ENERGY AUDIT – FINAL REPORT

WARREN COUNTY
ADMINISTRATION BUILDING

165 COUNTY ROAD
BELVIDERE, NJ 07823
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CEG PROJECT NO. 9C09086

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Table of Contents

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I. EXECUTIVE SUMMARY

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

Warren County
Administration Building
165 County Road
Belvidere, NJ 07823

Municipal Contact Person: Christopher J. Pessolano
Facility Contact Person: James F. Burborow

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	$ 104,147
Natural Gas	$ 36,142
Total	$ 140,289

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)

ECMs	ECM Description	COST[A]	ANNUAL SAVINGS[B]	SIMPLE PAYBACK (Years)	LIFETIME ROI
ECM #1	Lighting Upgrade	$70,061	$11,987	5.8	327.7%
ECM #2	Lighting Controls	$5,386	$2,625	2.1	631.1%
ECM #3	Boiler Lockout & Point of Use Hot Water Heaters	$6,669	$13,881	0.5	1981.4%
ECM #4	Air Cooled Chiller	$57,572	$3,368	17.1	17.0%
ECM #5	Absorption Chiller	$152,757	$4,487	34.0	-41.3%
ECM #6	Solar Photovoltaic	$761,760	$50,468	15.1	65.6%

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

ECMs	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELEC. DEMAND (KW)	ELEC. CONSUMPTION (KWH)	GAS (THERMS)
ECM#1	Lighting Upgrade	29.6	68,627	NA
ECM#2	Lighting Controls	NA	15,815	NA
ECM#3	Boiler Lockout and Point of Use Hot Water Heaters	NA	36,480	5,148
ECM#4	Air Cooled Chiller	25.4	20,288	NA
ECM#5	Absorption Chiller	59.5	87,656	(6,621)
ECM#6	Solar Photovoltaic System	84.64	97,806	NA

*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 ten (10) years. The following Energy Conservation Measures are recommended for Warren County Administration Building:

- **ECM #1:** Lighting Upgrade
- **ECM #2:** Lighting Controls
- **ECM #3:** Boiler Lockout and Point of Use Hot Water Heaters

Although ECM #4 does not provide a payback less than 10 years, it is recommended to utilize a high efficiency air cooled chiller as suggested in ECM #4 (or equal) when the chiller is replaced. A new air cooled chiller should be considered since the existing unit is in need of replacement.

In addition to the ECMs, maintenance and operational measures can provide significant energy savings and 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. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Provide frequent air filter changes if not already done so to decrease overall system power usage and maintain better IAQ. This is especially important in a VFD driven AHU where the supply air will vary to meet load. If the filters are becoming clogged, the VFD will automatically increase air speed therefore "hiding" the underlining filter issue, meanwhile energy usage is increasing unnecessarily.
3. Check operation of outdoor lighting photocells to ensure lighting is only on as desired for the needs of the facility and only at night.
4. Confirm proper operation of all outside air dampers and mixing boxes on the main air handling unit in the building. Outside air dampers that have unintentionally opened more than the original setting will cause significant increases in heating and cooling energy consumption as well as decreased occupant comfort and humidity control.
5. Turn off computers when they are not used or set to run in hibernation or sleep mode with the monitors set to automatically turn off (Not in screen saver mode.)

Office buildings continue to grow their electric demand as a result of increases in electronic equipment. Facilities with high energy use have a high potential for energy savings. Overall this facility's "Source Energy Use Index" rating is approximately 5% when compared to other office buildings (0%-lowest efficiency, 100%-highest efficiency). This low rating is due to a combination of multiple sources. One reason for increased energy usage is the high density (people and computers per square foot) of the office building. Another major factor for increased energy use is the operation of the heating system and hot water loop year round in a cooling

dominant building. The rating is also a function of mechanical equipment efficiency, and lighting efficiency. All of these reasons have effective energy reduction solutions that can be implemented.

HVAC equipment replacements are difficult to justify with the energy savings alone. Due to the age of the existing air cooled chiller and increased need for cooling for this facility, the energy savings pays for the entire installation within 17.1 years. The replacement of the chiller to a new energy efficient unit is more easily achieved compared to other systems since the main cooling equipment is packed into one machine. With the added incentive for increased reliability and due to the existing equipment's age and condition, this option is recommended to be considered despite the fact that the payback is not less than 10 years.

A lighting retrofits for this facility is a simple and effective approach to reduce energy use. Although the operational hours are only 8.5 hours per day, the payback is relatively quick at 5.8 years. In addition to reduced energy consumption and operating costs, a lighting retrofit to modern fluorescent fixtures provide reduced maintenance costs and added occupant comfort with improved light quality.

The existing boiler operation and domestic hot water system represent a significant potential for energy reduction. The boiler is controlled to run all year long adding heat to the space when the cooling load is peaking. The domestic hot water needs of the building are very minimal however to keep domestic hot water available to the lavatories and sinks, the circulation pump in required to run adding more heat to the building. Hot water circulation in the summer months is responsible for approximately 20% of the facilities natural gas energy. This heat energy only taxes the cooling system which requires more energy to cool. The recommendation to correct this endless cycle is to eliminate the heat generation through boiler controls and point of use hot water heaters. The savings as a result of this conservation measure pays for the installation in the first two months of summer operation. It is recommended to rectify the boiler controls before the start of the next cooling season.

Retro commissioning for this facility could prove to uncover large energy "leaks" In the building. Systems and components may appear to be operating correctly when they are not. The building having trouble to provide adequate cooling the summer could be in part a direct result of failed heating control valves fighting the cooling system by heating the space when in cooling mode. Older systems and components typically do not reflect the original building's design parameters resulting in unnecessary energy waste. CEG recommends a commissioning effort take place on the major mechanical equipment for this facility.

II. INTRODUCTION

The comprehensive energy audit provided within this report, covers the 24,320 square foot Warren County Administration Building. The administration building operates on a typical office schedule, approximately 9 hours per day, 5 days per week. The Energy utilities for the building are comprised of electricity for lighting, computers, and cooling/ventilation, and natural gas for for heating and domestic hot water production. The facility includes offices, conference rooms, lunch rooms, large meeting room, and data center for the county data and IT back-up.

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 in section IV.)

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 Smart Start 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 life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$Simple\ Payback = \left(\frac{Net\ Cost}{Yearly\ Savings} \right)$$

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

$$Simple\ Lifetime\ ROI = \frac{(Simple\ Lifetime\ Savings - Net\ Cost)}{Net\ Cost}$$

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

$$Internal\ Rate\ of\ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + IRR)^n} \right)$$

$$Net\ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + DR)^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The electric usage profile 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. Elizabethtown Gas provides natural gas to the facility under the Multi Family Use 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 provided, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	16.6¢ / kWh
Natural Gas	$1.52 / Therm

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted base on the information provided by the owner.

