ENERGY AUDIT – FINAL REPORT

MARGATE CITY HALL & FIRE HOUSE #1

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MARGATE, NJ 08402
ATTN: MR. THOMAS D. HILTNER
City Clerk

CEG PROJECT NO. 9C09047

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I. EXECUTIVE SUMMARY

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

Margate City Hall	Firehouse #1
1 S. Washington Avenue	Ventnor & Washington Avenues
Margate City, NJ 08402	Margate City, NJ 08402

Municipal Contact Person: Mr. Thomas D. Hiltner, City Clerk
Facility Contact Person: Mr. Fred Verna, Director of Facilities

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 energy supplied for the City Hall & Firehouse #1 buildings are serviced by the same utility electric and gas meters, therefore the annual energy costs are as follows:

Electricity	$ 36,079
Natural Gas	$ 20,709
Total	$ 56,788

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	Upgrade the Lighting	$8,240	$4,765	2.14	46.7 %
2	Install Lighting Controls	$1,980	$38	52.1	1.9 %
3	Install New Windows	$44,000	$3,680	11.9	8.4 %
4	Replace Heating Hot Water Boiler	$24,440	$1,967	12.4	8 %
5	Domestic HWH Replacement	$2,850	$482	5.9	17 %
6	Court Room Split System Upgrades	$30,500	$2,695	11.3	8.8 %
7	15.6 KW PV Solar Panel System	$140,760	$12,032	11.7	7.5 %

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	Upgrade the Lighting	8.46	19,578	
2	Install Lighting Controls		2,714	
3	Install New Windows	-	-	3,069
4	Replace Heating Hot Water Boiler	-	-	1,640
5	Domestic HWH Replacement	-	4,680	(-143)
6	Court Room Split System Upgrades		18,850	-
7	15.6 KW PV Solar Panel System	15.6	24,407	-

Recommendations:

Concord Engineering Group recommends the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. ECM#3 was also added since it is also an occupant comfort issue. The potential energy and cost savings from these ECM's are economically justifiable. The following Energy Conservation Measures are recommended for the City Hall & Firehouse #1 facilities:

- **ECM #1:** Upgrade the Lighting
- **ECM #3:** Install New Windows
- **ECM #5:** Domestic HWH Replacement

II. INTRODUCTION

This comprehensive energy audit covers the City Hall & Firehouse #1 facility which is located at the southeast corner of Ventnor and South Washington Avenues. The brick building was constructed in 1903, according to the dated keystone on the southwest wall. The building houses the Administrative Offices of Public Works, Clerk, Tax Assessor, Court Offices, Mayor & Commissioners Offices & Conference Room, Land Use Administator, System Administrator, and Court Room. This beautiful building shares space with the local Fire Department. The Fire House portion was constructed in 1912 and houses fire engine bays on the 1st floor, firemen's quarters, kitchen and offices on the 2nd floor.

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 Intensity (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 municipality 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 (ECM's). 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 ECM's.

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

Electric

The following tables and figures represent the electrical usage for the surveyed facilities from April-08 to March-09. Atlantic City Electric Utility provides electricity to the facility. The electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

Natural Gas

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facilities from May-08 to April-09. South Jersey Gas supplies the natural gas and delivers the fuel to the burner at the facility. Below is the average unit cost for the utilities at this facility.

Description	Average
Electricity	$0.143 / kWh (4.2¢ / kBtu)
Natural Gas	$1.20 / therm (1.2¢ / kBtu)

*Note: The Natural Gas cost per Therm includes customer service charges.

Table 3
Electricity Billing Data

City Hall & Firehouse #1

Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Peak Demand	Units	Load Factor (%)	Total Consumption	Units	Delivery Charge	Supply Charge	Total $
Atlantic City Electric	April	4/7/2008	5/6/2008	0096 2129 9990	Electric	29	49.6	kw	56.77	19600	kwh	$ 864.43	$ 1,779.64	$ 2,644.07
Atlantic City Electric	May	5/6/2008	6/5/2008	0096 2129 9990	Electric	30	56.8	kw	48.31	19760	kwh	$ 621.60	$ 1,924.67	$ 2,546.27
Atlantic City Electric	June	6/5/2008	7/7/2008	0096 2129 9990	Electric	32	66.4	kw	47.69	24320	kwh	$ 665.63	$ 3,159.72	$ 3,825.35
Atlantic City Electric	July	7/7/2008	8/5/2008	0096 2129 9990	Electric	29	66.4	kw	55.91	25840	kwh	$ 632.47	$ 3,342.05	$ 3,974.52
Atlantic City Electric	August	8/5/2008	9/4/2008	0096 2129 9990	Electric	30	64.0	kw	51.38	23680	kwh	$ 617.94	$ 3,069.78	$ 3,687.72
Atlantic City Electric	September	9/4/2008	10/6/2008	0096 2129 9990	Electric	32	60.0	kw	48.95	22560	kwh	$ 614.18	$ 2,829.81	$ 3,443.99
Atlantic City Electric	October	10/6/2008	11/4/2008	0096 2129 9990	Electric	29	60.0	kw	39.27	16400	kwh	$ 526.27	$ 1,761.25	$ 2,287.52
Atlantic City Electric	November	11/4/2008	12/5/2008	0096 2129 9990	Electric	31	60.0	kw	44.62	19920	kwh	$ 589.57	$ 2,127.69	$ 2,717.26
Atlantic City Electric	December	12/5/2008	1/7/2009	0096 2129 9990	Electric	33	60.0	kw	49.32	23440	kwh	$ 645.72	$ 2,501.41	$ 3,147.13
Atlantic City Electric	January	1/7/2009	2/4/2009	0096 2129 9990	Electric	28	60.0	kw	48.21	19440	kwh	$ 544.25	$ 2,099.18	$ 2,643.43
Atlantic City Electric	February	2/4/2009	3/6/2009	0096 2129 9990	Electric	30	60.0	kw	46.48	20080	kwh	$ 577.06	$ 2,172.24	$ 2,749.30
Atlantic City Electric	March	3/6/2009	4/6/2009	0096 2129 9990	Electric	31	60.0	kw	37.81	16880	kwh	$ 564.83	$ 1,847.23	$ 2,412.06
						Max Peak:	66.4	kw	**Total:**	251,920	kwh		**Total:**	$ 36,078.62
* Electric Tariff (AGS) Annual General Service													**Avg. Cost per kwh:**	$ 0.143
													Avg. Cost per kBtu:	$ 0.042

