC	1-1/2 TON	14 SEER	ELEV MACH ROOM	ELEV MACH ROOM	10 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
SS-1 (OUTDOOR)	MITSUBISHI	PK18PEK	MINI SPLIT SYSTEM AC	1-1/2 TON		ELEV MACH ROOM	OUDOOR	10 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
RADIATORS	UNKNOWN	-	CAST IRON RADIATORS	VARIES	-	THROUGHOUT BUILDING	THROUGHOUT BUILDING	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
FINNED-TUBE RADIATION	TRANE	-	COPPER TUBE, ALUMINUM FINS	VARIES	-	STAIRS AND TOILER ROOM	STAIRS AND TOILER ROOM	19 YEARS	CONDITION - VERY GOOD, 2003 VINTAGE
HWH	BRADFORD WHITE	MI70L3DF10	OIL-FIRED DOMESTIC HOT WATER HEATER	70 GALLON, 140 MBH INPUT	78%	KITCHEN & STAGE AREA BATHROOMS	BOILER ROOM	12 YEARS	CONDITION - VERY GOOD
HWH	BRADFORD WHITE	M240S6DS2	ELECTRIC DOMESTIC HOT WATER HEATER	40 GALLON, 1500 WATTS	100%	BATHROOMS FOR BALLROOM	JANITOR CLOSET 2ND FLOOR	10 YEARS	CONDITION - GOOD
HWH	BRADFORD WHITE	M240S6DS2	ELECTRIC DOMESTIC HOT WATER HEATER	40 GALLON, 1500 WATTS	100%	BATHROOMS FOR THEATRE	ATTIC SPACE 3RD FLOOR	10 YEARS	CONDITION - GOOD

ECM #1: Lighting Upgrade

Appendix E

Scottish Rite Mansion and Theater

CEG Project #: 9C09083
Project Name : Borough of Collingswood Energy Audit
Address: 315 White Horse Pike
City, State: Collingswood, NJ 08108