Table 3
Electricity Billing Data

Utility Provider: JCP&L, General Service Secondary 3 Phase (Meter # S68176568)			
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND**	**TOTAL BILL**
Jun-08	70,880	168.0	$12,455
Jul-08	70,720	164.8	$12,467
Aug-08	63,200	155.2	$11,197
Sep-08	67,040	161.6	$10,187
Oct-08	59,200	155.2	$9,070
Nov-08	33,600	129.6	$5,444
Dec-08	39,680	100.8	$6,371
Jan-09	38,080	97.6	$6,161
Feb-09	41,120	112.0	$6,680
Mar-09	41,600	123.2	$6,677
Apr-09	48,320	147.2	$7,782
May-09	54,560	134.4	$9,655
Totals	**628,000**	**168.0 Max**	**$104,147**
AVERAGE DEMAND 137.5 KW average			
AVERAGE RATE $0.166 $/kWh			

Figure 1
Electricity Usage Profile

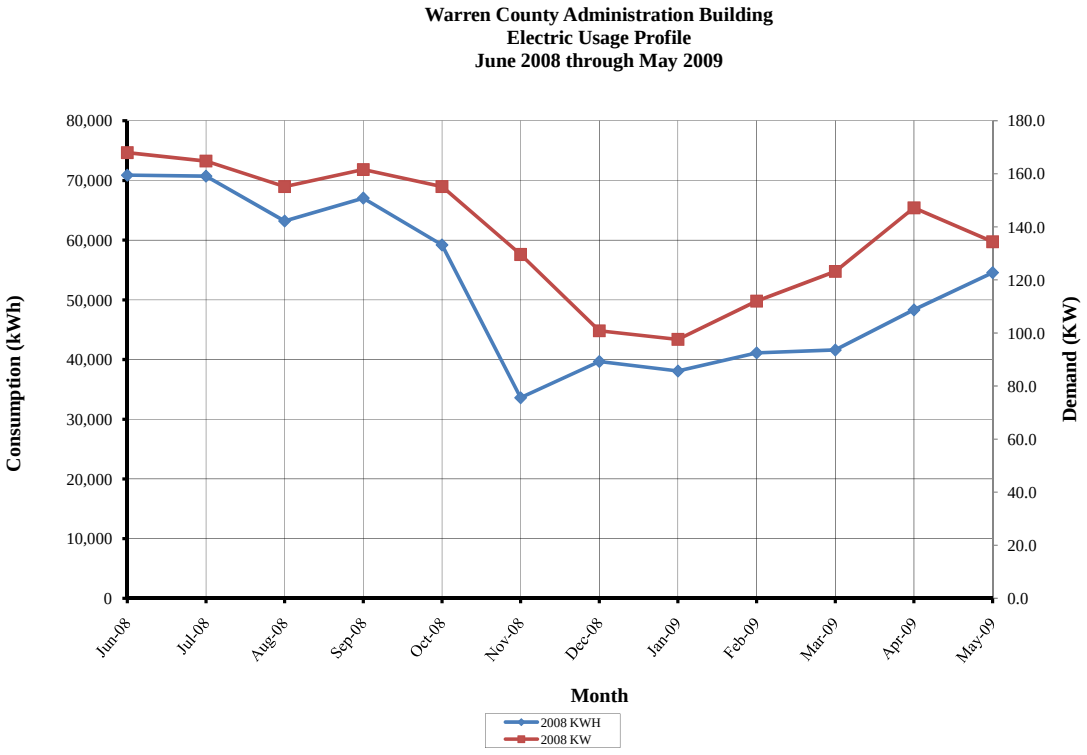
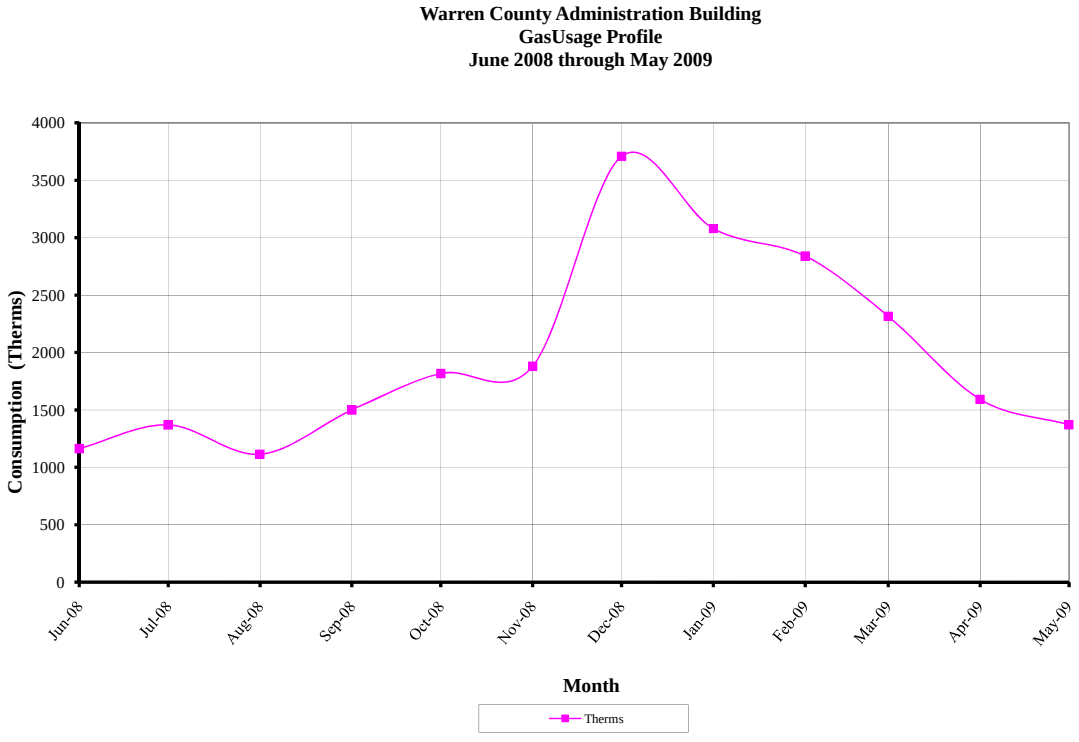


Table 4
Gas Billing Data

Utility Provider: Elizabethtown Gas, Rate - Multi Family Use, (Meter # 05474565)		
MONTH OF USE	**CONSUMPTION (Therms)**	**TOTAL BILL**
Jun-08	1,163	$1,598.16
Jul-08	1,370	$1,852.32
Aug-08	1,114	$1,525.89
Sep-08	1,500	$2,128.37
Oct-08	1,817	$2,864.28
Nov-08	1,880	$2,961.65
Dec-08	3,709	$5,702.63
Jan-09	3,079	$4,758.77
Feb-09	2,840	$4,400.01
Mar-09	2,315	$3,613.54
Apr-09	1,592	$2,532.14
May-09	1,371	$2,204.08
TOTALS	**23,751**	**$36,141.84**
AVERAGE RATE:	**$1.52**	**$/Therm**

Figure 2
Gas Usage Profile



B. Energy Use Index

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building (also known as energy use intensity.) 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:

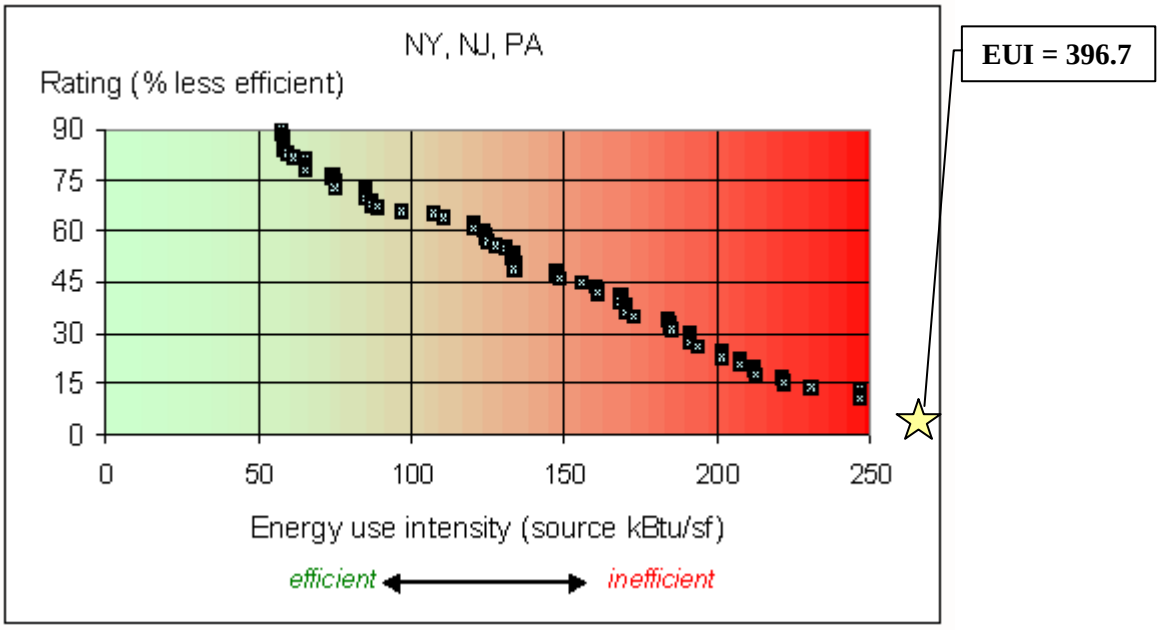
$$Building\ \ Site\ EUI = \frac{(Electric\ Usage\ in\ kBtu + Gas\ Usage\ in\ kBtu)}{Building\ \ Square\ \ Footage}$$

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

Table 5
Warren County Administration Building EUI Calculations

ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu	RATIO	kBtu
ELECTRIC	628,000			2,143,992	3.340	7,160,933
NATURAL GAS		23,751.00		2,375,100	1.047	2,486,730
FUEL OIL			0.00	0	1.010	0
PROPANE			0.00	0	1.010	0
TOTAL				4,519,092		9,647,663
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		24,320		SQUARE FEET		
BUILDING SITE EUI		185.82		kBtu/SF/YR		
BUILDING SOURCE EUI		**396.70**		**kBtu/SF/YR**		

Figure 3
Source Energy Use Intensity Distributions: Office 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:

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

User Name: warrencountylgea
Password: lgeaceg2009

Security Question: What is your birth city?
Security Answer: "warren county"

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
Administration Building	5	50

See the **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

General

The 24,320 square foot Administration building was built in 1986. The facility is comprised of a main floor and ground floor partially below grade. The building construction is face brick façade and drywall construction for interior walls. It is insulation value within the walls is unknown. The windows are double pane clear glass windows with metal frames and in good condition. The majority of the south facing windows and some East and West facing windows have had a window film added to the interior pane of glass for solar heat reflection. The roof is a flat roof. The roof has been replaced one year ago with new rigid foam insulation installed below the roofing membrane 1”-2” thick.

Operation

The building is a high density office building. The building is occupied during typical office hours approximately 8:00AM to 5:00PM. The building houses the county’s communications and data storage in a small data center on the 1st floor (approximately 200 SF). The Data center is operational 24/7.

Energy Utilities

Utilities for the facility are electricity and natural gas. The primary heat source is a single gas fired heating water boiler that provide heating hot water throughout the facility to air handling equipment hot water coils and baseboards. Gas is also used for the domestic hot water heater, for bathroom lavatories, and lounge sinks. The primary use for electricity is lighting, computer equipment, and air conditioning systems. Electrical power is also used for the a kitchen refrigerator, appliances. A small data center operates 24/7 and is responsible for added load on the electrical system due to electrical power for servers, routers, and telecommunication, as well as the continuous air conditioning load to remove the heat generated by the equipment.

HVAC Systems

The main cooling system for the building is provided by an air cooled screw chiller located on the south side of the building. The chiller is in poor condition and unable to recover when the building is overheated, however the unit is operational. One compressor on the chiller was locked out or failed on low voltage alarm. At the time of the survey, the chiller was not capable of meeting chilled water set point due to the malfunction. Operating and standby chilled water pumps located in the ground floor mechanical room distribute the chilled water to the main central air handling unit. These pumps are in fair condition. The 80 ton chiller is 15 years old and no longer manufactured making it difficult to find replacement and service parts. The chilled water is distributed by two 5 HP (operating and standby) chilled water pumps to the main central air handling unit’s chilled water coil. The chiller is in poor condition and not functioning correctly. The chilled water pumps are in fair condition.

The main heating system for the building is provided by one cast iron heating hot water boilers located in the ground floor mechanical room. The boilers each have input capacity of 1,183 MBH. The heating hot water is distributed throughout the building by two 3HP pumps to the main air handling unit and VAV box re-heat coils throughout the facility. The boilers operate year round to provide hot water re-heat capability to the VAV boxes. This creates added heat loss during the summer months which add to the air conditioning load. The boilers and pumps are in fair condition.

Air distribution is provided by the main air handling unit and VAV boxes. The main air handling unit has been retrofitted with a variable frequency drive to vary the speed of the supply fan. The main AHU provides air to the variable air volume boxes (VAV boxes.) The VAV boxes connected to the main AHU divide air into zones throughout the building. There are VAV boxes for each main office area and private offices or zone of offices. All VAV boxes have heating hot water re-heat coils for individual zone temperature control in the heating season. The ductwork distribution in the mechanical room is missing insulation in some areas. The main air handing unit is functioning correctly; however overall in poor condition other than the retrofitted variable frequency drive.

The data center has two dedicated air conditioning units, one floor mounted computer room air conditioner, and one packaged rooftop unit as a backup. The computer room unit is a precision cooling system with re-heat, re-humidification, and dehumidification capability. The computer room unit runs 24/7 to provide cooling for the computer / IT load. The packaged rooftop unit is used only as a backup for the computer room unit and for high ambient conditions were the computer room unit cannot provide adequate cooling. The rooftop unit and computer room unit condenser coil is located on the roof. Both systems are in good condition.

Domestic Water

Domestic water is provided by the city. Domestic hot water is provided by a dedicated hot water heater. The domestic hot water serves bathroom lavatories, as well as lounge area sinks, etc. The domestic hot water tank is gas fired with 100 gallons of storage and input capacity of 199 MBH. The domestic hot water loop has a re-circulation pump, which runs to maintain hot water at all terminal plumbing fixtures. The hot water re-circulation pump is currently set above the hot water heater set point, forcing the pump to operate 24/7.

HVAC Controls

The HVAC system is controlled by a central control system. Zone sensors as well as equipment operation is tied into the front end “MetaSystem” controller by Johnson Controls. The controller reads zone temperatures with wall mounted temperature sensors and controls VAV boxes accordingly to provide heating or cooling. The central AHU, chiller, chilled water pumps, boiler, and boiler pumps are all controlled through the control system. The computer room unit is operated with the self contained controls.

Exhaust / Ventilation System

General exhaust is provided throughout the facility for bathrooms and maintenance rooms by rooftop exhaust fans. The exhaust fans operate continuously.