Figure 1
Electrical Usage Profile

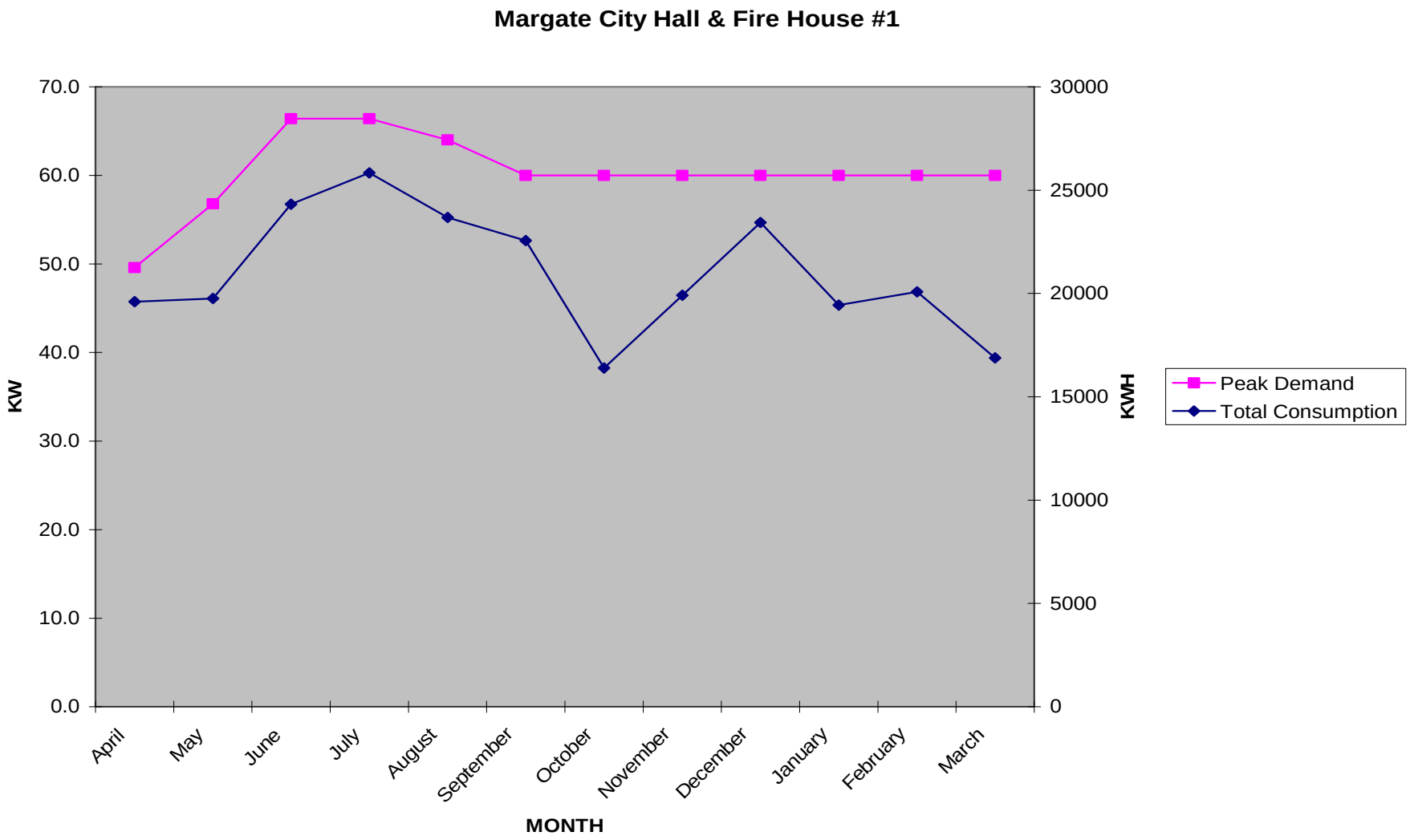


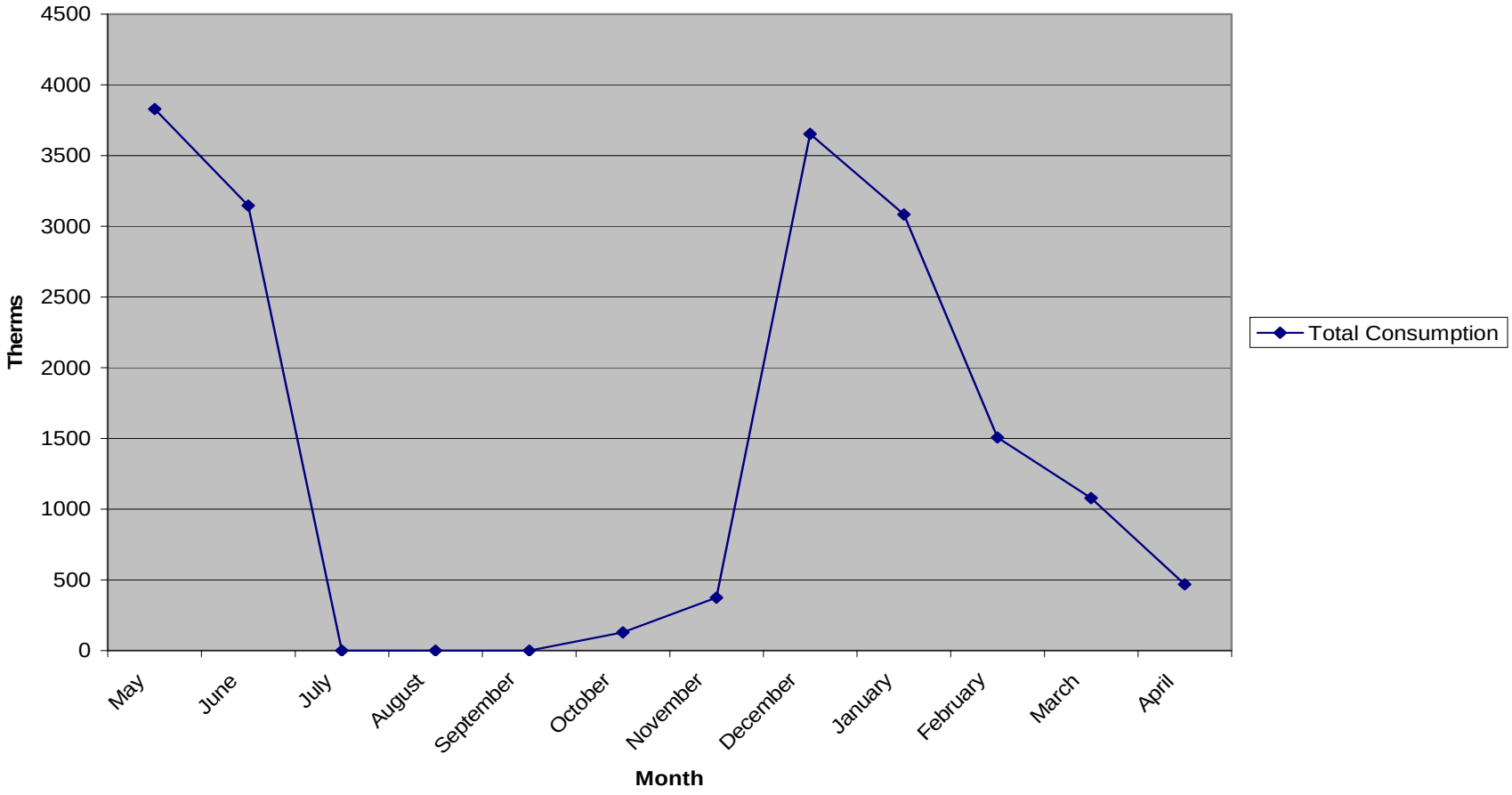
Table 4
Natural Gas Billing Data

City Hall & Firehouse #1

Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Consumption	Units	Total $	
South Jersey Gas	May	5/6/2008	6/5/2008	119 32 0015 03	Gas	30	3829.07	therms	$ 4,001.76	*
South Jersey Gas	June	6/5/2008	7/7/2008	119 32 0015 03	Gas	32	3146.52	therms	$ 3,318.22	*
South Jersey Gas	July	7/7/2008	8/5/2008	119 32 0015 03	Gas	29	0	therms	$ 115.17	
South Jersey Gas	August	8/5/2008	9/4/2008	119 32 0015 03	Gas	30	0	therms	$ 125.85	
South Jersey Gas	September	9/4/2008	10/6/2008	119 32 0015 03	Gas	32	0	therms	$ 117.37	
South Jersey Gas	October	10/6/2008	11/4/2008	119 32 0015 03	Gas	29	129.77	therms	$ 175.50	*
South Jersey Gas	November	11/4/2008	12/4/2008	119 32 0015 03	Gas	30	374.15	therms	$ 440.54	*
South Jersey Gas	December	12/4/2008	1/4/2009	119 32 0015 03	Gas	31	3653.97	therms	$ 4,329.40	
South Jersey Gas	January	1/4/2009	2/4/2009	119 32 0015 03	Gas	31	3083.16	therms	$ 3,486.53	
South Jersey Gas	February	2/4/2009	3/6/2009	119 32 0015 03	Gas	30	1506.34	therms	$ 2,119.25	
South Jersey Gas	March	3/6/2009	4/6/2009	119 32 0015 03	Gas	31	1078.36	therms	$ 1,668.83	*
South Jersey Gas	April	4/6/2009	5/6/2009	119 32 0015 03	Gas	30	469.5	therms	$ 810.85	*
						12 Month Total:	17270.84	therms	$ 20,709.27	
* Rate (GSG) General Service Gas		* Oct-Estimated	* Therms - Estimated			**Average Cost per therm:**	$ 1.199			

Average Cost per KBtu:	$0.012

Figure 2
Natural Gas Usage Profile



B. Energy Use Intensity (EUI)

The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. Their website allows the user to determine how well the client's building Energy Use Intensity compares with similar facilities throughout the U.S. and in your specific region or state.

Energy Use Intensity (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (electricity, gas, 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. The EUI for this facility is calculated as follows:

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

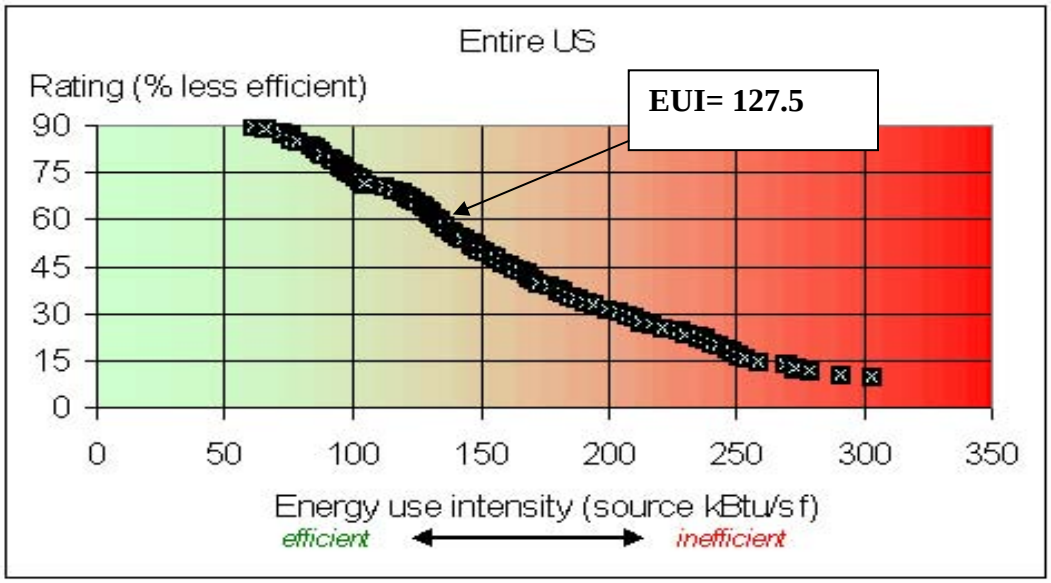
Electric = ((251,920 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu / 1 kBtu)
= 860,054.88 kBtu

Gas = ((17,270.84 therms) * (100,000 Btu/h / 1 Therm)) / (1000 Btu / 1 kBtu) = 1,727,084 kBtu

$$\text{Building EUI} = \frac{\text{(860,054.88 kBtu + 1,727,084 kBtu)}}{\text{20,288 SF}} = \frac{\text{2,587,138 kBtu}}{\text{20,288 SF}} = 127.5 \text{ kBtu/SF}$$

City Hall & Firehouse #1 EUI = 127.5 kBtu/SF

Figure 3
Energy Use Intensity Distributions – Offices



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 environment.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the municipality in order to allow access to monitor 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

User Name:	margatecity
Password:	lgeaceg09008

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 5
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
City Hall & Fire House #1	N/A	N/A

* N/A Due to building category, see below.

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "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 Star Performance Rating cannot be calculated if more then 10% of a building is classified as "Other", or if the building is an office with less than 5,000 square feet of floor space.

The City Hall is 14,288 square feet of floor space and the Firehouse #1 is 6,000 square feet so an Energy Star Performance Rating could not be calculated for the combined buildings due to the fact that the Firehouse is more than 10% of the the total floor space, and they are serviced by one main utility meter for each energy source, electricity and natural gas. Despite this, the Portfolio Manager also calculates the building Energy Use Intensity (EUI).

The EUI is also an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the municipality can strive to meet. CEG recommends that the City of Margate keep their Portfolio Manager account up to date to monitor the performance of the building.

The EUI calculated in the previous section and in the Energy Star Portfolio Manager is not an accurate indicator of the energy performance of the City Hall & Firehouse #1 due to the combined utility metering.

