ENERGY AUDIT – FINAL REPORT

BRANCHBURG TOWNSHIP
POLICE BUILDING,
1077 US HIGHWAY 202 NORTH
BRANCHBURG, NJ 08876
ATTN: JOHN GREGORY JR.,
ASSISTANT ADMINISTRATOR

CEG PROJECT NO. 9C09060

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I. EXECUTIVE SUMMARY

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

Branchburg Township
Police Building
1077 US Highway 202 North
Branchburg, NJ 08876

Municipal Contact Person: John Gregory
Facility Contact Person: Tom Mantz

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

The annual energy costs at this facility are as follows:

Electricity	$ 24,316
Natural Gas	$ 8,164
Total	$ 32,480

The potential annual energy cost savings for each energy conservation measure (ECM) are shown below in Table 1. Be aware that the ECM's are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST[A]	ANNUAL SAVINGS[B]	SIMPLE PAYBACK (YEARS)	SIMPLE ROI
1	Lighting Upgrade – General	$4,823	$576	8.4	11.9%
2	Lighting Controls	$1,809	$436	4.2	24.1%
3	HVAC Split System Replacement	$6,203	$295	21.9	4.8%
4	Solar PV System	$124,200	$7,537	11.3	8.8%

Notes: A. Cost takes into consideration applicable NJ Smart Start™ incentives.
B. Savings takes into consideration applicable maintenance savings.

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

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	NAT GAS (THERMS)
1	Lighting Upgrade – General	1.66	3,514	-
2	Lighting Controls	-	2,727	-
3	HVAC Split System Replacement	2.31	1,846	-
4	Solar PV System	13.8	21,536	-

*Elec. Demand Savings are calculated for cooling season only. Elec. consumption savings are totaled annually.

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under seven (7) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #2:** Lighting Controls

Although ECM #3 does not provide a payback less than 7 years, it is recommended to proceed with the installation of an efficient split system condensing unit as suggested in ECM #3 (or equal), since the existing unit is in poor condition and is a good candidate for replacement.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Maintain all weather stripping on entrance doors.
2. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

5. Install programmable thermostats and set back zones 5°F - 10°F in unoccupied periods.
6. Re-insulate the attic floor where damaged to ensure full vapor barrier and fiberglass insulation is filled throughout the entire joist space.

II. INTRODUCTION

The comprehensive energy audit covers the 9,134 square foot Police Building, which includes the offices, a conference room, locker rooms, workout area, holding room, and storage areas.

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 Appendix A).

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 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

The electric usage profile (below) represents the actual electrical usage for the facility. Jersey Central Power and Light (JCP&L) provides electricity to the facility under their General Service Secondary Three-Phase rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. Public Service Electric and Gas (PSE&G) provides natural gas to the facility under the Basic General Supply Service (GSGH) rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provide, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	16.0¢ / kWh
Natural Gas	$1.47 / Therm

Table 3
Electricity Billing Data

Utility Provider: JCP&L, General Service Secondary 3 Phase			
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND**	**TOTAL BILL**
Jan-08	10,200	39.6	$1,521
Feb-08	10,960	39.6	$1,615
Mar-08	9,640	39.6	$1,374
Apr-08	9,720	30.8	$1,425
May-08	12,680	32.0	$2,086
Jun-08	17,320	39.6	$3,048
Jul-08	19,640	39.6	$3,419
Aug-08	15,760	39.6	$2,788
Sep-08	13,120	39.2	$2,035
Oct-08	11,720	27.6	$1,776
Nov-08	10,800	39.6	$1,646
Dec-08	10,500	39.6	$1,583
Totals	**152,060**	**39.6 Max**	**$24,316**
AVERAGE DEMAND 37.2 KW average			
AVERAGE RATE $0.160 $/kWh			

*Dec-08 data estimated based on previous month profile

Figure 1
Electricity Usage Profile

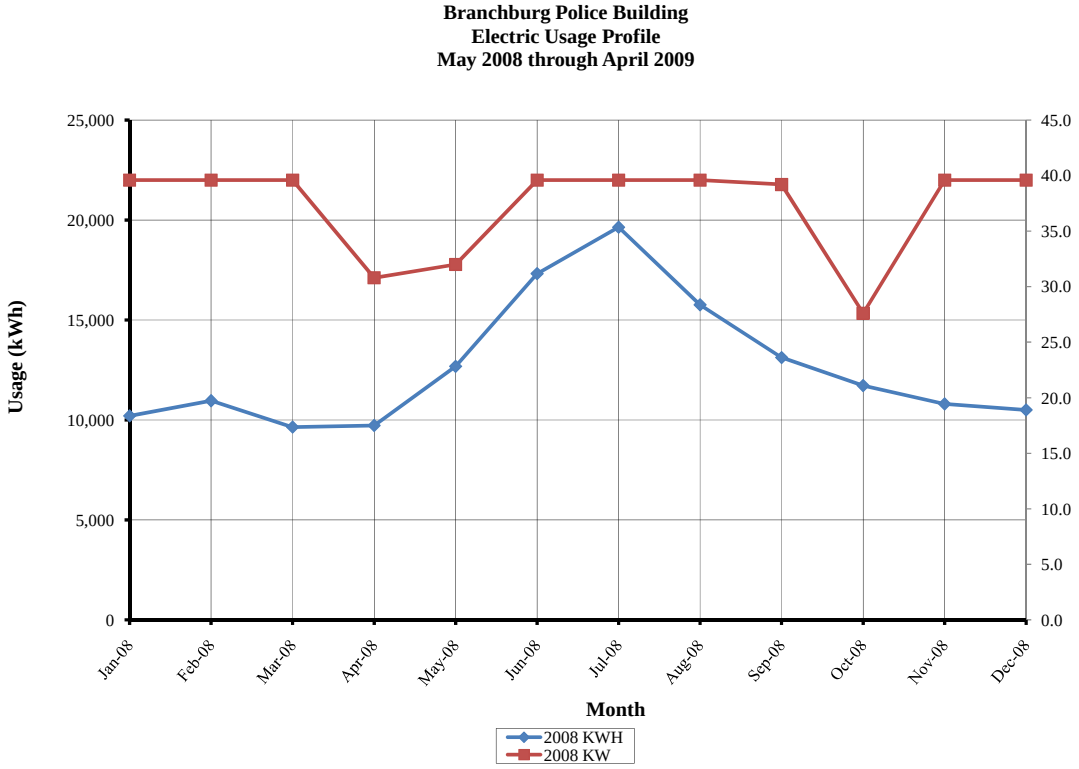
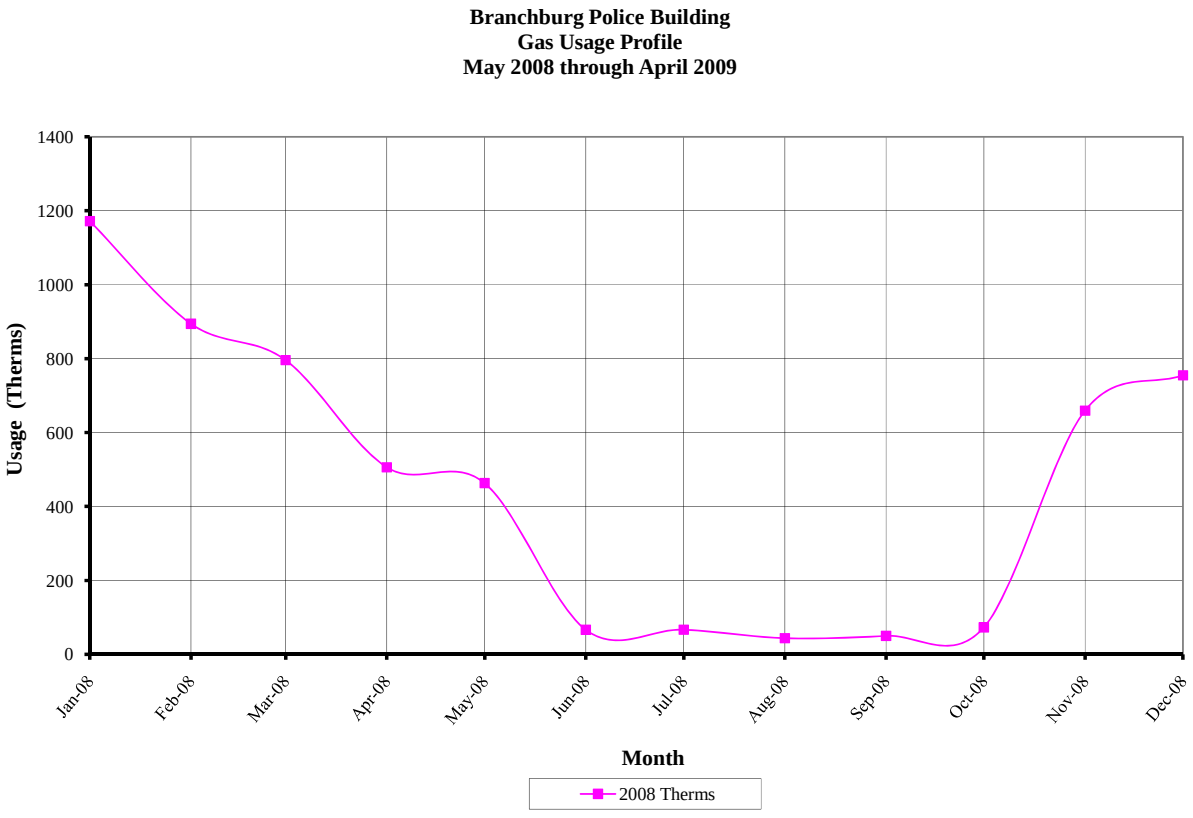


