ENERGY AUDIT – FINAL REPORT

GLOUCESTER CITY
CITY HALL
313 MONMOUTH AVE.
GLOUCESTER CITY, NJ 08030
ATTN: MR. JACK LIPSETT

CEG PROPOSAL NO. 9C08131

CONCORD ENGINEERING GROUP

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

CONTACT: RAYMOND JOHNSON
Cell: (609) 760-4057
rjohnson@ceg-inc.net

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I. EXECUTIVE SUMMARY

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

Gloucester City
City Hall
313 Monmouth Street
Gloucester City, NJ 08030

Facility Contact Person:

This audit was performed in connection with the New Jersey Clean Energy Local Government Energy Audit Program. These energy audits are conducted to promote the office of Clean Energy's mission, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	$31,183
#2 Fuel Oil	$ 2,665
Total	$33,848

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Interior Lighting Upgrades	$10,983	$10,482	1.1	98.3%
2	Install Compact Fluorescent Lamps	$260	$60	4.3	24.2%
3	Interior Lighting Controls	$675	$149	3.3	31.6%
4	Install LED Exit Signs	$230	$369	0.6	124.9%
5	Upgrade Exterior Building Lighting	$1,015	$304	3.3	31.5%
6	High-Efficiency Rooftop Units	$57,439	$2,273	25.3	1.8%
7	High-Efficiency Split AC Unit	$4,224	$260	16.2	0.9%

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

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	FUEL OIL (GALLONS)
1	Interior Lighting Upgrades	12.4	65,481	-
2	Install Compact Fluorescent Lamps	-	375	-
3	Interior Lighting Controls	-	928	-
4	Install LED Exit Signs	-	2,292	-
5	Upgrade Exterior Building Lighting	-	1,888	-
6	High-Efficiency Rooftop Units	-	14,118	-
7	High-Efficiency Split AC Unit	-	1,615	-

Recommendation:

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

- **ECM #1:** Interior Lighting Upgrades
- **ECM #2:** Install Compact Fluorescent Lamps
- **ECM #3:** Interior Lighting Controls
- **ECM #4:** Install LED Exit Signs
- **ECM #5:** Upgrade Exterior Building Lighting

II. INTRODUCTION

This comprehensive energy audit covers the 9,596 square foot Gloucester City, City Hall facility that includes the police headquarters, municipal court, administrative offices, file storage rooms, conference rooms, communications room, etc.

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

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

After gathering the utility data and calculating the EUI, the next step in the audit process is obtaining Architectural and Engineering drawings (where available). By reviewing the Architectural and Engineering drawings, questions regarding the building envelope, lighting systems/controls, HVAC equipment and controls are noted. These questions are then compared to the energy usage profiles developed during the utility data gathering step. Furthermore, through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc. After this information is gathered the next step in the process is the site visit.

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

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

III. METHOD OF ANALYSIS

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

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Public Service Electric and Gas Company (PSE&G) provides electricity to the facility under the General Lighting and Power Service (GLP) Rate Schedule. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

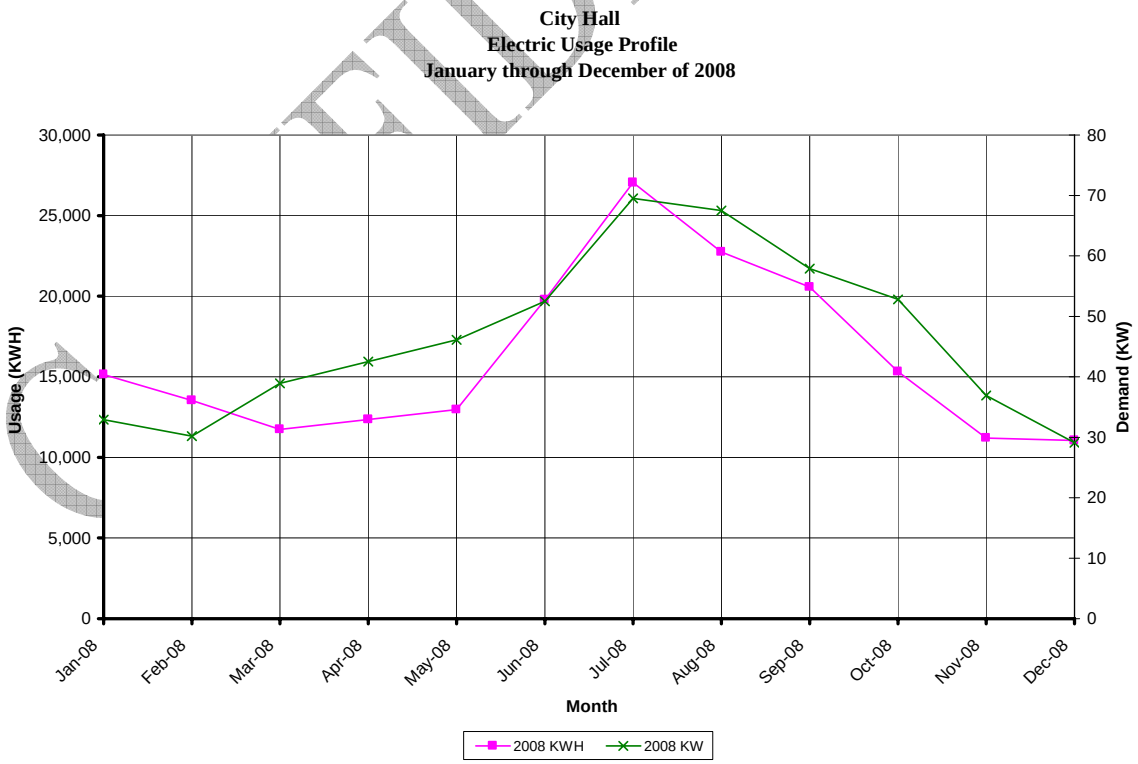
In addition, #2 Burner Fuel Oil is purchased for the oil furnace in the basement and a domestic hot water heater. 799.6 gallons of fuel oil was purchased to provide heating for the season.