Date 12/02/09
kWh Cost $0.162

	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**
Mansion															
Basement	100	12	(1)100w Incand. Lamp. Porc. Keyless Fixture - 100w	1200	$19.44	12	32w Edison-base CFL	384	816	82	$13.22	17.2	$18.90	$226.80	$0.00
1st Floor Front Office	2000	8	(4)40w T12 Lamps. 2' x 4' recessed Fixture w/Mag. Ballast - 154w	1232	$399.17	8	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE	760	472	944	$152.93	4.0	$95.55	$764.40	$160.00
1st Floor Back Office	2000	4	(2)40w T12 Lamps. 1' x 4' Recessed Fixture w/Mag. Ballast - 82w	328	$106.27	4	(2)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE	192	136	272	$44.06	7.2	$89.05	$356.20	$40.00
Existing Front Entrance	1026	1	(1)60w Incand. Lamp. Weather-proof Ceiling Fixture - 60w	60	$9.97	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	18	42	43	$6.98	2.6	$17.86	$17.86	$0.00
Front Lobby	1026	1	(3)60w Incand. Lamp. Chandelier Fixture - 180w	180	$29.92	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830	54	126	129	$20.94	2.6	$53.58	$53.58	$0.00
Main Corridor	600	2	(1)150w Incand. Lamp. Surface Mounted Globe Fixture - 150w	300	$29.16	2	42w Edison-base CFL	84	216	130	$21.00	1.9	$19.90	$39.80	$0.00
Living room	100	1	(1)150w Incand. Lamp. Chandelier Fixture - 150w	150	$2.43	1	42w Edison-base CFL	42	108	11	$1.75	11.4	$19.90	$19.90	$0.00
Porch	100	1	(2)100w Incand. Lamp. Surface Mounted Globe	200	$3.24	1	32w Edison-base CFL	64	136	14	$2.20	17.2	$37.80	$37.80	$0.00
2nd Floor Stair	600	1	(5)75w Incand. Lamp. Chandelier Fixture - 375w	375	$36.45	1	26w Edison-base CFL	130	245	147	$23.81	3.7	$89.30	$89.30	$0.00
Corridor & Stair	600	2	(1)150w Incand. Lamp. Surface Mounted Globe	300	$29.16	2	42w Edison-base CFL	84	216	130	$21.00	1.9	$19.90	$39.80	$0.00
Living room	100	2	(1)100w Incand. Lamp. Surface Mounted Globe	200	$3.24	2	32w Edison-base CFL	64	136	14	$2.20	17.2	$18.90	$37.80	$0.00
Office	1026	1	(3)60w Incand. Lamp. Ceiling Drum Fixture - 180w	180	$29.92	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830	54	126	129	$20.94	2.6	$53.58	$53.58	$0.00
Toilet	100	1	(1)100w Incand. Lamp. Surface Mounted Globe	100	$1.62	1	32w Edison-base CFL	32	68	7	$1.10	17.2	$18.90	$18.90	$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**
Large Office	1026	4	(4)40w T12 Lamps. 1' x 4' recessed Fixture w/Mag. Ballast - 154w	616	$102.39	4	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #QHE	380	236	242	$39.23	7.7	$95.55	$382.20	$80.00
Short Offcie Corridor	100	2	(1)100w Incand. Lamp. Surface Mounted Globe Fixture - 100w	200	$3.24	2	32w Edison-base CFL	64	136	14	$2.20	17.2	$18.90	$37.80	$0.00
Rear Office	100	1	(3)60w Incand. Lamp. Surface Globe Fixture - 180w	180	$2.92	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	54	126	13	$2.04	26.2	$53.58	$53.58	$0.00
Office Toilet	100	1	(1)50w Incand. Lamp. Wall Bracket Fixture - 50w	50	$0.81	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	19	31	3	$0.50	35.6	$17.86	$17.86	$0.00
3rd Floor Corridor & Stair	100	1	(1)100w Incand. Lamp. Surface Mounted Globe Fixture - 100w	100	$1.62	1	32w Edison-base CFL	32	68	7	$1.10	17.2	$18.90	$18.90	$0.00
Toilet	50	1	(1)100w Incand. Lamp. Wall Bracket Fixture - 100w	100	$0.81	1	32w Edison-base CFL	32	68	3	$0.55	34.3	$18.90	$18.90	$0.00
Large Pool Room	100	3	(2)40w T12 Lamps. Pendant Mounted 4' & 8' Fixture	246	$3.99	3	(2)32w T8 Sylvania Lamps #FO32	144	102	10	$1.65	143.5	$89.05	$267.15	$30.00
