ENERGY AUDIT – FINAL REPORT

HOBOKEN
Police Headquarters

106-124 Hudson St.
Hoboken, NJ 07030

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CEG PROPOSAL NO. 9C08143

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I. EXECUTIVE SUMMARY

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

Hoboken
Police Station
106-124 Hudson St.
Hoboken, NJ 07030

Facility Contact Person: Lt. Tory Pasculli

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

The annual energy costs at this facility are as follows:

Electricity	$49,560
Natural Gas	$13,649
Total	$63,209

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Interior Lighting Upgrades	$1,329	$165	8.1	12.3%
2	Install Compact Fluorescent Lamps	$30	$76	0.4	250%
3	Exit Sign Upgrade	$322	$235	1.67	59.8%
4	Interior Lighting Controls	$2,365	$255	9.27	10.8%
5	High-Efficiency Rooftop Units	$170,300	$454	312.5	.32%
6	High-Efficiency Split AC Unit	$16,062	$92	174.6	.57%
7	Boiler Replacement	$52,500	$2,424	21.66	4.6%
8	Domestic Water Heater Replacement	$7,272	$754	9.6	10.4%

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)	NATURAL GAS (MBH)
1	Interior Lighting Upgrades	0.22	1,004	-
2	Install Compact Fluorescent Lamps	0.17	1,647	-
3	Exit Sign Upgrade	0.15	1,349	
4	Interior Lighting Controls	-	280	-
5	High-Efficiency Rooftop Units	-	3,136	-
6	High-Efficiency Split AC Unit	-	636	-
7	Boiler Replacement	-	-	175,680
8	Domestic Water Heater Replacement	-	-	62,250

Recommendation:

Concord Engineering Group strongly recommends the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The potential energy and cost savings from these ECM's are too great to pass upon. The following Energy Conservation Measures are recommended for the Hoboken, Police Station:

- **ECM #1:** Interior Lighting Upgrades
- **ECM #2:** Install Compact Fluorescent Lamps
- **ECM #3:** Exit Sign Upgrade
- **ECM #4:** Interior Lighting Controls
- **ECM #8:** Domestic Water Heater Replacement – High Efficiency

Concord Engineering Group recommends that consideration be given to the implementation of all ECM's where equipment is substantially past its useful life. Equipment that is substantially past its useful life typically is inefficient, has higher maintenance costs and is more susceptible to mechanical failure. This equipment does not meet the criteria of simple payback at or under ten years on energy savings alone. Additional consideration should be given to maintenance costs, reliability and the length of time the owner expects to own and maintain the building. Concord Engineering Group recommends the following ECM for implementation based on useful life expectancy:

- **ECM #5:** High-Efficiency Rooftop Units
- **ECM #7:** Boiler Replacement – High Efficiency Upgrade

II. INTRODUCTION

This comprehensive energy audit covers the 23,242 square foot Hoboken, Police Station facility that includes the police headquarters, processing room, holding cells, Inspectoral Services, Bureau of I.D., Dispatch communications room, weight room, offices, locker rooms, server room, storage room, classroom, etc.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ SmartStart Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The costs and savings are applied and a simple payback and simple return on investment (ROI) is calculated. The simple payback is based on the years that it takes for the savings to pay back the net installation cost (Net Installation divided by Net Savings.) A simple return on investment is calculated as the percentage of the net installation cost that is saved in one year (Net Savings divided by Net Installation.)

A simple life-time calculation is shown for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The energy savings is extrapolated throughout the life-time of the ECM. The total energy savings is calculated as the total life-time multiplied by the yearly savings.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Electric

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-07 to December-07. The utility bill for December-07 was not available and an average of January-07 and November-07 was assumed for December-07. Public Service Electric and Gas Company (PSE&G) provides electricity to the facility under the General Lighting and Power Service (GLP) rate. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

Natural Gas

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facility from January-07 to December-07. The utility bill for December-07 was not available and an average of January-07 and November-07 was assumed for December-07. PSE&G charges a rate per therm for delivery of the natural gas via their pipelines to the burners under their Large Volume Gas (LVG) rate.

Description	Average
Electricity	14.5¢ /kWh
Natural Gas	$1.38 /Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-07	17,490	105.3	$2,271
Feb-07	3,990	36.3	$714
Mar-07	45,870	110.0	$5,138
Apr-07	18,420	36.9	$2,142
May-07	23,820	79.2	$2,845
Jun-07	28,740	108.3	$4,965
Jul-07	24,150	108.3	$4,892
Aug-07	46,800	112.2	$7,849
Sep-07	27,810	105.3	$5,368
Oct-07	35,370	105.9	$4,902
Nov-07	39,870	105.3	$4,892
Dec-07	28,680	105.3	$3,581
Totals	**341,010**	**112.2 Max**	**$49,560**

AVERAGE DEMAND 93.2 KW average
AVERAGE RATE $0.145 $/kWh

Figure 1
Electricity Usage Profile

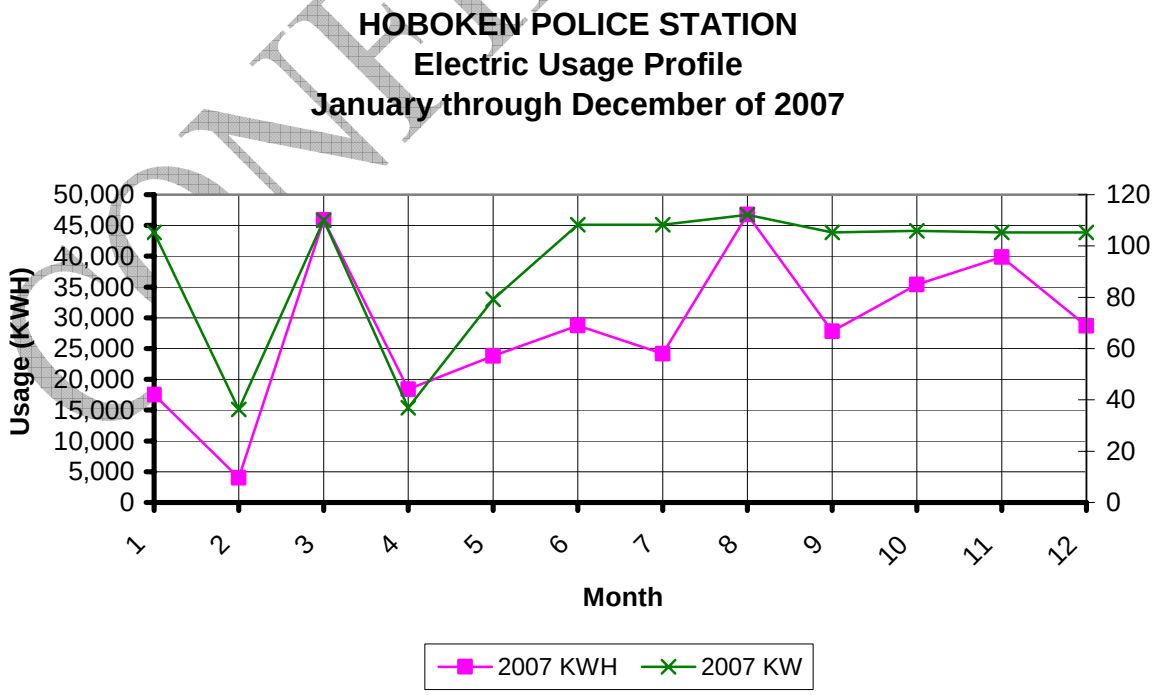
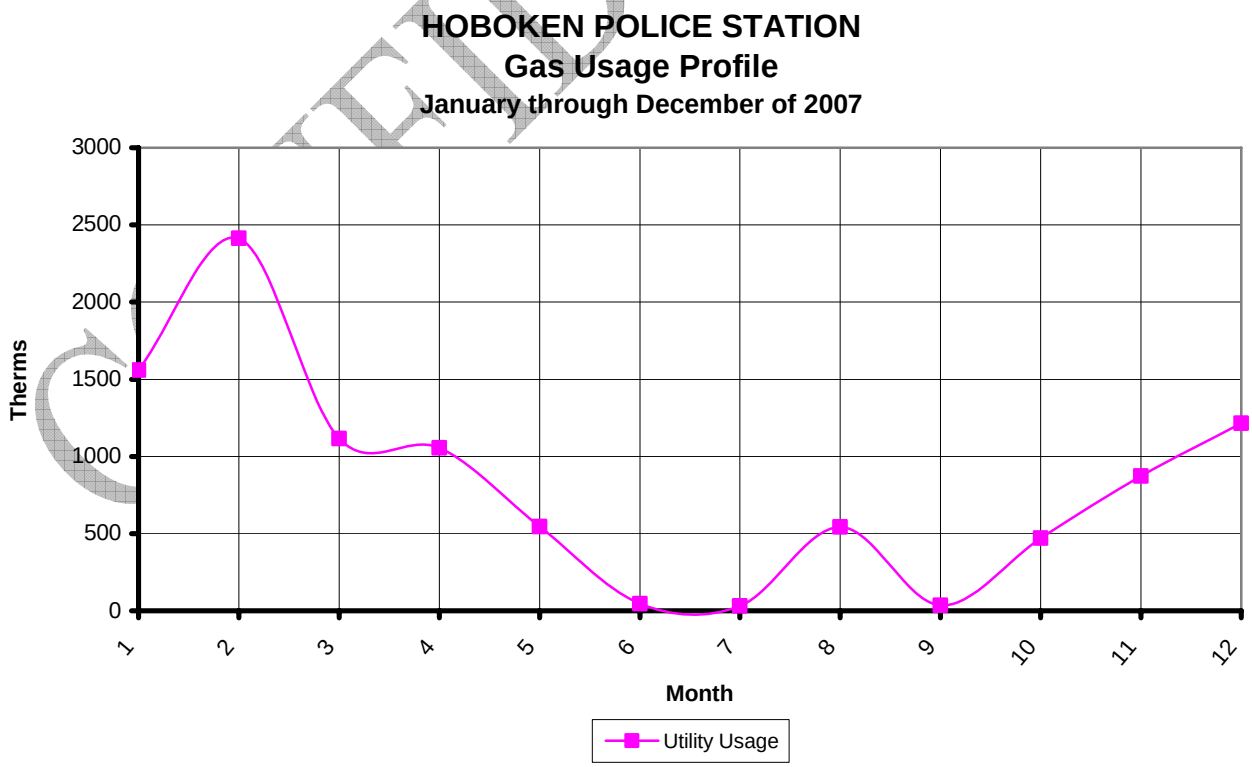