Description	Average
Electricity	16.1¢ / kWh
#2 Fuel Oil	$3.33 / Gallon

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	15,135	33	$1,899
2/08	13,530	30	$1,727
3/08	11,745	39	$1,592
4/08	12,353	43	$1,649
5/08	12,960	46	$1,706
6/08	19,770	53	$3,130
7/08	27,045	70	$4,957
8/08	22,740	68	$4,394
9/08	20,565	58	$4,053
10/08	15,315	53	$2,588
11/08	11,205	37	$1,782
12/08	11,055	29	$1,706
Totals	**193,418**	**70 Max**	**$31,183**

Figure 1
Electricity Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically 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 amongst building of similar type. The EUI for this facility is calculated as follows:

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

Electric = ((193,418 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 660,329 kBtu

Oil = (799.6 gallons) * (140,000 Btu/Gallon) = 111,944 kBtu

$$Building\ \ EUI = \frac{(660{,}329\ kBtu + 111{,}944\ kBtu)}{9{,}596\ SF} = \frac{772{,}273\ kBtu}{9{,}596\ SF}$$

City Hall Building EUI = <u>80.48 kBtu/SF</u>

C. EPA Energy Benchmarking System

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

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Start account for the municipal in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. The 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

Username: Gloucestercity
Password: lgeaceg2009

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

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

V. FACILITY DESCRIPTION

The Gloucester City Hall consists of the judicial court, offices, and courtroom along with the police areas; totaling approximately 9,596 SF. The brick/block facility was built in 1939. The facility is typically occupied from 7 AM until approximately 5 PM except during court sessions.

Heating System

The City Hall building is mainly heated by a Columbia L-32 oil-fired, 700,000 BTUH input, hot water boiler in the basement with a rated efficiency of 80%. Seven (7) zone pumps deliver hot water to coils in the following zones:

a) Building offices
b) Court Room
c) Court Clerk Offices
d) Police Dispatch
e) Police Chief Offices
f) Police Locker Rooms
g) Front entrance

Domestic Hot Water

Domestic hot water for the restrooms is provided by a Bradford White, electric hot water heater, 40-gallon capacity rated at 4,500 Watts input and an oil-fired Aero hot water heater with a 32-gallon capacity.

Cooling System

Cooling is provided by five (5) cooling-only rooftop units ranging in size from 4-Tons to 10-Tons. A 3-Ton split unit serves the server room.

Lighting

The offices are lit via 2-foot by 4-foot lay-in fixtures containing T12 fluorescent lamps and magnetic ballasts. Some areas are also lit by incandescent lamps. Standard switching is utilized and there are no other types of lighting controls present. The exit signs throughout the facility contain incandescent lamps and consume an estimated 30 watts of electricity per exit sign.

The exterior lighting is mounted on the building and consists of one 400-Watt Metal Halide fixture and seven (7) 100 Watt incandescent fixtures. The exterior lighting is controlled by a photocell.

VI. MAJOR EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial energy savings. In addition, the list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Table 4 thru 6
Existing Equipment Listing

HEATING EQUIPMENT						
Description	**Qty**	**Rated Capacity(BTUH)**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
Columbia L-32 Oil-Fired Hot Water Heater	1	560,000	#2 Burner Fuel	10	18	8

COOLING EQUIPMENT							
Description	**Qty**	**Cooling Capacity (Tons)**	**Cooling Capacity (BTUH)**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
Evcon Industries Model No. BPCH048	2	4	48,000	Electric	20	15	(5)
Trane Model No. TCDO75C	2	6.25	75,000	"	20	15	(5)
Trane (Police Station)	1	10	120,000	"	20	15	(5)
Payne Model No. PAIDJAO36A	1	3	36,000	"	15	15	0

DOMESTIC HOT WATER SYSTEM						
Description	**Qty**	**Capacity**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
Bradford White MI40S6D S13 Hot Water Heater	1	40 gallon	Electric	6	12	6
Aero CF 32T Oil-Fired DHW Heater	1	32 gallon	#2 Burner Fuel	10	12	2

Note: Equipment noted as having a negative (#) remaining life is considered past its standard service life as described in 2007 ASHRAE Applications Handbook and is most likely a good candidate for replacement.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Interior Lighting Upgrades

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 188 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

CEG recommends a replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the Owner on electrical costs due to the better performance of the electronic ballasts. In addition to functional cost savings, the fixture replacement will also provide operational cost savings. The operational cost savings will be realized through the lesser number of lamps that will be required to be replaced per year. The expected lamp life of a T8 lamp, approximately 30,000 burn-hours, in comparison to the existing T12 lamps, approximately 20,000 burn-hours, will provide the Owner with fewer lamps to replace per year. Based on the operating hours of this facility, the owner will be changing approximately 33% less lamps per year.