Double Office	100	4	(2)40w T12 Lamps. 1' x 4' Surface Mounted Fixture w/Mag. Ballast - 82w	328	$5.31	4	(1)32w T8 Sylvania Lamp #FO32 Sylvania Ballast	192	136	14	$2.20	143.5	$89.05	$356.20	$40.00
Mansion Summary		**54**		**6625**	**$821.07**	**54**		**2879**	**3746**	**2355.68**	**$381.62**	**6.7**		**$2,908.31**	**$350.00**
Ballroom First Floor															
Ballroom	900	4	(1)60w Incand. Lamp. Hi-Hat Fixture - 60w	240	$34.99	4	(1)19w CFL Sylvania Lamp CF19EL/MINI/830	72	168	151	$24.49	2.9	$17.86	$71.44	$0.00
Ballroom	900	62	(1)100w Incand. Lamp. Hi-Hat Fixture - 100w	6200	$903.96	62	32w Edison-base CFL	1984	4216	3,794	$614.69	1.9	$18.90	$1,171.80	$0.00
Ballroom	900	4	(1)100w Incand. Lamp. Hi-Hat Wall Washer Fixture - 100w	400	$58.32	4	32w Edison-base CFL	128	272	245	$39.66	1.9	$18.90	$75.60	$0.00
Ballroom	900	6	(3)60w Incand. Lamps. Pendant Mounted Fixture - 180w	1080	$157.46	6	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	324	756	680	$110.22	2.9	$53.58	$321.48	$0.00
Ballroom	900	13	(6)25w Incand. Lamps. Pendant Mounted Fixture - 150w	1950	$284.31	13	10w Edison-base CFL	780	1170	1,053	$170.59	7.8	$102.90	$1,337.70	$0.00
Ballroom	900	6	(1)26w CF Lamp. Hi-Hat Fixture - 26w	156	$22.74	6	Existing to Remain	156	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	10	(6)25w Incand. Lamps. Surface Mounted Fixture - 150w	1500	$218.70	10	10w Edison-base CFL	600	900	810	$131.22	7.8	$102.90	$1,029.00	$0.00
Ballroom	900	2	(2)60w Incand. Lamps. Surface Mounted Fixture - 120w	240	$34.99	2	(2)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	72	168	151	$24.49	2.9	$35.72	$71.44	$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**
Ballroom	900	4	(1)32w CF Lamp. Recessed Fixture - 32w	128	$18.66	4	Existing to Remain	128	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	18	(2)25w Incand. Lamps. Surface Mounted Wall Scounce Fixture - 50w	900	$131.22	18	10w Edison-base CFL	360	540	486	$78.73	7.8	$34.30	$617.40	$0.00
Ballroom	900	4	(1)50w MR16 Lamp. Low Voltage Hi-Hat Fixture - 50w	200	$29.16	4	Existing to Remain	200	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	2	(1)26w CF Lamp. Hi-Hat Fixture - 26w	52	$7.58	2	Existing to Remain	52	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	2	(1)35w MR16 Lamp. Low Voltage Hi-Hat Fixture - 35w	70	$10.21	2	Existing to Remain	70	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	4	(1)50w MR16 Lamp. Low Voltage Hi-Hat Fixture - 50w	200	$29.16	4	Existing to Remain	200	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	3	(4)40w T-12 Lamps. Pendant Mounted Plasticwrap Fixture w/ Mag. Ballast - 160w	480	$69.98	3	(4)32w T8 Sylvania Lamps #FO32 Sylvania Ballast #OHE	285	195	176	$28.43	8.0	$95.55	$286.65	$60.00
Ballroom	900	3	(2)32w T-8 Lamps. Pendant Mounted Plasticwrap Fixture w/ Mag. Ballast - 55w	165	$24.06	3	Existing to Remain	165	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	3	(2)40w CF Lamps. Pendant Mounted Fixture w/ Mag. Ballast - 80w	240	$34.99	3	Existing to Remain	240	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	9	(1)60w Incand. Lamp. Wall Mounted Porc. Keyless Fixture - 60w	540	$78.73	9	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	162	378	340	$55.11	2.9	$17.86	$160.74	$0.00