Table 4
Natural Gas Billing Data

Utility Provider: PSE&G, Rate - GSGH, (Meter # 3355600)		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Jan-08	1,171.71	$1,620.10
Feb-08	894.35	$1,298.01
Mar-08	796.09	$1,226.52
Apr-08	506.04	$788.62
May-08	463.26	$765.70
Jun-08	66.71	$128.97
Jul-08	66.84	$137.25
Aug-08	43.99	$82.53
Sep-08	50.28	$83.18
Oct-08	73.18	$109.71
Nov-08	659.24	$898.51
Dec-08	754.78	$1,025.41
TOTALS	**5546.45**	**$8,164.51**
AVERAGE RATE:	**$1.47**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

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

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

The site and source EUI for this facility is calculated as follows. (See Table 5 for details):

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

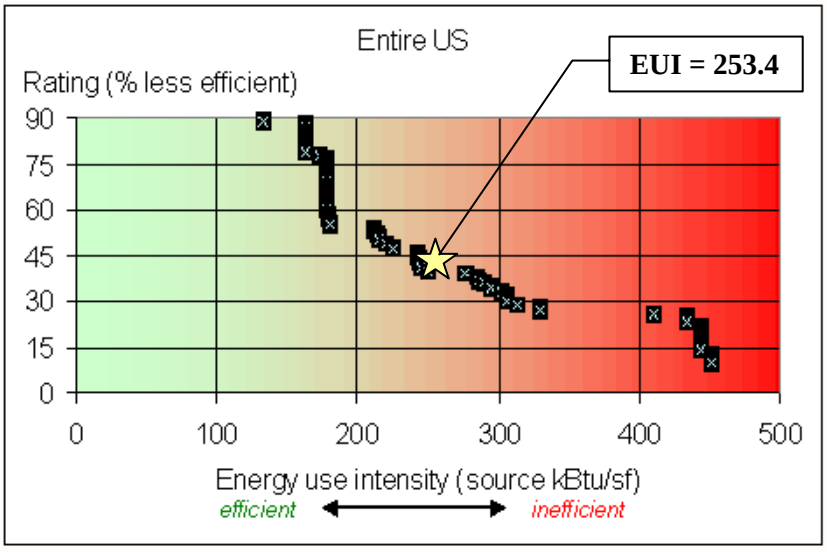
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

Table 5
Branchburg Police Building EUI Calculations

ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu	RATIO	kBtu
ELECTRIC	152,060			519,133	3.340	1,733,904
NATURAL GAS		5,546.45		554,645	1.047	580,713
FUEL OIL			0.00	0	1.010	0
PROPANE			0.00	0	1.010	0
TOTAL				1,073,778		2,314,617
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		9,134		SQUARE FEET		
BUILDING SITE EUI		117.56		kBtu/SF/YR		
BUILDING SOURCE EUI		**253.42**		**kBtu/SF/YR**		

Table Figure 3 below depicts a national EUI grading for the source energy use of public order and safety buildings.

Figure 3
Source Energy Use Intensity Distributions: Public Order Buildings



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 tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

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

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The following is the user name and password for this account:

User Name:	branchburg
Password:	lgeaceg2009
Security Question:	What city were you born in?
Security Answer:	"branchburg"

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Police Bldg	N/A	N/A

The Police building fall under an "other" category which is not applicable for Energy Performance Rating. See the Statement of Energy Performance appendix for the detailed energy summary.

V. FACILITY DESCRIPTION

The 9,134 SF Police Building is a two story facility comprised of offices, a conference room, and holding rooms on the ground floor and storage area, locker room, and workout area on the basement floor. The facility is open 24 hours per day however, the typical hours of operation for the office areas, are between 8:00 am and 4:30 pm. Exterior walls are brick construction. The amount of insulation within the wall is unknown. The roof and attic structure is wood frame construction with insulation in the attic floor joist spaces. The attic floor insulation is falling through in many locations and is in overall poor condition due to personnel walking through the attic to maintain the HVAC systems. The roof is plywood construction with shingles. None of the HVAC systems are mounted on the roof. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the facility are double pane, ¼" clear glass with wood frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building was built in 1985 with one addition since the original construction. The addition was completed in 1995, which is comprised of offices and a conference room.

HVAC Systems

The building is conditioned by multiple residential style split systems. Each split system is made up of a gas fired furnace with DX cooling coils in the attic and a remote condensing unit mounted outside on grade next to the building. Each system is a constant volume unit with single stage of cooing. Local thermostats control each split system for heating and cooling to regulate space temperature. Conditioned air is distributed to for each system through ductwork run in the attic to ceiling diffusers throughout the building. The basement and garage is only heated with two standalone unit heaters in the basement and one larger unit heater in the garage. The basement and garage unit heaters are gas fired indirect unit heater hung from the ceilings.

The two split systems in the addition are in good condition. The old portion of the building has one older split system in fair to poor condition and one newer unit in good condition. The unit heaters are in fair condition.

Exhaust / Ventilation System

The exhaust systems are comprised on exhaust fans within the bathrooms and locker rooms ducted to the outdoors. The attic in the addition is ventilated with a centrifugal exhaust fan ducted to a side wall louver. The existing building attic is ventilated with a large prop fan mounted in the bell-tower style penthouse in the center of the building. The addition attic is extremely hot and under ventilated resulting in excess heat radiating back down to the conditioned space and heat being absorbed through the supply and return ductwork distribution. The existing building attic ventilation is sized and performing adequately.

Domestic Hot Water

Domestic hot water for the restrooms, conference room sink, and locker room showers is provided by a gas fired hot water heater. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The circulation pump runs 24 hours per day.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. Rooms in the original building including locker rooms, basement, evidence room, holding cells, storage rooms and closets are lit with T-12 fixtures and magnetic ballasts. Other areas including the stairs and foyers are lit with recessed compact fluorescent lamps. The parking lot is lit with light poles and high pressure sodium lamps. Accent lighting, ground lighting and signage lights are incandescent flood light and other various fixtures with standard bulbs.

VI. MAJOR EQUIPMENT LIST

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

Refer to the Major Equipment List appendix for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade – General

Description:

The lighting in the police building is partially made up of fluorescent fixtures with T-12 lamps and magnetic ballasts. The remaining lighting is fluorescent fixtures with T-8 lamps and electronic ballasts, compact fluorescent fixtures. The attic was lit for service for the AHU's with standard bulb incandescent fixtures.

