ENERGY AUDIT – FINAL REPORT

GLOUCESTER CITY
MUNICIPAL BUILDING
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GLOUCESTER CITY, NJ 08030
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CEG PROPOSAL NO. 9C08131

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I. EXECUTIVE SUMMARY

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

Gloucester City Municipal Building
51 South Brown Street
Gloucester City, NJ 08030

Facility Contact Person: Bob Bevan
Municipal Contact Person: Jack Lipsett

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	$ 9,284.00
#2 Fuel Oil	$ 1,280.83
Total	$10,564.83

The potential annual energy cost savings are shown below in Table 1. 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[A]	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Lighting Upgrade – Fluorescent Fixtures	$4,031	$1,566	2.6	48.8%
2	Lighting Upgrade – Incandescent Fixtures	$261	$219	1.2	86.1%
3	Lighting Controls	$1,100	$359	3.1	34.3%

Notes: A. Cost includes applicable incentive and maintenance savings.

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

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	NAT GAS (THERMS)
1	Lighting Upgrade – Fluorescent Fixtures	3.96	8,700	-
2	Lighting Upgrade – Incandescent Fixtures	0.59	1,217	-
3	Lighting Controls	-	1,993	-

Recommendation:

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

- **ECM #1:** Lighting Upgrade – Fluorescent Fixtures
- **ECM #2:** Lighting Upgrade – Incandescent Fixtures
- **ECM #3:** Lighting Controls

If the Owner decides to package the three (3) recommended energy conservation measures, the approximate total cost would equal $5,391, total annual savings $2,144 and a combined simple payback equaling 2.5 years.

It is pertinent to note that the Owner has made a conscientious effort over the recent years to upgrade the majority of HVAC equipment throughout the facility. All of the major HVAC equipment is either at the beginning or middle of its estimated service life as outline in the 2007 ASHRAE Applications Handbook.

II. INTRODUCTION

The Municipal Building is a 6,388 square feet facility that includes a conference room, two small lobbies, offices, an attic, and a basement.

The first energy auditing task was to collect and review 2008 utility energy data for electricity and #2 Fuel Oil. 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 less 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 Light and Power (GLP) and Body Political Light (BPL) Rate Schedules. 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.

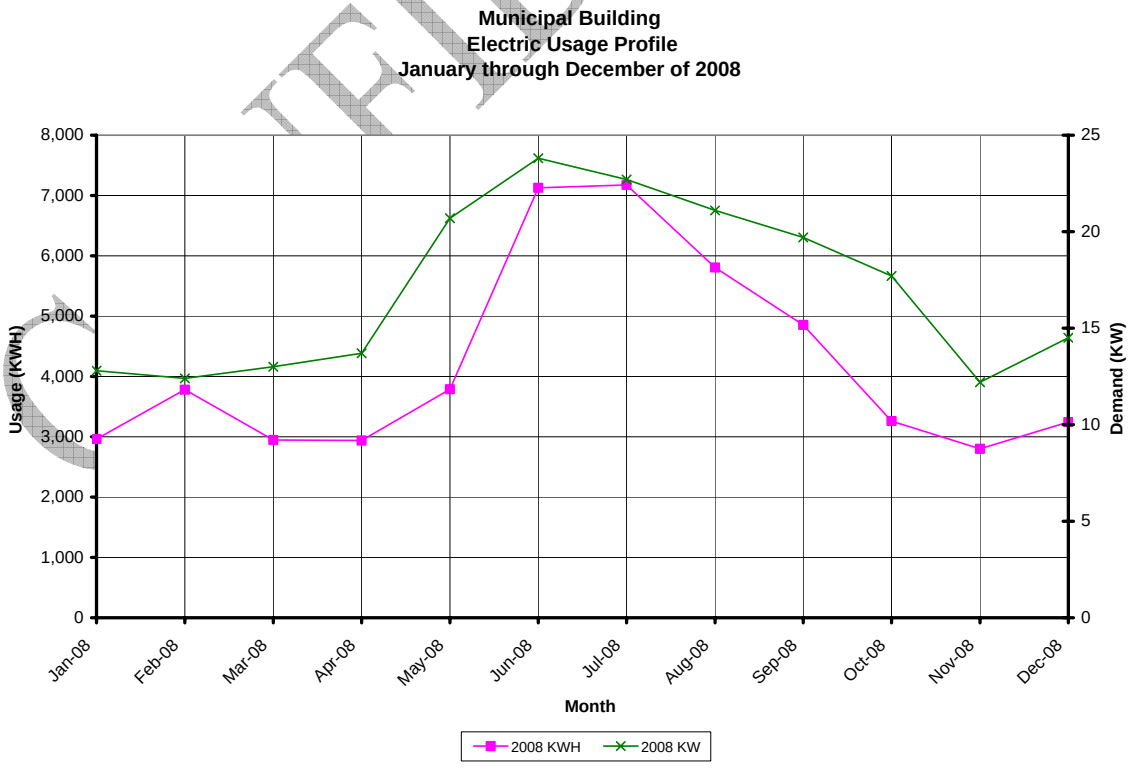
The Municipal Building utilizes No. 2 heating fuel oil as its heating source. Based on information provided by the Owner for 2008, the Municipal Building received a total of 378.3 gallons of No. 2 heating fuel oil for a total cost of $1,280.83.