Ballroom	900	1	(2)32w T-8 Lamps.Wall Bracket Fixture w/ Mag. Ballast - 55w	55	$8.02	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom First Floor Summary		**160**		**14796**	**$2,157.26**	**160**		**6033**	**8763**	**7886.7**	**$1,277.65**	**4.0**		**$5,143.25**	**$60.00**
Ballroom Second Floor															
Ballroom	900	2	(1)26w CF Lamp. Hi-Hat Fixture - 26w	52	$7.58	2	Existing to Remain	52	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	36	(1)42w CF Lamp. Hi-Hat Fixture - 42w	1512	$220.45	36	Existing to Remain	1512	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	4	(1)100w Incand. Lamp. Hi-Hat Wall Washer Fixture - 100w	400	$58.32	4	32w Edison-base CFL	128	272	245	$39.66	1.9	$18.90	$75.60	$0.00
Ballroom	900	5	(3)60w Incand. Lamps. Pendant Mounted Fixture - 180w	900	$131.22	5	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	270	630	567	$91.85	2.9	$53.58	$267.90	$0.00
Ballroom	900	9	(16)25w Incand. Lamps. Pendant Mounted Fixture - 400w	3600	$524.88	9	10w Edison-base CFL	1440	2160	1,944	$314.93	7.8	$274.40	$2,469.60	$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**
Ballroom	900	1	(6)40w Incand. Lamps. Pendant Mounted Fixture - 240w	240	$34.99	1	10w Edison-base CFL	60	180	162	$26.24	3.9	$102.90	$102.90	$0.00
Ballroom	900	2	(8)40w Incand. Lamps. Pendant Mounted Fixture - 320w	640	$93.31	2	10w Edison-base CFL	160	480	432	$69.98	3.9	$137.20	$274.40	$0.00
Ballroom	900	4	(1)32w CF Lamp. Recessed Fixture - 32w	128	$18.66	4	Existing to Remain	128	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	12	(2)25w Incand. Lamps. Surface Mounted Wall Scounce Fixture - 50w	600	$87.48	12	10w Edison-base CFL	240	360	324	$52.49	7.8	$34.30	$411.60	$0.00
1st to 3rd Floor Stair	900	21	(2)25w Incand. Lamps. Surface Mounted Wall Scounce Fixture - 50w	1050	$153.09	21	10w Edison-base CFL	420	630	567	$91.85	7.8	$34.30	$720.30	$0.00
2nd Floor	900	43	(4)100w Incand. Lamps. Surface Mounted Glass Gothic Fixture - 400w	17200	$2,507.76	43	32w Edison-base CFL	5504	11696	10,526	$1,705.28	1.9	$75.60	$3,250.80	$0.00
Ballroom Second Floor Summary		**139**		**26322**	**$3,838**	**139**		**9914**	**16408**	**14767.2**	**$2,392**	**3.2**		**$7,573**	**$0**
BallroomThird Floor															
Ballroom	900	4	(1)26w CF Lamp. Hi-Hat Fixture - 26w	104	$15.16	4	Existing to Remain	104	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	13	(3)60w Incand. Lamps. Pendant Mounted Fixture - 180w	2340	$341.17	13	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	702	1638	1,474	$238.82	2.9	$53.58	$696.54	$0.00
Ballroom	900	4	(2)32w T-8 Lamps. Pendant Mounted Plasticwrap Fixture w/ Mag. Ballast - 55w	220	$32.08	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
Ballroom	900	1	(1)60w Incand. Lamp. Wall Mounted Porc. Keyless Fixture - 60w	60	$8.75	1	(1)19w CFL Sylvania Lamp CF19EL/MINI/830 19w	18	42	38	$6.12	2.9	$17.86	$17.86	$0.00
Ballroom	900	7	(2)100w Incand. Lamps. Surface Mounted Glass Gothic Fixture - 200w	1400	$204.12	7	32w Edison-base CFL	448	952	857	$138.80	1.9	$37.80	$264.60	$0.00
Ballroom	900	3	(1)150w Incand. Lamps. Surface Mounted Glass Globe Fixture - 150w	450	$65.61	3	42w Edison-base CFL	126	324	292	$47.24	1.3	$19.90	$59.70	$0.00
Ballroom Third Floor Summary		**32**		**4574**	**$667**	**32**		**1618**	**2956**	**2660.4**	**$431**	**2.4**		**$1,039**	**$0**
	Totals:	**385**		**52317**	**$7,483**	**385**		**20444**	**31873**	**27669.98**	**$4,483**	**3.6**		**$16,663**	**$410**
COMMENTS:															