Lighting

The lighting throughout building is fluorescent tube recessed fixtures with T-12 lamps and magnetic ballasts. Storage rooms and closets are lit with standard surface mount fixtures with incandescent bulbs. Exit signs are lit with small incandescent bulbs. Lights are manually operated throughout the facility on an as needed basis. The parking lot is lit with light poles and high pressure sodium lamps. Parking lot lighting is controlled by time clock.

VI. MAJOR EQUIPMENT LIST

The equipment list is considered major energy consuming equipment and through replacement 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 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 Warren County Administration Building is primarily made up of fluorescent fixtures with T-12 lamps and magnetic ballasts. There are a few storage rooms and closets with incandescent lighting and compact fluorescent 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 all incandescent fixtures to compact fluorescent fixtures as well as the replacement of all exterior halogen (incandescent) fixtures to metal halide fixtures. The energy usage of an incandescent compared to a compact fluorescent or metal halide approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 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.

Hours of Operation:

Office Areas and Hallways:
45 Hrs per week, 52 weeks per year – 2340 Hrs per year.

Storage rooms and Meeting / Conference rooms:
25% of normal hours (above) – 585 Hrs per year.

Outdoor Lighting:
10 Hrs per day, 7 days per week, 52 weeks per year – 3640 Hrs per year.

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.

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

$$\text{Smart Start®}\ Incentive = (172 \times\ \$10) + (330 \times\ \$20) = \underline{\$8{,}320}$$

Replacement and Maintenance Savings are calculated as follows:

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

$$Savings = (85\ lamps\ \ per\ \ year) \times (\$2.00 + \$5.00) = \underline{\$595}$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$78,381
NJ Smart Start Equipment Incentive ($):	($8,320)
Net Installation Cost ($):	$70,061
Yearly Maintenance Savings ($/Yr):	$595
Yearly Energy Savings ($/Yr):	$11,323
Total Yearly Savings ($/Yr):	$11,918
Estimated ECM Lifetime (Yr):	25
Simple Payback	5.9
Simple Lifetime ROI	325.3%
Simple Lifetime Maintenance Savings	$14,875
Simple Lifetime Savings	$297,962
Internal Rate of Return (IRR)	17%
Net Present Value (NPV)	$137,477.75

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

ECM #2: 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.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control - 20%-28%.

Energy savings achieved for "Occupancy Sensors for Lighting Control" average 20%-28%. Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors. The estimated savings is below the average reported by the U.S. Department of Energy due to the nature of a densely populated office building. Estimated savings for spaces with occupancy and daylight sensors is 28%.

The ECM includes replacement of standard wall switches with sensors wall switches for individual all offices, conference room, and meeting rooms. The ECM also includes installation of daylight sensors in the entry vestibule to take advantage of the existing skylights. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. See the "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 sensors and 28% for all areas that include occupancy sensors and daylight sensors.

Light Energy = 153,478 kWh/Yr. proposed lighting controlled energy

Energy Savings Calculations:

$$Energy\ Savings = (10\% \times Occuapancy\ Sensored\ Light\ Energy\ (kWh/Yr)) + ... \\ (18\% \times Daylight\ Controlled\ Light\ Energy\ (kWh/Yr))$$

$$Energy\ Savings = (10\% \times 153{,}478\ (kWh)) + (18\% \times 2593\ (kWh)) = 15{,}815\ (kWh)$$

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

$$Savings. = 15{,}815\ (kWh) \times 0.166\left(\frac{\$}{kWh}\right) = \$2{,}625$$

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

Installation Cost = $75 x 90 motion sensors = $6,750
Installation Cost = $238 x 2 daylight sensors = $476
Total = $7,226

From the NJ Smart Start appendix, the installation of a lighting control device warrants the following incentive: occupancy = $20 per fixture, daylight = $25 per fixture.

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ wall\ mount\ devices \times\ \$\ 20) = (92 \times \$20) = \$1{,}840$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$7,226
NJ Smart Start Equipment Incentive ($):	$1,840
Net Installation Cost ($):	$9,066
Yearly Maintenance Savings ($/Yr):	$0
Yearly Energy Savings ($/Yr):	$2,625
Total Yearly Savings ($/Yr):	$2,625
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.5
Simple Lifetime ROI	334.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$39,375
Internal Rate of Return (IRR)	28%
Net Present Value (NPV)	$22,271.08

* 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: Boiler Lockout Controls and Point of Use HWH.

Description:

The administration building has an existing central control system. The existing central control system has the capability to re-set boiler water supply temperature through a 3-way mixing valve based on outdoor temperature. The system has a lower limit to the supply water temperature of approximately 135°F. The controls do not include any form of boiler lockout to avoid boiler operation when there is no need for heat. The standby losses due to the boiler operation and piping network throughout the building throughout the summer months are compounded by the added cooling load resulting from the standby losses. In addition if any control valves throughout the system are failing to close fully, then heat is directly added to the space creating additional cooling load.

The domestic hot water heater is centrally located in the ground floor mechanical room. The domestic hot water production load is very small due to the type and nature of an office building. The losses due to circulating and re-heating domestic hot water through the building far exceed the heat energy to produce hot water. Furthermore the domestic hot water circulation pump is set to run 24/7. The losses due to keeping the domestic hot water piping hot are compounded by the added cooling load resulting from the added heat load.

This ECM includes installing a Boiler lockout relay based on outdoor temperature. The lockout relay is wired ahead of the boiler power circuit to turn off the boiler when the outside temperature is above a specified set point (65°F). This will effectively eliminate boiler operation during the summer months. In addition the ECM includes installation of electric point of use domestic hot water heaters for each of the four lavatories and sink in the building as well as small storage type electric hot water heaters for each janitor closet sink. The combination of these two changes would eliminate gas usage in the summer and reduce electric load on the cooling system in excess of the added point of use hot water heaters.

Savings from the implementation of this ECM will be achieved through reduced gas consumption from reduced heating energy as well as reduced electric consumption from reduced air conditioning energy. Estimations for domestic hot water use are based on the LEED rating system version 2.2.

The ECM calculations are based on Rheem hot water heaters model number 81VP10S or equal, and Bosch tankless hot water heaters model number AE-3.4 Power Star or equal. The installation cost of a lockout relay, remote outdoor temperature sensor, five point of use hot water heaters, two janitor's closet small tank type hot water heaters, and associated wiring is $7,671 ($3,617 Materials)

Ave Summer Gas usage (Average of Jun, Jul, Aug, Sep)	= 1,304 Therms
Average Cost of Oil	= $1.52/Therm
Average Cooling Equipment EER	= 8.22 EER
Average Cost of Electricity	= $0.165/kWh

Full Time Equivalent Occupants (FTE) = 55
Sink Dom. HW usage (0.25 Min per FTE per day) = 2.5 GPM
Lavatory Faucet (0.75 Min per FTE per day) = 2.5 GPM

Energy Savings Calculations:

Domestic Hot Water Usage Calculations

$$DHW\ Usage = FTE \times Flowrate\left(\frac{Gal}{Min}\right) \times Duration\left(\frac{Min}{Day}\right) \times Duration\left(\frac{Day}{Wk}\right) \times Duration\left(\frac{Wk}{Yr}\right)$$

$$DHW\ Usage = 55\ FTE \times 2.5\left(\frac{Gal}{Min}\right) \times (0.25 + 0.75)\left(\frac{Min}{Day}\right) \times 5\left(\frac{Day}{Wk}\right) \times 52\left(\frac{Wk}{Yr}\right) = 35{,}750(Gal)$$

$$Added\ Elec. = \frac{DHW\ Usage\left(\frac{Gal}{Yr}\right) \times 8.33\left(\frac{Lbs}{Gal}\right) \times TempRise(°F) \times 1\left(\frac{Btu}{Lb\,°F}\right)}{\text{Proposed DHW Eff} \times ElecHeat\left(\frac{Btu}{kWh}\right)}$$

$$Added\ Elec. = \frac{35{,}750\left(\frac{Gal}{Yr}\right) \times 8.33\left(\frac{Lbs}{Gal}\right) \times (120(°F) - 50(°F)) \times 1\left(\frac{Btu}{Lb\,°F}\right)}{100\% \times 3{,}414\left(\frac{Btu}{kWh}\right)} = 6{,}107(kWh)$$

Heating Savings Calculations

$$Heat\ Savings = Ave\ Cons.\left(\frac{Therms}{Month}\right) \times Non\ Heating\ Season(Months)$$

$$Heat\ Savings = 1{,}287\left(\frac{Therms}{Month}\right) \times 4(Months) = 5{,}148(Therms)$$

Cooling Savings Calculations

$$Heat\ \text{Reduction} = HeatSavings(Therms) \times Heat\ Eff\,\% \times Gas\ Heat\left(\frac{Btu}{Therm}\right)$$

$$Heat\ \text{Reduction} = 5{,}148(Therms) \times 68\% \times 100\left(\frac{kBtu}{Therm}\right) = 350{,}064(kBtu)$$

$$CoolingEnergySavings = \frac{Heat\ \text{Re}duction(kBtu)}{EER\left(\frac{kBtu}{kWh}\right)}$$

$$CoolingEnergySavings = \frac{350{,}064(kBtu)}{8.22\left(\frac{kBtu}{kWh}\right)} = 42{,}587(kWh)$$

$$GasSavings. = Heat\ \text{Re}duction(Therms) \times Ave\ Gas\ Cost\left(\frac{\$}{Therm}\right)$$

$$GasSavings. = 5{,}148(Therms) \times 1.52\left(\frac{\$}{Therm}\right) = \$7{,}825$$

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

$$Elec.\ Savings. = \left(42{,}587(kWh) - 6{,}107(kWh)\right) \times 0.166\left(\frac{\$}{kWh}\right) = \$6{,}056$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,669
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$6,669
Yearly Maintenance Savings ($/Yr):	$0
Yearly Energy Savings ($/Yr):	$13,881
Total Yearly Savings ($/Yr):	$13,881
Estimated ECM Lifetime (Yr):	10
Simple Payback	0.5
Simple Lifetime ROI	1981.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$138,810
Internal Rate of Return (IRR)	208%
Net Present Value (NPV)	$111,738.75

ECM #4: Air Cooled Chiller Replacement

Description:

The Administration Building is cooled by an 80 ton air cooled chiller. The air cooled chiller is in fair to poor condition, and the unit is inefficient and no longer produced or supported for maintenance. The estimated efficiency of the chiller is 1.46 KW/Ton at full load capacity (Minimum efficiency requirement from ASHRAE 90.1-1989). High efficiency multiple scroll air cooled chillers operate at efficiencies as low as 1.0 KW/Ton.

This ECM includes the installation of a new high efficient air cooled chiller. The ECM is based on a Trane packaged air cooled chiller model number CGAM or equivalent.

Full Load Cooling Hrs.	= 800 hrs/yr.
Average Cost of Electricity	= $0.166/kWh
Cooling Capacity	= 80 Tons
Existing Unit Eff.	= 1.46 KW/Ton (8.22 EER)
New Unit Eff.	= 1.14 KW/Ton (10.5 EER)

Energy Savings Calculations:

Cooling Savings:

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

$$EnergySavings = \frac{80\,(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{8.22\left(\frac{Btu}{W}\right)} - \frac{1}{10.5\left(\frac{Btu}{W}\right)}\right) \times 800\ hours$$

$$= 20{,}288\ kWh$$

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

$$Demand\ Savings = \frac{20{,}288(kWh)}{800\ Hrs.} = 25.4\ KW$$

$$Cooling\ Cost\ Savings = 20{,}288(kWh) \times 0.166\left(\frac{\$}{kWh}\right) = \$3{,}368$$

Installation cost for the air cooled chiller is estimated to be $59,652 ($36,000 Materials).

From the NJ Smart Start® Program appendix, the unit falls under the category "Electric Chiller" and warrants an incentive based on efficiency (EER) at 1.14 KW/Ton. The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\ Tons \times\ \$/Ton\ Incentive)$$
$$= (80\ Tons \times \$26/Ton) = \$2{,}080$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$59,652
NJ Smart Start Equipment Incentive ($):	($2,080)
Net Installation Cost ($):	$57,572
Yearly Maintenance Savings ($/Yr):	$0
Yearly Energy Savings ($/Yr):	$3,368
Total Yearly Savings ($/Yr):	$3,368
Estimated ECM Lifetime (Yr):	20
Simple Payback	17.1
Simple Lifetime ROI	17.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$67,360
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($7,464.66)

ECM #5: Absorption Chiller Installation

Description:

The Administration Building is cooled by an 80 ton air cooled chiller. The air cooled chiller is in fair to poor condition, and the unit is inefficient and no longer produced or supported for maintenance. The estimated efficiency of the chiller is 1.46 KW/Ton at full load capacity (Minimum efficiency requirement from ASHRAE 90.1-1989). Absorption chillers are liquid coolers that operate the compression cycle with gas as the fuel in lieu of electricity. Absorption chillers are inherently less efficient than electric chillers however the overall "Source energy" use is reduced by utilizing natural gas in lieu of electricity. In addition the energy source of a gas fired absorption chiller is less expensive compared to electricity. Nat gas appliances reduce the peak demand stress on the electric grid in the summer months. The relatively short periods of high electric demand in the summer cooling months account for an extremely high electric consumption and overall inefficiency for electric production and distribution. As a result significant incentives are available for the installation of gas fired cooling equipment. Reduced gas rate structures are also available for facilities that utilize gas fired cooling equipment.

This ECM includes the installation of a new gas fired absorption chiller, cooling tower, pumps, piping and unit controls. The ECM is based on a Thermax packaged absorption chiller model number GD10DCE or equivalent. The full load efficiency of the absorption chiller is 1.16 COP.