Description	Average
Electricity	18¢ / kWh
No. 2 Burner Fuel Oil	$3.39 / Gallon

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	2,962	13	$ 444
2/08	3,780	12.4	$ 544
3/08	2,948	13	$ 446
4/08	2,937	14	$ 442
5/08	3,787	21	$ 566
6/08	7,128	24	$ 1,419
7/08	7,175	23	$ 1,430
8/08	5,806	21	$ 1,252
9/08	4,854	20	$ 1,062
10/08	3,258	18	$ 597
11/08	2,799	12	$ 514
12/08	3,244	15	$ 569
Totals	**50,679**	**24 Max**	**$9,284**

Figure 1
Electricity Usage Profile



B. Energy Use Index (EUI)

The Energy Use Index is a measure of the total energy consumed in cooling and heating a building or facility in a year, expressed in British thermal units (Btu) per conditioned gross square footage.

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

Electric = [(50,679 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W)]/ (1000 Btu/h / 1 kBtu/h)
= 173,018.1 kBtu

Fuel Oil = (378.3 Gallons * 140,000 Btu/Gallon) / (1000 Btu/h / 1 kBtu/h) = 52,962 kBtu

EUI = (173,018.1 kBtu + 52,962 kBtu) / (6,388 SF)

Municipal Building EUI = 35.4 kBtu/SF

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.

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. Therefore, it is vital that local government municipalities assess their energy usage, benchmark this usage utilizing Portfolio Manager, set priorities and goals to lessen their energy usage and move forward with these priorites and goals. Saving energy will in-turn save the environement.

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

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

Username: Gloucestercity
Password: lgeaceg2009

Utilizing the utility bills and other information gathered during the energy audit process, CEG entered the respective data into Portfolio Manager and the following is a summary of the results:

Table 4
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Municipal Building	83	75

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

V. FACILITY DESCRIPTION

The Gloucester City Municipal Building is a 3-story Victorian style house that has wood frame construction, shingled roof, single-pane wood and double-pane vinyl replacement windows. The 6,388 square foot facility was built in 1910, and is in operation for 40 hours during a typical week. The Municipal Building consists of a basement, walk-up attic, and two (2) middle floors that are home to offices, restrooms, and storage closets. The average amount of employees occupying the building is fifteen (15).

Heating System

Heating is provided via two (2) Emerald EM-165 boilers located in the basement. The boilers are the same model, and each operates with an input capacity of 231 MBH. Their DOE output and NET output capacities are 193 and 168, respectively. The boilers are oil-fired, and burn fuel at a rate of 1.65 GPH with Honeywell Beckett AFG burners. The oil for the boilers is stored in two (2) 20" x 30" x 60" tanks. Five (5) circulation pumps with 1/25 HP motors move the hot water to the twelve (12) heating zones of the building. It is pertinent to note that none of the hot water piping in the basement was insulated. Pipe insulation throughout the building could not be verified because of enclosed walls.

Convectors are located on the first floor in the lobby and in the waiting room. There are multiple Fin Tube Radiators located throughout the building.

Domestic Hot Water

A Bradford White electric hot water heater is the sole provider of hot water to the Municipal Building. It has a capacity of 40 gallons and runs at 240 V/60 A.

Cooling System

The first floor of the municipal building is cooled via two (2) Carrier vertical air-handling units located in a storage closet adjacent to the tax office. The respective remote, air-cooled condensing units are located at grade in the rear of the building. The condensing units are manufactured by Bryant and utilize R-22 refrigerant. The above equipment appears to be in good working condition.

The second floor offices of the building are cooled via four (4) ductless split system units manufactured by EMI. In each instance, two (2) evaporators are piped to a common condensing unit located on the low roof. The above equipment appears to be in good working condition.

The municipal building basement is not cooled.

Controls System

The heating temperature of the building is controlled by White Rogers programmable thermostats that are currently set to hold at 70° F, while the cooling temperature of the building is controlled by Honeywell programmable thermostats.