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-07	1558.56	$2,179.29
Feb-07	2414.06	$3,000.07
Mar-07	1115.47	$1,538.22
Apr-07	1055.83	$1,303.35
May-07	546.23	$710.63
Jun-07	44.95	$143.07
Jul-07	31.48	$126.52
Aug-07	543.61	$643.88
Sep-07	34.67	$124.52
Oct-07	470.75	$1,044.12
Nov-07	873.14	$1,163.60
Dec-07	1215.85	$1,671.45
TOTALS	**9904.59**	**$13,648.72**
AVERAGE RATE:	**$1.38**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance amongst building of similar type. The EUI for this facility is calculated as follows:

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

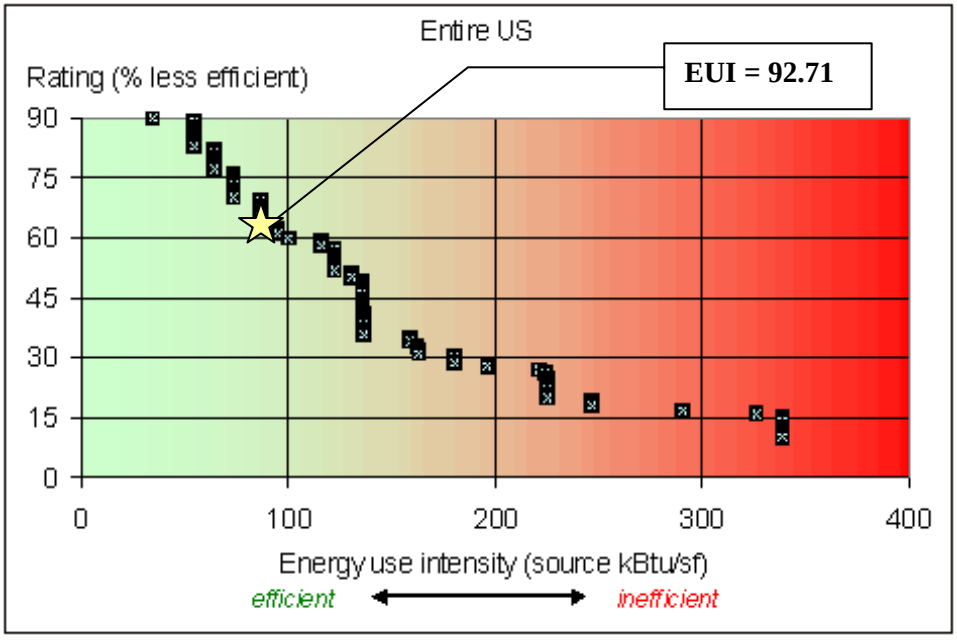
Electric = ((341,010 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 1,164,208 kBtu

Natural Gas = (9905 Therms) * (100,000 Btu/Therm) / 1000 BTU / kBTU= 990,459 kBtu

$$Building\ \ EUI = \frac{(1{,}164{,}208\ \ kBtu + 990{,}459\ kBtu)}{23{,}242\ SF} = \frac{2{,}154{,}667\ kBtu}{23{,}242\ SF}$$

Police Station EUI = 92.71 kBtu/SF

Figure 3
Energy Use Intensity Distributions: Fire and Police Stations



C. EPA Energy Benchmarking System

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

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Start account for the municipal in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

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

Username: hobokencity

Password: lgeaceg2009

Security Question: What is your birth city?

Security answer: hoboken city

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

V. FACILITY DESCRIPTION

The Hoboken Police Station consists of the police headquarters, processing room, holding cells, Inspectoral Services, Bureau of I.D., Dispatch communications room, weight room, offices, locker rooms, server room, storage room, and classroom; totaling approximately 23,242 SF. The brick/block facility was built in 1968. The facility is occupied 24 hours a day.

Heating System

The Police Station building is primarily heated by a H.B Smith 19 Series-11 sections, natural gas-fired, 917,000 BTUH input, hot water boiler in the basement with a rated efficiency of 75%. Four (4) zone pumps deliver hot water to coils in the following zones:

a) AHU-1

b) AHU-2

c) 1st Floor perimeter radiation

d) 2nd Floor perimeter radiation

Domestic Hot Water

Domestic hot water for the restrooms is provided by a State Sandblaster, natural gas domestic water heater, 40-gallon capacity rated at 199,999 Btuh input.

Cooling System

Cooling is provided by two (2) Trane Climate Changer, Multi-zone, rooftop split system units. Each system utilizes R-22 refrigerant for cooling and hot water for heating and has 27-Tons nominal cooling capacity. A 1.5-Ton split system, Sanyo model KMS1812, serves the server room. A 0.5-Ton split system, Sanyo KMS0712, serves the training room. A 3-Ton split system is assumed to serve the Captain's office. A GE Zoneline 3100 PTAC unit serves the holding cell area.

Lighting

The Boiler room, weight room and server room are lit via 1-tube, 8 foot long fluorescent T12 lamps and magnetic ballasts. Other areas are lit by 2-foot by 4-foot lay-in fixtures containing T8 fluorescent lamps and electronic ballasts. The vestibule and kitchen are lit by incandescent lamps. Standard switching is utilized and there are no other types of lighting controls present. The exit signs throughout the facility contain incandescent lamps and consume an estimated 30 watts of electricity per exit sign.