This ECM includes 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 lamp and ballasts. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes replacement of the incandescent outdoor fixtures to compact fluorescent fixtures. The energy usage of an incandescent compared to a compact fluorescent approximately 3 - 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 – 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

The Investment Grade Lighting Audit appendix outlines the proposed retrofits, costs, savings, and payback periods.

NJ Smart Start® Program Incentives are calculated as follows:

From the Smart Start Incentive appendix, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-2 lamp) = $10 per fixture; T-5 or T-8 (3-4 lamp) = $20 per fixture.

$$\text{Smart Start® } Incentive = (\#\ of\ 1-2\ lamp\ \ fixtures \times\ \$10) + (\#\ of\ 3-4\ lamp\ \ fixtures \times\ \$20)$$

$$\text{Smart Start® } Incentive = (42 \times\ \$10) + (0 \times\ \$20) = \underline{\$420}$$

Replacement and Maintenance Savings are calculated as follows:

$$Savings = (reduction\ in\ lamps\ replaced\ \ per\ \ year) \times (repacment\ \$\ per\ lamp + Labor\ \$\ per\ lamp)$$

$$Savings = (2\ lamps\ \ per\ \ year) \times (\$2.00 + \$5.00) = \underline{\$14}$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,243
NJ Smart Start Equipment Incentive ($):	($420)
Net Installation Cost ($):	$4,823
Maintenance Savings ($ / yr):	*$14*
Energy Savings ($ / yr):	*$562*
Net Savings ($ / yr):	*$576*
Simple Payback (yrs):	*8.4*
Simple Return On Investment	*11.9%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Savings ($):	*$14,400*

ECM #2: Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in storage rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. Photocell control senses light levels and turn off or reduce lights when there is adequate daylight. Photocells are mostly used outside, but are becoming more popular in energy-efficient interior lighting designs as well.

ASHRAE Standard 90.1-2004, Appendix G is a reference standard for modeling building efficiency. The standard estimates that lighting controls provide a 10% reduction in lighting power usage for daytime occupancies in buildings over 5,000 SF, and 15% reduction in buildings under 5,000 SF. This ECM implements dual technology occupancy sensors in the courthouse, each private office, open office, conference room, restrooms, lunch room, storage rooms, and file room.

The ECM includes replacement of standard wall switches with sensors wall switches for individual rooms, ceiling mount sensors for large office areas or restrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. See “Investment Grade Lighting Audit” appendix for details.

The “Investment Grade Lighting Audit” appendix of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by 10% for all areas that include occupancy sensor lighting controls and 20% for areas that include occupancy sensors as well as photocell daylight sensors.

Energy Savings Calculations:

$$Energy\ Savings = 10\% \times Occuapancy\ Sensored\ Light\ Energy\ (kWh/Yr)$$

$$Energy\ Savings = 10\% \times 27{,}267\ (kWh) = 2{,}727\ (kWh)$$

$$Savings. = Energy\ Savings\ (kWh) \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

$$Savings. = 2{,}727\ (kWh) \times 0.160\left(\frac{\$}{kWh}\right) = \$436$$

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

$$Installation\ Cost = (\#\ of\ \ sensors \times\ \ \$\ per\ sensor) = (33 \times \$75) = \underline{\$\ 2{,}475}$$

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the incentive for installing a lighting control is $20 per controller.

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ controller \times\ \ \$\ 20) = (33 \times \$\ 20) = \underline{\$\ 666}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY*	
Installation Cost ($):	$2,475
NJ Smart Start Equipment Incentive ($):	($666)
Net Installation Cost ($):	*$1,809*
Maintenance Savings ($ / yr):	-
Energy Savings ($ / yr):	*$436*
Total Energy Savings ($ / yr):	*$436*
Simple Payback (yrs):	*4.2*
Simple Return On Investment (%):	*24.1%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$6,540*

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

ECM #3: HVAC Split System Replacement

Description:

The Police Building is conditioned through 4 split systems. Three of the systems are in good condition. The largest of the systems is a 7.5 Ton York unit which serves the center of the building. This unit is old and poor condition. The unit's cooling efficiency was 9.63 EER when new. Due to the age and wear, the estimated cooling efficiency is 9.0 EER today. The life span of the split system is 15 years.

This ECM includes replacing the 7.5 ton split system condensing unit and DX cooling coil. The ECM calculations are based on a 7.5 ton Trane split system model TTA090 or equal. Cooling efficiency of 11.7 EER.

Cooling Season Full Load Cooling Hrs. = 800 hrs/yr.
Average Cost of Electricity = $0.160/kWh

Total Rated Cooling Capacity = 7.5 Tons
Existing System Efficiency = 9.0 EER
Proposed System Efficiency = 11.7 EER

Energy Savings Calculations:

Cooling Savings Calculation:

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}}\right) \times Full\ Load\ Hrs.$$

$$EnergySavings = \frac{7.5\,(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{9.0\left(\frac{Btu}{W}\right)} - \frac{1}{11.7\left(\frac{Btu}{W}\right)}\right) \times 800\ hours$$

$$= 1{,}846\ kWh$$

$$Demand\ Savings = \frac{Energy\ Savings\,(kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{1{,}846\,(kWh)}{800\ Hrs.} = 2.31\ KW$$

$$Cooling\ Cost\ Savings = 1{,}846\,(kWh) \times 0.160\left(\frac{\$}{kWh}\right) = \$295$$

Installation cost for the 7.5 ton split system condensing unit and DX cooling coil is estimated at $6,750. Note that this estimate includes the demolition of the existing units.

From the NJ Smart Start® Program appendix, the rooftop unit replacement falls under the category "Central DX AC Systems" and warrants an incentive based on efficiency (EER) at a certain cooling tonnage. The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\,Tons \times\ \$/Ton\ Incentive)$$
$$= (7.5 Tons \times \$73/Ton) = \$548$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY*	
Installation Cost ($):	$6,750
NJ Smart Start Equipment Incentive ($):	($548)
Net Installation Cost ($):	*$6,202*
Maintenance Savings ($ / yr):	-
Energy Savings ($ / yr):	*$295*
Total Energy Savings ($ / yr):	*$295*
Simple Payback (yrs):	*21.0*
Simple Return On Investment (%):	*4.8%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$4,425*

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 Branchburg NJ, and concluded that there is potential for solar energy generation.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof 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 880 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in the Renewable / Distributive Energy Measures Calculation appendix. Using this square footage it was determined that a system size of 13.8 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 21,536 KWh annually, reducing the overall utility bill by approximately 14% percent. A detailed financial analysis can be found in Renewable / Distributed Energy Measures Calculation appendix. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The solar panel system analysis is based on Sun Power SPR-230 panels. The panel efficiency is 18% with an inverter efficiency of 95%. This region allows for a typical range of sunlight between 4.5 and 4.9 hours per day. The calculations are based on an average 4.68 hours per day. The operating hours are calculated based on 351 days per year accounting for two weeks per year of service down time. The calculations are also based on a solar PV system which utilizes the New Jersey guidelines for net metering. Net metering allows excess energy generated at production peaks to flow onto the grid. The excess energy is metered and subtracted from the facility's total energy usage on an annual basis. Due to this allowance the system design excludes the use of inefficient battery storage.

CEG has reviewed financing options for the owner. Two options were studied and they are as follows: Self-financed and direct purchase without finance. Self-finance was calculated with

95% of the total project cost financed at a 7% interest rate over 25 years. Direct purchase involves the local government paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Both of these calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following are the payback periods for the respective method of payment:

PAYMENT TYPE	SIMPLE PAYBACK	SIMPLE ROI	INTERNAL RATE OF RETURN
Self-Finance	11.3 Years	8.8%	11.9%
Direct Purchase	11.3 Years	8.8%	7.9%

*The solar energy measure is shown for reference in the executive summary ECM table

The resultant Internal Rate of Return indicates that if the Owner was able to "self-finance" the solar project, the project would be slightly more beneficial to the Owner. However, if the Owner was able to work out a Power Purchase Agreement with a third-party and agree upon a decent base energy rate for kilowatt hour production, the "direct purchase" option could also, prove to be a beneficial route.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the Branchburg Police Building. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed of approximately seven (7) mile per hour not adequate, and the kilowatt demand for the building is below the threshold (200 kW typically) for purchase of a commercial wind turbine. Therefore, CEG has determined that wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. 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 typical cooling load profile. The summer (May-September) demonstrates increased consumption typical to air conditioning load (as exemplified by the multiple split systems). There is a fairly steady yearlong electric load most likely attributable to office equipment and 24 hour operation of the facility. A flat load profile will allow for more competitive energy prices when shopping for alternative suppliers.