Full Load Cooling Hrs.	= 800 hrs/yr.
Average Cost of Electricity	= $0.164/kWh
Average Cost of Natural Gas	= $1.51/Therm
Cooling Capacity	= 115 Tons
Cooling Tower Total HP	= 6 HP
Existing Unit Eff.	= 1.46 KW/Ton (8.22 EER)
New Unit Eff.	= 1.16 COP

Energy Savings Calculations:

$$CoolingEnergy = Cooling(Tons) \times 12{,}000 \left(\frac{Btu}{Ton\ hr} \right) \times Full\ Load\ Hrs.$$

$$CoolingEnergy = 80\,(Tons) \times 12{,}000 \left(\frac{Btu}{Ton\ hr} \right) \times 800\ hours = 768{,}000(kBtu)$$

$$Electric\ Usage = Cooling(Tons) \times Eff\,(KW/Ton) \times Full\ Load\ Hrs.$$

$$Electric\ Usage = 80(Tons) \times 1.46\,f\,(KW/Ton) \times 800(Hrs.) = 93{,}440(kWh)$$

$$\text{Proposed Gas Usage} = \frac{\text{CoolingEnergy}(kBtu)}{\text{Eff}(C.O.P.) \times \text{HeatValue}\left(\frac{Btu}{Therm}\right)}$$

$$\text{Proposed Gas Usage} = \frac{768{,}000(kBtu)}{1.16(C.O.P.) \times 100\left(\frac{kBtu}{Therm}\right)} = 6{,}621(Therms)$$

$$\text{Proposed Electric Usage} = (\text{CoolingTowerEnergy}(KW) + \text{AbsorberEnergy}(KW)) \times \text{Full Load Hrs.}$$

$$\text{Proposed Electric Usage} = (4.48(KW) + 2.75(KW)) \times 800(Hrs.) = 5{,}784(kWh)$$

$$\text{Electric EnergySavings} = \text{ExistingElecEnergy}(kWh) - \text{ProposedElecEnergy}(kWh)$$

$$\text{Electric EnergySavings} = 93{,}440(kWh) - 5{,}784(kWh) = 87{,}656(kWh)$$

$$\text{Demand Savings} = \text{ExistingChillerDemand}\ (KW) - \text{AbsorberDemand}\ (KW)$$

$$\text{Demand Savings} = 66.7(KW) - 7.23(KW) = 59.5(KW)$$

$$\text{Existing Cooling Cost} = \text{ExistingUsage}(kWh) \times \text{AveCost}\left(\frac{\$}{kWh}\right)$$

$$\text{Existing Cooling Cost} = 93{,}440(kWh) \times 0.166\left(\frac{\$}{kWh}\right) = \$15{,}511$$

$$\text{Proposed Cooling Cost} = \text{ProposedGasUsage}(Therms) \times \text{AveCost}\left(\frac{\$}{Therm}\right) + \ldots$$

$$\text{ProposedElecUsage}(kWh) \times \text{AveCost}\left(\frac{\$}{kWh}\right)$$

$$\text{Proposed Cooling Cost} = 6{,}621(Therms) \times 1.52\left(\frac{\$}{Therm}\right) + 5{,}784(kWh) \times 0.166\left(\frac{\$}{kWh}\right) = \$11{,}024$$

$$\text{Savings} = \text{ExistingCost}\ (\$) - \text{ProposedCost}(\$) = \$4{,}487$$

Installation cost for the absorption chiller, cooling tower, pumps, piping and controls is estimated to be $188,757 (158,331 Materials).

From the NJ Smart Start® Program appendix, the absorption chiller falls under "Gas Cooling" and warrants an incentive based on capacity and efficiency at or above 1.1 COP. The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\ Tons \times \$/Ton\ Incentive)$$
$$= (80\ Tons \times \$450/Ton) = \$36{,}000$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$188,757
NJ Smart Start Equipment Incentive ($):	($36,000)
Net Installation Cost ($):	$152,757
Yearly Maintenance Savings ($/Yr):	$0
Yearly Energy Savings ($/Yr):	$4,487
Total Yearly Savings ($/Yr):	$4,487
Estimated ECM Lifetime (Yr):	20
Simple Payback	34.0
Simple Lifetime ROI	-41.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$89,740
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($86,001.77)

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 Warren Haven Nursing Home, 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 5,403 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in Renewable / Distributed Energy Measures Calculation appendix. Using this square footage it was determined that a system size of 84.64 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 97,806 KWh annually, reducing the overall utility bill by approximately 15.6% percent. A detailed financial analysis can be found in the 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%. The overall DC-to-AC derate factor is 81%. The panel tilt angle and direction is based on the actual proposed roof conditions and roof slope. For flat roof installations, the tilt is based on 10° from horizontal and facing South. The solar radiation and resultant AC energy calculations are based on the "National Renewable Energy Laboratory PVWatts Version 1.0 Calculator." The monthly energy output and savings from the PVWatts calculator is shown in the **Renewable / Distributed Energy Measures Calculation Appendix**.

The proposed solar PV system 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	INTERNAL RATE OF RETURN
Self-Finance	15.09 Years	-3.13%
Direct Purchase	15.09 Years	5.0%

The resultant Internal Rate of Return indicates that if the Owner was able to "Direct Purchase" 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 this 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 facility. 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 this facility, it was determined that the average wind speed is not adequate and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option.

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 fairly typical electric load profile. There is steady but substantial usage throughout the year based on the fact that it is a densely populated building with a data center that is operational 24 hours, 7 days a week. The building is occupied during typical office hours. The primary use for electricity is lighting, computer equipment and air conditioning systems. Air conditioning is provided by an air cooled screw chiller with 80 ton chiller capacity. Cooling load can be seen in the electric load profile especially in the summer months (March – October). A lower yet consistent electric profile (November – February) can be observed through the use of servers, routers and telecommunications which is part of the 24/7 operation throughout the year. The data center has (2) two dedicated air conditioning units. The data center's cooling system is a precision cooling system with re-heat, re-humidification and de-humidification capability. In a smaller part, the kitchen, refrigerator and appliances add to the electric load of the Administration Building annually, as well. These factors all contribute to this elevated base-load electric profile that is observed. A flatter load profile, will allow for more competitive energy prices when shopping for alternative suppliers.

Natural Gas:

The Natural Gas Usage Profile demonstrates a fairly typical natural gas, heating load profile. With the winter period (November –March), demonstrating the largest use of energy. This of course is due to the demand for heating the building. The primary source for heat is a single natural gas fired heating hot water boiler. The boiler operates annually. Natural gas is also the primary source for domestic hot water. Hot water is provided by a dedicated hot water heater that supplies the bathroom lavatories as well as lounge sinks. The flatter the load profile the easier it is to procure more competitive energy when shopping for a Third Party Supplier.

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 facility's 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:

Natural gas service is provided by Elizabethtown Gas Company on a Multi Family Service (MFS) natural gas tariff service rate. This service classification is closed, and only available to customers who are currently receiving this service as of December 1, 2002, and whose annual weather normalized usage as determined by the Company is equal to or greater 3,000 therms per year and have maintained continuous thereafter. Additional facilities added at these customers' existing site after this date will qualify for service under this classification. The following building types qualify for this service:

Governmental Buildings
Religious Institutions
Hospitals and Nursing Homes

Provided that gas supplied under this rates is the primary source of energy for all of the following purposes:

a). Central Heating
b). Heating water where water is used..

..and Gas Company's facilities are suitable and the required quantity of gas is available for the service desired. Commercial or Industrial use is not permitted under this rate. This service is not available for new or additional boiler equipment with a rated input in excess of 12.5 million BTU's per hour. The Gas Company may waive this limitation in cases where the Customer enters into a longer term contract or agrees to guarantee a monthly minimum revenue level as may be determined by the Gas Company. This is a continuous service.

The following are the charges associated with this service classification:

Service Charge
Demand Charge
Distribution Charge
Commodity Charge (Ride A)

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the BOE. 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 $.1398/kWh (this is the average "price to compare" if the client intends to shop for energy). The average

price per decatherm for natural gas is $ 11.46 / dth (dth, is the common unit of measure). The weighted average price per gallon for propane is $1.4934 / gallon. The average price per gallon for Heating Oil is $2.2763/ gallon.

Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Warren County could see improvement in its energy costs if it were to take advantage of these current market prices quickly, before energy prices increase. Based on annual historical consumption (July 2008 through June 2009) and current electric rates, the county could see an improvement in its electric costs of up to 24% annually. This number is substantial noting that the annual expenditure is over $500,000. (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 second recommendation coincides with the natural gas costs. Based on the current market, Warren County could improve its natural gas costs by up to 24%. CEG recommends the county receive further advisement on these prices through an energy advisor. They should also consider procuring energy (natural gas) through an alternative supply source.

CEG's third recommendation coincides with the propane costs associated with the Nursing Home. Based on a one-year weighted average price per gallon, Warren County pays $1.4934 / gallon for propane. The county has a contract with Amerigas Propane Inc., for a (2) two year period, expiring August 31, 2009. Because of the liquidity and volatility issues associated with propane, CEG strongly recommends renegotiating this contract with Amerigas for a (1) or (2) year fixed price contract. This will allow the county to improve its propane costs by up to 29%. CEG suggests the use of an energy advisor for the procurement of propane.

CEG's forth recommendation coincides with the Heating Oil (HO; # 2 Fuel Oil), costs. The county's average annual price per gallon of HO is $2.2763 / gallon. At the current time "spot" (daily or monthly) prices are very competitive. The fear is that along with crude price increases (and crude will escalate first), the HO will follow. Also as the winter approaches, Heating Oil prices will increase (subject to many physical factors such as refining). CEG noticed that the county has a 2-year contract with Allied Oil Company expiring August 2009. While energy prices remain competitive, CEG would suggest renegotiating this contract for a (1) or (2) year fixed price. This will allow for budget certainty while hedging the county against HO price increases.

CEG also recommends scheduling a meeting with the 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 municipality can learn more about the competitive supply process. The county can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. They should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the information for ongoing demand-side management projects. Furthermore, special

attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with the utility representative. Warren County should ask the utility representative about alternative billing options, such as consolidated billing 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. As stated in the executive summary these items should be considered the first form of action for this facility.

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 system power usage and maintain better IAQ.

D. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and minimize potential for over ventilation energy consumption.

E. Confirm proper operation of outdoor lighting controls including photocells and time clocks to minimize outdoor lighting energy usage.

F. Turn off computers when not in use by utilizing hibernation or sleep mode. Set computer monitors to automatically turn off when not in use (Not screen saver mode.)

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 US department of energy reports that commissioning for buildings on average save 5%-15% savings on energy usage.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Warren County Administration Building

ECMs	ECM Description	Installation Cost				Yearly Savings			ECM Lifetime	Lifetime Savings	Lifetime Maint. Savings	Lifetime ROI	Payback	Internal Rate of Return (IRR)	Net Present Value (NPV)
		Material	Labor	NJ Smart Start	Net	Energy	Maint.	Total		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade	$39,190	$39,190	($8,320)	$70,061	$11,392	$595	$11,987	25	$299,678	$14,875	327.7%	5.8	16.75%	$138,672.64
ECM #2	Lighting Controls	$1,588	$5,638	($1,840)	$5,386	$2,625	$0	$2,625	15	$39,375	$0	631.1%	2.1	48.61%	$25,951.08
ECM #3	Boiler Lockout & Point of Use Hot Water	$3,617	$3,052	$0	$6,669	$13,881	$0	$13,881	10	$138,810	$0	1981.4%	0.5	208.14%	$111,738.75
ECM #4	Air Cooled Chiller	$36,000	$23,652	($2,080)	$57,572	$3,368	$0	$3,368	20	$67,360	$0	17.0%	17.1	1.54%	($7,464.66)
ECM #5	Absorption Chiller	$158,331	$30,426	($36,000)	$152,757	$4,487	$0	$4,487	20	$89,740	$0	-41.3%	34.0	-4.61%	($86,001.77)
ECM #6	Solar Photovoltaic System	$761,760	$0	$0	$761,760	$50,468	$0	$50,468	25	$1,261,700	$0	65.6%	15.1	4.33%	$117,046.74

Notes:
1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Warren County Administration Building"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Ground Flr - Mechanical Room	Heating Water Loop	H.B. Smith Co.	1	2500L	-	1,183	807	68%	Natural Gas	23	35	12	Burner: Smith Mills Burner Unit, No. 89650-H

Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Frame Size	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Ground Flr - Mechanical Room	Building Heating Water Loop	-	2	-	-	3	1750	-	-	-	208	3	23 (Est)	20	(3)	Base Mounted Pumps, Electric Motor U.S. Electric
Ground Flr - Mechanical Room	Building Chilled Water Loop	Armstrong	2	-	-	5	1750	-	-	-	208	3	13 (Est)	20	7	Base Mounted Pumps, Marathon Elec Motor MN: 3VC184TTDR73568T

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Ground Flr - Mechanical Room	Whole Bldg.	A.O. Smith	1	BTR 197 118	M06M00137	199	193	120	-	Nat Gas	3	10	7	HW Re-circ pump (set 140°F) is set above dom. HWH setpoint (set to 130°F)

Air Handling Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Fan HP	Cooling Type	Heating Type	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Ground Flr - Mechanical Room	All VAV Units	Mammoth	1	VVW-701-FXM	20394-01-01	25	Chilled Water Coil	Hot Water Coil	208	3	-	23	15	(8)	Supply fan controlled by VFD through ductwork static pressure. Unit has been retrofitted from original package style to central AHU
Data Center	Data Center	Liebert	1	Challenger 3000	-	1.5	DX cooling coil	Electric	208	3	-	2	15	13	Precision Cooling unit controls Temperature and Humidity
Above Data Center Ceiling	Data Center (backup)	Trane	1	2TEC3F60B1000AA	7193kT01V	1	DX cooling coil	None	208	1	7.6	2	15	13	Back up AHU for liebert system or high load conditions.

AC Condensers / Condensing Units

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Roof	Data Center	Liebert	1	DCSF083-P	0712C95622	60 MBH (Est.)	-	R-22	208	1	2	15	13	Dual Circuit Air Cooled Condenser.
Roof	Data Center (backup)	Trane	1	2A7C3060A3000AA	70325SB4F	60 MBH	-	R-22	208	3	2	15	13	Single circuit Condensing Unit

Chiller

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Capacity	Cooling Eff. (KW/Ton)	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Grade	Whole Bldg	Applied Products	1	ASC080B2CB	A96K00085	960 MBH	1.46 (Est.)	R-22	208	3	15	15	0	Air Cooled, (2) Hitachi screw compressors, (6) condenser fans.

Split Systems

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Indoor - Office 208	Office 208	Mitsubishi Electric Corp	1	PLA-A12BA	-	12 MBH	9.9 EER (Est.)	R-22	208	1		Less than 13	15	-	Supplemental AC unit for office 208
Outdoor - Roof			1	PU12EK	4ZU01804A				208	1					

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Administration Building

Building ID: 1856413
For 12-month Period Ending: May 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: September 30, 2009

Facility
Administration Building
165 County Road
Belvidere, NJ 07823

Facility Owner
County of Warren
165 County Rd. 519S Wayne Dumont, Jr.
Administration Building
Velvidere, NJ 07823

Primary Contact for this Facility
Chris Pessolano
165 County Rd. 519S Wayne Dumont, Jr.
Administration Building
Belvidere, NJ 07823

Year Built: 1986
Gross Floor Area (ft²): 24,320

Energy Performance Rating[2] (1-100) 5

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	2,142,736
Natural Gas (kBtu)[4]	2,375,000
Total Energy (kBtu)	4,517,736

Energy Intensity[5]

Site (kBtu/ft²/yr)	186
Source (kBtu/ft²/yr)	397

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	453

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	99
National Average Source EUI	211
% Difference from National Average Source EUI	88%
Building Type	Office

Stamp of Certifying Professional

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

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

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

Certifying Professional
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	Administration Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	165 County Road, Belvidere, NJ 07823	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		☐
Office (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	24,120 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	84	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	84	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Data Center (Computer Data Center)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	200 Sq. Ft.	Does this square footage include all supporting functions of the computer data center?		☐

Weekly operating hours	168 Hours	Is this the total number of hours per week that the computer data center is in operation?		