Exhaust System

A 900 CFM Nautilus Exhaust Fan with an open louver to the outside provides a means of exhaust for the basement.

Lighting

The basement is lit by 135 W incandescent lamps that sit in porcelain fixtures.

The majority of the building is lit by varying types and sizes of T-12 lights. Lamp wattages vary from 40 W to 96W for the respective T-12 lamps.

The main lobby and the second floor restroom are the only two areas of the building that contain T-8 lighting fixtures.

VI. EQUIPMENT LIST

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

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade – Fluorescent Fixtures

Description:

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

CEG recommends a replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the Owner on electrical costs due to the better performance of the electronic ballasts. In addition to functional cost savings, the fixture replacement will also provide operational cost savings. The operational cost savings will be realized through the lesser number of lamps that will be required to be replaced per year. The expected lamp life of a T8 lamp, approximately 30,000 burn-hours, in comparison to the existing T12 lamps, approximately 20,000 burn-hours, will provide the Owner with fewer lamps to replace per year. Based on the operating hours of this facility, approximately 1460 hours per year, the Owner will be changing approximately 33% less lamps per year.

Energy Savings Calculations:

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

NJ Smart Start® 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.

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

$$\text{Smart Start® } Incentive = (1 \times \$25) + (52 \times\ \$\,30) = \$1{,}585$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (158 \times 33\%\ reduction \times \$\,2.00) + (52 \times \$10) = \$624$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,240
NJ Smart Start Equipment Incentive ($):	($1,585)
Maintenance Savings ($):	($624)
Net Installation Cost ($):	*$4,031*
Total Energy Savings ($ / yr):	*$1,566*
Simple Payback (yrs):	*2.6*
Simple Return on Investment:	*48.8%*

ECM #2: Lighting Upgrade – Incandescent Fixtures

Description:

During CEG's site survey it was noted that numerous incandescent lamps are still being used in throughout the facility. CEG recommends a replacement of the remaining incandescent lamps with energy-efficient lamps. 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: a 15-Watt CFL for a 60-Watt incandescent lamp, a 21-Watt CFL for a 75-Watt incandescent lamp, a 25-Watt CFL for a 100-Watt incandescent lamp and a 125-Watt CFL for a 500- 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 the remaining incandescent lamps in the facility with energy efficient compact fluorescent lamps.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$261
NJ Smart Start Equipment Incentive ($):	($0)
Maintenance Savings ($):	($0)
Net Installation Cost ($):	*$261*
Total Energy Savings ($ / yr):	*$219*
Simple Payback (yrs):	*1.2*
Simple Return on Investment:	*86.1%*

ECM #3: Lighting Controls

Description:

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

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all areas of the facility; 6,388 SF.

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the existing offices and storage rooms to be ±1.3 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 1.5 Watts/SF x 6,388 SF x 2,080 hrs/yr. = 1,993 kWh x $0.18/kWh

Savings = $359 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 rooms to be retrofitted is 20.

Total cost to install sensors is $55/unit x 20 units = $1100

Energy Savings Summary:

ECM #3 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,500
NJ Smart Start Equipment Incentive ($):	$400
Maintenance Savings ($):	$0
Net Installation Cost ($):	*$1,100*
Total Energy Savings ($ / yr):	*$359*
Simple Payback (yrs):	*3.1*
Simple Return on Investment:	*34.3%*

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 330 S.F. can be utilized for a PV system on the Municipal Building. A depiction of the area utilized is shown in Appendix G. Using this square footage it was determined that a system size of 7.36 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 11,486 kWh annually, reducing the overall utility bill by 20% percent. A detailed financial analysis can be found in Appendix G. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

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

PAYMENT TYPE	SIMPLE PAYBACK	INTERNAL RATE OF RETURN
Self-Finance	10.9 Years	16.4%
Direct Purchase	10.9 Years	8.5%

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 the Municipal Building 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, (May – July), complimenting the heating load. It is evident that there is a significant reduction in the Peak Load from January to May2008 and August through November 2008. There is a substantial increase from June 2008 to August 2008. The Off Peak load is typical, with an unexpected increase in consumption during December 2008. 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.

X. INSTALLATION FUNDING OPTIONS

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

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

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 in the window AC units periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%. The 3-step process includes cleaning of the coils, rinsing and a microbicide treatment. Thoroughly cleaned coils are not as susceptible to re-fouling so they stay clean longer, reducing the cleaning cycle frequency

B. Maintain all weather stripping on windows and doors.

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

D. Repair/replace damaged or missing piping and ductwork insulation in the ceiling spaces.

E. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc. During the site survey, some areas were measured at over 100 foot candles.