The EUI distribution, Figure 3, is specific for Office Buildings. The City Hall & Firehouse #1 facility combined has an EUI of 127.5 rating. The lower the EUI the less energy the facility uses per square foot. A low EUI indicates a more efficient building. There maybe some opportunity for improvement making the facility more energy efficient and saving more on the utility costs.

CEG would also recommend installing in house sub-meters for electricity and natural gas for the Firehouse #1 in order to provide accurate energy usage for each building independently.

V. FACILITY DESCRIPTION

The Margate Municipal Building is approximately 1,504 square feet, 2-story slab on grade with masonry construction and 4" face brick. Windows are clear, double-pane, insulating type, 1970's vintage. Walls and ceilings are insulated with 6" fiber glass batt insulation. The building house's Administrative Offices of Public Works, Clerk, Tax Assessor, Court Offices, Mayor & Commissioners Offices & Conference room, Land Use Administator, System Administrator, and Court Room. The Fire House portion of the facility houses fire engine bays on the 1st floor, firemen's quarters, kitchen and offices on the 2nd floor.

Heating & Cooling System

The primary Heating and Cooling system for this facility is a Ground Water Heat Pump system installed in the year 2000. This system uses well water as the heat sink to reject or absorb heat. The system consists of two open wells, supply and return, located in the parking lot with submersible well pumps. The ground water is pumped to two plate and frame heat exchangers located in the boiler room. A house water loop, connected to the other side of the heat exchangers, pumps water in a closed loop to unitary water source heat pump units located throughout the building. The unitary equipment consists of both console and horizontal ducted type units.

In addition, a hot water boiler is used to generate hot water for baseboard heat and also to boost the house loop water temperature if necessary. The boiler is a Wiel McLain BL784-W model with a ¼ hp Unipower gas burner, 750 Mbh input. The boiler is vintage, estimated age is at least 25 years. Thermostatically controlled zone valves are used to control baseboard heat.

The Court Room is heated with hydronic baseboard heat and cooled by a 10 ton split system. The split system consists of an air handler located in the attic coupled with an outdoor condensing unit. The system is over 30 years old but is still functioning adequately. A progammable thermostat controls these systems.

The Fire House garage bays are heated with five (5) hydronic unit heaters. The 2nd floor offices and living quarters are heated and cooled with a 5 ton heat pump connected to the house water loop.

Domestic Hot Water

Domestic hot water for the facility is located in the boiler room, an AO Smith electric, model ECT80200, 5 years old.

Lighting System

Most office areas are lit using 4-foot fixtures containing T8 lamps and electronic ballasts. Other offices are lit using 2-foot fixtures containing T8 lamps and electronic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

The court room is lit primarily with down lights containing incandescent par lamps, and Xenon lighting in the two perimeter coves. Standard switching is utilized and there are no other types of lighting controls present.

Most public spaces are lit using wall sconces and down lights containing incandescent and compact fluorescent lamps. Standard switching is utilized and there are no other types of lighting controls present.

Other public spaces like the bathrooms are lit using 1-foot fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Spaces like the boiler room, storage rooms and closets are lit using surface fixtures containing incandescent lamps. Standard switching is utilized and there are no other types of lighting controls present.

The attic space is lit using 4-foot fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Remaining public spaces like the vestibule, lobbies adjacent to offices areas and corridors are lit using incandescent and compact fluorescent down lights. Standard switching is utilized and there are no other types of lighting controls present.

Second floor mayor's and commissioner's offices, along with secretarial area are lit using 4-foot fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

The second floor conference room is lit with a combination of 2-foot fixtures containing T8 lamps and electronic ballasts and down lights containing incandescent fixtures. Standard switching is utilized and there are no other types of lighting controls present.

The fire chief's and captain's offices are lit using 4-foot fixtures containing T8 lamps and electronic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

The dorm area and kitchen are lit using 2-foot fixtures containing T8 lamps and electronic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Most of the other firehouse second floor spaces are lit using 4-foot fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Firehouse first floor vehicle bays are lit using 8-foot fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

The exterior lighting is mounted on the building and includes an assortment of wall packs, metal halide, and incandescent fixtures.

Refer to Appendix E for a detailed Investment Grade Lighting Audit.

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 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 manufacturers 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.

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, lack of nameplates, etc.

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

VII. ENERGY CONSERVATION MEASURES (ECM)

ECM #1: Upgrade the Lighting

Description:

Upgrade the Fluorescent Lighting

Improved fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple retrofit of the existing fixture can provide substantial savings. A conventional drop-ceiling lay-in fixture with four, 4-foot lamps has a total wattage of 154 Watts per fixture. By using the improved lamps and ballasts, the total wattage would be reduced to 96 Watts. The light levels would increase by about 15% and the light quality would increase by 35%.

CEG recommends replacement of the existing T8 and T12 lamps and ballasts with the latest technology T8 lamps and high efficiency electronic ballasts. The new energy efficient, T8 lamps will provide adequate lighting and will save 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 the latest high efficiency T8 lamps is approximately 30,000 burn-hours, requiring fewer lamps to replace per year. Based on the operating hours of this portion of the facility, approximately 1500-2200 hours per year, the Owner will be changing approximately 33% less lamps per year.

In addition, a single electronic ballast can operate one, two, three, or four lamps in a fixture. The existing magnetic ballasts can only operate up to two lamps. The electronic ballasts could reduce the amount of ballasts in the facility by half. This can be taken advantage of with "tandem wiring" of ballasts. Instead of using one electronic ballast for every one fixture it is sometimes feasible to use one electronic ballast for every two or more fixtures. The electrician wires a single ballast to operate the lamps in adjacent light fixtures which further reduces the amount of ballasts needed.

Fluorescent Lighting 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.

Maintenance Savings are calculated as follows:

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

Maintenance Savings = (182 x 33% *reduction* x $2.00) + ($20 x 60) = $1,320

Install Compact Fluorescent Lighting

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 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 25-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 existing fixtures, or hardwired into existing fixtures.

Compact Fluorescent Lighting 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.

Maintenance Savings are calculated as follows:

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

Maintenance Savings = (58 x 75% *reduction* x $5) + ($15 x 43) = $645

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$10,965**
NJ Smart Start Equipment Incentive ($):	**($760)**
Net Installation Cost ($):	**$10,205**
Maintenance Savings ($ / yr):	**$1,965**
Energy Savings ($ / yr):	**$2,800**
Net Savings ($ / yr):	**$4,765**
Simple Payback (yrs):	**2.14**
Simple Return On Investment (%):	**46.7 %**
Simple Lifetime ROI (%):	**10.67 %**
Estimated ECM Lifetime (yr):	**25**
Simple Lifetime Savings ($):	**$119,125**

- ECM#1 Calculations DO NOT include lighting control changes implemented in ECM#2.
- If ECM#1 and #2 are implemented together the savings will be relatively lower than shown above.

ECM #2: Install Lighting Controls

Description:

Install Lighting Controls to Reduce the Lighting Use

In some areas the lighting is left on unnecessarily. There has been a belief 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 determined that the best option is to turn the lights off whenever possible. Although this practice reduces the lamp life, the energy savings far outweigh the lamp replacement costs.

Lighting controls are available in many forms. Lighting controls can be as simplistic as an additional switch. Time-clocks are often used which allows the user to set an on/off schedule. Time-clocks range from a dial clock with on/off indicators to a small box the size of a thermostat with user programs for on/off schedule in a digital format. 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 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 the Office and Storage Building office spaces, conference room, document storage room, time-clock area and entrance area. Occupancy sensors are recommended in the Water Treatment Building treatment room and garage area, and in the Water Meter Repair Shop in the garage, storage area and shop area.

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large office areas, 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 annual kilowatt hours (kWh) savings for the areas where the proposed occupancy sensors will be located:

Savings = *Total Kilowatts* x *Annual Average Burn Hours*

= 2714 kWh/yr. x 10% x $0.143/kWh

Annual Savings = $38 / yr.

Installation cost per dual-technology sensor is $75/unit.

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 36.

Total cost to install sensors is $55 x 36 units = $1,980.

Total ECM Lifetime Energy Savings = 15 Years (Est.) x $38 / yr. = $570

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$2,700**
NJ Smart Start Equipment Incentive ($):	**($720)**
Net Installation Cost ($):	**$1,980**
Maintenance Savings ($ / yr):	**$0**
Energy Savings ($ / yr):	**$38**
Net Savings ($ / yr):	**$38**
Simple Payback (yrs):	**52.1**
Simple Return On Investment (%):	**1.9 %**
Simple Lifetime ROI (%):	**74.2 %**
Estimated ECM Lifetime (yr):	**15**
Simple Lifetime Savings ($):	**$570**

ECM #3: Install New Windows

Description:

The facility has 1970's era thermal pane replacement windows which allow substantial heat losses and gains resulting in cooler interior surfaces during the heating season and warmer interior surfaces during the cooling season. In addition, these windows are a source of cold air leakage into the building.

High-performance windows can provide many benefits including:

- Improved comfort by reducing radiant heat exchange
- Improved indoor air quality by reducing air leakage that can bring dirt, dust, and other impurities into the building
- Lower utility bills since these windows are better insulated and more air-tight
- Fewer condensation problems since these windows stay warmer in the heating season resulting in drier windows

This energy conservation measure would replace all of the existing windows with double-pane, low-e insulating windows.

Energy savings calculations:

Heating Degree Days = 5,169°F – day/yr.

Cooling Degree Days = 3,198°F – day/yr.