Natural Gas:

The Natural Gas Profile demonstrates a very typical natural gas (heat load) profile. The summer months (June – October) demonstrate very low consumption, complimenting the heating load (November –March). The heating load is attributable to a natural gas-fired furnace and indirect unit heater hung from the ceiling. Domestic hot water is supplied by a natural gas-fired hot water heater. A base-load shaping (flat) will secure more competitive energy prices when procuring through an alternative energy source.

Tariff Analysis:

Electricity:

This facility receives electrical service through Jersey Central Power & Light (JCP&L) on a GSS (General Service Secondary-3 phase) rate. Service classification GS is available for general service purposes on secondary voltages not included under Service Classifications RS, RT, RGT or GST. This facilities rate is a single or three phase service at secondary voltages. For electric supply (generation), the customer will use the utilities Basic Generation Service (BGS) or a Third Party Supplier (TPS). This facility uses Basic Generation service from the utility. Therefore they will pay according to the BGS default service. The Delivery Service includes the following charges: Customer Charge, Supplemental Customer Charge, Distribution Charge (kW Demand), kWh Charge, Non-utility Generation Charge, TEFA, SBC, SCC, Standby Fee and RGGI

Natural Gas:

This facility receives natural gas service through Public Service Electric and Gas Company (PSE&G) on a GSGH (General Service Gas-Heating) rate when not receiving commodity by a Third Party Supplier. The utility tariff rate (GSGH) is for General Service. This is a firm delivery service (higher level of delivery) for general purposes where 1) customer does not qualify for RSG (residential) and 2) customers usage does not exceed 3,000 therms in any month. Customers may either purchase gas supply from a Third Party (TPS) of from Public Services Basic Gas Supply Service default service as detailed in the rate schedule.

The service described above has a much higher priority of delivery, based on the pipeline capacity. When the pipelines capacity was unbundled (much like the telecom service), it was divided into various levels of service. The "firm" service is the highest priority, and does not get interrupted.

This rate 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). Note: Should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service. Should the TPS supplier under-deliver, the utility will make up the difference automatically with a default 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.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the Township. The primary area for potential improvement is seen in the electric costs. The average price per kWh (kilowatt hour) for all buildings based on 1-year historical average price is $.1374/kWh (this is the average "price to compare" when shopping for energy). The average price per decatherm for natural gas is $ 11.08 / 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 Township could see improvement in its energy costs if it were to take advantage of these current market prices quickly, before energy increases. Based on annual historical consumption (May 2008 through April 2009) and current electric rates, the Township could see an improvement in its electric costs of up to 20% annually. (Note: Savings were calculated using Average Annual Consumption and a variance to a Fixed Average 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 the natural gas costs. Based on the current market, Branchburg could improve its natural gas costs up to 25% annually. CEG recommends that Branchburg receives further advisement on these prices. The Township should also consider procuring energy (natural gas) through alternative supply sources.

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. Loptacong 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 information to manage ongoing demand-side management projects. Furthermore, special attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition Branchburg 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 supplier for energy (natural gas) is changed, closely monitor balancing, particularly when the contract is close to termination. This could be performed with the aid of an "energy advisor".

X. INSTALLATION FUNDING OPTIONS

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

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

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

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

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

D. Clean all light fixtures to maximize light output.

E. Install programmable thermostats and set back zones 5°F - 10°F in unoccupied periods.

F. Confirm that outside air dampers on the split systems are functioning properly (closed in unoccupied periods) repair / replace where not functioning correctly.

G. Re-insulate the attic floor where damaged to ensure full vapor barrier and fiberglass insulation filled throughout entire joist space.

In addition to the recommendations above, implementing Retro-Commissioning would be beneficial for this facility. Retro-Commissioning is a means to verify your current equipment is operating at its designed efficiency, capacity, airflow, and overall performance. Retro-Commissioning provides valuable insight into systems or components not performing correctly or efficiently. The commissioning process defines the original system design parameters and recommends revisions to the current system operating characteristics.

INSTALLATION COST AND REBATES

CONCORD ENGINEERING GROUP

Branchburg - Police Building

ECM 1: LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$4,193	-	-	$5,243
Utility Incentive - NJ Smart Start					($420)
Total Cost Less Incentive					$4,823

ECM 2: LIGHTING CONTROLS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	33	$75	$1,125	$1,350	$2,475
Utility Incentive - NJ Smart Start					($666)
Total Cost Less Incentive					$1,809

ECM 3: HVAC SPLIT SYSTEM REPLACEMENT

	Qty	Unit Cost $	Material $	Labor $	Total $
7.5 Ton CU replacement	1	$6,750	$3,375	$3,375	$6,750
Utility Incentive - NJ Smart Start					($548)
Total Cost Less Incentive					$6,202

ECM 4: SOLAR PV SYSTEM

	Qty	Unit Cost $	Material $	Labor $	Total $
Solar PV System	1	$124,200			$124,200
Utility Incentive - (see Renewable Energy Measures appendix for details)					-
Total Cost Less Incentive					$124,200

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Branchburg Police Building"

Domestic Hot Water Heaters

Service	Location	Manufacturer	Type	Qty.	Model #	Serial #	Input (KW)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Sinks, Showers	Bsmt Closet	-	Gas	1	-	-	-	-	-	-	-	-	10	-

Ductless Split Systems

Service	Location	Manufacturer	Type	Qty.	Model #	Serial #	Cooling Type	Cooling Capacity	SEER	Heating Type	Heating Capacity (Input)	Eff	Fan HP	Motor RPM	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Addition SW Side	AHU - Attic	Trane	Constant Volume DX split system	1	TXC048C4HPB1	M303R0A5G	DX R-22	48 MBH	10	Gas	-	80%	-	-	208	1	5	15	10
	CU - Grade			1	TTA048C300A0	M14315CBF							-	-	208	1	5	15	10
Addition NE Side	AHU - Attic	Trane	Constant Volume DX split system	1	TXC048C4HPB1	M302SP35G	DX R-22	48 MBH	10	Gas	-	80%	-	-	208	1	5	15	10
	CU - Grade			1	TTA048C300A0	M34145YBF							-	-	208	1	5	15	10
Original Building Center	AHU - Attic	York	Constant Volume DX split system	1	P4HUE30N13006A	WGMM023602	DX R-22	90 MBH	9.63	Gas	-	80%	-	-	208	1	Unknown	15	-
	CU - Grade			1	H1RA090S25A	WGMM054760							-	-	208	3	Unknown	15	-
Original Building End	AHU - Attic	Trane	Constant Volume DX split system	1	TXC049C4HPB1	M225RS45G	DX R-22	48 MBH	10	Gas	-	80%	-	-	208	1	5	15	10
	CU - Grade			1	2TTA0048A30000AA	80354K543F							-	-	208	1	5	15	10

Unit Heaters

Service	Location	Manufacturer	Type	Qty.	Model #	Serial #	Fan (CFM)	Input (MBH)	Output (MBH)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Bsmt	Bsmt	ITT Grinnell	Gas	2	-	-	-	60	48	-	Nat Gas	-	13	-
Garage	Garage	Modine	Gas	1	PAE175AC	5081010694	-	175	140	-	Nat Gas	-	13	-

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Police Building

Building ID: 1817015
For 12-month Period Ending: November 30, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 27, 2009

Facility
Police Building
1077 US Highway 202 North
Branchburg, NJ 08876

Facility Owner
Township of Branchburg
1077 US Highway 202 North
Branchburg, NJ 08876

Primary Contact for this Facility
John Gregory
1077 US Highway 202 North
Branchburg, NJ 08876