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

G. Recalibrate existing sensors serving the hot water unit heaters and fin-tube radiators. Sensors are currently ~ 5°F off desired setpoint.

H. Clean all fixtures to maximize light output.

I. Feel for air drafts around electrical outlets. Inexpensive pads are available, as are plugs for unused sockets.

Electric Cost Summary

PSE&G Electric (Rates Vary)

Municipal Building **2008**
(Service Type)

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	365	
Account # 61 851 070 07														
Meter # 126378991 (rate - GLP)														
KWH	109	97	105	101	98	92	65	56	50	44	90	147	1054	
KW	1.1	1	1.1	1	1	0.9	0.7	0.6	0.5	0.4	0.9	1.5	1.5	Max
Electric Delivery, $	$11.02	$10.37	$10.94	$10.46	$10.40	$16.91	$13.92	$12.56	$11.25	$6.82	$9.88	$13.75	138.28	
Electric Supply, $	$11.00	$10.32	$10.72	$10.19	$10.10	$15.07	$12.20	$11.51	$10.47	$8.87	$12.80	$17.47	140.723	
Monthly Load Factor	13%	14%	13%	14%	13%	14%	12%	13%	14%	15%	14%	13%	14%	
Total Cost, $	$22.02	$20.69	$21.66	$20.65	$20.50	$31.98	$26.12	$24.07	$21.72	$15.69	$22.68	$31.22	$279.00	
$/KWH														
Account # 61 851 155 06													0	
Meter # 626002703 (rate - GLP)													0	
KWH	2652	3510	2676	2694	3558	6918	6984	5610	4650	3036	2520	2892	47700	Max
KW	11.7	11.4	11.9	12.7	19.7	22.9	22	20.5	19.2	17.3	11.3	13	22.9	
Electric Delivery, $	$111.10	$129.74	$112.42	$115.95	$163.17	$459.81	$451.72	$395.13	$352.80	$141.86	$108.06	$127.25	2669.01	
Electric Supply, $	$270.24	$355.49	$274.10	$270.61	$348.36	$893.80	$917.45	$795.09	$649.50	$400.00	$343.66	$368.87	5887.17	
Monthly Load Factor	30%	46%	30%	29%	24%	42%	43%	37%	34%	24%	31%	30%	33%	
Total Cost, $	$381.34	$485.23	$386.52	$386.56	$511.53	$1,353.61	$1,369.17	$1,190.22	$1,002.30	$541.86	$451.72	$496.12	$8,556.18	
$/KWH	$0.14	$0.14	$0.14	$0.14	$0.14	$0.20	$0.20	$0.21	$0.22	$0.18	$0.18	$0.17	$0.18	
Account # 61 973 642 04													0	
Meter # Unmetered Electric Service (rate - BPL)													0	
KWH	200.7	173.7	167	142.3	131	118	126.2	140	154	178.2	189	204.7	1924.8	
KW													0	Max
Electric Delivery, $	$25.53	$24.88	$24.72	$24.10	$23.83	$23.51	$23.71	$24.05	$24.39	$24.99	$25.36	$26.12	295.19	
Electric Supply, $	$15.13	$13.64	$12.66	$10.55	$10.04	$10.17	$11.19	$13.21	$13.46	$14.17	$14.45	$15.09	153.76	
Monthly Load Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Cost, $	$41	$39	$37	$35	$34	$34	$35	$37	$38	$39	$40	$41	$449	
$/KWH	$0.2026	$0.2218	$0.2238	$0.2435	$0.2585	$0.2854	$0.2765	$0.2661	$0.2458	$0.2198	$0.2106	$0.2013	$0.2332	

Total Usage

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	
KWH	2,962	3,781	2,948	2,937	3,787	7,128	7,175	5,806	4,854	3,258	2,799	3,244	50,679
KW	13	12	13	14	21	24	23	21	20	18	12	15	24
Total Cost, $	$444.02	$544.44	$445.56	$441.86	$565.90	$1,419.27	$1,430.19	$1,251.55	$1,061.87	$596.71	$514.21	$568.55	$9,284.13
$/KWH	$0.15	$0.14	$0.15	$0.15	$0.15	$0.20	$0.20	$0.22	$0.22	$0.18	$0.18	$0.18	$0.18

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

MUNICIPAL BUILDING

ECM 1 Lighting Upgrade - Fluorescent Fixtures

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$6,240	$0	$0	$6,240
Total Cost			$0	$0	$6,240
Utility Incentive - NJ Smart Start ($25 per 1-2 lamp; $30 per 3-4 lamp fixture)					($1,585)
Total Cost Less Incentive					$4,655