Total window area to be retrofitted = 804 SF
U exist. = 1.13 Btu/hr – ft^2 - °F
U new = 0.55 Btu/hr – ft^2 - °F

Total window crack length=904 LF
Leakage rate at 20 mph wind = 1 cfm/LF crack
Leakage Heating Load (HL)= 1.1* (904*1) * (60 degree delta T) = 59.7 MBH

Annual Energy Savings (Heating) =

= (24 hrs * Window Areas * (U exist - U new) * HD Days) +
((HL* HDD *24) / (60^{o}f * efficiency * 1 Btu/Btu))

= (24 * 804* (1.13-0.55) * 5,169) + ((59.7*5,169*24)/60) = 181,930 MBH/Year

Energy Savings = 1,819.3. Therms x $1.199/Therm = $2,181/year

Annual Energy Savings (Cooling) =

= 24 hrs * Window Areas * (U exist - U new) * CD Days

= 24 * 804 * (1.13-0.55) * 3,198 = 10,149 MBH/Year = 10,484 kWh/year

Energy Savings = 10,484 kWh/year x $0.143 = $1,499/year

Upgraded Window Cost = $44,000

Total Annual Savings = $2,181 + $1,499 = $3,680/Year

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$44,000**
NJ Smart Start Equipment Incentive ($):	**($0)**
Net Installation Cost ($):	**$44,000**
Maintenance Savings ($ / yr):	**$0**
Energy Savings ($ / yr):	**$3,680**
Net Savings ($ / yr):	**$3,680**
Simple Payback (yrs):	**11.9**
Simple Return On Investment (%):	**8.4 %**
Simple Lifetime ROI (%):	**1.5 %**
Estimated ECM Lifetime (yr):	**30**
Simple Lifetime Savings ($):	**$66,400**

ECM #4: Replace Heating Hot Water Boiler

Description:

The facility heating boiler is a 750 MBH input hot water boiler which presently is about 78% efficient. As an alternative energy conservation measure, the Concord team recommends that this boiler be replaced with two(2) Aerco Modulex MLX-303 high-efficiency boiler rated at 303 MBH and 88% efficient.

Energy Use Calculations:

The boiler is the primary natural gas user:
Annual Natural Gas Cost = $20,709 (Based on gas billing data)
Annual Natural Gas Cost for Heat = $19,673 (based on 5% for cooking, etc. per summer use)
Average Cost of Natural Gas = $1.199 / Therm

Energy Savings Calculations:

Energy Savings = Old Boiler Energy Cost x ((New Boiler Efficiency – Old Boiler) / New Boiler Efficiency))
Energy Savings = $19,673 x (0.88-0.78) = $1,967 / yr.

The SmartStart Buildings® incentive is $1.75 per MBH which equates to $1,060.

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$25,500**
NJ Smart Start Equipment Incentive ($):	**($1,060)**
Net Installation Cost ($):	**$24,440**
Maintenance Savings ($ / yr):	**$0**
Energy Savings ($ / yr):	**$1,967**
Net Savings ($ / yr):	**$1,967**
Simple Payback (yrs):	**12.4**
Simple Return On Investment (%):	**8%**

Simple Lifetime ROI (%):	**1.01%**
Estimated ECM Lifetime (yr):	**25**
Simple Lifetime Savings ($):	**$24,735**

ECM #5 Domestic HWH Replacement

Description:

This energy conservation measure will replace the existing electric, 4,500 Watt, 40-gallon capacity domestic hot water heater with a gas-fired, tankless water heater. Tankless water heaters heat water directly without the use of a storage tank. Therefore, they avoid the standby heat losses associated with storage water heaters. In a gas-fired tankless water heater, a gas burner heats the water and provides a constant supply of hot water. Therefore, you do not need to wait for the storage tank to fill up with enough hot water as is typical with storage-type hot water heaters.

An Aqua Star GWH-425HN Tankless HWH, 82% efficiency, 4.25 gpm @ 45º rise, 117,000 MBH input, was used for the basis of design for this ECM.

The following calculations show the potential energy savings from this ECM.

Energy Savings Calculations:

Existing Electric DHW Heater

Rated Capacity = 4,500 Watts Energy Factor (EF) = 0.92 30 gallons storage
Average cost of electricity = 16.4¢/kWh
Electric DHW Heater Operating Hrs/Yr. = 1,040 Hrs.
Annual Electric Usage = (1,040 Hrs x 4,500 Watts) ÷ 1,000 Watts/Kw = 4,680 kWh
Annual Energy Cost = 16.4¢/kWh x 4,680 kWh = $767

Proposed High-Efficiency Gas-Fired Tankless Water Heater

Rated Capacity = 4.25 gallons per minute Energy Factor (EF) = 0.80
Average cost of natural gas = $1.709 / Therm
Annual Gas Usage = 143 Therms
Annual Energy Cost = 143 Therms x $ 1.709 /Therm = $245

Annual ECM Savings = $767 - $245 = $482

NJ Smart Start® Program Incentives:

From Appendix C, a natural gas-fired domestic hot water heater less than 50 gallons warrants the following incentive:

$$\text{Smart Start®}\ Incentive = (\$50\ per\ DHW\ Heater) = \$50$$

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$2,900**
NJ Smart Start Equipment Incentive ($):	**($50)**
Net Installation Cost ($):	**$2,850**
Maintenance Savings ($ / yr):	**$0**
Energy Savings ($ / yr):	**$482**
Net Savings ($ / yr):	**$482**
Simple Payback (yrs):	**5.9**
Simple Return On Investment (%):	**17 %**
Simple Lifetime ROI (%):	**1.5 %**
Estimated ECM Lifetime (yr):	**15**
Simple Lifetime Savings ($):	**$4,380**

ECM #6: Court Room Split System Upgrade

Description:

Cooling for the Court Room is provided by a split system air conditioner. The condensing unit is inefficient with an estimated energy efficiency ratio (EER) of 9. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 12.0 SEER for units of this type. The existing units are 1975 vintage and are at the end of their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for packaged air-conditioning units is 15 years.

This ECM would replace the exterior condensing unit with a more efficient unit. The existing equipment will be replaced with equipment having heating and cooling capacities equal to the existing units. The average EER of the new cooling equipment will be 11.2 EER. The energy efficiency of the new equipment is based on a Lennox T-class TSA 10 ton, with R-410A refrigerant.

Cooling Energy Savings Calculations:

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

Existing Air Conditioning Units
Rated Capacity = 10 Tons
Unit Efficiency = 9 EER

Proposed High-Efficiency Air Conditioning Unit
Rated Capacity = 10 Tons
New Unit Efficiency = 11.2 EER
Cooling Season Hrs. of Operation = 432 hrs/yr. (12 hrs/day, 3 days/wk, 12 weeks)
Average Cost of Electricity - $0.143/kWh

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

$$EnergySavings = \frac{[10 CoolingTons \times 12{,}000\ Btu/ton \div 1000 W/kW]}{[(11.2 EER_{NEW} - 9 EER_{OLD})]} \times 0.80 \times 432$$

$$= 18{,}850\ kWh/yr./Unit$$

Cost Savings = 18,850 kWh/Yr/ x $0.143/kWh = $2,695 / Yr.

Simple Payback (yrs.) = (Cost – Incentive) / (Annual Energy Savings + Annual Maintenance Savings)

Simple Lifetime Return on Investment (%) = (((Annual Energy Savings + Annual Maintenance Savings) x (ECM Lifetime)) – (Cost – Incentive)) / (Cost – Incentive)

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$31,250**
NJ Smart Start Equipment Incentive ($):	**($750)**
Net Installation Cost ($):	**$30,500**
Maintenance Savings ($ / yr):	**$0**
Energy Savings ($ / yr):	**$2,695**
Net Savings ($ / yr):	**$2,695**
Simple Payback (yrs):	**11.3**
Simple Return On Investment (%):	**8.8 %**
Simple Lifetime ROI (%):	**0.32 %**
Estimated ECM Lifetime (yr):	**15**
Simple Lifetime Savings ($):	**$9,925**

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES (ECM #7)

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 Margate City Hall & Firehouse #1, to evaluate if there is any potential for solar or 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). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park a vehicle under the array, this way no parking lot area is lost. 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. Due to the limited roof area on the City Hall building facing south, and the degree of roof pitch, it is our opinion that a roof mounted PV Solar Panel system is not plausible for the City Hall. However, CEG has reviewed the existing roof area of the Firehouse #1 and determined there is a potential for a roof mounted photovoltaic system. A roof area of 1,200 S.F. can be utilized for a PV system on the Firehouse #1 roof. A depiction of the area utilized is shown in Appendix F following the financial calculations. Using this square footage it was determined that a system size of 15.64 kilowatts could be installed. The required square footage for a system of this size is approximately 1,000 S.F. and has an estimated kilowatt hour production of 24,407 kWh annually, reducing the overall electric consumption by approximately 9.7%. 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	11.7 Years	8.6 %
Direct Purchase	11.7 Years	7.5 %

The above information is concluded as ECM #7 showing installation costs, energy savings and other pertinent summarized information in Section I of this report.

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 Margate City and has determined it is not a viable option.

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

Electricity:

The Electric Usage Profile demonstrates a flat (base-load) consumption profile throughout the year. There is some expected increase in electric consumption in the summer (June-August) as is associated with air-conditioner load. The load is steady throughout the year as this does contain a living area and this is consistent with this type of building. Flat (base-load) shaping is important because it will yield more competitive pricing when shopping for alternative energy supply.

Natural Gas:

The Natural Gas Usage Profile demonstrates a fairly typical heating load profile, with increasing consumption in the winter months (November – February) and a dramatic drop in consumption in the summer months (July – October). The gas profile does demonstrate a sharp peak in demand May through June with a sharp drop-off in July. Natural gas prices will be higher in the winter period as they are related to heating demand and the increase in use during this time. The flatter (base-load,) the consumption profile the more competitive the pricing when shopping for alternative suppliers for energy.

Tariff Analysis:

Electricity:

This facility receives electrical Delivery Service from Atlantic City Electric on an AGS Secondary (Annual General Service) utility rate. This rate is available at any point of Company's system where facilities of adequate character and capacity exist for the entire electric service requirements of any customer contracting for annual service delivered at one point and metered at or compensated to the voltage of delivery. This delivery service includes the following charges: Delivery Service Charges, Distribution Demand Charges, Reactive Demand Charges, Distribution Rates, Non-Utility Generation Charges, Societal Benefits Charges, Regulatory Assets Recovery Charges, Transition Bond Charges, Market Transition Charge Tax, Transmission Demand Charge, Regional Greenhouse Gas Initiative Recovery Charge, and Infrastructure Investment Surcharge.