This ECM shall replace all T12 fixtures throughout the facility with new T8 lay-in type fixtures.

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

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

$$\text{Smart Start®}\ Incentive = (30 \times\ \$\ 25) + (\ 104 \times\ \$\ 30) = \$3{,}870$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (\ 372 \times 33\%\ reduction \times \$\ 2.00) + (\$20 \times 123) = \$2{,}707$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$17,560
NJ Smart Start Equipment Incentive ($):	($3,870)
Maintenance Savings ($):	($2,707)
Net Installation Cost ($):	*$10.983*
Total Energy Savings ($ / yr):	*$10,482*
Simple Payback (yrs):	*1.1*
Simple Return on Investment:	*98.3%*

ECM #2: Install Compact Fluorescent Lamps

Description:

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: an 18-Watt CFL for a 60-Watt incandescent lamp, a 21-Watt CFL for a 75-Watt incandescent lamp, and a 23-Watt CFL for a 100-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures.

This ECM involves replacing all incandescent lamps in the facility with energy efficient compact fluorescent lamps.

Energy Savings Calculations:

There are four (4) 60-Watt and ten (10) 100-Watt incandescent lamps in the facility that can be upgraded to 18 and 23 Watt CFL units respectively. The average operating hours for these lamps is estimated to be 400.

Energy cost savings:

[4 units * (60W – 18W) + 10 units * (100W – 23W)] 400 hours * 1 kW/1,000 W * $0.161/kWh] = $60.40/yr

The cost of four (4) 18-Watt and ten (10) 23-Watt CFL's is $260

Energy Savings Summary:

ECM #2 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$260
NJ Smart Start Equipment Incentive ($):	-
Maintenance Savings ($):	-
Net Installation Cost ($):	*$260*
Total Energy Savings ($ / yr):	*$60.40*
Simple Payback (yrs):	*4.3*
Simple Return on Investment:	*24.2%*

ECM #3: Interior Lighting Controls – Judicial Areas

Description:

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

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, conference rooms, restrooms, storage rooms; file rooms, etc. in the judicial areas of the facility (nine spaces at approximately 1,800 SF). Since the police station area of the building is a 24/7 operation, occupancy sensors would have very little savings.

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper, etc.

Energy Savings Calculations:

From Appendix E of this report, we calculated the lighting power density (Watts/ft^2) of the private offices, conference rooms, restrooms, storage rooms; file rooms, etc. in the judicial areas of the facility to be ±2.48 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 2.48Watts/SF x 1,800 SF x 2,080 hrs/yr. = 928 kWh x $0.161/kWh

Savings = $149 per year

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is $75/unit including material and labor.

The SmartStart Buildings® incentive is $20 per control which equates to an installed cost of $55/unit. Total number of spaces to be retrofitted is 9.

Total cost to install sensors is $55/unit x 9 units = $495

Energy Savings Summary:

ECM #3 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$675
NJ Smart Start Equipment Incentive ($):	($180)
Maintenance Savings ($):	$0
Net Installation Cost ($):	*$495*
Total Energy Savings ($ / yr):	*$149*
Simple Payback (yrs):	*3.3*
Simple Return on Investment:	*31.6%*

ECM #4: Install LED Exit Signs

Description:

LED is an acronym for light-emitting-diode. LED's are small light sources that are readily associated with electronic equipment. LED exit signs have been manufactured in a variety of shapes and sizes. There are also retrofit kits that allow for simply modification of existing exit signs to accommodate LED technology. The benefits of LED technology are substantial. LED exit signs will last for 20-30 years without maintenance. This results in tremendous maintenance savings considering that incandescent or fluorescent lamps need to be replaced at a rate of 1-5 times per year. Lamp costs ($2-$7 each) and labor costs ($8-$20 per lamp) add up rapidly. Additionally, LED exit lights only uses 3.8 Watts. In comparison, conventional exit signs use 30 Watts. It is recommended that samples of the products be installed to confirm that they are compatible with the existing electrical system.

This ECM replaces all of the existing exit signs, ten (10) in total, throughout the building with high energy efficient LED exit signs. A Pegasus Associates Lighting LED exit sign or equivalent was used for the basis of design.

Energy Savings Calculations:

Existing exit sign energy costs: 10 units x 30 watts/unit x 8,760 hrs/yr x $0.161/kWh = $423

New LED exit sign energy costs: 10 units x 3.8 watts/unit x 8,760 hrs x $0.161/kWh = $54

Net energy savings = $423 - $54 = $369

Installed cost of new LED exit signs = $80 x 10 = $800

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the replacement of an incandescent exit sign warrants the following incentive: LED Exit Sign = $20 per fixture.

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ exit\ signs \times\ \$\ 20) = (10 \times \$20) = \$200$$

Maintenance Savings are calculated as follows:

$$Maintenance\ Savings = (\#\ of\ \ lamps \times \$\ \ per\ \ lamp) + Installation\ Labor$$

$$Maintenance\ Savings = (20 \times \$4.50) + (20 \times \$14) = \$370$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$800
NJ Smart Start Equipment Incentive ($):	($200)
Maintenance Savings ($):	($370)
Net Installation Cost ($):	*$230*
Total Energy Savings ($ / yr):	*$369*
Simple Payback (yrs):	*0.6*
Simple Return on Investment:	*124.9%*

ECM #5: Upgrade Exterior Building Lighting

Description:

The exterior building lighting fixtures consist of seven (7) 100-Watt incandescent lamps and one fixture with a 400-Watt Metal Halide lamp. Just as an automobile's fuel efficiency is measured in miles per gallon, lamp efficiency is measured in terms of lumens per watt – the amount of light produced for each watt of electricity consumes. The 100-Watt lamps have an efficiency of 10-17 lumens/watt while a Compact Fluorescent Lamp (CFL) has an efficiency of 40-70 Lumens per Watt.