	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**

Project Name: LGEA Solar PV Project - Collingswood Scottish Rite Auditorium
Location: Collingswood, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$1,140,570
Annual kWh Production	197,768
Annual Energy Cost Reduction	$31,445
Annual SREC Revenue	$69,219
First Cost Premium	**$1,140,570**
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	$57,029	0	0	0	$0	0	0	(57,029)	0
1	$0	197,768	$31,445	$0	$69,219	$75,323	$16,576	$8,765	($48,264)
2	$0	196,779	$32,388	$0	$68,873	$74,124	$17,774	$9,362	($38,901)
3	$0	195,795	$33,360	$0	$68,528	$72,840	$19,059	$9,990	($28,912)
4	$0	194,816	$34,361	$0	$68,186	$71,462	$20,437	$10,648	($18,264)
5	$0	193,842	$35,392	$1,997	$67,845	$69,984	$21,915	$9,341	($8,923)
6	$0	192,873	$36,454	$1,987	$67,506	$68,400	$23,499	$10,074	$1,150
7	$0	191,909	$37,547	$1,977	$67,168	$66,701	$25,198	$10,840	$11,990
8	$0	190,949	$38,674	$1,967	$66,832	$64,880	$27,019	$11,640	$23,630
9	$0	189,994	$39,834	$1,957	$66,498	$62,927	$28,972	$12,476	$36,106
10	$0	189,044	$41,029	$1,947	$66,166	$60,832	$31,067	$13,348	$49,454
11	$0	188,099	$42,260	$1,937	$65,835	$58,586	$33,312	$14,258	$63,712
12	$0	187,159	$43,527	$1,928	$65,506	$56,178	$35,721	$15,206	$78,918
13	$0	186,223	$44,833	$1,918	$65,178	$53,596	$38,303	$16,194	$95,112
14	$0	185,292	$46,178	$1,909	$64,852	$50,827	$41,072	$17,223	$112,335
15	$0	184,365	$47,564	$1,899	$64,528	$47,858	$44,041	$18,293	$130,629
16	$0	183,443	$48,990	$1,889	$64,205	$44,674	$47,225	$19,407	$150,036
17	$0	182,526	$50,460	$1,880	$63,884	$41,260	$50,638	$20,565	$170,601
18	$0	181,614	$51,974	$1,871	$63,565	$37,600	$54,299	$21,769	$192,370
19	$0	180,706	$53,533	$1,861	$63,247	$33,675	$58,224	$23,020	$215,390
20	$0	179,802	$55,139	$1,852	$62,931	$29,465	$62,433	$24,319	$239,709
21	$0	178,903	$56,793	$1,843	$62,616	$26,845	$57,396	$33,326	$273,035
22	$0	178,008	$58,497	$1,833	$62,303	$21,693	$47,231	$50,042	$323,078
23	$0	177,118	$60,252	$1,824	$61,991	$0	$0	$120,419	$443,497
24	$0	176,233	$62,060	$1,815	$61,681	$0	$0	$121,926	$565,423
25	$0	175,352	$63,921	$1,806	$61,373	$0	$0	$123,488	$688,911
	Totals:	3,772,999	$844,942	$30,775	$1,320,550	$1,141,194	$696,785	$801,412	$3,721,822
				Net Present Value (NPV)			**$151,436**		
				Internal Rate of Return (IRR)			**20.8%**		

Project Name: LGEA Solar PV Project - Collingswood Scottish Rite Auditorium
Location: Collingswood, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