VI. MAJOR EQUIPMENT LIST

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

Table 4 thru 6
Existing Equipment Listing

Cooling Equipment							
Description	**Qty**	**Cooling Capacity (Tons)**	**Cooling Capacity (BTUH)**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
A-Trane Model No. CC SIZE 25	1	See A below	-	Electric	38	15	-23
B-Trane Model No. CC SIZE 25	1	See below	-	Electric	38	15	-23
A-Trane Model No. RA 400 3A	1	31.6	380,000	Electric	38	15	-23
B-Trane Model No. RA 400 3A	1	33.4	401,000	Electric	38	15	-23
Sanyo Model KMS0712	1	0.5	7,000	Electric	8 *	15	7
Sanyo Model KMS1812	1	1.5	18,000	Electric	8 *	15	7
Mitsubishi Model No.PUY-A36NHA	1	3	34,200	Electric	8 *	15	9

* - Manufacture date estimated due to information is unavailable.

HEATING EQUIPMENT						
Description	**Qty**	**Rated Capacity(BTUH)**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
H.B. Smith – Water Boiler	1	917,000	Natural Gas	38	35	(-3)

DOMESTIC WATER HEATING SYSTEM						
Description	**Qty**	**Capacity**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
State SBF8 0199NE Water Heater	1	40 gallon	Natural Gas	6 *	12	6

* - Manufacture date estimated due to information is unavailable.

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Interior Lighting Upgrades

Description:

Replacing the 1 foot x 8 foot, one T12 lamp fluorescent fixtures with a new T8 fluorescent fixture is a simple change that can provide substantial savings. A typical 1 foot x 8 foot, one T12 lamp fluorescent fixture has a total wattage of about 125 Watts. By replacing it with two (2) new 1 foot x 4 foot fixture that have T8 lamps, reflector and electronic ballasts the total wattage would be reduced to 28 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

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

This ECM shall replace all T12 fixtures throughout the facility with new T8 lay-in type fixtures in locations where there are ceilings. In locations where there is no ceiling and is exposed to structure, a pendant type fixture should be installed.

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

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

$$\text{Smart Start®}\ Incentive = (7 \times\ \$\ 25) + (\ 0 \times\ \$\ 30) = \$175$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (7 \times 33\%\ reduction \times \$\ 2.00) = \$5$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,504
NJ Smart Start Equipment Incentive ($):	($175)
Net Installation Cost ($):	*$1,329*
Maintenance Savings ($ / yr):	*$5*
Energy Savings ($ / yr):	*$160*
Net Savings ($ / yr):	*$165*
Simple Payback (yrs):	*8.1*
Simple Return On Investment (%):	*12.3%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$2,475*

ECM #2: Install Compact Fluorescent Lamps

Description:

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

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

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

Energy Savings Calculations:

There are six (6) 60-Watt and zero (0) 100-Watt incandescent lamps in the facility that can be upgraded to 18 and 23 Watt CFL units respectively. The average operating hours for these lamps is estimated to be 2080.

Energy cost savings:

[6 units * (60W – 18W) + 0 units * (100W – 23W)] 2080 hours * 1 kW/1,000 W * $0.145/kWh] = $76.00/yr

The installed cost of six (6) 18-Watt and zero (0) 23-Watt CFL's is $30

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$30
NJ Smart Start Equipment Incentive ($):	-
Net Installation Cost ($):	*$30*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$76*
Net Savings ($ / yr):	*$76*
Simple Payback (yrs):	*.4*
Simple Return On Investment (%):	*250%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$1,140*

ECM #3: Exit Sign Upgrade

Description:

Exit signs are lit all year long and are typically a forgotten energy hog. Exits signs have replacement lamps ranging from 4 volt, 3.6 watt to 120volt or 277 volt, 25 watt depending on the existing fixture. Exit signs are usually electrically powered using incandescent bulbs, compact fluorescent lamps (CFL) or light emitting diode (LED) arrays. Most LED exit signs and some CFL exit signs meet Energy Star requirements.

There is a LED Thermoplastic Universal Architectural Exit sign with battery back-up available that is relatively inexpensive that will replace existing exit signs to a more efficient fixture, meeting the Energy Star requirements. Typical replacements are 2 watt for green text or 4 watt for red text fixture.

Energy Savings Calculations:

There are seven (7) exit signs in the facility (assumed to be 26 watt due to inaccessibility) that can be upgraded to standard 120/277 volt input, high out-put LED 4 watt (red) or 2 watt (green) fixtures with the Thermoplastic Universal Architectural Exit sign with battery back-up. The operating hours for these fixtures is continuous all year long at 8760 hours per year.

Energy cost savings:

7 units * (26W – 4W)]* 8760 hours * 1 kW/1,000 W * $0.143 kWh] = $193/yr

The installed cost of each 4-Watt LED exit signs is $56.
7 units * $56 = $392.

There is a NJ Smart Start Equipment Incentive of $10 per new LED exit sign for buildings with ≥75kW demand.
7 units * $10 = $70

Maintenance Savings are calculated as follows:

$$Maintenance\ Savings = (14 lamps \times 100\%\ reduction \times \$\,3.00\ per lamp) = \$42.00$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$392
NJ Smart Start Equipment Incentive ($):	($70)
Net Installation Cost ($):	*$280*
Maintenance Savings ($ / yr):	*$42*
Energy Savings ($ / yr):	*$193*
Net Savings ($ / yr):	*$235*
Simple Payback (yrs):	*1.67*
Simple Return On Investment (%):	*59.8%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Savings ($):	*$5,875*

ECM #4: Interior Lighting Controls

Description:

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

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, classroom, restrooms, storage rooms, file rooms, boiler room, weight room, server room, Inspectoral Services, kitchen, locker rooms, etc. in the police station facility (43 spaces approximately 13,836 square feet).

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

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the private offices, conference rooms, restrooms, storage rooms, file rooms, (all areas with 2080 hours operation) etc. the facility to be ±0.61 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 0.61Watts/SF x 13,836 SF x 2,080 hrs/yr. = 1755 kWh x $0.145/kWh

Savings = $255 per year

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

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

Total cost to install sensors is $55/unit x 43 units = $2365

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,225
NJ Smart Start Equipment Incentive ($):	($860)
Net Installation Cost ($):	*$2,365*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$255*
Net Savings ($ / yr):	*$255*
Simple Payback (yrs):	*9.27*
Simple Return On Investment (%):	*10.8%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$3,825*

ECM #5: High-Efficiency Condensing Units (Multi zone split system)

Description:

The direct expansion (DX) cooling with hot water heating multi-zone rooftop split system units are excellent candidates for replacement. These units were shipped from the factory in January 1971. These rooftop units are well beyond their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, these units should be replaced.

This measure would replace each air handling and condensing unit with an energy-efficient unit. The systems would have a variable air volume air handler with DX cooling and hot water heating coil, variable air volume zone control dampers and an energy efficient condensing unit by Trane or approved equivalent.

Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}} \right) \times Avg.LoadFactor \times Hrs.ofCooling$$

Existing Trane 40-Ton CU (2 units)

Rated Capacity = 40 Tons per unit
Condenser Section Efficiency = 9.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.145/kWh

Proposed High-Efficiency 40-Ton Rooftop Unit

Rated Capacity = 40 Tons per Unit
New Cooling Unit Efficiency = 10.1 EER

$$EnergySavings = \frac{[40Tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{9} - \frac{1}{10.1} \right) \times 0.15 \times 1800 = 1{,}568 kWh/yr \text{ per unit}$$

Total Energy Cost Savings = (1,568) kWh/yr. x $0.145/kWh = $227 per year per unit

Installation costs for the two (2) rooftop Multi-zone split system Air handling units and two (2) condensing unit replacements are estimated at $174,000. It is pertinent to note that this estimate includes the demolition of the existing units and dunnage modifications (if required).