Year Built: 1985
Gross Floor Area (ft²): 9,134

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

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	564,131
Electricity (kBtu)	514,142
Total Energy (kBtu)	1,078,273

Energy Intensity[5]

Site (kBtu/ft²/yr)	118
Source (kBtu/ft²/yr)	254

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	108

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	62%
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
Ray Johnson
520 S Burnt Mill Road
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 Building	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	1077 US Highway 202 North, Branchburg, NJ 08876	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 Building (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	9,134 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	15 (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	12 (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: Jersey Central Power & Lt Co

Fuel Type: Electricity

Meter: Electric Meter (kWh (thousand Watt-hours))
Space(s): Entire Facility

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/02/2008	11/03/2008	11,720.00
09/04/2008	10/01/2008	13,120.00
08/05/2008	09/03/2008	15,760.00
07/03/2008	08/04/2008	19,640.00
06/03/2008	07/02/2008	17,320.00
05/02/2008	06/02/2008	12,680.00
04/03/2008	05/01/2008	9,720.00
03/04/2008	04/02/2008	9,640.00
02/01/2008	03/03/2008	10,960.00
01/03/2008	01/31/2008	10,200.00
12/04/2007	01/03/2008	10,520.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**141,280.00**
Electric Meter Consumption (kBtu)		**482,047.36**
Total Electricity Consumption (kBtu)		**482,047.36**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Gas Meter (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
10/16/2008	11/20/2008	659.24
09/17/2008	10/16/2008	73.18
08/18/2008	09/17/2008	50.28
07/22/2008	08/18/2008	43.99
06/21/2008	07/22/2008	66.84
05/20/2008	06/21/2008	66.71
04/24/2008	05/20/2008	463.26
03/24/2008	04/24/2008	506.04
02/20/2008	03/24/2008	796.09
01/24/2008	02/20/2008	894.35

12/18/2007	01/24/2008	1,171.71
Gas Meter Consumption (therms)		**4,791.69**
Gas Meter Consumption (kBtu)		**479,169.00**
Total Natural Gas Consumption (kBtu)		**479,169.00**
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.

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C08060
Project: Branchburg Police Building Energy Audit
Address: 1077 US Highway 202 North
Branchburg, NJ 08876
Building SF: 9134

"Branchburg Police Building"

KWH COST: $0.160

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING											PROPOSED LIGHTING								SAVINGS				
Line No.	CEG Type	Fixture Location	No. Fixts	No. Lamps	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	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	Evidence Room	4	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	94	0.38	196	$31.28	4	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.22	114	$18.30	$100.00	$400.00	0.16	81.12	$12.98	30.82
2	A	Basement Storage	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	94	0.09	49	$7.82	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	29	$4.58	$100.00	$100.00	0.04	20.28	$3.24	30.82
3	A	Basement	14	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	94	1.32	2,737	$437.96	14	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.77	1,602	$256.26	$100.00	$1,400.00	0.55	1135.68	$181.71	7.70
4	B	Stairs	1	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.04	87	$13.98	1	2	2' 2-Lamp T-8 17W wall Mtd.Metalux BC217	34	0.03	71	$11.32	$151.00	$151.00	0.01	16.64	$2.66	56.72
	M		3	0	1-Lamp CFL Recessed Fixture	2080	38	0.11	237	$37.94	3	0	No Change	38	0.11	237	$37.94	$0.00	$0.00	0.00	0	$0.00	0.00
	N		3	0	2-Lamp CFL Recessed Fixture	2080	28	0.08	175	$27.96	3	0	No Change	28	0.08	175	$27.96	$0.00	$0.00	0.00	0	$0.00	0.00
5	C	Small Foyer	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	8760	73	0.07	639	$102.32	1	0	No Change	73	0.07	639	$102.32	$0.00	$0.00	0.00	0	$0.00	0.00
6	D	Men's Locker and Women's Locker	3	0	2'x2' 2-Lamp T-8 U-Tube, Prism Lens Electronic Ballast	2080	73	0.22	456	$72.88	3	0	No Change	73	0.22	456	$72.88	$0.00	$0.00	0.00	0	$0.00	0.00
	B		4	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.17	349	$55.91	4	2	2' 2-Lamp T-8 17W wall Mtd.Metalux BC217	34	0.14	283	$45.26	$151.00	$604.00	0.03	66.56	$10.65	56.72
	E		6	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	0.35	724	$115.81	6	0	No Change	58	0.35	724	$115.81	$0.00	$0.00	0.00	0	$0.00	0.00
7	D	Men's Locker and Women's Locker	3	0	2'x2' 2-Lamp T-8 U-Tube, Prism Lens Electronic Ballast	2080	73	0.22	456	$72.88	3	0	No Change	73	0.22	456	$72.88	$0.00	$0.00	0.00	0	$0.00	0.00
	B		4	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.17	349	$55.91	4	2	2' 2-Lamp T-8 17W wall Mtd.Metalux BC217	34	0.14	283	$45.26	$151.00	$604.00	0.03	66.56	$10.65	56.72
	E		6	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	0.35	724	$115.81	6	0	No Change	58	0.35	724	$115.81	$0.00	$0.00	0.00	0	$0.00	0.00
7	C	Traffic Section	6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.44	911	$145.77	6	0	No Change	73	0.44	911	$145.77	$0.00	$0.00	0.00	0	$0.00	0.00
8	C	Patrol Offices	3	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.22	456	$72.88	3	0	No Change	73	0.22	456	$72.88	$0.00	$0.00	0.00	0	$0.00	0.00
	O		1	0	2-Lamp CFL Recessed Fixture	8760	76	0.08	666	$106.52	1	0	No Change	76	0.08	666	$106.52	$0.00	$0.00	0.00	0	$0.00	0.00

9	E	Main Foyer	10	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	8760	58	0.58	5,081	$812.93	10	0	No Change	58	0.58	5,081	$812.93	$0.00	$0.00	0.00	0	$0.00	0.00
10	C	Restroom	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.07	152	$24.29	1	0	No Change	73	0.07	152	$24.29	$0.00	$0.00	0.00	0	$0.00	0.00
11	E	Main Hall	18	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	1.04	2,172	$347.44	18	0	No Change	58	1.04	2,172	$347.44	$0.00	$0.00	0.00	0	$0.00	0.00
12	C	Shift Supervisor	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
13	N	Conference Room	3	0	2-Lamp CFL Recessed Fixture	2080	28	0.08	175	$27.96	3	0	No Change	28	0.08	175	$27.96	$0.00	$0.00	0.00	0	$0.00	0.00
	C		6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.44	911	$145.77	6	0	No Change	73	0.44	911	$145.77	$0.00	$0.00	0.00	0	$0.00	0.00
	J		2	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	46	0.09	191	$30.62	2	0	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.06	125	$19.97	$100.00	$200.00	0.03	66.56	$10.65	18.78
14	C	Criminal Inv. Corn	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
15	C	Criminal Inv. Center	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
16	C	Auxilary Hall	2	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.15	304	$48.59	2	0	No Change	73	0.15	304	$48.59	$0.00	$0.00	0.00	0	$0.00	0.00
17	F	Holding Cell 1	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	80	0.08	166	$26.62	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	114	$18.30	$100.00	$100.00	0.03	52	$8.32	12.02
18	F	Holding Cell 2	2	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	80	0.16	333	$53.25	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	229	$36.61	$100.00	$200.00	0.05	104	$16.64	12.02
19	F	Garage	8	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	80	0.64	333	$53.25	8	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.44	229	$36.61	$100.00	$800.00	0.20	104	$16.64	48.08
20	G	Backing Room	2	0	2'X4' 3-Lamp T-8 Parabolic Lens Electronic Ballast	2080	82	0.16	341	$54.58	2	0	No Change	82	0.16	341	$54.58	$0.00	$0.00	0.00	0	$0.00	0.00
	H		1	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	39	0.04	81	$12.98	1	0	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.03	62	$9.98	$100.00	$100.00	0.01	18.72	$3.00	33.39
21	C	Records Station	8	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.58	1,215	$194.36	8	0	No Change	73	0.58	1,215	$194.36	$0.00	$0.00	0.00	0	$0.00	0.00
22	I	Central Files Room	6	0	1'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	520	58	0.35	181	$28.95	6	0	No Change	58	0.35	181	$28.95	$0.00	$0.00	0.00	0	$0.00	0.00
23	G	Office	2	0	2'X4' 3-Lamp T-8 Parabolic Lens Electronic Ballast	2080	82	0.16	341	$54.58	2	0	No Change	82	0.16	341	$54.58	$0.00	$0.00	0.00	0	$0.00	0.00
	J		1	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	46	0.05	96	$15.31	1	0	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.03	62	$9.98	$100.00	$100.00	0.02	33.28	$5.32	18.78
	K		1	1	1'X4' 1-Lamp T-12 Prism Lens Magnetic Ballast	2080	50	0.05	104	$16.64	1	1	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.03	62	$9.98	$100.00	$100.00	0.02	41.6	$6.66	15.02
24	L	Bicycle Storage	1	0	1'X2' 2-Lamp T-8 Prism Lens Electronic Ballast	520	34	0.03	18	$2.83	1	0	No Change	34	0.03	18	$2.83	$0.00	$0.00	0.00	0	$0.00	0.00
25	F	Electrical closet	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	80	0.08	42	$6.66	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	29	$4.58	$100.00	$100.00	0.03	13	$2.08	48.08
26	N	Hallway Bridge	3	0	2-Lamp CFL Recessed Fixture	2080	28	0.08	175	$27.96	3	0	No Change	28	0.08	175	$27.96	$0.00	$0.00	0.00	0	$0.00	0.00