This measure would replace the seven (7) existing fixtures with CFL recessed, fixtures that consist of two 13-Watt lamps, low ambient ballasts, and corrosion free fixture housing as manufactured by Cooper or equal.

Energy Savings Calculations:

It is estimated that the average nighttime hours for these fixtures is 10 hours per day x 365 days per year = 3,650 hours.

Energy Cost Savings = 7 Fixtures x (100 Watts – 26 Watts) x 3,650 hours x $0.161 / kWh = $304

Installation cost is $175 x 7 Units = $1,225

NJ Smart Start® Program Incentives are calculated as follows:

$30 per new 2-lamp fixture x 7 fixtures = $ 210

Energy Savings Summary:

ECM #5 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,225
NJ Smart Start Equipment Incentive ($):	($210)
Maintenance Savings ($):	-
Net Installation Cost ($):	*$1,015*
Total Energy Savings ($ / yr):	*$304*
Simple Payback (yrs):	*3.3*
Simple Return on Investment:	*31.5%*

ECM #6: High-Efficiency Rooftop Units

Description:

The cooling only rooftop units located over the offices are excellent candidates for replacement. These units appear to be 1989 vintage units. These rooftop units are beyond their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, these units should be replaced.

This measure would replace these five units with energy-efficient DX cooling units, by Trane or approved equivalent.

Energy Savings Calculations:

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

Existing Evcon 4-Ton RTU (2 Units)

Rated Capacity = 4 Tons per unit
Condenser Section Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.161/kWh

Proposed High-Efficiency 4-Ton Rooftop Unit

Rated Capacity = 4 Tons per Unit
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[8CoolingTons \times 12{,}000\,Btu/ton \div 1000W/kW]}{[(14EER_{NEW} - 7EER_{OLD})]} \times 0.15 \times 1800 = 3{,}703kWh/yr.$$

Existing Trane 6.25-Ton RTU (2 Units)

Rated Capacity = 6.25 Tons per unit
Condenser Section Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Proposed High-Efficiency 7.5-Ton Rooftop Unit

Rated Capacity = 7.5 Tons per Unit
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[12.5CoolingTons \times 12{,}000\,Btu/ton \div 1000W/kW]}{[(14EER_{NEW} - 7EER_{OLD})]} \times 0.15 \times 1800 = 5{,}786kWh/yr.$$

Existing Trane 10-Ton RTU (1 Unit)

Rated Capacity = 10 Tons
Condenser Section Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Proposed High-Efficiency 10-Ton Rooftop Unit

Rated Capacity = 10 Tons
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[10 CoolingTons \times 12{,}000\, Btu/ton \div 1000 W/kW]}{[(14 EER_{NEW} - 7 EER_{OLD})]} \times 0.15 \times 1800 = 4{,}629 kWh/yr.$$

Total Energy Cost Savings = (3,703 + 5,786 + 4,629) kWh x $0.161/kWh = $2,273 per year

Installation costs for the five (5) rooftop replacements are estimated at $60,000. It is pertinent to note that this estimate includes the demolition of the existing units and curb modifications (if required).

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the rooftop unit replacement falls under the category "Unitary HVAC" and warrants an incentive based on efficiency (EER) at a certain cooling tonnage.

$$\text{Smart Start® } Incentive\ (RTU - 4\ Tons) = (Cooling\ Tons \times\ RTU\ Incentive)$$
$$= 2(4 Tons \times \$92/Ton) = \$736$$

$$\text{Smart Start® } Incentive\ (RTU - 7.5\ Tons) = (Cooling\ Tons \times\ RTU\ Incentive)$$
$$= 2(7.5 Tons \times \$73/Ton) = \$1{,}095$$

$$\text{Smart Start® } Incentive\ (RTU - 10\ Tons) = (Cooling\ Tons \times\ RTU\ Incentive)$$
$$= (10\ Tons \times \$73/Ton) = \$730$$

Energy Savings Summary:

ECM #6 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$60,000
NJ Smart Start Equipment Incentive ($):	($2,561)
Maintenance Savings ($):	-
Net Installation Cost ($):	*$57,439*
Total Energy Savings ($ / yr):	*$2,273*
Simple Payback (yrs):	*25.3*
Simple Return on Investment:	*1.8%*

ECM #7: High-Efficiency Split AC Unit

Description:

The cooling only split rooftop unit located over the server room is an excellent candidate for replacement. This unit appears to be a 1994 vintage unit. This split rooftop unit is beyond its service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, this unit should be replaced.

This measure would replace this unit with a more energy-efficient split DX cooling unit, by Trane or approved equivalent.

Energy Savings Calculations:

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

Existing Payne Split 3-Ton AC Unit

Rated Capacity = 3 Tons per unit
Condenser Section Efficiency = 8.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.161/kWh

Proposed High-Efficiency 3-Ton Split AC Unit

Rated Capacity = 3 Tons per Unit
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[3CoolingTons \times 12{,}000\,Btu/ton \div 1000W/kW]}{[(14EER_{NEW} - 8EER_{OLD})]} \times 0.15 \times 1800 = 1{,}620 kWh/yr.$$

Energy Cost Savings = 1,620 kWh x $0.161/kWh = $260 per year

Installation costs for the split AC rooftop replacement are estimated at $4,500.