NJ Smart Start® Program Incentives are calculated as follows:

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

$$\text{Smart Start®}\ \textit{Incentive}\ (\textit{RTU} - 40\ \textit{Tons}) = (\textit{Cooling Tons} \times\ \textit{RTU Incentive})$$
$$= 2(40\textit{Tons} \times \$40/\textit{Ton}) = \$3200$$

$$\text{Smart Start®}\ \textit{Incentive DualEnthalpyEconomizerControls} = \$250\ \text{x 2 units} = \$500$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$174,000
NJ Smart Start Equipment Incentive ($):	($3,700)
Net Installation Cost ($):	*$170,300*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$454*
Net Savings ($ / yr):	*$454*
Simple Payback (yrs):	*312.5*
Simple Return On Investment (%):	*.32%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$6,810*

ECM #6: High-Efficiency Split AC Unit

Description:

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

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

Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}} \right) \times Avg.LoadFactor \times Hrs.ofCooling$$

Existing Sanyo 0.75-Ton Split System (1 Unit)

Rated Capacity = 0.75 Tons per unit
Condenser Section Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.145/kWh

Proposed High-Efficiency 0.75-Ton Rooftop Unit

Rated Capacity = 0.75 Tons per Unit
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[0.75Tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{7} - \frac{1}{14} \right) \times 0.15 \times 1800 = 173 \;\; kWh/yr$$

Total Energy Cost Savings = (173) kWh x $0.145/kWh = $25 per year

The installation cost for the ¾ ton split AC replacement is estimated at $3,390.

Existing Sanyo 1.5-Ton Split System (1 Unit)

Rated Capacity = 1.5 Tons per unit
Condenser Section Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.145/kWh

Proposed High-Efficiency 1.5-Ton Rooftop Unit

Rated Capacity = 1.5 Tons per Unit
New Cooling Unit Efficiency = 14.0 EER

$$EnergySavings = \frac{[1.5Tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{7} - \frac{1}{14}\right) \times 0.15 \times 1800 = 347 \;\; kWh/yr$$

Total Energy Cost Savings = (347) kWh x \$0.145/kWh = \$50 per year

The installation cost for the 1.5 ton split AC replacement is estimated at \$4,665.

Existing Mitsubishi Split 3-Ton AC Unit

Rated Capacity = 3 Tons per unit
Condenser Section Efficiency = 12.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - \$0.145/kWh

Proposed High-Efficiency 3-Ton Split AC Unit

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

$$EnergySavings = \frac{[3Tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{12} - \frac{1}{14}\right) \times 0.15 \times 1800 = 116 \;\; kWh/yr$$

Energy Cost Savings = 116 kWh x \$0.145/kWh = \$17 per year

The installation cost for the 3 ton split AC replacement is estimated at \$8,490.

NJ Smart Start® Program Incentive is calculated as follows:

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

$$\text{Smart Start®}\; Incentive\,(RTU - 3/4\;Tons) = (Cooling\,Tons \times \;\; RTU\;\; Incentive)$$
$$= (3/4\;Tons \times \$92/Ton) = \$69$$

$$\text{Smart Start® } Incentive\ (RTU - 1.5\ Tons) = (Cooling\ Tons \times\ RTU\ Incentive)$$
$$= (1.5\ Tons \times \$92/Ton) = \$138$$

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

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,545
NJ Smart Start Equipment Incentive ($):	($483)
Net Installation Cost ($):	*$16,062*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$92*
Net Savings ($ / yr):	*$92*
Simple Payback (yrs):	*174.6*
Simple Return On Investment (%):	*.57%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$1,380*

ECM #7: Boiler Replacement – High Efficiency Upgrade

Description:

This ECM replaces the boiler with a high efficiency condensing hot water boiler. The Hoboken Police Station is heated by one (1) HB Smith 19 Series Natural Gas-fired, 11 sections, 917 MBh hot water boiler which presently is about 70% efficient. As an energy conservation measure, the Concord team recommends this boiler be replaced by one (1) Lochinvar SYNC model SBN 1000 condensing boilers or equivalent with an efficiency of 94.6%. There is potential for these boilers to operate at 98% efficiency with lower system return water temperatures. This, however, would impact the connected equipment (air handling units and baseboard radiation) and an engineer should be consulted before changing the heating loop temperature difference. This ECM will consider the original system loop temperature difference of 30°F (180°F -150°F).

Existing Heating Hot Water Boiler:

Rated Capacity = 917 MBh (Natural Gas)

Combustion Efficiency = 75%
Age & Radiation Losses = 5%
Thermal Efficiency = 70%

Replacement Boiler:

High-Efficiency Condensing Boiler

Rated Capacity = 1,000 MBh (Natural Gas)

Combustion Efficiency = 94.6%
Radiation Losses = 0.5%
Thermal Efficiency = 94.1%

Operating Data:

Annual Fuel Consumption of Natural Gas is calculated as:
917,000 BTU x 4935 HDD65 x 0.15 diversity / (100,000 Btu/1 Therm of natural gas)
= 6,859.09 Therms

Average Cost of Natural Gas = $1.38/Therm

Energy Savings Calculations:

Energy Savings = Old Boiler Energy Input x ((New Boiler Efficiency – Old Boiler) / New Boiler Efficiency))

$$\text{Energy Savings} = 6{,}859.1 \text{ Therms} \times \frac{94.1\% - 70\%}{94.1\%} = 1756.8 \text{ Therms}$$

Energy Cost Savings = Annual Energy Savings x $/Therm

Energy Cost Savings = 1,756.8 Therms x $1.38/Therm = $2,424/ yr.

Installed cost of one (1) Lochinvar SYNC model SBN 1000 Condensing Boiler including removal of existing unit, all piping changes and controls = $53,500.

Smart Start Incentive = $1.00/MBh x 1,000/installed MBh = $1,000

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$53,500
NJ Smart Start Equipment Incentive ($):	($1,000)
Net Installation Cost ($):	*$52,500*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$2,424*
Net Savings ($ / yr):	*$2,424*
Simple Payback (yrs):	*21.66*
Simple Return On Investment (%):	*4.6%*
Estimated ECM Lifetime (yr):	*35*
Simple Lifetime Savings ($):	*$84,840*

ECM #8: Domestic Water Heater Replacement

Description:

The existing domestic hot water heater is a State model SBF80199NE with 199,900 BTUH input Natural Gas Heater and has a 80% thermal efficiency. The nameplate recovery rate is 184 gallons per hour at 75% thermal efficiency.

This energy conservation measure will replace the existing natural gas 35-gallon capacity domestic water heater with a 92% thermal efficient Bradford White gas fired domestic hot water heater with 60-gallon storage capacity or equivalent. This ECM requires coordination with the utility due to increase in natural gas demand for the facility. CEG advises the owner to contact the utility provider regarding the installation of this ECM.

Energy Savings Calculations:

Existing Natural Gas DW Heater

Rated Capacity = 199.9 MBH input; 35 gallons storage

Combustion Efficiency = 80%
Age & Radiation Losses = 5%
Thermal Efficiency = 75%

Proposed Natural Gas-Fired, High-Efficiency DW Heater

Rated Capacity = 199 MBH input; 60 gallons storage

Thermal Efficiency = 92%
Radiation Losses = 0.5%
Net Efficiency = 91.5%

Operating Data for DW Heater

Estimated Daily DWH Load = (200 occupants x 0.4 gal/hour)x 0.5 Diversity = 40 gal/h

DW Heater Operating Hrs/Yr. = (40 gal/hr /230 gal/hr recovery) x 8760 hrs/yr = 1,523.5 Hrs/yr

Natural Gas Consumption = 1,523.5 hrs x 199,000 BTU/Hr x 1 Therm/ 100,000 BTU/Hr
Natural Gas Consumption = 3,031.8 Therms

Energy Savings = Old Water Heater Energy Input x ((New Water Heater Efficiency – Old Water Heater) / New Water Heater Efficiency))
Energy Savings = 3,031.8 Therms x $\frac{91.5\% - 75\%}{(91.5\%)}$ = 547 Therms

Average Cost of Natural Gas = $1.38/Therm

Yearly Savings = 547 Therm x $1.38/ Therm = $754/year

Cost of Commercial Domestic Water Heater, 2-year warranty extension (years 4 and 5) and Installation = $7,670

Smart Start Incentive = $2.00/MBh x $199 /installed MBh = $398.