27	C	DARE Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
28	N	OEM Radio Room	4	0	2-Lamp CFL Recessed Fixture	2080	28	0.11	233	$37.27	4	0	No Change	28	0.11	233	$37.27	$0.00	$0.00	0.00	0	$0.00	0.00
29	C	Employee RR	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.07	152	$24.29	1	0	No Change	73	0.07	152	$24.29	$0.00	$0.00	0.00	0	$0.00	0.00
	B		1	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.04	87	$13.98	1	2	2' 2-Lamp T-8 17W wall Mtd.Metalux BC217	34	0.03	71	$11.32	$151.00	$151.00	0.01	16.64	$2.66	56.72
30	C	Chief of Police	6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.44	911	$145.77	6	0	No Change	73	0.44	911	$145.77	$0.00	$0.00	0.00	0	$0.00	0.00
31	C	Captain's Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
32	C	Juvenile Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
33	C	Juvenile Bureau	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.29	607	$97.18	4	0	No Change	73	0.29	607	$97.18	$0.00	$0.00	0.00	0	$0.00	0.00
34	I	Holding Room	1	0	1'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2080	58	0.06	121	$19.30	1	0	No Change	58	0.06	121	$19.30	$0.00	$0.00	0.00	0	$0.00	0.00
38	S	Outside Lighting	2	0	1-Lamp Incandescent Flood Par Fixture	3640	90	0.18	655	$104.83	2	0	1-Lamp 23W CFL Recessed PAR-38 MaxLite M/N SKR3823FL	26	0.05	189	$30.28	$11.67	$23.34	0.13	465.92	$74.55	0.31
	T		5	0	1-Lamp High Pressure Sodium Surface Wall / Ground Fixure	3640	188	0.94	3,422	$547.46	5	0	No Change	188	0.94	3,422	$547.46	$11.67	$58.35	0.00	0	$0.00	0.00
	R		4	0	1-Lamp Incandescent Surface Fixture	3640	60	0.24	874	$139.78	4	0	1-Lamp 20W CFL MaxLite M/N SKS20EAWW	23	0.09	335	$53.58	$5.75	$23.00	0.15	538.72	$86.20	0.27
	U		5	0	1-Lamp Incandescent Pole Mount Path Fixtures	3640	60	0.30	1,092	$174.72	5	0	1-Lamp 20W CFL MaxLite M/N SKS20EAWW	23	0.12	419	$66.98	$5.75	$28.75	0.19	673.4	$107.74	0.27
	V		1	0	1-Lamp Metal Halide Fixure	3640	94	0.09	342	$54.75	1	0	No Change	94	0.09	342	$54.75	$0.00	$0.00	0.00	0	$0.00	0.00
39	W	Parking Lot	5	0	1-Lamp Metal Halide Parking Pole Mount Fixure	3640	213	1.07	3,877	$620.26	5	0	No Change	213	1.07	3,877	$620.26	$0.00	$0.00	0.00	0	$0.00	0.00
		Totals	205	23				14.82	37,636.48	$6,021.84	205	23			13.16	34,121.80	$5,459.49		$5,243.44	1.66	3,514.68	$562.35	9.32

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Hours of Operation based on information from Owner - Office: 2210 hours, Outside 10 Hrs per day
3. Lamp totals only include T-12 tube replacment calculations

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C08060
Project: Branchburg Police Building Energy Audit
Address: 1077 US Highway 202 North
Branchburg, NJ 08876
Building SF: 9134

"Branchburg Police Building"

KWH COST: $0.160

ECM #2: Lighting Controls

EXISTING LIGHTING											PROPOSED LIGHTING CONTROLS										SAVINGS			
Line No.	CEG Type	Fixture Location	No. Fixts	No. Lamps	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Controls Description	Watts Used	Total kW	Energy Savings	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
1	A	Evidence Room	4	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	94	0.376	195.52	31.2832	4	2	Dual Occupancy Sensor	94	0.38	10%	175.97	$28.15	$75.00	$75.00	0.00	19.552	$3.13	23.97
2	A	Basement Storage	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	94	0.094	48.88	7.8208	1	2	Dual Occupancy Sensor	94	0.09	0%	48.88	$7.82	$0.00	$0.00	0.00	0	$0.00	0.00
3	A	Basement	14	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	94	1.316	2737.28	437.9648	14	2	Dual Occupancy Sensor	94	1.32	10%	2,463.55	$394.17	$75.00	$75.00	0.00	273.728	$43.80	1.71
4	B	Stairs	1	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.042	87.36	13.9776	1	2	Dual Occupancy Sensor	42	0.04	10%	78.62	$12.58	$75.00	$75.00	0.00	8.736	$1.40	53.66
	M		3	0	1-Lamp CFL Recessed Fixture	2080	38	0.114	237.12	37.9392	3	0		38	0.11	10%	213.41	$34.15	$0.00	$0.00	0.00	23.712	$3.79	0.00
	N		3	0	2-Lamp CFL Recessed Fixture	2080	28	0.084	174.72	27.9552	3	0		28	0.08	10%	157.25	$25.16	$0.00	$0.00	0.00	17.472	$2.80	0.00
5	C	Small Foyer	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	8760	73	0.073	639.48	102.3168	1	0	Dual Occupancy Sensor	73	0.07	10%	575.53	$92.09	$75.00	$75.00	0.00	63.948	$10.23	7.33
6	D	Men's Locker and Women's Locker	3	0	2'x2' 2-Lamp T-8 U-Tube, Prism Lens Electronic Ballast	2080	73	0.219	455.52	72.8832	3	0	Dual Occupancy Sensor	73	0.22	10%	409.97	$65.59	$75.00	$75.00	0.00	45.552	$7.29	10.29
	B		4	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.168	349.44	55.9104	4	2		42	0.17	10%	314.50	$50.32	$0.00	$0.00	0.00	34.944	$5.59	0.00
	E		6	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	0.348	723.84	115.8144	6	0		58	0.35	10%	651.46	$104.23	$0.00	$0.00	0.00	72.384	$11.58	0.00
7	D	Men's Locker and Women's Locker	3	0	2'x2' 2-Lamp T-8 U-Tube, Prism Lens Electronic Ballast	2080	73	0.219	455.52	72.8832	3	0	Dual Occupancy Sensor	73	0.22	10%	409.97	$65.59	$75.00	$75.00	0.00	45.552	$7.29	10.29
	B		4	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.168	349.44	55.9104	4	2		42	0.17	10%	314.50	$50.32	$0.00	$0.00	0.00	34.944	$5.59	0.00
	E		6	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	0.348	723.84	115.8144	6	0		58	0.35	10%	651.46	$104.23	$0.00	$0.00	0.00	72.384	$11.58	0.00
7	C	Traffic Section	6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.438	911.04	145.7664	6	0	Dual Occupancy Sensor	73	0.44	10%	819.94	$131.19	$75.00	$75.00	0.00	91.104	$14.58	5.15
8	C	Patrol Offices	3	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.219	455.52	72.8832	3	0	Dual Occupancy Sensor	73	0.22	10%	409.97	$65.59	$75.00	$75.00	0.00	45.552	$7.29	10.29
	O		1	0	2-Lamp CFL Recessed Fixture	8760	76	0.076	665.76	106.5216	1	0		76	0.08	10%	599.18	$95.87	$75.00	$75.00	0.00	66.576	$10.65	7.04