This facility receives electrical supply service through Atlantic City Electric on a BGS (Basic Generation Service) rate. Since the passing and implementation of the Electricity Discount and Energy Competition Act (EDECA) in 1999, there have been many changes brought about by the deregulation of the electric industry in New Jersey. Since that time, customers in New Jersey have been able to choose their electrical supplier. Customers who do not choose to switch to a Third Party Supplier (TPS), or who leave a TPS to return to their Electric Delivery Company are supplied with Basic Generation Service. Beside the commodity itself, BGS also has the following charges: System Control Charge, CIEP Standby Fee, Transmission Enhancement Charge and Basic Generation Service Charge.

Natural Gas:

This facility is serviced by South Jersey Gas Company (SJG) on its Firm Delivery rate (GSG) General Service Gas from the utility and BGSS (Basic Generation Supply Service) when not being served by a Third Party Supplier (TPS). This Delivery Rate has the following charges: Customer Charge, Delivery Charge, BSC Volume Charge and Commodity Charge under this rate structure. The BGSS Supply rates are designed to recover SJG's cost of gas applicable to customers who purchase gas from SJG. The company earns no profit from BGSS. BGSS consists of (2) two pricing mechanisms: Residential and Commercial customers that use less than 5,000 therms annually and Commercial and Industrial customers that consume at least 5,000 therms annually.

Imbalances occur when Third Party Suppliers (TPS) are used to supply natural gas and full-delivery is not made, or when a new supplier is contracted and the customer returns to the utility. Note: It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used otherwise, imbalances can occur, jeopardizing economics and scheduling. If the supplier does not deliver they can be placed on a very costly rate. A customer can automatically be put on an alternative supply rate by the utility.

A "firm account" refers to the type of interstate pipeline service that the utility has subscribed for and delivered on behalf of the customer. Much like the telecom industry, the pipeline space (capacity) has been deregulated. The pipeline capacity is broken down into reliability of service. "Firm service" is the highest level of reliability and is the last, in pecking order, for interruption.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the scope. CEG's observations are seen in both the electric and natural gas costs. The average "price to compare" per kWh (kilowatt hour) for all buildings is $.1271 / kWh (kWh is the common unit of electric measure). The average "price to compare" per decatherm for natural gas is $.09975 /dth (dth is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The city could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (April 2008 – March 2009) and current electric rates, Margate City can see an improvement of over 20 % in its electric costs. (Note: Savings were calculated using an Average Annual Consumption of 637,617 kWh and a

fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends that the city seek an energy advisor to maximize energy savings and to apply a managed approach to procuring energy.

CEG's secondary recommendation coincides with the city's natural gas costs. Based on the current market, (which is very competitive), the city could see a savings of over 15% in its natural gas expenditures. Again CEG recommends the use of any energy advisor to review alternative energy sourcing strategies.

CEG recommends the city schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the city will learn more about the competitive supply process. The town 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 given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, they should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

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

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 periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

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

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

F. Recalibrate existing sensors serving the office spaces

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

H. Clean all light fixtures to maximize light output.

I. Confirm that outside air economizers on the rooftop units that serve the Office Areas are functioning properly to take advantage of free cooling.

APPENDIX

Electric Cost Summary

Margate City Hall &
Firehouse #1
ATLANTIC CITY
ELECTRIC
Acct.No: 0096 2129 9990

Appendix A

Month	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Total
Last Meter Read Date	4/7/2008	5/6/2008	6/5/2008	7/7/2008	8/5/2008	9/4/2008	10/6/2008	11/4/2008	12/5/2008	1/7/2009	2/4/2009	3/6/2009	4/7/2008
Current Meter Read Date	5/6/2008	6/5/2008	7/7/2008	8/5/2008	9/4/2008	10/6/2008	11/4/2008	12/5/2008	1/7/2009	2/4/2009	3/6/2009	4/6/2009	4/6/2009
Billing Days	29	30	32	29	30	32	29	31	33	28	30	31	364
KWH	19,600	19,760	24,320	25,840	23,680	22,560	16,400	19,920	23,440	19,440	20,080	16,880	251,920
KW	50	57	66	66	64	60	60	60	60	60	60	60	66
Monthly Load Factor	57%	48%	48%	56%	51%	49%	39%	45%	49%	48%	46%	38%	48%
Electric Delivery, $	$864	$622	$666	$632	$618	$614	$526	$590	$646	$544	$577	$565	$7,464
Delivery $/kwh	$0.044	$0.031	$0.027	$0.024	$0.026	$0.027	$0.032	$0.030	$0.028	$0.028	$0.029	$0.033	$0.030
Electric Supply, $	$1,780	$1,925	$3,160	$3,342	$3,070	$2,830	$1,761	$2,128	$2,501	$2,099	$2,172	$1,847	$28,615
Supply $/kwh	$0.091	$0.097	$0.130	$0.129	$0.130	$0.125	$0.107	$0.107	$0.107	$0.108	$0.108	$0.109	$0.112
Total Cost, $	$2,644	$2,546	$3,825	$3,975	$3,688	$3,444	$2,288	$2,717	$3,147	$2,643	$2,749	$2,412	$36,079
$/KWH	$0.1349	$0.1289	$0.1573	$0.1538	$0.1557	$0.1527	$0.1395	$0.1364	$0.1343	$0.1360	$0.1369	$0.1429	$0.1432

Natural Gas Cost Summary

Margate City Hall &
Firehouse #1
SOUTH JERSEY GAS
Acct. No. 119 32 0015 03

Month	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	Total
Billing Days	30	32	29	30	32	29	30	31	31	30	31	30	365
Last Meter Read Date	5/6/2008	6/5/2008	7/7/2008	8/5/2008	9/4/2008	10/6/2008	11/4/2008	12/4/2008	1/4/2009	2/4/2009	3/6/2009	4/6/2009	5/6/2008
Current Meter Read Date	6/5/2008	7/7/2008	8/5/2008	9/4/2008	10/6/2008	11/4/2008	12/4/2008	1/4/2009	2/4/2009	3/6/2009	4/6/2009	5/6/2009	5/6/2009
Gas Used per 100 cu ft	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BTU Factor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Therms (Burner Tip)	3,829	3,147	0	0	0	130	374	3,654	3,083	1,506	1,078	470	17,271
Total Distribution Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cost per Therm	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Commodity Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cost per Therm	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Cost	$4,002	$3,318	$115	$126	$117	$176	$441	$4,329	$3,487	$2,119	$1,669	$811	$20,709
Cost per Therm	$1.05	$1.05	#DIV/0!	#DIV/0!	#DIV/0!	$1.35	$1.18	$1.18	$1.13	$1.41	$1.55	$1.73	$1.20

Margate City Hall

CONSTRUCTION COST AND REBATES

ECM # 1 - UPGRADE THE LIGHTING	Qty	Unit Cost $	Material $	Labor $	Total $
New T-8 & CFL Lamps & Ballasts	1	$3,331	$3,331	$4,830	$8,161
Total Cost					$8,161
Utility Incentive					-$760
Total Net Cost					**$7,401**
ECM # 2 - INSTALL LIGHTING CONTROLS	Qty	Unit Cost $	Material $	Labor $	Total $
Occupancy Sensors	36	$75	$2,700	$0	$2,700
Total Cost					$2,700
Utility Incentive					-$720
Total Net Cost					**$1,980**
ECM # 3 - DOUBLE PANE INSULATING WINDOWS	Qty	Unit Cost $	Material $	Labor $	Total $
New Windows - 3'X6'	40	$500	$20,000	$20,000	$40,000
New Windows - 6"X7'	2	$1,000	$2,000	$2,000	$4,000
Total Cost					$44,000
Utility Incentive					$0
Total Net Cost					**$44,000**
ECM#4 HIGH EFFICIENCY BOILER	Qty	Unit Cost $	Material $	Labor $	Total $
303 MBH Input Aerco Boiler (88% Eff.)	2	$5,000	$10,000	$10,000	$20,000
Demo Old Boiler	1	$500	$0	$500	$500
Flue Modifications	2	$500	$1,000	$4,000	$5,000
Total					**$25,500**
Utility Incentive					$1,060
Total Net Cost					**$24,440**
ECM #5 DOMESTIC HWH REPLACEMENT	Qty	Unit Cost $	Material $	Labor $	Total $
Aqua Star GWH-425HN Instant Gas	1	$750	$750	$1,500	$2,250
Copper Piping, Insulated (per L.F.)	20	$12	$240	$360	$600
Demo Electric HWH	1	$50	$0	$50	$50
Utility Incentive					$50
Total					**$2,850**
ECM #6 Court room Split System Upgrade	Qty	Unit Cost $	Material $	Labor $	Total $
Lennox t-Class TSA 10 Ton Condensing Unit	1	$6,250	$6,250	$12,500	$18,750
Matching Evaporator Coil & Exp. Valve, Rerig Piping	1	$4,000	$4,000	$8,000	$12,000
Demo Existing	1	$500	$0	$500	$500
Total					**$31,250**
Utility Incentive					$750
Total Net Cost					**$30,500**