Simple Payback = $7,272 / $754 = 9.6 years

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$7,670
NJ Smart Start Equipment Incentive ($):	($398)
Net Installation Cost ($):	*$7,272*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$754*
Net Savings ($ / yr):	*$754*
Simple Payback (yrs):	*9.6*
Simple Return On Investment (%):	*10.4%*
Estimated ECM Lifetime (yr):	*12*
Simple Lifetime Savings ($):	*$9,048*

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 732 S.F. can be utilized for a PV system on Police Station. A depiction of the area utilized is shown in Appendix G. Using this square footage it was determined that a system size of 11.5 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 17,946 KWh annually, reducing the overall utility bill by 5.26% percent. A detailed financial analysis can be found in Appendix E. 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	11.65 Years	9%
Direct Purchase	11.65 Years	7.5%

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

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to Section III, Figures 1 and 2 included within this report to reference the respective electricity and natural gas usage load profile for June 2007 through May 2008.

Electricity:
Section IV, Figure 1 demonstrates an erratic load profile. There is an extreme summer peak in August which is consistent with summertime cooling. But there is an equally extreme peak in March. The load profile gradually increases as the summer progresses to the peak in August. Most likely due to the Trane Climate Changers (27 ton each), the Sanyo 1.5 ton unit and the 3 ton split system cooling units. These units probably run most of the year as demonstrated by the high profile in October, November and March.

Natural Gas:
Section IV, Figure 2 demonstrates a more typical heating load (January-April, October, November, and December). The spike in natural gas consumption takes place in February, which is consistent with heating profiles. There is a clear separation between summer and winter loads consistent with energy commodities traded on the New York Mercantile Exchange. Heating loads carry a much higher average cost because of the higher demand for natural gas to heat during the winter. This facility is heated by a zoned, natural fired, not water system.

Tariff Analysis:

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

Natural Gas:
This facility receives natural gas service through Public Service Electric and Gas Company (PSE&G) on a LVG (Large Volume Service) rate when not receiving commodity by a Third Party Supplier. This tariff is for firm delivery service for general purposes. Customers may either purchase gas supply from a Third Party Supplier (TPS) or from Public Service Electric & Gas's Basic Gas Supply Service default service as detailed in the rate schedule.
This rate schedules have a Delivery Charge Mechanism which includes: Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.
From review of the information provided, it appears that Hoboken can improve its average natural gas costs by between 20-25%.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within City of Hoboken. CEG's primary observation is seen in the electric costs. The average price per kWh (kilowatt hour) for all buildings based on 1-year historical costs is $.15/kWh (kWh is the common unit of electric measure). The average price per decatherm for natural gas is $ 13.71dth (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. Hoboken could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on annual historical consumption (January through December 2007) and current electric rates, an annual savings of over $100,000 per year (Note: Savings were calculated using Hoboken's Average Annual Consumption of kWh and a variance to a fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".
CEG's secondary recommendation coincides with Hoboken's natural gas costs. Based on the current market, Hoboken could improve its natural gas costs by approximately 25% annually. CEG recommends further advisement on these prices. The City should also consider procuring energy (natural gas) through alternative supply sources. CEG recommends energy advisory services.
CEG also recommends that 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. Hoboken can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu, and should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, 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 Hoboken frequently changes or plans on changing its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the 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.

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

C. Maintain all weather stripping on windows and doors.

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

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

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

G. Recalibrate existing sensors serving the office spaces.

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

I. Clean all light fixtures to maximize light output.

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

Electric Cost Summary
PSE&G

Project #9C08143
Police Headquarters 120 Hudson St. Hoboken, NJ **2007**
Account # 21 324 008 13
Meter # 678002338

Month	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	17,490	3,990	45,870	18,420	23,820	28,740	24,150	46,800	27,810	35,370	39,870	28,680	341,010	
KW	105	36	110	37	79	108	108	112	105	106	105	105	112	Max
Monthly Load Factor	22%	16%	56%	69%	40%	37%	30%	56%	37%	45%	53%	37%	42%	
Electric Delivery, $	$ 805	$ 234	$ 1,456	$ 564	$ 851	$ 2,029	$ 1,898	$ 2,588	$ 1,969	$ 1,223	$ 1,335	$ 1,070	$16,021	
Delivery $/kwh	$0.046	$0.059	$0.032	$0.031	$0.036	$0.071	$0.079	$0.055	$0.071	$0.035	$0.033	$0.037	$0.047	
Electric Supply, $	$ 1,467	$ 479	$ 3,683	$ 1,578	$ 1,994	$ 2,936	$ 2,995	$ 5,262	$ 3,399	$ 3,679	$ 3,557	$ 2,512	$33,539	
Supply $/kwh	$0.084	$0.120	$0.080	$0.086	$0.084	$0.102	$0.124	$0.112	$0.122	$0.104	$0.089	$0.088	$0.098	
Total Cost, $	$2,271	$714	$5,138	$2,142	$2,845	$4,965	$4,892	$7,849	$5,368	$4,902	$4,892	$3,581	$49,560	
$/KWH	$0.130	$0.179	$0.112	$0.116	$0.119	$0.173	$0.203	$0.168	$0.193	$0.139	$0.123	$0.125	**$0.145**	

.=Utility information estimated. Utility bill not provided by owner.

Summary of Natural Gas Cost
PSE&G
Project #9C08143

Police Headquarters 120 Hudson St. Hoboken, NJ **2007**
Account # 21 319 008 13
Meter # 3163918

Month	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	**Total**
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	
Therms (Burner Tip)	1558.6	2414.1	1115.5	1055.8	546.2	45.0	31.5	543.6	34.7	470.7	873.1	1215.8	9904.6
Total Distribution Cost	$628	$797	$412	$210	$154	97.1	$96	$153	$96	$605	$347	$487	4,082
Cost per Therm	$0.403	$0.330	$0.369	$0.199	$0.282	$2.160	$3.036	$0.282	$2.768	$1.286	$0.397	$0.401	$0.412
Total Commodity Cost	$1,551	$2,203	$1,126	$1,093	$557	46.0	$31	$490	$29	$439	$817	$1,184	9,566
Cost per Therm	$1.00	$0.91	$1.01	$1.04	$1.02	$1.02	$0.98	$0.90	$0.82	$0.93	$0.94	$0.97	$0.97
Total Cost	$2,179	$3,000	$1,538	$1,303	$711	$143	$127	$644	$125	$1,044	$1,164	$1,671	$13,649
Cost per Therm	$1.398	$1.243	$1.379	$1.234	$1.301	$3.183	$4.019	$1.184	$3.592	$2.218	$1.333	$1.375	**$1.378**

.=Utility information estimated. Utility bill not provided by owner.