NJ Smart Start® Program Incentive is calculated as follows:

From Appendix C, the rooftop unit replacement falls under the category "Unitary HVAC" and warrants an incentive based on efficiency (EER) at a certain cooling tonnage.

$$\text{Smart Start®}\ Incentive\ (RTU - 3\ Tons) = (Cooling\ Tons \times\ RTU\ Incentive)$$
$$= (3\ Tons \times \$92/Ton) = \$276$$

Energy Savings Summary:

ECM #7 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,500
NJ Smart Start Equipment Incentive ($):	($276)
Maintenance Savings ($):	-
Net Installation Cost ($):	*$4,224*
Total Energy Savings ($ / yr):	*$260*
Simple Payback (yrs):	*16.2*
Simple Return on Investment:	*0.9%*

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof 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 1,933 S.F. can be utilized for a PV system on City Hall. A depiction of the area utilized is shown in Appendix F. Using this square footage it was determined that a system size of 30.36 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 47,378 KWh annually, reducing the overall utility bill by 24% percent. A detailed financial analysis can be found in Appendix F. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

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

PAYMENT TYPE	SIMPLE PAYBACK	INTERNAL RATE OF RETURN
Self-Finance	11.3 Years	10.8%
Direct Purchase	11.3 Years	6.5%

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

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to Section IV, Figure 1 included within this report to reference the electricity usage load profile for January 2008 through December 2008.

Electricity:

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

Fuel Oil:

Fuel oil is utilized as the heating fuel source for the facility. There was no fluctuation in oil use during the study period.

Tariff Analysis:

Electricity:

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

Recommendations:

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

CEG advises Gloucester City take a global approach that will be consistent for all facilities within the municipality. Gloucester City's "weighted average price" per kWh (kilowatt hour) for all

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

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

VII. INSTALLATION FUNDING OPTIONS

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

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and 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.

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

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.

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

C. Maintain all weather stripping on windows and doors.

D. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.

E. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc.

F. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.

G. Recalibrate existing sensors serving the office spaces

H. Install a Vending Miser system to turn off the vending machines in the lunch room when not in use.

I. Clean all light fixtures to maximize light output.

J. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling.

Electric Cost Summary

PSE&G - Electric - rate - GLP

City Hall **2008**

Account # 61 133 318 06

Meter # 678004664

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	15,135	13,530	11,745	12,353	12,960	19,770	27,045	22,740	20,565	15,315	11,205	11,055	193,418	
KW	33	30	39	43	46	53	70	68	58	53	37	29	70	Max
Monthly Load Factor	62%	67%	41%	40%	38%	52%	52%	45%	49%	39%	42%	51%	48%	
Electric Delivery, $	$480	$434	$427	$455	$483	$1,162	$1,563	$1,415	$1,245	$564	$409	$380	$9,019	
Delivery $/kwh	$0.032	$0.032	$0.036	$0.037	$0.037	$0.059	$0.058	$0.062	$0.061	$0.037	$0.037	$0.034	$0.047	
Electric Supply, $	$1,419	$1,292	$1,165	$1,194	$1,223	$1,967	$3,394	$2,979	$2,808	$2,024	$1,373	$1,326	$22,165	
Supply $/kwh	$0.094	$0.095	$0.099	$0.097	$0.094	$0.100	$0.126	$0.131	$0.137	$0.132	$0.123	$0.120	$0.115	
Total Cost, $	$1,899	$1,727	$1,592	$1,649	$1,706	$3,130	$4,957	$4,394	$4,053	$2,588	$1,782	$1,706	$31,183	
$/KWH	$0.125	$0.128	$0.136	$0.134	$0.132	$0.158	$0.183	$0.193	$0.197	$0.169	$0.159	$0.154	**$0.161**	

Yellow Area Indicates Estimated Value Due to Missing Information.

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

CITY HALL

ECM 1 Interior Lighting Upgrades

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$17,820	$0	$0	$17,820
Total Cost			$0	$0	$17,820
Utility Incentive - NJ Smart Start ($30 per 3-4 lamp fixture)					($3,870)
Total Cost Less Incentive					$13,950

ECM 2 Install Compact Fluorescent Lamps

	Qty	Unit Cost $	Material $	Labor $	Total $
Compact Fluorescent Lamps	14	$260	$260	$0	$260
Total Cost			$260	$0	$260
Utility Incentive - NJ Smart Start					$0
Total Cost Less Incentive					$260

ECM 3 Interior Lighting Controls

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual Technology Sensor	9	$75	$675	$0	$675
Total Cost			$675	$0	$675
Utility Incentive - N/A					$0
Total Cost Less Incentive ($20 per Sensor)					$675

ECM 4 Install LED Exit Signs

	Qty	Unit Cost $	Material $	Labor $	Total $
New LED Exit Signs	10	$80	$50	$30	$800
Total Cost			$50	$30	$800
Utility Incentive - NJ Smart Start ($73 per Sign)					($200)
Total Cost Less Incentive					$600

ECM 5 Upgrade Exterior Building Lighting

	Qty	Unit Cost $	Material $	Labor $	Total $
New Exterior Lights	7	$175	$100	$75	$1,225
Total Cost			$100	$75	$1,225
Utility Incentive - NJ Smart Start ($30 per 2 lamp fixture)					($210)
Total Cost Less Incentive					$1,015