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

Margate City Hall

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
CH-102	WEIL McLAIN	BL-784-W	GAS-FIRED BOILER	750 MBH INPUT	78.0%	HYDRONIC BASEBOARD & GEATHERMAL LOOP	BOILER ROOM		20 PLUS RS OLD. WITH VENT DAMPER?
P-1 & 2	BELL & GOSSET	-	IN-LINE CIRCULATOR	1-1/2 HP	-	INDOOR GEOTHERMAL LOOP	BOILER ROOM		1 IS STANDBY PUMP
P-3 & 4	-	-	SUBMERSIBLE	-	-	UNDERGROUNG GEOTHERMAL WATER	UNDERGROUNG IN PARKING LOT		1 IS STANDBY PUMP
P-4 & 5	BELL & GOSSET	-	IN-LINE CIRCULATOR	-	-	BOILER	BOILER ROOM		1 IS STANDBY PUMP
HX-1 & 2	-	-	PLATE & FRAME HEAT EXCHANGER	250 MBH	-	OUTDOOR / INDOOR GEOTHERMAL LOOP	BOILER ROOM		
HX-3	-	-	PLATE & FRAME HEAT EXCHANGER	175 MBH	-	BOILER / INDOOR GEOTHERMAL LOOP	BOILER ROOM		
HOT WATER BASEBOARD	-	-	FINNED-TUBE RATIATION	-	-	1ST FLOOR PERIMETER	1ST FLOOR PERIMETER		
CH-101	AO SMITH	ECT80200	HWH, ELECTRIC WITH STORAGE	240V, 4500 WATT	100%		BOILER ROOM		6 YEARS OLD
CH-	YORK	E8V-122	AIR HANDLING UNIT	10 TONS	-	COURT ROOM	ATTIC		1975 VINTAGE
CH-	YORK	-	CONDENSING UNIT	10 TONS	-	COURT ROOM	OUTDOOR		1975 VINTAGE
CH-400	RETRO AIRE		GROUND SOURCE HEAT PUMP			1ST FLOOR BOTTOM STEPS	1ST FLOOR BOTTOM STEPS		10 PLUS YRS OLD
CH-400	RETRO AIRE		GROUND SOURCE HEAT PUMP			1ST FLOOR NEAR POSTAGE MACHINE	1ST FLOOR NEAR POSTAGE MACHINE		10 PLUS YRS OLD
CH-400	RETRO AIRE		GROUND SOURCE HEAT PUMP			2ND FLOOR COMFERENCE ROOM	2ND FLOOR COMFERENCE ROOM		10 PLUS YRS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			1ST FLOOR CITY CLERK	1ST FLOOR CITY CLERK		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			1ST FLOOR COURT OFFICE	1ST FLOOR COURT OFFICE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			1ST FLOOR JUDGE OFFICE	1ST FLOOR JUDGE OFFICE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR COMMISSIONER OFFICE	2ND FLOOR COMMISSIONER OFFICE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR CONFERENCE ROOM	2ND FLOOR CONFERENCE ROOM		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR COURT OFFICE	2ND FLOOR COURT OFFICE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR LAND USE	2ND FLOOR LAND USE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR MAYOR OFFICE	2ND FLOOR MAYOR OFFICE		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR MAYOR SECRETARY	2ND FLOOR MAYOR SECRETARY		3-5 YEARS OLD
CH-200	FLORIDA HEAT PUMP		GROUND SOURCE HEAT PUMP			2ND FLOOR SYSTEM ADMIN.	2ND FLOOR SYSTEM ADMIN.		3-5 YEARS OLD
CH-300	AAF		GROUND SOURCE HEAT PUMP			1ST FLOOR RECEPTION AREA	1ST FLOOR RECEPTION AREA		10 PLUS YRS OLD
CH-300	AAF		GROUND SOURCE HEAT PUMP			1ST FLOOR REV/FIN OFFICE	1ST FLOOR REV/FIN OFFICE		10 PLUS YRS OLD
CH-300	AAF		GROUND SOURCE HEAT PUMP			1ST FLOOR W/S OFFICE	1ST FLOOR W/S OFFICE		10 PLUS YRS OLD
CH-300	AAF ENERCON	SSAWC 09280	GROUND SOURCE HEAT PUMP			2ND FLOOR HALLWAY	2ND FLOOR HALLWAY		10 PLUS YRS OLD, NOT WORKING?

Margate Fire House #1

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
CH-400	RETRO AIRE	GSHP	WATER SOURCE HEAT PUMP	5 TONS	-	CAPTAIN'S OFFICE	CAPTAIN'S OFFICE	10	10 PLUS YRS OLD
FH1-1	AMERICAN AIR	UH	HORIZONTAL HYDRONIC UNIT HEATER	-	-	STATION 1	CEILING MOUNTED	10	10 PLUS YRS OLD
FH1-2	AMERICAN AIR	UH	HORIZONTAL HYDRONIC UNIT HEATER	-	-	STATION 1	CEILING MOUNTED	10	10 PLUS YRS OLD
FH1-3	AMERICAN AIR	UH	HORIZONTAL HYDRONIC UNIT HEATER	-	-	STATION 1	CEILING MOUNTED	10	10 PLUS YRS OLD
FH1-4	AMERICAN AIR	UH	HORIZONTAL HYDRONIC UNIT HEATER	-	-	STATION 1	CEILING MOUNTED	10	10 PLUS YRS OLD
FH1-5	STERLIMG	UH	VERTICAL HYDRONIC PROP UNIT HEATER	-	-	STATION 1	CEILING MOUNTED	10	10 PLUS YRS OLD

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Project #: BS09-008
Project Name : City Hall & F.H. #1
Address: 1 S. Washington Ave.
City, State: Margate, NJ.
Building SF: 14,288

kWh Cost: 0.143
Burn Hrs: 8760

	Existing Fixtures							Proposed Fixtures											Fixtures Retrofitted			Unit Installation Cost								
Existing Lighting Fixture Type	Room Name	Lighting Fixture Description	Lamps per Fixture	Voltage	Watts	Qty of Fixtures	Total Watts	New Lighting Fixture Type	Existing/Replace	Description	Lamps per Fixture	Watts	Qty of Fixtures	Total Watts	Wattage Reduction	Average Burn Hours	Ave $/kwh	Energy Savings, kWh	Energy Savings, $	Qty	Material Each	Labor Each	Total Each	Total Materials	Total Labor	Total All	Rebate Estimate	Simple Payback
	First Floor																												
A	Boiler Room	2L-T12-60w 1'x8' Surface Fixture	2	120	160	1	160	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	1	96	64	1000	$0.14	64	$9.15	1	105.76	60	$165.76	$105.76	$60.00	$165.76	$10.00	17.0
B	Boiler Room	1L-60w-A-lamp Surface Fixture	1	120	60	2	120	NB	Relamp	1L-CFL-26w Medium base	1	28	2	56	64	1000	$0.14	64	$9.15	2	4.55	37.5	$42.05	$9.10	$75.00	$84.10	$0.00	9.2
C	Court Room	1L-25w (Incand.) Wall Sconce	1	120	25	4	100	NC	Relamp	1L-CFL-13w Medium base	1	15	4	60	40	2000	$0.14	80	$11.44	4	4.55	37.5	$42.05	$18.20	$150.00	$168.20	$0.00	14.7
D	Court Room	1L-75w Par Downlight	1	120	75	34	2550	ND	Relamp	1L-CFL-26w Medium base	1	28	34	952	1598	2000	$0.14	3,196	$457.03	34	4.55	37.5	$42.05	$154.70	$1,275.00	$1,429.70	$0.00	3.1
E	Court Room	1L-60w Par Downlight	1	120	60	4	240	NE	Relamp	1L-CFL-26w Medium base	1	28	4	112	128	2000	$0.14	256	$36.61	4	4.55	37.5	$42.05	$18.20	$150.00	$168.20	$0.00	4.6
F	Court Room (Cove Lighting)	Xenon Lamps (80' @ 25w/Ft.)	1	120	2000	2	4000	NF	Replace	4ft. Fluorescent strip fixture w/32w-T8 energy saver w/electronic T8 High Efficiency ballast	1	29	20	580	3420	2000	$0.14	6,840	$978.12	20	27.88	60	$87.88	$557.60	$1,200.00	$1,757.60	$200.00	1.6
G	Court Office	3L-T8-32w 2'x4' Troffer	3	120	71	2	142	NG	Existing to Remain	3L-T8-32w 2'x4' Troffer	3	71	2	142	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
G	Court Office	3L-T8-32w 2'x4' Troffer	3	120	71	4	284	NG	Existing to Remain	3L-T8-32w 2'x4' Troffer	3	71	4	284	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
H	Court Office (Ctr Ltg)	1L-35w Par Downlight	1	120	35	2	70	NH	Relamp	1L-CFL-18w Medium base	1	21	2	42	28	2500	$0.14	70	$10.01	2	4.55	37.5	$42.05	$9.10	$75.00	$84.10	$0.00	8.4
I	Court Office (Undercrt Ltg)	1L-T8-17w 18" Undercrt ltg	1	120	31	2	62	NI	Reballast	17w-T8 energy saver w/electronic T8 High Efficiency ballast (only)	1	18	2	36	26	1500	$0.14	39	$5.58	2	17.88	60	$77.88	$35.76	$120.00	$155.76	$20.00	24.3
C	Main Lobby	1L-25w (Incand.) Wall Sconce	1	120	25	2	50	NC	Relamp	1L-CFL-13w Medium base	1	15	2	30	20	2500	$0.14	50	$7.15	2	4.55	37.5	$42.05	$9.10	$75.00	$84.10	$0.00	11.8
K	Main Lobby (Display Case)	1L-20w MR16 (Display)	1	120	20	1	20	NK	Existing to Remain	1L-20w MR16 (Display)	1	20	1	20	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
L	Main Lobby (Task Ltg)	1L-T8-24w U-tube Surface Fixture	1	120	21	3	63	NL	Existing to Remain	1L-T8-24w U-tube Surface Fixture	1	21	3	63	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
M	Main Lobby (Downlights)	1L-14w CPF Downlight	1	120	16	5	80	NM	Existing to Remain	1L-14w CPF Downlight	1	16	5	80	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
N	Main Lobby (Downlights)	1L-42w CPF Downlight	1	120	48	9	432	NN	Existing to Remain	1L-42w CPF Downlight	1	48	9	432	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
M	Vestibule	1L-14w CPF Downlight	1	120	16	2	32	NM	Existing to Remain	1L-14w CPF Downlight	1	16	2	32	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
N	Vestibule	1L-42w CPF Downlight	1	120	48	1	48	NN	Existing to Remain	1L-42w CPF Downlight	1	48	1	48	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
O	Mens Bathroom	2L-T12-40w 1x4 Troffer	2	120	77	1	77	NO	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	2	48	1	48	29	2000	$0.14	58	$8.29	1	22.88	60	$82.88	$22.88	$60.00	$82.88	$10.00	8.8
P	Mens Bathroom	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	1	48	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	1	48	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
O	Womens Bathroom	2L-T12-40w 1x4 Troffer	2	120	77	2	154	NO	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	2	48	2	96	58	2000	$0.14	116	$16.59	2	22.88	60	$82.88	$45.76	$120.00	$165.76	$20.00	8.8
J	Womens Bathroom	1L-32w CPF Surface Fixture	1	120	35	1	35	NJ	Existing to Remain	1L-32w CPF Surface Fixture	1	35	1	35	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
Q	Tax Office Lobby	1L-42w CPF Recessed Fixture (1'x1')	1	120	45	5	225	NQ	Existing to Remain	1L-42w CPF Recessed Fixture (1'x1')	1	45	5	225	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
R	Tax Office Lobby	1L-60w A-lamp Recessed Fixture (1'x1')	1	120	60	1	60	NR	Relamp	1L-CFL-18w Medium base	1	21	1	21	39	2500	$0.14	98	$13.94	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	3.0
P	Tax Office	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	10	480	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	10	480	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
A	Safe Room	2L-T12-60w 1'x8' Surface Fixture	2	120	160	1	160	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	1	96	64	2500	$0.14	160	$22.88	1	105.76	60	$165.76	$105.76	$60.00	$165.76	$10.00	6.8
P	CFO	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	4	192	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	4	192	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	City Clerk/City Sewer Offices	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	14	672	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	14	672	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Top of Stairwell	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	2	96	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	2	96	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
A	Vehicle Bays	2L-T12-60w 1'x8' Surface Fixture	2	120	160	10	1600	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	10	960	640	3000	$0.14	1,920	$274.56	10	105.76	60	$165.76	$1,057.60	$600.00	$1,657.60	$100.00	5.7