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

Hoboken Police Station

ECM 1 Interior Lighting Upgrade

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$1,504	$0	$0	$1,504
Total Cost			$0	$0	$1,504
Utility Incentive - NJ Smart Start (1-2 lamp fixture $25, 3-4 lamp fixture $30)					($175)
Total Cost Less Incentive					$1,329

ECM 2 Compact Flourescent Lighting

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

ECM 3 Exit Sign Replacement

	Qty	Unit Cost $	Material $	Labor $	Total $
Exit Sign - LED	7	$56			$392
Total Cost			$0	$0	$392
Utility Incentive - NJ Smart Start ($10/new LED exit Sign)					($70)
Total Cost Less Incentive					$322

ECM 4 Interior Lighting Controls

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	43	$75	$1,290	$1,935	$3,225
Total Cost			$1,290	$1,935	$3,225
Utility Incentive - NJ Smart Start ($20 per Sensor)					($860)
Total Cost Less Incentive					$2,365

ECM 5 High-Efficiency Condensing Units

	Qty	Unit Cost $	Material $	Labor $	Total $
40 Ton Split System	2	$87,000	$0	$0	$174,000
Total Cost			$0	$0	$174,000
Smart Start® Incentive ($40/Ton)	80				($3,200)
Smart Start® Incentive Dual Enthalpy Economizer	2.00				($500)
Utility Incentive - N/A					$0
Total Cost Less Incentive					$170,300

ECM 6 High Efficiency Split System AC Upgrade

	Qty	Unit Cost $	Material $	Labor $	Total $
New 3/4-Ton Split System AC System	1	$3,390	$0	$0	$3,390
New 1.5-Ton Split System AC System	1	$4,665	$0	$0	$4,665
New 3-Ton Split System AC System	1	$8,490	$0	$0	$8,490
Total Cost			$0	$0	$16,545
Smart Start® Incentive ($92/Ton)	5.25				($483)
Total Cost Less Incentive					$16,062

ECM 7 Boiler Replacement - High Efficiency

	Qty	Unit Cost $	Material $	Labor $	Total $
Lochinvar SYNC SBN 1000	1	$53,500	$0	$0	$53,500
Total Cost			$0	$0	$53,500
Smart Start® Incentive ($1.00/MBH)	1000				($1,000)
Utility Incentive - N/A					$0
Total Cost Less Incentive					$52,500

ECM 8 Domestic Water Heater Replacement

	Qty	Unit Cost $	Material $	Labor $	Total $
A.O. Smith Cyclone BTH-199NG	1	$7,670	$0	$0	$7,670
Total Cost			$0	$0	$7,670
Smart Start® Incentive ($2.00/MBH)	200				($398)
Utility Incentive - N/A					$0
Total Cost Less Incentive					$7,272

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

	$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Police Headquarters

Building ID: 1774157
For 12-month Period Ending: December 31, 2007[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 15, 2009

Facility
Police Headquarters
106-24 Hudson St.
Hoboken, NJ 07030

Facility Owner
City of Hoboken
94 Washington Street
Hoboken, NJ 07030

Primary Contact for this Facility
James Ronga
94 Washington Street
Hoboken, NJ 07030

Year Built: 1968
Gross Floor Area (ft²): 23,242

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

Site Energy Use Summary[3]

Electricity (kBtu)	1,163,526
Natural Gas (kBtu)[4]	990,460
Total Energy (kBtu)	2,153,986

Energy Intensity[5]

Site (kBtu/ft²/yr)	93
Source (kBtu/ft²/yr)	212

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	230

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

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	35%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional

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

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

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Police Headquarters	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	106-24 Hudson St., Hoboken, NJ 07030	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		☐
Police HQ (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	23,242 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	41 (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	177 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: Police HQ Electric (kWh)
Space(s): Police HQ

Start Date	End Date	Energy Use (kWh)
12/01/2007	12/31/2007	28,680.00
11/01/2007	11/30/2007	39,870.00
10/01/2007	10/31/2007	35,370.00
09/01/2007	09/30/2007	27,810.00
08/01/2007	08/31/2007	46,800.00
07/01/2007	07/31/2007	24,150.00
06/01/2007	06/30/2007	28,740.00
05/01/2007	05/31/2007	23,820.00
04/01/2007	04/30/2007	18,420.00
03/01/2007	03/31/2007	45,870.00
02/01/2007	02/28/2007	3,990.00
01/01/2007	01/31/2007	17,490.00
Police HQ Electric Consumption (kWh)		**341,010.00**
Police HQ Electric Consumption (kBtu)		**1,163,526.12**
Total Electricity Consumption (kBtu)		**1,163,526.12**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Police HQ Gas (therms)
Space(s): Police HQ

Start Date	End Date	Energy Use (therms)
12/01/2007	12/31/2007	1,215.80
11/01/2007	11/30/2007	873.10
10/01/2007	10/31/2007	470.70
09/01/2007	09/30/2007	34.70
08/01/2007	08/31/2007	543.60
07/01/2007	07/31/2007	31.50
06/01/2007	06/30/2007	45.00
05/01/2007	05/31/2007	546.20
04/01/2007	04/30/2007	1,055.80

03/01/2007	03/31/2007	1,115.50
02/01/2007	02/28/2007	2,414.10
01/01/2007	01/31/2007	1,558.60
Police HQ Gas Consumption (therms)		**9,904.60**
Police HQ Gas Consumption (kBtu)		**990,460.00**
Total Natural Gas Consumption (kBtu)		**990,460.00**
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
Police Headquarters
106-24 Hudson St.
Hoboken, NJ 07030

Facility Owner
City of Hoboken
94 Washington Street
Hoboken, NJ 07030

Primary Contact for this Facility
James Ronga
94 Washington Street
Hoboken, NJ 07030

General Information

Police Headquarters	
Gross Floor Area Excluding Parking: (ft^2)	23,242
Year Built	1968
For 12-month Evaluation Period Ending Date:	December 31, 2007

Facility Space Use Summary

Police HQ	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	23,242
Number of PCs[o]	41
Weekly operating hours[o]	168
Workers on Main Shift[o]	177

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2007)	**Baseline** (Ending Date 12/31/2007)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	93	93	0	N/A	78
Source (kBtu/ft^2)	212	212	0	N/A	157
Energy Cost					
$/year	$ 63,208.00	$ 63,208.00	N/A	N/A	$ 53,196.20
$/$ft^2$/year	$ 2.72	$ 2.72	N/A	N/A	$ 2.29
Greenhouse Gas Emissions					
$MtCO_2e$/year	230	230	0	N/A	194
$kgCO_2e/ft^2$/year	10	10	0	N/A	8

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

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

"Hoboken Police HQ"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
BOILER ROOM	BUILDING	H.B. Smith	1	19 SERIES-11 CRN# C3059 6	T-91 262	917	687.8	75	NATURAL GAS	17	35	18	Corrosion at Burner conn. Plate and at gas pipe at selonoid valve

Boiler - Burner

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Vintage	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
BOILER ROOM	BUILDING	Power Flame	1	JR50A-15	99202256	917	Sep-92	75	NATURAL GAS	17	21	4	Corrosion at Burner conn. Plate and at gas pipe at selonoid valve

Boiler - Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Volts	Phase	Approx. Age	ASHRAE Service Life	Notes
BOILER ROOM	HVAC-1 1ST FLOOR	ITT Bell & Gossett	1	FQD56A17D11002BP		1/4							10	
BOILER ROOM	HVAC-2 2ND FLOOR	ITT Bell & Gossett	1	FQD56A17D11002BP		1/4							10	
BOILER ROOM	1ST FLOOR RADIATION	ITT Bell & Gossett	1	FQD56A17D11002BP		1/4							10	
BOILER ROOM	2ND FLOOR RADIATION	ITT Bell & Gossett	1	FQD56A17D11002BP		1/4							10	

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	Service Life	Remaining Life	Notes
BOILER ROOM	BUILDING	State	1	SBF8 0199NE	-	199,990	184	80	80	NATURAL GAS	10+	10	0	Model discontinued in late 90s

Air Handling Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	GPM	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Roof		Trane	1	Climate Changer type L2-2S	K1B196351	DX, R22		490 TC / 325.5 SC	HOT WATER	-	427		43	208	3		38	15	(-23)	7 ZONES
Roof		Trane	1	Climate Changer type L2-2S	K1B196352	DX, R22		454 TC / 315 SC	HOT WATER	-	305		30	208	3		38	15	(-23)	6 ZONES

AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Roof		TRANE	1	RA 400 3A	621-634C 1B-122 74	27.1 TON		R-22	208-230	3	38	20	(-18)	
Roof		TRANE	1	RA 400 3A	621-634C 1B-122 78	26.2 TON		R-22	208-230	3	38	20	(-18)	