ECM 2 Lighting Upgrade - Incandescent Fixtures

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$261	$0	$0	$261
Total Cost			$0	$0	$261
Utility Incentive - N/A					$0
Total Cost Less Incentive					$261

ECM 3 Lighting Controls

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	20	$75	$600	$900	$1,500
Total Cost			$600	$900	$1,500
Utility Incentive - NJ Smart Start ($20 per sensor)					($400)
Total Cost Less Incentive ($20 per Sensor)					$1,100

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
Municipal Building

Building ID: 1772815
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 08, 2009

Facility
Municipal Building
512 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: 1910
Gross Floor Area (ft²): 6,388

Energy Performance Rating[2] (1-100) 83

Site Energy Use Summary[3]

Electricity (kBtu)	172,916
Fuel Oil (No. 2) (kBtu)	52,962
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	225,878

Energy Intensity[5]

Site (kBtu/ft²/yr)	35
Source (kBtu/ft²/yr)	99

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	31

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

National Average Comparison

National Average Site EUI	55
National Average Source EUI	155
% Difference from National Average Source EUI	-36%
Building Type	Office

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	Municipal Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	512 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		☐
Municipal Building (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	6,388 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 Office 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	15	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. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	20	Is this the number of personal computers in the Office?		☐
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?		☐

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 Meter - 126378991 (kWh) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	147.00
11/01/2008	11/30/2008	90.00
10/01/2008	10/31/2008	44.00
09/01/2008	09/30/2008	50.00
08/01/2008	08/31/2008	56.00
07/01/2008	07/31/2008	65.00
06/01/2008	06/30/2008	92.00
05/01/2008	05/31/2008	98.00
04/01/2008	04/30/2008	101.00
03/01/2008	03/31/2008	105.00
02/01/2008	02/29/2008	97.00
01/01/2008	01/31/2008	109.00
Electric Meter - 126378991 Consumption (kWh)		**1,054.00**
Electric Meter - 126378991 Consumption (kBtu)		**3,596.25**
Meter: Electric Meter - 62002703 (kWh) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	2,892.00
11/01/2008	11/30/2008	2,520.00
10/01/2008	10/31/2008	3,036.00
09/01/2008	09/30/2008	4,650.00
08/01/2008	08/31/2008	5,610.00
07/01/2008	07/31/2008	6,984.00
06/01/2008	06/30/2008	6,918.00
05/01/2008	05/31/2008	3,558.00
04/01/2008	04/30/2008	2,694.00
03/01/2008	03/31/2008	2,676.00
02/01/2008	02/29/2008	3,510.00
01/01/2008	01/31/2008	2,652.00
Electric Meter - 62002703 Consumption (kWh)		**47,700.00**
Electric Meter - 62002703 Consumption (kBtu)		**162,752.40**

Meter: Electric Meter - Unmetered Electric (kWh) Space(s): Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	204.70
11/01/2008	11/30/2008	189.00
10/01/2008	10/31/2008	178.20
09/01/2008	09/30/2008	154.00
08/01/2008	08/31/2008	140.00
07/01/2008	07/31/2008	126.20
06/01/2008	06/30/2008	118.00
05/01/2008	05/31/2008	131.00
04/01/2008	04/30/2008	142.30
03/01/2008	03/31/2008	167.00
02/01/2008	02/29/2008	173.70
01/01/2008	01/31/2008	200.70
Electric Meter - Unmetered Electric Consumption (kWh)		**1,924.80**
Electric Meter - Unmetered Electric Consumption (kBtu)		**6,567.42**
Total Electricity Consumption (kBtu)		**172,916.07**
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	378.30
Fuel Oil Consumption (Gallons)		**378.30**
Fuel Oil Consumption (kBtu)		**52,961.92**
Total Fuel Oil (No. 2) Consumption (kBtu)		**52,961.92**
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
Municipal Building
512 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

Municipal Building	
Gross Floor Area Excluding Parking: (ft^2)	6,388
Year Built	1910
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Municipal Building	
Space Type	Office
Gross Floor Area(ft^2)	6,388
Weekly operating hours	40
Workers on Main Shift	15
Number of PCs	20
Percent Cooled	50% or more
Percent Heated	50% or more

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	83	83	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	35	35	41	N/A	55
Source (kBtu/ft^2)	99	99	114	N/A	155
Energy Cost					
$/year	$ 10,566.01	$ 10,566.01	$ 12,218.44	N/A	$ 16,521.34
$/$ft^2$/year	$ 1.65	$ 1.65	$ 1.91	N/A	$ 2.58
Greenhouse Gas Emissions					
$MtCO_2e$/year	31	31	36	N/A	48
$kgCO_2e/ft^2$/year	5	5	6	N/A	8