9	E	Main Foyer	10	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	8760	58	0.58	5080.8	812.928	10	0	Dual Occupancy Sensor	58	0.58	10%	4,572.72	$731.64	$75.00	$75.00	0.00	508.08	$81.29	0.92
10	C	Restroom	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.073	151.84	24.2944	1	0	Dual Occupancy Sensor	73	0.07	10%	136.66	$21.86	$75.00	$75.00	0.00	15.184	$2.43	30.87
11	E	Main Hall	18	0	1'X4' 2-Lamp T-8 Industrial Strip Electronic Ballast	2080	58	1.044	2171.52	347.4432	18	0	Dual Occupancy Sensor	58	1.04	10%	1,954.37	$312.70	$75.00	$75.00	0.00	217.152	$34.74	2.16
12	C	Shift Supervisor	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
13	N	Conference Room	3	0	2-Lamp CFL Recessed Fixture	2080	28	0.084	174.72	27.9552	3	0	Dual Occupancy Sensor	28	0.08	10%	157.25	$25.16	$75.00	$75.00	0.00	17.472	$2.80	26.83
	C		6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.438	911.04	145.7664	6	0		73	0.44	10%	819.94	$131.19	$0.00	$0.00	0.00	91.104	$14.58	0.00
	J		2	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	46	0.092	191.36	30.6176	2	0		46	0.09	10%	172.22	$27.56	$0.00	$0.00	0.00	19.136	$3.06	0.00
14	C	Criminal Inv. Corn	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
15	C	Criminal Inv. Center	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
16	C	Auxilary Hall	2	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.146	303.68	48.5888	2	0	Dual Occupancy Sensor	73	0.15	10%	273.31	$43.73	$75.00	$75.00	0.00	30.368	$4.86	15.44
17	F	Holding Cell 1	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	80	0.08	166.4	26.624	1	2	Dual Occupancy Sensor	80	0.08	10%	149.76	$23.96	$75.00	$75.00	0.00	16.64	$2.66	28.17
18	F	Holding Cell 2	2	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	80	0.16	332.8	53.248	2	2	Dual Occupancy Sensor	80	0.16	10%	299.52	$47.92	$75.00	$75.00	0.00	33.28	$5.32	14.09
19	F	Garage	8	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	80	0.64	332.8	53.248	8	2	Dual Occupancy Sensor	80	0.64	10%	299.52	$47.92	$75.00	$75.00	0.00	33.28	$5.32	14.09
20	G	Backing Room	2	0	2'X4' 3-Lamp T-8 Parabolic Lens Electronic Ballast	2080	82	0.164	341.12	54.5792	2	0	Dual Occupancy Sensor	82	0.16	10%	307.01	$49.12	$75.00	$75.00	0.00	34.112	$5.46	13.74
	H		1	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	39	0.039	81.12	12.9792	1	0		39	0.04	10%	73.01	$11.68	$0.00	$0.00	0.00	8.112	$1.30	0.00
21	C	Records Station	8	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.584	1214.72	194.3552	8	0	Dual Occupancy Sensor	73	0.58	10%	1,093.25	$174.92	$75.00	$75.00	0.00	121.472	$19.44	3.86
22	I	Central Files Room	6	0	1'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	520	58	0.348	180.96	28.9536	6	0	Dual Occupancy Sensor	58	0.35	10%	162.86	$26.06	$75.00	$75.00	0.00	18.096	$2.90	25.90
23	G	Office	2	0	2'X4' 3-Lamp T-8 Parabolic Lens Electronic Ballast	2080	82	0.164	341.12	54.5792	2	0	Dual Occupancy Sensor	82	0.16	10%	307.01	$49.12	$75.00	$75.00	0.00	34.112	$5.46	13.74
	J		1	0	1'X4' 1-Lamp T-8 Prism Lens Magnetic Ballast	2080	46	0.046	95.68	15.3088	1	0		46	0.05	10%	86.11	$13.78	$0.00	$0.00	0.00	9.568	$1.53	0.00
	K		1	1	1'X4' 1-Lamp T-12 Prism Lens Magnetic Ballast	2080	50	0.05	104	16.64	1	1		50	0.05	10%	93.60	$14.98	$0.00	$0.00	0.00	10.4	$1.66	0.00
24	L	Bicycle Storage	1	0	1'X2' 2-Lamp T-8 Prism Lens Electronic Ballast	520	34	0.034	17.68	2.8288	1	0	None	34	0.03	0%	17.68	$2.83	$0.00	$0.00	0.00	0	$0.00	0.00
25	F	Electrical closet	1	2	1'X4' 2-Lamp T-12 Industrial Strip Magnetic Ballast	520	80	0.08	41.6	6.656	1	2	None	80	0.08	0%	41.60	$6.66	$0.00	$0.00	0.00	0	$0.00	0.00
26	N	Hallway Bridge	3	0	2-Lamp CFL Recessed Fixture	2080	28	0.084	174.72	27.9552	3	0	Dual Occupancy Sensor	28	0.08	10%	157.25	$25.16	$75.00	$75.00	0.00	17.472	$2.80	26.83

27	C	DARE Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
28	N	OEM Radio Room	4	0	2-Lamp CFL Recessed Fixture	2080	28	0.112	232.96	37.2736	4	0	Dual Occupancy Sensor	28	0.11	10%	209.66	$33.55	$75.00	$75.00	0.00	23.296	$3.73	20.12
29	C	Employee RR	1	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.073	151.84	24.2944	1	0	Dual Occupancy Sensor	73	0.07	10%	136.66	$21.86	$75.00	$75.00	0.00	15.184	$2.43	30.87
	B		1	2	1'X2' 2-Lamp T-12 Industrial Strip Magnetic Ballast	2080	42	0.042	87.36	13.9776	1	2		42	0.04	10%	78.62	$12.58	$0.00	$0.00	0.00	8.736	$1.40	0.00
30	C	Chief of Police	6	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.438	911.04	145.7664	6	0	Dual Occupancy Sensor	73	0.44	10%	819.94	$131.19	$75.00	$75.00	0.00	91.104	$14.58	5.15
31	C	Captain's Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
32	C	Juvenile Office	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
33	C	Juvenile Bureau	4	0	2'x2' 2-Lamp T-8 U-Tube, Parabolic Lens Electronic Ballast	2080	73	0.292	607.36	97.1776	4	0	Dual Occupancy Sensor	73	0.29	10%	546.62	$87.46	$75.00	$75.00	0.00	60.736	$9.72	7.72
34	I	Holding Room	1	0	1'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2080	58	0.058	120.64	19.3024	1	0	Dual Occupancy Sensor	58	0.06	10%	108.58	$17.37	$75.00	$75.00	0.00	12.064	$1.93	38.86
		Totals	183	23				12.00	27,375.32	$4,380.05	183	23			12.00		24,648.60	$3,943.78		$2,475.00	0.00	2,726.72	$436.27	5.67

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

2. Hours of Operation based on information from Owner - Office: 2210 hours, Outside 10 Hrs per day

3. Lamp totals only include T-12 tube replacment calculations

Project Name: LGEA Solar PV Project - Branchburg Police Building
Location: Branchburg, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$124,200
Annual kWh Production	21,536
Annual Energy Cost Reduction	$3,446
Annual SREC Revenue	$7,537
First Cost Premium	**$124,200**
Simple Payback:	**11.31** Years