Split Systems and AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
IN SERVICE TRAINING RM	IN SERVICE TRAINING RM	Sanyo	1	KMS 0712	-		10 SEER	R-22	-				15		
on grade at Bldg. rear	IN SERVICE TRAINING RM	Sanyo	1	*CO951*	-	9,500	10 SEER	R-22	115	1			15		
HOLDING CELL	HOLDING CELL	Sanyo	1	KMS 1812	-		10 SEER	R-22	-				15		
on grade at Bldg. rear	HOLDING CELL	Sanyo	1	CL1852	32451	17,000		R-22	208-230	1			15		
CHIEF'S OFFICE ?	CHIEF'S OFFICE ?	Mitsubishi	1	PKA-36FA	-			R-410A	-				15		
on grade at Bldg. rear	CHIEF'S OFFICE ?	Mitsubishi	1	PUY-A36 NHA	-	34,200	13.1 SEER	R-410A	208/230	1			15		

PTAC - Units

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - HW	Fan HP	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
HOLDING CELL	HOLDING CELL	GENERAL ELECTRIC	2	ZONELINE 3100	-	DX						41	15	(-26)	

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C08143
Project: Hoboken Energy Audit
Address: 1st and Hudson Street
Hoboken, NJ 07030
Building SF: 23242

"Hoboken Police Head Quarters"

DATE: 06/17/2009
KWH COST: $0.145

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.	CEG Type	Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
1	A	Boiler Room	2	1 Lamp 8' T-12 No Lens	2080	125	0.25	520	$75.40	2	1'X4' 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Lithonia M/N 3889631	49	0.10	203.84	$29.56	$72.00	$144.00	0.15	316.16	$45.84	3.14
2	B		1	2 Lamp 4' T-8, No Lens, 32 watt, Electronic Ballast	2080	58	0.06	120.64	$17.49		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
3	B	Basement Hall	1	2 Lamp 4' T-8, No Lens, 32 watt, Electronic Ballast	8760	58	0.06	508.08	$73.67		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
4	D		2	1 Lamp 4' T-8, No Lens, Electronic Ballast	8760	28	0.06	490.56	$71.13		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
5	A	Weight Room	4	1 Lamp 8' T-12 No Lens	2080	125	0.50	1040	$150.80	4	1'X4' 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Lithonia M/N 3889631	49	0.20	407.68	$59.11	$320.00	$1,280.00	0.30	632.32	$91.69	13.96
6	A	Server Room	1	1 Lamp 8' T-12 No Lens	2080	125	0.13	260	$37.70	1	1'X4' 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Lithonia M/N 3889631	49	0.05	101.92	$14.78	$80.00	$80.00	0.08	158.08	$22.92	3.49
7	E	Inspectoral Services	6	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.35	723.84	$104.96		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
8	E	1st Floor Hall	6	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.35	3048.48	$442.03		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
9	E	1st B-Room	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
10	E	Office	8	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.46	965.12	$139.94		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
11	E	Office	3	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	5	0.02	31.2	$4.52		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
12	E	Office	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.23	482.56	$69.97		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
13	E	Office Hall	3	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.17	1524.24	$221.01		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
14	E	2nd Floor Office Hall	3	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.17	1524.24	$221.01		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
15	E	Office Fl. 2	8	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.46	965.12	$139.94		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
16	E	Office Fl. 2	3	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.17	361.92	$52.48		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
17	E	Office Fl. 2	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.23	482.56	$69.97		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
18	E	Lobby	16	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.93	8129.28	$1,178.75		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

19		Vestibule	4	60 W Incandescent	8760	60	0.24	2102.4	$304.85	4	COMPACT FLUORESCENT	18	0.07	630.72	$91.45	$4.96	$19.84	0.17	1471.68	$213.39	0.09
20	E	Office	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.23	482.56	$69.97		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
21	E	Process Room	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.23	2032.32	$294.69		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
22	D	Process Room Hall	3	1 Lamp 4' T-8, No Lens, Electronic Ballast	8760	28	0.08	735.84	$106.70		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
23	D	Holding Cell	2	1 Lamp 4' T-8, No Lens, Electronic Ballast	8760	28	0.06	490.56	$71.13		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
24	F	Bureau of I.D.	20	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	8760	47	0.94	8234.4	$1,193.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
25	F	Storage	1	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	2080	47	0.05	97.76	$14.18		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
26	E		3	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	28	0.08	174.72	$25.33		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
27	G	Office 1	1	2' x 4' 4 Lamp T-8, Prism Lens, Electronic Ballast	2080	109	0.11	226.72	$32.87		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
28	F	Office 2	2	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	2080	47	0.09	195.52	$28.35		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
29		Kitchen	2	60 W Incandescent	2080	60	0.12	249.6	$36.19	2	COMPACT FLUORESCENT	18	0.04	74.88	$10.86	$4.96	$9.92	0.08	174.72	$25.33	0.39
30	E	Front Desk	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.23	2032.32	$294.69		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
31	F	Dispatch	5	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	8760	47	0.24	2058.6	$298.50		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
32	F	Room adjacent to vestibule	1	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	2080	47	0.05	97.76	$14.18		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
33	E	2nd Floor Lobby	11	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	8760	58	0.64	5588.88	$810.39		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
34	G		1	2' x 4' 4 Lamp T-8, Prism Lens, Electronic Ballast	8760	109	0.11	954.84	$138.45		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
35	E	Men's Locker Room	17	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.99	2050.88	$297.38		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
36	E	Restroom	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
37	F		1	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	2080	47	0.05	97.76	$14.18		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
38	E	Women's Locker Room	1	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.06	120.64	$17.49		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
39	F		2	2' x 2' 3 Lamp T-8, Prism Lens, Electronic Ballast	2080	47	0.09	195.52	$28.35		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
40	E	Office	5	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.29	603.2	$87.46		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
41	G	Classroom	8	2' x 4' 4 Lamp T-8, Prism Lens, Electronic Ballast	2080	109	0.87	1813.76	$263.00		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

42	H	2nd Floor Hall	12	2' x 2' 2 Lamp T-8 U-Tube, Check Lens	8760	73	0.88	7673.76	$1,112.70		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
43	E	Supply	1	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.06	120.64	$17.49		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
44	H	Office Hall	4	2' x 2' 2 Lamp T-8 U-Tube, Check Lens	8760	73	0.29	2557.92	$370.90		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
45	E	Office 1	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
46	E	Office 2	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
47	E	Office 3	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
48	E	Office 4	2	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.12	241.28	$34.99		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
49	E	Office 5	4	2 Lamp 2' x 4' T-8, Checked Lens, Electronic Ballast	2080	58	0.23	482.56	$69.97		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
50	H		2	2' x 2' 2 Lamp T-8 U-Tube, Check Lens	2080	73	0.15	303.68	$44.03		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
51	I	Chief	8	2' x 2' 2 Lamp T-8 Check Lens	2080	73	0.58	1214.72	$176.13		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
52			8	Hi - Hats	2080	65	0.52	1081.6	$156.83		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
53	B	Men"s room	1	2 Lamp 4' T-8, No Lens, 32 watt, Electronic Ballast	2080	58	0.06	120.64	$17.49		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
54	I		1	2' x 2' 2 Lamp T-8 Check Lens	2080	73	0.07	151.84	$22.02		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
55	B	Women's Room	1	2 Lamp 4' T-8, No Lens, 32 watt, Electronic Ballast	2080	58	0.06	120.64	$17.49		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
56	I		1	2' x 2' 2 Lamp T-8 Check Lens	2080	73	0.07	151.84	$22.02		No change recommended.		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
57		**Totals**	232				14.11	67,241.92	$9,750.08	13			0.45	1,419.04	$205.76		$1,533.76	0.784	2752.96	$399.18	3.84