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Municipal Building"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Basement	Entire Building	Emerald	2	EM-165	47551	231	168	0.73	#2 Fuel Oil	2	25	23	Beckett AFG Oil Burner

DHW - Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Volts	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Basement	12 Heating Zones	Taco	5	007-F5	-	1/25	3250	0-20	0-11	115	7.1	2	10	8	

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	KW	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Basement	Entire Building	Bradford White	1	M240S6DS-1NCWW	EF10666279	4.5	-	40	90	Electric	1	12	11	

Air Handling Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Fan HP	Cooling Capacity	Input (MBh)	Output (MBh)	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Storage Closet	First Floor	Carrier	2	FB4ANF642	4598A15201	DX R-22	1/2 HP	3.5 tons	N/A	N/A	120	1	2	11	15	4	
Office	Second Floor	EMI	4	WSP 12	-	DX R-22	.06 HP	1 ton	N/A	N/A	120	1	-	5	15	10	

AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Outside at Grade	First Floor	Bryant	2	597CN042-D	0499E04250	3.5 Tons	12 SEER	R-22	208-230	1	11	20	9	
Outside at Grade	First Floor	Bryant	2	597CN042-D	0499E04245	3.5 Tons	12 SEER	R-22	208-230	1	11	20	9	
Low Roof-top	Second Floor	EMI	2	MC20400A0000J	-	2 Tons	10.5 SEER	R-22	208-230	1	5	20	15	

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C08131
Project: Municipal Building
Address: 512 Monmouth Street
City: Gloucester City, NJ
Building SF: 6388

Municipal Building

DATE: 06/04/2009
KWH COST: $0.180

ECM #1: Lighting Upgrade - Fluorescent Fixtures

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.	CEG Type	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 Simple Payback
1	B	UGC Office	6	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.96	1996.8	$359.42	6	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.48	998.4	$179.71	$120.00	$720.00	0.48	998.4	$179.71	4.01
2	B	Toilet	1	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.16	332.8	$59.90	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.08	166.4	$29.95	$120.00	$120.00	0.08	166.4	$29.95	4.01
3	B	Office	4	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.64	1331.2	$239.62	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.32	665.6	$119.81	$120.00	$480.00	0.32	665.6	$119.81	4.01
4	B	Storage Closet 2	1	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.16	332.8	$59.90	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.08	166.4	$29.95	$120.00	$120.00	0.08	166.4	$29.95	4.01
5	B	Tax Office	7	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	1.12	2329.6	$419.33	7	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.56	1164.8	$209.66	$120.00	$840.00	0.56	1164.8	$209.66	4.01
6	B	Tax Lobby	2	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.32	665.6	$119.81	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.16	332.8	$59.90	$120.00	$240.00	0.16	332.8	$59.90	4.01
7	A	Main Lobby	4	4' 2-Lamp T-8, Prism Reflector, Below Ceiling, EB	2,080	58	0.23	482.56	$86.86	4	No change Required	58	0.23	482.56	$86.86	$0.00	$0.00	0.00	0	$0.00	#DIV/0!
8	B	Assessor's Office	3	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.48	998.4	$179.71	3	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.24	499.2	$89.86	$120.00	$360.00	0.24	499.2	$89.86	4.01
9	B	Clerk's Office	4	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.64	1331.2	$239.62	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.32	665.6	$119.81	$120.00	$480.00	0.32	665.6	$119.81	4.01