ECM 6 High-Efficiency Rooftop Units

	Qty	Unit Cost $	Material $	Labor $	Total $
New Rooftop Units	5	$12,000	$45,000	$15,000	$60,000
Total Cost			$45,000	$15,000	$60,000
Utility Incentive - NJ Smart Start ($/ton varies per unit)					($2,561)
Total Cost Less Incentive					$57,439

ECM 7 High-Efficiency Spilt AC Unit

	Qty	Unit Cost $	Material $	Labor $	Total $
New Split System	1	$4,500	$3,375	$1,125	$4,500
Total Cost			$3,375	$1,125	$4,500
Utility Incentive - NJ Smart Start ($92 per ton)					($276)
Total Cost Less Incentive					$4,224

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

	$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

STATEMENT OF ENERGY PERFORMANCE
City Hall

Building ID: 1772882
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 08, 2009

Facility
City Hall
313 Monmouth St.
Gloucester City, NJ 08030

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

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

Year Built: 1939
Gross Floor Area (ft²): 9,596

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

Site Energy Use Summary[3]

Electricity (kBtu)	659,942
Fuel Oil (No. 2) (kBtu)	111,944
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	771,886

Energy Intensity[5]

Site (kBtu/ft²/yr)	80
Source (kBtu/ft²/yr)	241

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	109

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	54%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional

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

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

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

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

Notes:
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	City Hall	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	313 Monmouth St., Gloucester City, NJ 08030	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		☐
Court and Assoc. Offices (Courthouse)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	4,500 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.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Courthouse 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	36	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.		☐
Number of PCs	29	Is this the number of personal computers in the Courthouse?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Police Station (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑

Gross Floor Area	5,096 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	N/A(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	N/A(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: Electric (kWh) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	11,055.00
11/01/2008	11/30/2008	11,205.00
10/01/2008	10/31/2008	15,315.00
09/01/2008	09/30/2008	20,565.00
08/01/2008	08/31/2008	22,740.00
07/01/2008	07/31/2008	27,045.00
06/01/2008	06/30/2008	19,770.00
05/01/2008	05/31/2008	12,960.00
04/01/2008	04/30/2008	12,353.00
03/01/2008	03/31/2008	11,745.00
02/01/2008	02/29/2008	13,530.00
01/01/2008	01/31/2008	15,135.00
Electric Consumption (kWh)		**193,418.00**
Electric Consumption (kBtu)		**659,942.22**
Total Electricity Consumption (kBtu)		**659,942.22**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)		
Meter: Fuel Oil (Gallons) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (Gallons)**
12/01/2008	12/31/2008	0.00
11/01/2008	11/30/2008	0.00
10/01/2008	10/31/2008	0.00
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	0.00
05/01/2008	05/31/2008	0.00
04/01/2008	04/30/2008	0.00

03/01/2008	03/31/2008	0.00
02/01/2008	02/29/2008	0.00
01/01/2008	01/31/2008	799.60
Fuel Oil Consumption (Gallons)		**799.60**
Fuel Oil Consumption (kBtu)		**111,943.84**
Total Fuel Oil (No. 2) Consumption (kBtu)		**111,943.84**
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.	☐

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
City Hall
313 Monmouth St.
Gloucester City, NJ 08030

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

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

General Information

City Hall	
Gross Floor Area Excluding Parking: (ft^2)	9,596
Year Built	1939
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Court and Assoc. Offices	
Space Type	Courthouse
Gross Floor Area(ft^2)	4,500
Weekly operating hours	40
Workers on Main Shift	36
Number of PCs	29
Percent Cooled	50% or more
Percent Heated	50% or more

Police Station	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	5,096
Number of PCs°	N/A
Weekly operating hours°	168
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	80	80	51	N/A	78
Source (kBtu/ft^2)	241	241	154	N/A	157
Energy Cost					
$/year	$ 33,844.67	$ 33,844.67	$ 21,630.46	N/A	$ 32,818.05
$/$ft^2$/year	$ 3.53	$ 3.53	$ 2.26	N/A	$ 3.42
Greenhouse Gas Emissions					
$MtCO_2e$/year	109	109	70	N/A	106
$kgCO_2e/ft^2$/year	11	11	7	N/A	11

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.

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C08131
Project: City Hall
Address: 313 Monmouth Street
City: Gloucester City
Building SF: 9,596

"City Hall"

DATE: 05/26/2009
KWH COST: $0.161

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.		Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Payback
1		Report Writing Room	5	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.94	8234.4	$1,325.74	5	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.46	3985.8	$641.71	$140.00	$700.00	0.49	4248.6	$684.02	1.02
2		Communications Room	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
3		Admin Office	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
4		Deputy Chief Office	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
5		Chief Office	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
6		Records Room	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
7		Detective Room	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
8		Lieutenant Office	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
9		Corridor	5	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.94	8234.4	$1,325.74	5	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.46	3985.8	$641.71	$140.00	$700.00	0.49	4248.6	$684.02	1.02
10		Lunch Room	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
11		Lunch Room	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02