Project Name: LGEA Solar PV Project - Hoboken Police Station
Location: Hoboken, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$103,500
Annual kWh Production	17,946
Annual Energy Cost Reduction	$2,602
Annual SREC Revenue	$6,281
First Cost Premium	**$103,500**
Simple Payback:	**11.65** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.145**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/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	$5,175	0	0	0	$0	0	0	(5,175)	0
1	$0	17,946	$2,602	$0	$6,281	$6,809	$2,339	($264)	($5,439)
2	$0	17,857	$2,680	$0	$6,250	$6,640	$2,508	($218)	($5,657)
3	$0	17,767	$2,761	$0	$6,219	$6,458	$2,690	($169)	($5,826)
4	$0	17,678	$2,844	$0	$6,187	$6,264	$2,884	($117)	($5,942)
5	$0	17,590	$2,929	$181	$6,157	$6,055	$3,092	($244)	($6,186)
6	$0	17,502	$3,017	$180	$6,126	$5,832	$3,316	($186)	($6,372)
7	$0	17,415	$3,107	$179	$6,095	$5,592	$3,556	($125)	($6,496)
8	$0	17,328	$3,200	$178	$6,065	$5,335	$3,813	($61)	($6,558)
9	$0	17,241	$3,296	$178	$6,034	$5,059	$4,088	$5	($6,552)
10	$0	17,155	$3,395	$177	$6,004	$4,764	$4,384	$75	($6,477)
11	$0	17,069	$3,497	$176	$5,974	$4,447	$4,701	$148	($6,330)
12	$0	16,984	$3,602	$175	$5,944	$4,107	$5,041	$224	($6,106)
13	$0	16,899	$3,710	$174	$5,915	$3,743	$5,405	$303	($5,803)
14	$0	16,814	$3,821	$173	$5,885	$3,352	$5,796	$385	($5,418)
15	$0	16,730	$3,936	$172	$5,856	$2,933	$6,215	$472	($4,946)
16	$0	16,646	$4,054	$171	$5,826	$2,484	$6,664	$561	($4,385)
17	$0	16,563	$4,176	$171	$5,797	$2,002	$7,146	$655	($3,730)
18	$0	16,480	$4,301	$170	$5,768	$1,485	$7,662	$752	($2,979)
19	$0	16,398	$4,430	$169	$5,739	$932	$8,216	$853	($2,126)
20	$0	16,316	$4,563	$168	$5,711	$338	$8,810	$958	($1,168)
21	$0	16,234	$4,700	$167	$5,682	$286	$8,099	$1,829	$661
22	$0	16,153	$4,841	$166	$5,654	$196	$6,665	$3,467	$4,128
23	$0	16,072	$4,986	$166	$5,625	$0	$0	$10,446	$14,574
24	$0	15,992	$5,136	$165	$5,597	$0	$0	$10,568	$25,142
25	$0	15,912	$5,290	$164	$5,569	$0	$0	$10,695	$35,838
	Totals:	342,377	$69,922	$2,793	$119,832	$84,630	$98,325	$113,089	($24,152)
				Net Present Value (NPV)			**$2,637**		
				Internal Rate of Return (IRR)			**9.0%**		

Project Name: LGEA Solar PV Project - Hoboken Police Station
Location: Hoboken, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

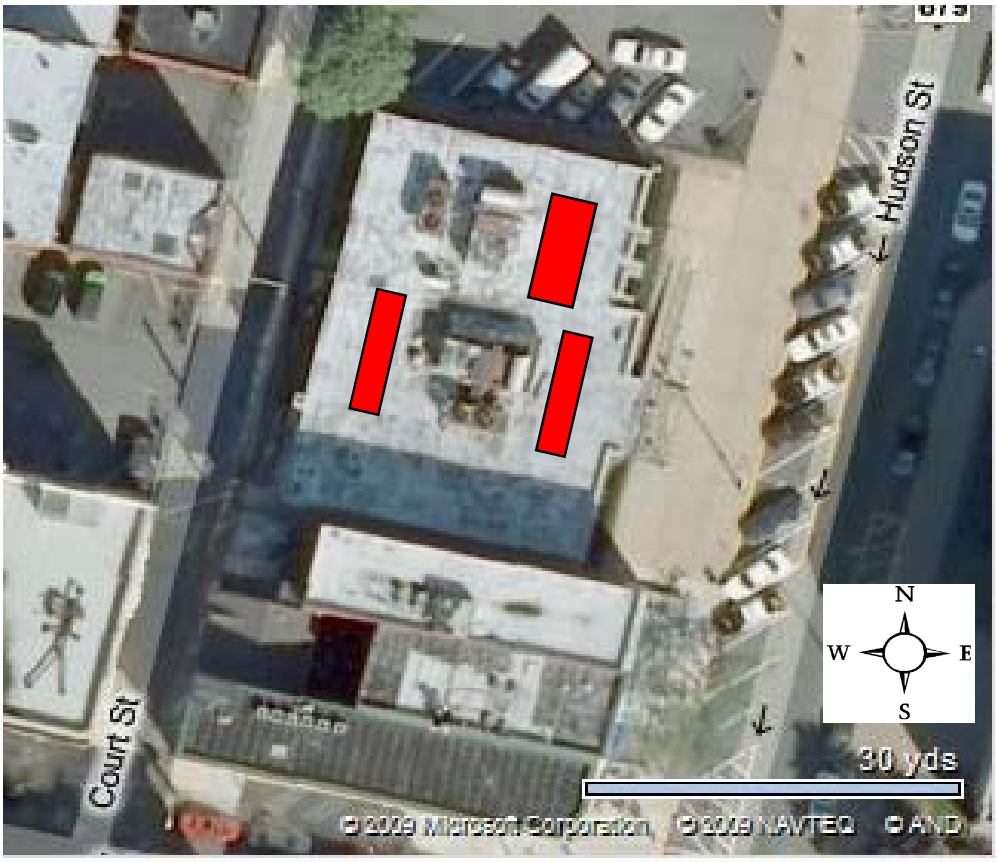
	Photovoltaic System - Direct Purchase
Total Construction Cost	$103,500
Annual kWh Production	17,946
Annual Energy Cost Reduction	$2,602
Annual SREC Revenue	$6,281
First Cost Premium	**$103,500**
Simple Payback:	**11.65** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.145**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$103,500	0	0	0	$0	(103,500)	0
1	$0	17,946	$2,602	$0	$6,281	$8,883	($94,617)
2	$0	17,857	$2,680	$0	$6,250	$8,930	($85,687)
3	$0	17,767	$2,761	$0	$6,219	$8,979	($76,707)
4	$0	17,678	$2,844	$0	$6,187	$9,031	($67,676)
5	$0	17,590	$2,929	$181	$6,157	$8,904	($58,772)
6	$0	17,502	$3,017	$180	$6,126	$8,962	($49,810)
7	$0	17,415	$3,107	$179	$6,095	$9,023	($40,787)
8	$0	17,328	$3,200	$178	$6,065	$9,087	($31,701)
9	$0	17,241	$3,296	$178	$6,034	$9,153	($22,547)
10	$0	17,155	$3,395	$177	$6,004	$9,223	($13,325)
11	$0	17,069	$3,497	$176	$5,974	$9,295	($4,029)
12	$0	16,984	$3,602	$175	$5,944	$9,371	$5,342
13	$0	16,899	$3,710	$174	$5,915	$9,451	$14,793
14	$0	16,814	$3,821	$173	$5,885	$9,533	$24,326
15	$0	16,730	$3,936	$172	$5,856	$9,619	$33,945
16	$0	16,646	$4,054	$171	$5,826	$9,709	$43,654
17	$0	16,563	$4,176	$171	$5,797	$9,802	$53,456
18	$0	16,480	$4,301	$170	$5,768	$9,899	$63,356
19	$0	16,398	$4,430	$169	$5,739	$10,000	$73,356
20	$0	16,316	$4,563	$168	$5,711	$10,106	$83,462
21	$1	16,234	$4,700	$167	$5,682	$10,215	$93,677
22	$2	16,153	$4,841	$166	$5,654	$10,328	$104,005
23	$3	16,072	$4,986	$166	$5,625	$10,446	$114,451
24	$4	15,992	$5,136	$165	$5,597	$10,568	$125,019
25	$5	15,912	$5,290	$164	$5,569	$10,695	$135,714
	Totals:	342,377	$69,922	$2,793	$119,832	$239,214	$186,962
				Net Present Value (NPV)		**$135,739**	
				Internal Rate of Return (IRR)		**7.5%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Police Station	732	Sunpower SPR230	50	14.7	735	11.50	17,946	1,650	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.