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.160**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/kWh) $0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$6,210	0	0	0	$0	0	0	(6,210)	0
1	$0	21,536	$3,446	$0	$7,537	$8,170	$2,807	$6	($6,204)
2	$0	21,428	$3,549	$0	$7,500	$7,967	$3,010	$72	($6,133)
3	$0	21,321	$3,656	$0	$7,462	$7,750	$3,227	$140	($5,992)
4	$0	21,214	$3,765	$0	$7,425	$7,517	$3,461	$213	($5,779)
5	$0	21,108	$3,878	$217	$7,388	$7,266	$3,711	$71	($5,708)
6	$0	21,003	$3,994	$216	$7,351	$6,998	$3,979	$152	($5,556)
7	$0	20,897	$4,114	$215	$7,314	$6,710	$4,267	$236	($5,320)
8	$0	20,793	$4,238	$214	$7,278	$6,402	$4,575	$324	($4,997)
9	$0	20,689	$4,365	$213	$7,241	$6,071	$4,906	$416	($4,581)
10	$0	20,586	$4,496	$212	$7,205	$5,717	$5,261	$511	($4,070)
11	$0	20,483	$4,631	$211	$7,169	$5,336	$5,641	$611	($3,458)
12	$0	20,380	$4,770	$210	$7,133	$4,929	$6,049	$716	($2,743)
13	$0	20,278	$4,913	$209	$7,097	$4,491	$6,486	$824	($1,919)
14	$0	20,177	$5,060	$208	$7,062	$4,022	$6,955	$937	($982)
15	$0	20,076	$5,212	$207	$7,027	$3,520	$7,458	$1,054	$73
16	$0	19,976	$5,368	$206	$6,991	$2,981	$7,997	$1,177	$1,249
17	$0	19,876	$5,529	$205	$6,957	$2,402	$8,575	$1,304	$2,553
18	$0	19,776	$5,695	$204	$6,922	$1,783	$9,195	$1,436	$3,989
19	$0	19,678	$5,866	$203	$6,887	$1,118	$9,859	$1,573	$5,562
20	$0	19,579	$6,042	$202	$6,853	$405	$10,572	$1,716	$7,278
21	$0	19,481	$6,223	$201	$6,818	$343	$9,719	$2,779	$10,057
22	$0	19,384	$6,410	$200	$6,784	$235	$7,998	$4,762	$14,818
23	$0	19,287	$6,602	$199	$6,750	$0	$0	$13,154	$27,972
24	$0	19,191	$6,800	$198	$6,717	$0	$0	$13,319	$41,292
25	$0	19,095	$7,004	$197	$6,683	$0	$0	$13,491	$54,783
	Totals:	410,853	$92,587	$3,351	$143,799	$101,556	$117,990	$135,707	$106,185
				Net Present Value (NPV)			**$7,492**		
				Internal Rate of Return (IRR)			**11.9%**		

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

Simple Payback Analysis

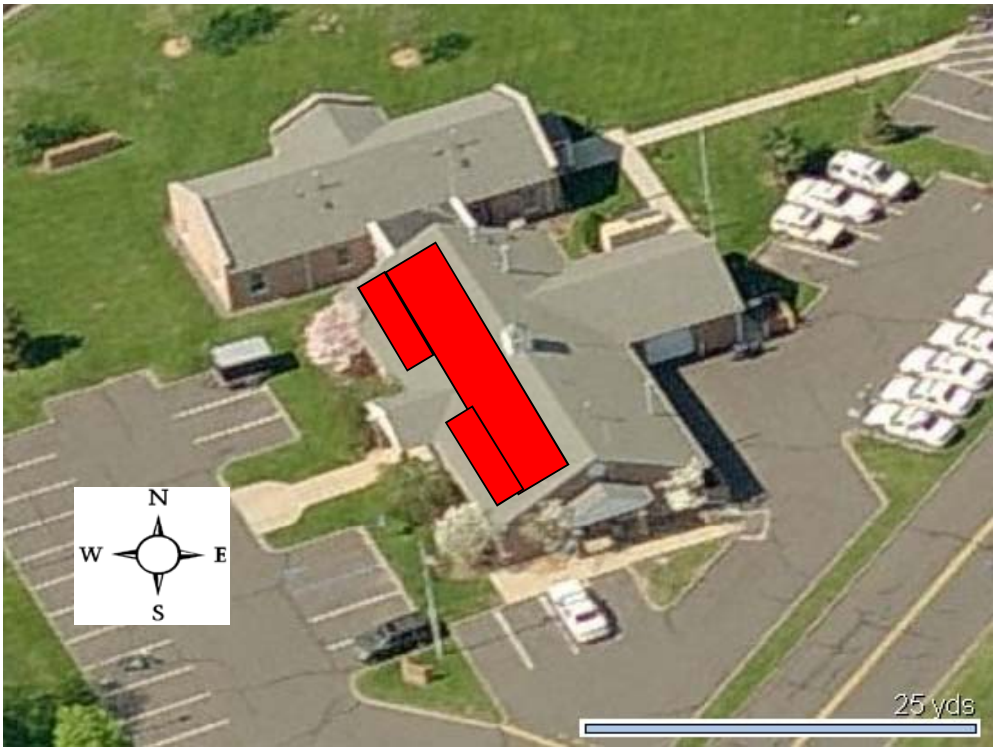
	Photovoltaic System - Direct Purchase
Total Construction Cost	$124,200
Annual kWh Production	21,536
Annual Energy Cost Reduction	$3,446
Annual SREC Revenue	$7,537
First Cost Premium	**$124,200**
Simple Payback:	**11.31** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.160**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$124,200	0	0	0	$0	(124,200)	0
1	$0	21,536	$3,446	$0	$7,537	$10,983	($113,217)
2	$0	21,428	$3,549	$0	$7,500	$11,049	($102,168)
3	$0	21,321	$3,656	$0	$7,462	$11,118	($91,050)
4	$0	21,214	$3,765	$0	$7,425	$11,190	($79,860)
5	$0	21,108	$3,878	$217	$7,388	$11,049	($68,812)
6	$0	21,003	$3,994	$216	$7,351	$11,129	($57,683)
7	$0	20,897	$4,114	$215	$7,314	$11,213	($46,469)
8	$0	20,793	$4,238	$214	$7,278	$11,301	($35,168)
9	$0	20,689	$4,365	$213	$7,241	$11,393	($23,775)
10	$0	20,586	$4,496	$212	$7,205	$11,489	($12,286)
11	$0	20,483	$4,631	$211	$7,169	$11,589	($698)
12	$0	20,380	$4,770	$210	$7,133	$11,693	$10,995
13	$0	20,278	$4,913	$209	$7,097	$11,801	$22,796
14	$0	20,177	$5,060	$208	$7,062	$11,914	$34,710
15	$0	20,076	$5,212	$207	$7,027	$12,032	$46,742
16	$0	19,976	$5,368	$206	$6,991	$12,154	$58,896
17	$0	19,876	$5,529	$205	$6,957	$12,281	$71,177
18	$0	19,776	$5,695	$204	$6,922	$12,413	$83,591
19	$0	19,678	$5,866	$203	$6,887	$12,551	$96,141
20	$0	19,579	$6,042	$202	$6,853	$12,693	$108,834
21	$1	19,481	$6,223	$201	$6,818	$12,841	$121,675
22	$2	19,384	$6,410	$200	$6,784	$12,995	$134,670
23	$3	19,287	$6,602	$199	$6,750	$13,154	$147,824
24	$4	19,191	$6,800	$198	$6,717	$13,319	$161,143
25	$5	19,095	$7,004	$197	$6,683	$13,491	$174,634
Totals:		410,853	$92,587	$3,351	$143,799	$298,834	$233,034
				Net Present Value (NPV)		**$174,659**	
				Internal Rate of Return (IRR)		**7.9%**	

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
Branchburg Police Bldg	880	Sunpower SPR230	60	14.7	882	13.80	21,536	1,980	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.