10	B	Asst. Clerk's Office	2	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.32	665.6	$119.81	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.16	332.8	$59.90	$120.00	$240.00	0.16	332.8	$59.90	4.01
11	B	Clerk Storage 2	1	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.16	332.8	$59.90	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.08	166.4	$29.95	$120.00	$120.00	0.08	166.4	$29.95	4.01
12	B	1st Floor Corridor	4	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.64	1331.2	$239.62	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.32	665.6	$119.81	$120.00	$480.00	0.32	665.6	$119.81	4.01
13	B	Finance Office	4	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.64	1331.2	$239.62	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.546	665.6	$119.81	$120.00	$480.00	0.09	665.6	$119.81	4.01
14	B	Middle Office	5	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.80	1664	$299.52	5	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.40	832	$149.76	$120.00	$600.00	0.40	832	$149.76	4.01
15	A	Toilet	1	4' 2-Lamp T-8, Prism Reflector, Below Ceiling, EB	2,080	58	0.06	120.64	$21.72	1	No change Required	58	0.06	120.64	$21.72	$0.00	$0.00	0.00	0	$0.00	0.00
16	B	Top Office	2	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.32	665.6	$119.81	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.16	332.8	$59.90	$120.00	$240.00	0.16	332.8	$59.90	4.01
17	B	Bottom Office	4	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.64	1331.2	$239.62	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.32	665.6	$119.81	$120.00	$480.00	0.32	665.6	$119.81	4.01
18	B	2nd Floor Corridor	2	4' x 2' 4-Lamp, T-12, Prism Reflector, MB	2,080	160	0.32	665.6	$119.81	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N WN	80	0.16	332.8	$59.90	$120.00	$240.00	0.16	332.8	$59.90	4.01
19	A	Attic	1	4' 2-Lamp T-8, Prism Reflector, Below Ceiling, EB	2,080	58	0.06	120.64	$21.72	1	No Change Required	58	0.06	120.64	$21.72	$0.00	$0.00	0.00	0	$0.00	0.00
20	E		1	8' 2-Lamp T-12, No Lens, MB	2,080	96	0.10	199.68	$35.94	1	8' 2-Lamp T-8 32 W Prism Lens/Elect Ballast; Metalux M/N WN	73	0.07	151.84	$27.33	$140.00	$140.00	0.02	47.84	$8.61	0.00
		Totals	59				8.76	18229.12	3281.24	59			4.81	9528.48	$1,715.13		$6,240.00	3.96	8,700.64	$1,566.12	3.98

NOTE: Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C08131
Project: Municipal Building
Address: 512 Monmouth Street
City: Gloucester City, NJ
Building SF: 6388

Municipal Building

DATE: 06/04/2009
KWH COS $0.180

ECM #2: Lighting Upgrade - Incandescent Fixtures

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.	CEG Type	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 Simple Payback
1	-	Storage Closet	1	60 W Porcelin Incandescent	2,080	60	0.06	124.8	$22.46	1	15 W CFL	15	0.02	31.2	$5.62	$27.00	$27.00	0.05	93.6	$16.85	1.60
2	-	Clerk's Storage	2	100 W Incandescent	2,080	100	0.20	416	$74.88	2	25 W CFL	25	0.05	104	$18.72	$30.00	$60.00	0.15	312	$56.16	1.07
3	-	Clerk Storage 3	1	60 W Porcelin Incandescent	2,080	60	0.06	124.8	$22.46	1	15 W CFL	15	0.02	31.2	$5.62	$27.00	$27.00	0.05	93.6	$16.85	1.60
4	-	Clerk Storage 4	1	60 W Porcelin Incandescent	2,080	60	0.06	124.8	$22.46	1	15 W CFL	15	0.02	31.2	$5.62	$27.00	$27.00	0.05	93.6	$16.85	1.60
5	-	2nd Floor Corridor	4	100 W High Hats	2,080	100	0.40	832	$149.76	4	25 W CFL	25	0.10	208	$37.44	$30.00	$120.00	0.30	624	$112.32	1.07
6	-	Attic	1	300 W Incandescent	2,080	300	0.30	624	$112.32	2	38 W CFL	38	0.08	158.08	$28.45	$35.00	$70.00	0.22	465.92	$83.87	0.83
7	-	Basement	7	135 W Incandescent	2080	135	0.95	1965.6	$353.81	1	38 W CFL	38	0.04	79.04	$14.23	$35.00	$35.00	0.91	1886.56	$339.58	0.10
		Totals	17				0.78	2246.40	404.35	9			0.20	405.60	$73.01		$261.00	0.59	1,216.80	$219.02	1.19