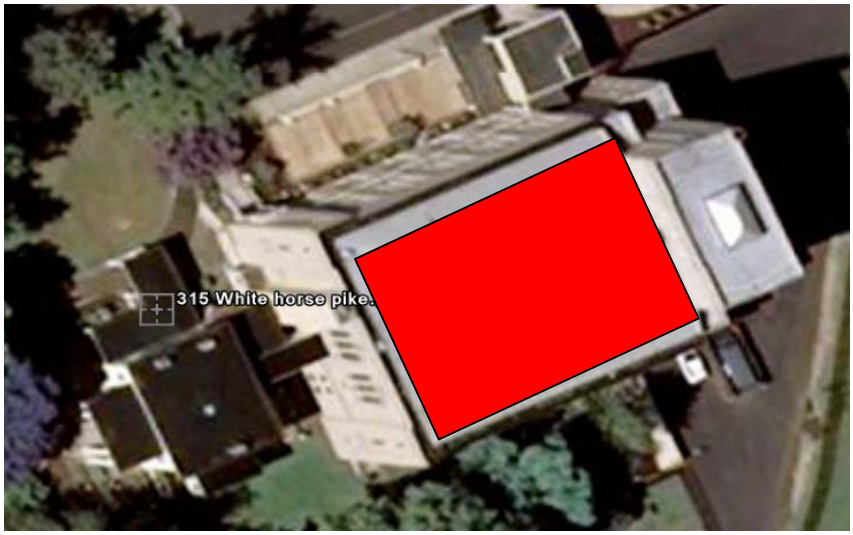
	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,140,570
Annual kWh Production	197,768
Annual Energy Cost Reduction	$31,445
Annual SREC Revenue	$69,219
First Cost Premium	**$1,140,570**
Simple Payback:	**11.33** **Years**

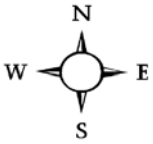
Life Cycle Cost Analysis

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	$1,140,570	0	0	0	$0	(1,140,570)	0
1	$0	197,768	$31,445	$0	$69,219	$100,664	($1,039,906)
2	$0	196,779	$32,388	$0	$68,873	$101,261	($938,645)
3	$0	195,795	$33,360	$0	$68,528	$101,888	($836,756)
4	$0	194,816	$34,361	$0	$68,186	$102,547	($734,210)
5	$0	193,842	$35,392	$1,997	$67,845	$101,240	($632,970)
6	$0	192,873	$36,454	$1,987	$67,506	$101,972	($530,997)
7	$0	191,909	$37,547	$1,977	$67,168	$102,738	($428,259)
8	$0	190,949	$38,674	$1,967	$66,832	$103,539	($324,720)
9	$0	189,994	$39,834	$1,957	$66,498	$104,375	($220,345)
10	$0	189,044	$41,029	$1,947	$66,166	$105,247	($115,098)
11	$0	188,099	$42,260	$1,937	$65,835	$106,157	($8,941)
12	$0	187,159	$43,527	$1,928	$65,506	$107,105	$98,164
13	$0	186,223	$44,833	$1,918	$65,178	$108,093	$206,257
14	$0	185,292	$46,178	$1,909	$64,852	$109,122	$315,379
15	$0	184,365	$47,564	$1,899	$64,528	$110,192	$425,571
16	$0	183,443	$48,990	$1,889	$64,205	$111,306	$536,877
17	$0	182,526	$50,460	$1,880	$63,884	$112,464	$649,342
18	$0	181,614	$51,974	$1,871	$63,565	$113,668	$763,010
19	$0	180,706	$53,533	$1,861	$63,247	$114,919	$877,929
20	$0	179,802	$55,139	$1,852	$62,931	$116,218	$994,147
21	$1	178,903	$56,793	$1,843	$62,616	$117,567	$1,111,713
22	$2	178,008	$58,497	$1,833	$62,303	$118,967	$1,230,680
23	$3	177,118	$60,252	$1,824	$61,991	$120,419	$1,351,099
24	$4	176,233	$62,060	$1,815	$61,681	$121,926	$1,473,025
25	$5	175,352	$63,921	$1,806	$61,373	$123,488	$1,596,514
	Totals:	3,772,999	$844,942	$30,775	$1,320,550	$2,737,084	$2,134,717
				Net Present Value (NPV)		**$1,596,539**	
				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 - Scottish Rite Auditorium	9000	Sunpower SPR230	551	14.7	8,102	126.73	197,768	18,183	15.64





.= Proposed PV Layout

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