12		Sergeant's Office	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
13		Sergeant's Office	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
14		Men's Room	5	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.94	8234.4	$1,325.74	5	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.46	3985.8	$641.71	$140.00	$700.00	0.49	4248.6	$684.02	1.02
15		Women's Room	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
16		Holding Area	16	1'X4' 2-Lamp T-12 No Lens Magnetic Ballast	8760	94	1.50	13175	$2,121.18	16	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.88	7708.8	$1,241.12	$100.00	$1,600.00	0.62	5466.24	$880.06	1.82
17		Storage Room	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	400	188	0.75	300.8	$48.43	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	145.6	$23.44	$140.00	$560.00	0.39	155.2	$24.99	22.41
18		Basement Gun Room	10	1'X4' 2-Lamp T-12 No Lens Magnetic Ballast	600	94	0.94	564	$90.80	10	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.55	330	$53.13	$100.00	$1,000.00	0.39	234	$37.67	26.54
19		Basement Storage	4	100 Watt Incand	400	100	0.40	160	$25.76	4	23 Watt CFL	23	0.09	36.8	$5.92	$20.00	$80.00	0.31	123.2	$19.84	4.03
20		Evidence Room	2	1'X4' 2-Lamp T-12 No Lens Magnetic Ballast	600	94	0.19	112.8	$18.16	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	66	$10.63	$100.00	$200.00	0.08	46.8	$7.53	26.54
21		Boiler Room	4	100 Watt Incand	400	100	0.40	160	$25.76	4	23 Watt CFL	23	0.09	36.8	$5.92	$20.00	$80.00	0.31	123.2	$19.84	4.03
22		Court Office	3	2'X4' 3-Lamp T-12 Prism Lens Magnetic Ballast	2080	144	0.43	898.56	$144.67	3	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.27	567.84	$91.42	$140.00	$420.00	0.16	330.72	$53.25	7.89
23		Court Offices	8	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	1.50	3128.32	$503.66	8	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1514.24	$243.79	$140.00	$1,120.00	0.78	1614.08	$259.87	4.31
24		Corridors	6	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	1.13	2346.24	$377.74	6	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1135.68	$182.84	$140.00	$840.00	0.58	1210.56	$194.90	4.31
25		Restroom	2	100 Watt Incand	400	100	0.20	80	$12.88	2	23 Watt CFL	23	0.05	18.4	$2.96	$20.00	$40.00	0.15	61.6	$9.92	4.03
26		Courtroom	9	2L 18 Watt CFL	200	36	0.32	64.8	$10.43	9	No Replacement	0	0.00	0	$0.00	$0.00	$0.00	0.32	64.8	$10.43	0.00

27		Men's Room	1	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	400	188	0.19	75.2	$12.11	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	36.4	$5.86	$140.00	$140.00	0.10	38.8	$6.25	22.41
28		Women's Room	1	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	400	188	0.19	75.2	$12.11	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	36.4	$5.86	$140.00	$140.00	0.10	38.8	$6.25	22.41
29		Court Lobby	3	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	0.56	1173.12	$188.87	3	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.27	567.84	$91.42	$140.00	$420.00	0.29	605.28	$97.45	4.31
30		Stairs	6	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	1.13	2346.24	$377.74	6	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1135.68	$182.84	$140.00	$840.00	0.58	1210.56	$194.90	4.31
31		Corridors	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	0.38	782.08	$125.91	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	378.56	$60.95	$140.00	$280.00	0.19	403.52	$64.97	4.31
32		Main Entrance	2	1'X4' 2-Lamp T-12 No Lens Magnetic Ballast	2080	94	0.19	391.04	$62.96	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	228.8	$36.84	$100.00	$200.00	0.08	162.24	$26.12	7.66
33		Conference Room	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	0.75	1564.16	$251.83	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	757.12	$121.90	$140.00	$560.00	0.39	807.04	$129.93	4.31
		Sergeants Room	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.38	3293.76	$530.30	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	1594.32	$256.69	$140.00	$280.00	0.19	1699.44	$273.61	1.02
		Corridor	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
		Police Entrance Lobby	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	8760	188	0.75	6587.52	$1,060.59	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	3188.64	$513.37	$140.00	$560.00	0.39	3398.88	$547.22	1.02
		Data Room	1	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	800	188	0.19	150.4	$24.21	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	72.8	$11.72	$140.00	$140.00	0.10	77.6	$12.49	11.21
34		Rest Rooms	4	60 Watt Incand	400	60	0.24	96	$15.46	4	18 Watt CFL	18	0.07	28.8	$4.64	$15.00	$60.00	0.17	67.2	$10.82	5.55
35		Corridor	4	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	2080	188	0.75	1564.16	$251.83	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	757.12	$121.90	$140.00	$560.00	0.39	807.04	$129.93	4.31
		Totals	157				23.80	129668	$20,876.52	157			11.42	64186.4	$10,334.02		$17,820.00	12.39	65481.4	$10,542.51	1.69

Project Name: LGEA Solar PV Project - City Hall
Location: Gloucester City, NJ
Description: Photovoltaic System 95% Financing

Simple Payback Analysis

	Photovoltaic System 95% Financing
Total Construction Cost	$273,240
Annual kWh Production	47,378
Annual Energy Cost Reduction	$7,628
Annual SREC Revenue	$16,582
First Cost Premium	**$273,240**
Life Cycle Payback Calculation:	**11.3** **Years**