NOTE: Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

Project Name: LGEA Solar PV Project - Municipal Building
Location: Gloucester City, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$66,240
Annual kWh Production	11,486
Annual Energy Cost Reduction	$2,067
Annual SREC Revenue	$4,020
First Cost Premium	**$66,240**
Simple Payback:	**10.88** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.180**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/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	$3,312	0	0	0	$0	0	0	(3,312)	0
1	$0	11,486	$2,067	$0	$4,020	$4,358	$1,497	$233	($3,079)
2	$0	11,428	$2,129	$0	$4,000	$4,249	$1,605	$275	($2,804)
3	$0	11,371	$2,193	$0	$3,980	$4,133	$1,721	$319	($2,486)
4	$0	11,314	$2,259	$0	$3,960	$4,009	$1,846	$365	($2,121)
5	$0	11,258	$2,327	$116	$3,940	$3,875	$1,979	$297	($1,825)
6	$0	11,201	$2,397	$115	$3,920	$3,732	$2,122	$347	($1,478)
7	$0	11,145	$2,469	$115	$3,901	$3,579	$2,276	$400	($1,077)
8	$0	11,090	$2,543	$114	$3,881	$3,414	$2,440	$455	($622)
9	$0	11,034	$2,619	$114	$3,862	$3,238	$2,617	$513	($110)
10	$0	10,979	$2,698	$113	$3,843	$3,049	$2,806	$573	$463
11	$0	10,924	$2,778	$113	$3,823	$2,846	$3,009	$635	$1,098
12	$0	10,869	$2,862	$112	$3,804	$2,629	$3,226	$700	$1,797
13	$0	10,815	$2,948	$111	$3,785	$2,395	$3,459	$767	$2,564
14	$0	10,761	$3,036	$111	$3,766	$2,145	$3,709	$837	$3,401
15	$0	10,707	$3,127	$110	$3,748	$1,877	$3,977	$910	$4,311
16	$0	10,654	$3,221	$110	$3,729	$1,590	$4,265	$985	$5,297
17	$0	10,600	$3,318	$109	$3,710	$1,281	$4,573	$1,064	$6,361
18	$0	10,547	$3,417	$109	$3,692	$951	$4,904	$1,146	$7,506
19	$0	10,495	$3,520	$108	$3,673	$596	$5,258	$1,230	$8,736
20	$0	10,442	$3,625	$108	$3,655	$216	$5,638	$1,318	$10,054
21	$0	10,390	$3,734	$107	$3,637	$183	$5,184	$1,897	$11,951
22	$0	10,338	$3,846	$106	$3,618	$125	$4,266	$2,967	$14,918
23	$0	10,286	$3,961	$106	$3,600	$0	$0	$7,456	$22,373
24	$0	10,235	$4,080	$105	$3,582	$0	$0	$7,557	$29,931
25	$0	10,184	$4,203	$105	$3,564	$0	$0	$7,662	$37,593
	Totals:	219,122	$55,552	$1,787	$76,693	$54,163	$62,928	$72,377	$152,752
					Net Present Value (NPV)			**$7,088**	
					Internal Rate of Return (IRR)			**16.4%**	

Project Name: LGEA Solar PV Project - Municipal Building
Location: Gloucester City, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$66,240
Annual kWh Production	11,486
Annual Energy Cost Reduction	$2,067
Annual SREC Revenue	$4,020
First Cost Premium	**$66,240**
Simple Payback:	**10.88** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.180**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$66,240	0	0	0	$0	(66,240)	0
1	$0	11,486	$2,067	$0	$4,020	$6,087	($60,153)
2	$0	11,428	$2,129	$0	$4,000	$6,129	($54,023)
3	$0	11,371	$2,193	$0	$3,980	$6,173	($47,850)
4	$0	11,314	$2,259	$0	$3,960	$6,219	($41,631)
5	$0	11,258	$2,327	$116	$3,940	$6,151	($35,480)
6	$0	11,201	$2,397	$115	$3,920	$6,202	($29,278)
7	$0	11,145	$2,469	$115	$3,901	$6,255	($23,023)
8	$0	11,090	$2,543	$114	$3,881	$6,310	($16,714)
9	$0	11,034	$2,619	$114	$3,862	$6,367	($10,346)
10	$0	10,979	$2,698	$113	$3,843	$6,427	($3,919)
11	$0	10,924	$2,778	$113	$3,823	$6,489	$2,570
12	$0	10,869	$2,862	$112	$3,804	$6,554	$9,124
13	$0	10,815	$2,948	$111	$3,785	$6,622	$15,746
14	$0	10,761	$3,036	$111	$3,766	$6,692	$22,437
15	$0	10,707	$3,127	$110	$3,748	$6,764	$29,202
16	$0	10,654	$3,221	$110	$3,729	$6,840	$36,042
17	$0	10,600	$3,318	$109	$3,710	$6,919	$42,960
18	$0	10,547	$3,417	$109	$3,692	$7,000	$49,960
19	$0	10,495	$3,520	$108	$3,673	$7,085	$57,045
20	$0	10,442	$3,625	$108	$3,655	$7,172	$64,217
21	$1	10,390	$3,734	$107	$3,637	$7,263	$71,481
22	$2	10,338	$3,846	$106	$3,618	$7,358	$78,839
23	$3	10,286	$3,961	$106	$3,600	$7,456	$86,294
24	$4	10,235	$4,080	$105	$3,582	$7,557	$93,851
25	$5	10,184	$4,203	$105	$3,564	$7,662	$101,513
	Totals:	219,122	$55,552	$1,787	$76,693	$167,753	$130,457
				Net Present Value (NPV)		**$101,538**	
				Internal Rate of Return (IRR)		**8.5%**	

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
Municpal Building	456	Sunpower SPR230	32	14.7	471	7.36	11,486	1,056	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.