		Existing Fixtures						Proposed Fixtures											Fixtures Retrofitted			Unit Installation Cost							
Existing Lighting Fixture Type	Room Name	Lighting Fixture Description	Lamps per Fixture	Voltage	Watts	Qty of Fixtures	Total Watts	New Lighting Fixture Type	Existing/Replace	Description	Lamps per Fixture	Watts	Qty of Fixtures	Total Watts	Wattage Reduction	Average Burn Hours	Ave $/kwh	Energy Savings, kWh	Energy Savings, $	Qty	Material Each	Labor Each	Total Each	Total Materials	Total Labor	Total All	Rebate Estimate	Simple Payback
A	Ladder Bay	2L-T12-60w 1'x8' Surface Fixture	2	120	160	7	1120	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	7	672	448	3000	$0.14	1,344	$192.19	7	105.76	60	$165.76	$740.32	$420.00	$1,160.32	$70.00	5.7
A	Shop	2L-T12-60w 1'x8' Surface Fixture	2	120	160	4	640	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	4	384	256	2000	$0.14	512	$73.22	4	105.76	60	$165.76	$423.04	$240.00	$663.04	$40.00	8.5
W	Shop (Bathroom)	1L-75w-A-lamp Surface Fixture	1	120	75	1	75	NW	Relamp	1L-CFL-32w Medium base	1	35	1	35	40	8760	$0.14	350	$50.11	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	0.8
X	Exterior Lighting	1L-250w MH Flood Light	1	120	250	7	1750	NX	Existing to Remain	1L-250w MH Flood Light	1	250	7	1750	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
W	Exterior Lighting	1L-75w-A-lamp Surface Fixture	1	120	75	2	150	NW	Relamp	1L-CFL-32w Medium base	1	35	2	70	80	3000	$0.14	240	$34.32	2	4.55	37.5	$42.05	$9.10	$75.00	$84.10	$0.00	2.5
Total First Floor						**153**	**15987**						**171**	**8945**	**7042**			**15,457**	**$2,210.34**	**100**				**$3,331**	**$4,830**	**$8,161**	**$480**	**3.5**
Second Floor																												
S	Attic/Storage	2L-T12-40w 1x4 Surface Fixture	2	120	77	7	539	NS	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	2	48	7	336	203	1500	$0.14	305	$43.54	7	22.88	60	$82.88	$160.16	$420.00	$580.16	$70.00	11.7
T	Attic/Storage	2L-T8-32w 1x4 Surface Fixture	2	120	55	1	55	NT	Existing to Remain	2L-T8-32w 1x4 Surface Fixture	2	55	1	55	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	System Administrator	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	3	144	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	3	144	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Court Administrator	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	6	288	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	6	288	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
A	Court Administrator	2L-T12-60w 1'x8' Surface Fixture	2	120	160	2	320	NA	Relamp, Reballast & Retrokit	32w-T8 energy saver w/ (2)electronic T8 High Efficiency ballasts	4	96	2	192	128	2500	$0.14	320	$45.76	2	105.76	60	$165.76	$211.52	$120.00	$331.52	$20.00	6.8
T	Court Administrator	2L-T8-32w 1x4 Surface Fixture	2	120	55	2	110	NT	Existing to Remain	2L-T8-32w 1x4 Surface Fixture	2	55	2	110	0	2500	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
N	2nd Floor Corridor	1L-42w CPF Downlight	1	120	48	9	432	NN	Existing to Remain	1L-42w CPF Downlight	1	48	9	432	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
C	2nd Floor Corridor	1L-25w (Incand.) Wall Sconce	1	120	25	2	50	NC	Relamp	1L-CFL-13w Medium base	1	15	2	30	20	2500	$0.14	50	$7.15	2	4.55	37.5	$42.05	$9.10	$75.00	$84.10	$0.00	11.8
P	Land & Use Room	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	4	192	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	4	192	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Kitchen	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	4	192	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	4	192	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Mens Bathroom	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	1	48	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	1	48	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Womens Bathroom	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	1	48	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	1	48	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
B	Closet	1L-60w-A-lamp Surface Fixture	1	120	60	1	60	NB	Relamp	1L-CFL-26w Medium base	1	28	1	28	32	1000	$0.14	32	$4.58	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	9.2
U	Stairwell (Fire House)	4L-T12-40w 2'x4' Troffer	4	120	154	1	154	NU	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	4	96	1	96	58	2500	$0.14	145	$20.74	1	27.88	60	$87.88	$27.88	$60.00	$87.88	$10.00	3.8
P	Mayor/Commissioner (Secretary area)	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	10	480	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	10	480	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
V	Mayor/Commissioner (Secretary area)	1L-T8-17w 18" Undercrtr ltg	1	120	18	3	54	NV	Existing to Remain	1L-T8-17w 18" Undercrtr ltg	1	18	3	54	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
U	Mayor's Office	4L-T12-40w 2'x4' Troffer	4	120	154	6	924	NU	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	4	96	6	576	348	2500	$0.14	870	$124.41	6	27.88	60	$87.88	$167.28	$360.00	$527.28	$60.00	3.8
U	Commissioners Office	4L-T12-40w 2'x4' Troffer	4	120	154	4	616	NU	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	4	96	4	384	232	2500	$0.14	580	$82.94	4	27.88	60	$87.88	$111.52	$240.00	$351.52	$40.00	3.8
P	Conference Room	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	2	96	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	2	96	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
N	Conference Room	1L-42w CPF Downlight	1	120	48	16	768	NN	Existing to Remain	1L-42w CPF Downlight	1	48	16	768	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Tax Accessors Office	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	18	864	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	18	864	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
B	Corridor Closet	1L-60w-A-lamp Surface Fixture	1	120	60	1	60	NB	Relamp	1L-CFL-26w Medium base	1	28	1	28	32	8760	$0.14	280	$40.09	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	1.0
Y	Dorm	2L-T8-31w U-tube 2'x2' Surface Fixture	2	120	48	6	288	NY	Existing to Remain	2L-T8-31w U-tube 2'x2' Surface Fixture	2	48	6	288	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
P	Dorm (Bathroom)	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	2	96	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	2	96	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
W	Closet	1L-75w-A-lamp Surface Fixture	1	120	75	1	75	NW	Relamp	1L-CFL-32w Medium base	1	35	1	35	40	8760	$0.14	350	$50.11	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	0.8
P	Kitchen	2L-T8-31w U-tube 2'x2'Troffer	2	120	48	7	336	NP	Existing to Remain	2L-T8-31w U-tube 2'x2'Troffer	2	48	7	336	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
Z	Kitchen (undercrtr ltg)	1L-T5-21w Undercrtr Light	1	120	18	1	18	NZ	Existing to Remain	1L-T5-21w Undercrtr Light	1	18	1	18	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
AA	TV Room	1L-T12-40w Fluor. Strip Light Fixture	1	120	40	4	160	NAA	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	1	24	4	96	64	8760	$0.14	561	$80.17	4	20.38	60	$80.38	$81.52	$240.00	$321.52	$40.00	3.5
U	Locker Room	4L-T12-40w 2'x4' Troffer	4	120	154	2	308	NU	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	4	96	2	192	116	2500	$0.14	290	$41.47	2	27.88	60	$87.88	$55.76	$120.00	$175.76	$20.00	3.8

		Existing Fixtures						Proposed Fixtures										Fixtures Retrofitted			Unit Installation Cost							
Existing Lighting Fixture Type	Room Name	Lighting Fixture Description	Lamps per Fixture	Voltage	Watts	Qty of Fixtures	Total Watts	New Lighting Fixture Type	Existing/Replace	Description	Lamps per Fixture	Watts	Qty of Fixtures	Total Watts	Wattage Reduction	Average Burn Hours	Ave $/kwh	Energy Savings, kWh	Energy Savings, $	Qty	Material Each	Labor Each	Total Each	Total Materials	Total Labor	Total All	Rebate Estimate	Simple Payback
BB	Foyer	4L-T12-40w 2'x4' Surface Fixture	4	120	154	2	308	NBB	Relamp, Reballast	32w-T8 energy saver w/electronic T8 High Efficiency ballast	4	96	2	192	116	2500	$0.14	290	$41.47	2	27.88	60	$87.88	$55.76	$120.00	$175.76	$20.00	3.8
CC	Captains Office	4L-T8-32w 2'x4' Troffer	4	120	96	2	192	NCC	Existing to Remain	4L-T8-32w 2'x4' Troffer	4	96	2	192	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
E	Captains Office	1L-60w Par Downlight	1	120	60	1	60	NE	Relamp	1L-CFL-26w Medium base	1	28	1	28	32	1500	$0.14	48	$6.86	1	4.55	37.5	$42.05	$4.55	$37.50	$42.05	$0.00	6.1
DD	Fire Chief's Office	3L-T8-32w 2'x4' Troffer	3	120	72	3	216	NDD	Existing to Remain	3L-T8-32w 2'x4' Troffer	3	72	3	216	0	8760	$0.14	0	$0.00	0	0	0	$0.00	$0.00	$0.00	$0.00	$0.00	
Total Second Floor						**135**	**8551**						**135**	**7130**	**1421**			**4,121**	**$589.28**	**34**				**$899**	**$1,905**	**$2,804**	**$280**	**4.3**