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.161**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/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	$13,662	0	0	0	$0	0	0	(13,662)	0
1	$0	47,378	$7,628	$0	$16,582	$17,975	$6,175	$60	($13,602)
2	$0	46,904	$7,857	$0	$16,417	$17,528	$6,622	$123	($13,479)
3	$0	46,435	$8,092	$0	$16,252	$17,050	$7,100	$195	($13,284)
4	$0	45,971	$8,335	$0	$16,090	$16,536	$7,614	$275	($13,009)
5	$0	45,511	$8,585	$234	$15,929	$15,986	$8,164	$130	($12,879)
6	$0	45,056	$8,843	$232	$15,770	$15,396	$8,754	$230	($12,649)
7	$0	44,606	$9,108	$230	$15,612	$14,763	$9,387	$340	($12,309)
8	$0	44,160	$9,381	$227	$15,456	$14,084	$10,066	$460	($11,849)
9	$0	43,718	$9,663	$225	$15,301	$13,357	$10,793	$589	($11,260)
10	$0	43,281	$9,953	$223	$15,148	$12,577	$11,573	$728	($10,532)
11	$0	42,848	$10,251	$221	$14,997	$11,740	$12,410	$877	($9,655)
12	$0	42,419	$10,559	$218	$14,847	$10,843	$13,307	$1,037	($8,618)
13	$0	41,995	$10,876	$216	$14,698	$9,881	$14,269	$1,208	($7,410)
14	$0	41,575	$11,202	$214	$14,551	$8,849	$15,301	$1,389	($6,021)
15	$0	41,160	$11,538	$212	$14,406	$7,743	$16,407	$1,582	($4,439)
16	$0	40,748	$11,884	$210	$14,262	$6,557	$17,593	$1,786	($2,653)
17	$0	40,341	$12,241	$208	$14,119	$5,285	$18,865	$2,002	($652)
18	$0	39,937	$12,608	$206	$13,978	$3,922	$20,228	$2,230	$1,578
19	$0	39,538	$12,986	$204	$13,838	$2,459	$21,691	$2,470	$4,049
20	$0	39,142	$13,376	$202	$13,700	$891	$23,259	$2,724	$6,773
21	$1	38,751	$13,777	$200	$13,563	$756	$21,382	$5,003	$11,775
22	$2	38,363	$14,190	$198	$13,427	$517	$17,595	$9,307	$21,082
23	$3	37,980	$14,616	$196	$13,293	$0	$0	$27,713	$48,795
24	$4	37,600	$15,054	$194	$13,160	$0	$0	$28,021	$76,816
25	$5	37,224	$15,506	$192	$13,028	$0	$0	$28,343	$105,159
	Totals:	862,724	$204,964	$3,482	$301,953	$223,423	$259,578	$298,555	$118,821
					Net Present Value (NPV)		**$12,215**		
					Internal Rate of Return (IRR)		**10.8%**		

Project Name:	**LGEA Solar PV Project - City Hall**
Location:	**Gloucester City, NJ**
Description:	**Photovoltaic System**

Simple Payback Analysis

	Photovoltaic System
Total Construction Cost	$273,240
Annual kWh Production	47,378
Annual Energy Cost Reduction	$7,628
Annual SREC Revenue	$16,582
First Cost Premium	**$273,240**
Life Cylce Payback Calculation:	**11.3**
	Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.161**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$273,240	0	0	0	$0	(273,240)	0
1	$0	47,378	$7,628	$0	$16,582	$24,210	($249,030)
2	$0	46,904	$7,857	$0	$16,417	$24,273	($224,756)
3	$0	46,435	$8,092	$0	$16,252	$24,345	($200,412)
4	$0	45,971	$8,335	$0	$16,090	$24,425	($175,987)
5	$0	45,511	$8,585	$234	$15,929	$24,280	($151,707)
6	$0	45,056	$8,843	$232	$15,770	$24,380	($127,326)
7	$0	44,606	$9,108	$230	$15,612	$24,490	($102,836)
8	$0	44,160	$9,381	$227	$15,456	$24,610	($78,226)
9	$0	43,718	$9,663	$225	$15,301	$24,739	($53,487)
10	$0	43,281	$9,953	$223	$15,148	$24,878	($28,609)
11	$0	42,848	$10,251	$221	$14,997	$25,027	($3,582)
12	$0	42,419	$10,559	$218	$14,847	$25,187	$21,605
13	$0	41,995	$10,876	$216	$14,698	$25,358	$46,963
14	$0	41,575	$11,202	$214	$14,551	$25,539	$72,502
15	$0	41,160	$11,538	$212	$14,406	$25,732	$98,234
16	$0	40,748	$11,884	$210	$14,262	$25,936	$124,170
17	$0	40,341	$12,241	$208	$14,119	$26,152	$150,321
18	$0	39,937	$12,608	$206	$13,978	$26,380	$176,702
19	$0	39,538	$12,986	$204	$13,838	$26,621	$203,322
20	$0	39,142	$13,376	$202	$13,700	$26,874	$230,196
21	$1	38,751	$13,777	$200	$13,563	$27,140	$257,336
22	$2	38,363	$14,190	$198	$13,427	$27,420	$284,756
23	$3	37,980	$14,616	$196	$13,293	$27,713	$312,469
24	$4	37,600	$15,054	$194	$13,160	$28,021	$340,490
25	$5	37,224	$15,506	$192	$13,028	$28,343	$368,832
Totals:		862,724	$204,964	$3,482	$301,953	$642,072	$503,436
				Net Present Value (NPV)		**$230,221**	
				Internal Rate of Return (IRR)		**6.5%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
City Hall	1933	Sunpower SPR230	132	14.7	1,941	30.36	47,378	4,356	15.64

.= Proposed PV Layout

Notes:

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