Project Name: Margate City Firehouse #1
Location: Margate City, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$140,760
Annual kWh Production	24,407
Annual Energy Cost Reduction	$3,490
Annual SREC Revenue	$8,542
First Cost Premium	**$140,760**
Simple Payback:	**11.70** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/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	$7,038	0	0	0	$0	0	0	(7,038)	0
1	$0	24,407	$3,490	$0	$8,542	$9,260	$3,181	($408)	($7,446)
2	$0	24,285	$3,595	$0	$8,500	$9,030	$3,411	($346)	($7,793)
3	$0	24,163	$3,703	$0	$8,457	$8,783	$3,658	($281)	($8,074)
4	$0	24,043	$3,814	$0	$8,415	$8,519	$3,922	($212)	($8,286)
5	$0	23,922	$3,928	$246	$8,373	$8,235	$4,206	($386)	($8,672)
6	$0	23,803	$4,046	$245	$8,331	$7,931	$4,510	($309)	($8,981)
7	$0	23,684	$4,167	$244	$8,289	$7,605	$4,836	($228)	($9,209)
8	$0	23,565	$4,292	$243	$8,248	$7,256	$5,185	($143)	($9,352)
9	$0	23,448	$4,421	$242	$8,207	$6,881	$5,560	($55)	($9,407)
10	$0	23,330	$4,554	$240	$8,166	$6,479	$5,962	$38	($9,369)
11	$0	23,214	$4,691	$239	$8,125	$6,048	$6,393	$135	($9,233)
12	$0	23,098	$4,831	$238	$8,084	$5,586	$6,855	$237	($8,997)
13	$0	22,982	$4,976	$237	$8,044	$5,090	$7,351	$342	($8,655)
14	$0	22,867	$5,125	$236	$8,004	$4,559	$7,882	$453	($8,202)
15	$0	22,753	$5,279	$234	$7,964	$3,989	$8,452	$567	($7,635)
16	$0	22,639	$5,438	$233	$7,924	$3,378	$9,063	$687	($6,947)
17	$0	22,526	$5,601	$232	$7,884	$2,723	$9,718	$812	($6,136)
18	$0	22,413	$5,769	$231	$7,845	$2,020	$10,421	$942	($5,194)
19	$0	22,301	$5,942	$230	$7,805	$1,267	$11,174	$1,077	($4,117)
20	$0	22,190	$6,120	$229	$7,766	$459	$11,982	$1,217	($2,900)
21	$0	22,079	$6,304	$227	$7,728	$389	$11,015	$2,400	($501)
22	$0	21,968	$6,493	$226	$7,689	$266	$9,064	$4,625	$4,124
23	$0	21,859	$6,688	$225	$7,650	$0	$0	$14,113	$18,237
24	$0	21,749	$6,888	$224	$7,612	$0	$0	$14,276	$32,513
25	$0	21,640	$7,095	$223	$7,574	$0	$0	$14,446	$46,959
	Totals:	465,633	$93,783	$3,798	$162,972	$115,097	$133,722	$153,801	($53,273)
				Net Present Value (NPV)			**$2,923**		
				Internal Rate of Return (IRR)			**8.6%**		

Project Name: **Margate City Firehouse #1**
Location: **Margate City, NJ**
Description: **Photovoltaic System - Direct Purchase**

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$140,760
Annual kWh Production	24,407
Annual Energy Cost Reduction	$3,490
Annual SREC Revenue	$8,542
First Cost Premium	**$140,760**
Simple Payback:	**11.70** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$140,760	0	0	0	$0	(140,760)	0
1	$0	24,407	$3,490	$0	$8,542	$12,033	($128,727)
2	$0	24,285	$3,595	$0	$8,500	$12,095	($116,633)
3	$0	24,163	$3,703	$0	$8,457	$12,160	($104,473)
4	$0	24,043	$3,814	$0	$8,415	$12,229	($92,244)
5	$0	23,922	$3,928	$246	$8,373	$12,055	($80,189)
6	$0	23,803	$4,046	$245	$8,331	$12,132	($68,057)
7	$0	23,684	$4,167	$244	$8,289	$12,213	($55,845)
8	$0	23,565	$4,292	$243	$8,248	$12,298	($43,547)
9	$0	23,448	$4,421	$242	$8,207	$12,386	($31,160)
10	$0	23,330	$4,554	$240	$8,166	$12,479	($18,681)
11	$0	23,214	$4,691	$239	$8,125	$12,576	($6,105)
12	$0	23,098	$4,831	$238	$8,084	$12,678	$6,572
13	$0	22,982	$4,976	$237	$8,044	$12,783	$19,356
14	$0	22,867	$5,125	$236	$8,004	$12,893	$32,249
15	$0	22,753	$5,279	$234	$7,964	$13,008	$45,258
16	$0	22,639	$5,438	$233	$7,924	$13,128	$58,386
17	$0	22,526	$5,601	$232	$7,884	$13,253	$71,638
18	$0	22,413	$5,769	$231	$7,845	$13,383	$85,021
19	$0	22,301	$5,942	$230	$7,805	$13,518	$98,539
20	$0	22,190	$6,120	$229	$7,766	$13,658	$112,196
21	$1	22,079	$6,304	$227	$7,728	$13,804	$126,000
22	$2	21,968	$6,493	$226	$7,689	$13,955	$139,956
23	$3	21,859	$6,688	$225	$7,650	$14,113	$154,069
24	$4	21,749	$6,888	$224	$7,612	$14,276	$168,345
25	$5	21,640	$7,095	$223	$7,574	$14,446	$182,791
	Totals:	465,633	$93,783	$3,798	$162,972	$323,551	$252,956
				Net Present Value (NPV)		**$182,816**	
				Internal Rate of Return (IRR)		**7.5%**	

Building	Usable Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Firehouse #1	1000	Sunpower SPR230	68	14.7	1,000	15.64	24,407	2,244	15.64

.= Proposed PV Layout

Notes:

Building	Usable Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Firehouse #1	1000	Sunpower SPR230	68	14.7	1,000	15.64	24,407	2,244	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.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
City Hall

Building ID: 1813245
For 12-month Period Ending: April 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 07, 2009

Facility
City Hall
1 South Washington Ave.
Margate City, NJ 08402

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1903
Gross Floor Area (ft²): 20,288

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

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	1,719,259
Electricity (kBtu)	849,952
Total Energy (kBtu)	2,569,211

Energy Intensity[5]

Site (kBtu/ft²/yr)	128
Source (kBtu/ft²/yr)	232

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	229

Electric Distribution Utility
Atlantic City Electric Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	27%
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.

Certifying Professional
N/A

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	City Hall	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	1 South Washington Ave., Margate City, NJ 08402	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		☐
City Hall (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	14,288 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	35 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	20	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	21	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?		☐
Firehouse #1 (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑

Gross Floor Area	6,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		
Number of PCs	5 (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	15 (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: Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
03/06/2009	04/05/2009	20,080.00
02/06/2009	03/05/2009	19,440.00
01/06/2009	02/05/2009	23,440.00
12/06/2008	01/05/2009	19,920.00
11/06/2008	12/05/2008	16,400.00
10/06/2008	11/05/2008	22,560.00
09/06/2008	10/05/2008	23,680.00
08/06/2008	09/05/2008	25,840.00
07/06/2008	08/05/2008	24,320.00
06/06/2008	07/05/2008	19,760.00
05/06/2008	06/05/2008	19,600.00
Electric Consumption (kWh (thousand Watt-hours))		**235,040.00**
Electric Consumption (kBtu)		**801,956.48**
Total Electricity Consumption (kBtu)		**801,956.48**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
03/06/2009	04/05/2009	1,078.36
02/06/2009	03/05/2009	1,506.34
01/06/2009	02/05/2009	3,083.16
12/06/2008	01/05/2009	3,653.97
11/06/2008	12/05/2008	374.15
10/06/2008	11/05/2008	129.77
09/06/2008	10/05/2008	0.00
08/06/2008	09/05/2008	0.00
07/06/2008	08/05/2008	0.00
06/06/2008	07/05/2008	3,146.52

05/06/2008	06/05/2008	3,829.07
Gas Consumption (therms)		**16,801.34**
Gas Consumption (kBtu)		**1,680,134.00**
Total Natural Gas Consumption (kBtu)		**1,680,134.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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
1 South Washington Ave.
Margate City, NJ 08402

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

City Hall	
Gross Floor Area Excluding Parking: (ft²)	20,288
Year Built	1903
For 12-month Evaluation Period Ending Date:	April 30, 2009

Facility Space Use Summary

City Hall	
Space Type	Office
Gross Floor Area(ft²)	14,288
Weekly operating hours	35
Workers on Main Shift	20
Number of PCs	21
Percent Cooled	50% or more
Percent Heated	50% or more

Firehouse #1	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft²)	6,000
Number of PCs°	5
Weekly operating hours°	168
Workers on Main Shift°	15

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2009)	**Baseline** (Ending Date 04/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	128	128	58	N/A	77
Source (kBtu/ft²)	232	232	105	N/A	182
Energy Cost					
$/year	$ 55,983.74	$ 55,983.74	$ 25,401.97	N/A	$ 33,572.80
$/ft²/year	$ 2.76	$ 2.76	$ 1.25	N/A	$ 1.66
Greenhouse Gas Emissions					
$MtCO_2e$/year	229	229	104	N/A	137
$kgCO_2e$/ft²/year	11	11	5	N/A	7

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

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