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
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
05/01/2009	05/31/2009	54,560.00
04/01/2009	04/30/2009	48,320.00
03/01/2009	03/31/2009	41,600.00
02/01/2009	02/28/2009	41,120.00
01/01/2009	01/31/2009	38,080.00
12/01/2008	12/31/2008	39,680.00
11/01/2008	11/30/2008	33,600.00
10/01/2008	10/31/2008	59,200.00
09/01/2008	09/30/2008	67,040.00
08/01/2008	08/31/2008	63,200.00
07/01/2008	07/31/2008	70,720.00
06/01/2008	06/30/2008	70,880.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**628,000.00**
Electric Meter Consumption (kBtu (thousand Btu))		**2,142,736.00**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,142,736.00**
Is this the total Electricity (Grid Purchase) 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)
05/01/2009	05/31/2009	1,371.00
04/01/2009	04/30/2009	1,592.00
03/01/2009	03/31/2009	2,315.00
02/01/2009	02/28/2009	2,840.00
01/01/2009	01/31/2009	3,079.00
12/01/2008	12/31/2008	3,709.00
11/01/2008	11/30/2008	1,880.00
10/01/2008	10/31/2008	1,817.00
09/01/2008	09/30/2008	1,500.00
08/01/2008	08/31/2008	1,114.00

07/01/2008	07/31/2008	1,370.00
06/01/2008	06/30/2008	1,163.00
Gas Meter Consumption (therms)		**23,750.00**
Gas Meter Consumption (kBtu (thousand Btu))		**2,375,000.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,375,000.00**
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.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the 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
Administration Building
165 County Road
Belvidere, NJ 07823

Facility Owner
County of Warren
165 County Rd. 519S Wayne Dumont, Jr.
Administration Building
Velvidere, NJ 07823

Primary Contact for this Facility
Chris Pessolano
165 County Rd. 519S Wayne Dumont, Jr.
Administration Building
Belvidere, NJ 07823

General Information

Administration Building	
Gross Floor Area Excluding Parking: (ft^2)	24,320
Year Built	1986
For 12-month Evaluation Period Ending Date:	May 31, 2009

Facility Space Use Summary

Office	
Space Type	Office
Gross Floor Area(ft^2)	24,120
Weekly operating hours	40
Workers on Main Shift	84
Number of PCs	84
Percent Cooled	50% or more
Percent Heated	50% or more

Data Center	
Space Type	Computer Data Center
Gross Floor Area(ft^2)	200
Weekly operating hours	168

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2009)	**Baseline**	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	5		75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	186	N/A	74	N/A	99
Source (kBtu/ft^2)	397	N/A	157	N/A	211
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	453	N/A	179	N/A	241
$kgCO_2e/ft^2$/year	19	N/A	8	N/A	10

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

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

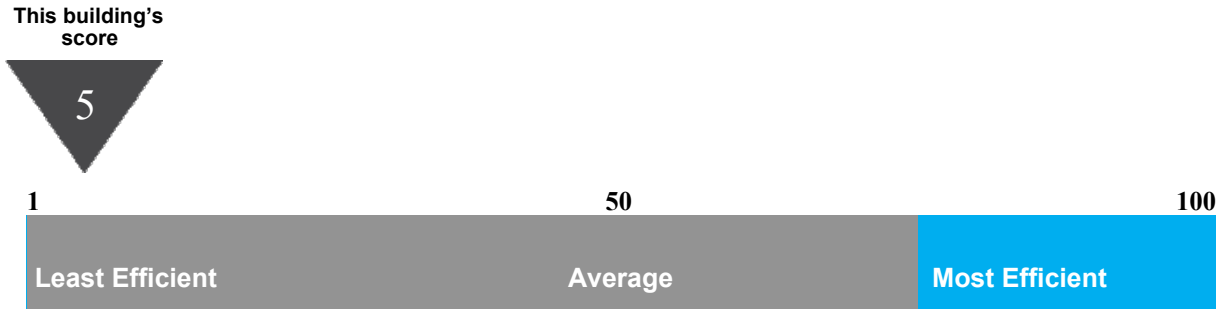
Statement of Energy Performance

2009

Administration Building
165 County Road
Belvidere, NJ 07823

Portfolio Manager Building ID: 1856413

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 397 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending May 2009

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 09/30/2009

CEG Job #: 9C09086
Project: Warren County Administration Building
Address: 165 County Road
Belvidere, NJ 07823
Building SF: 24,320

"Warren County - Administration Building"

KWH COST: $0.166

ECM #1: Lighting Upgrade

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	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
204	206 Office	2340	14	0	1-Lamp Incandescent Fixture	60	0.84	1,966	$326.29	14	0	18 W CFL Lamp	18	0.25	590	$97.89	$5.75	$80.50	0.59	1375.92	$228.40	0.35
1213		2340	2	1	3 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	47	0.09	220	$36.51	2	1	3' - 1-Lamp 25W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF125	23	0.05	108	$17.87	$119.00	$238.00	0.05	112.32	$18.65	12.76
1214	204 Large Meeting Rm.	2340	67	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	94	6.30	14,737	$2,446.40	67	1	4' - 1-Lamp 32W T-8 Strip w/ Elect Ballast; Metalux M/N SNF132	56	3.75	8,780	$1,457.43	$246.00	$16,482.00	2.55	5957.64	$988.97	16.67
1203	207 Freeholders Office	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.00	2,342	$388.83	$140.00	$1,540.00	0.76	1776.06	$294.83	5.22
1210		2340	9	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.54	1,264	$209.76	9	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.31	716	$118.86	$204.00	$1,836.00	0.23	547.56	$90.89	20.20
1202	212 Storage Closet	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	32	$5.34	$100.00	$100.00	0.04	22.815	$3.79	26.40
1203	206 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	208 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	213 Meeting Room	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1,278	$212.09	$140.00	$840.00	0.41	968.76	$160.81	5.22
204	211 Storage Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	18 W CFL Lamp	18	0.02	11	$1.75	$5.75	$5.75	0.04	24.57	$4.08	1.41
1207	203 Lobby	2340	9	1	1 X 4, 1-Lamp, T12, Magnetic Ballast, Prismatic Lens	50	0.45	1,053	$174.80	9	1	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.27	632	$104.88	$100.00	$900.00	0.18	421.2	$69.92	12.87
1214	202 Vestibule	2340	7	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	94	0.66	1,540	$255.59	7	1	4' - 1-Lamp 32W T-8 Strip w/ Elect Ballast; Metalux M/N SNF132	56	0.39	917	$152.27	$246.00	$1,722.00	0.27	622.44	$103.33	16.67
1216	256 Phone in Lobby	2340	1	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.06	133	$22.14	1	1	4' 1-Lamp T-8 32W wall Mtd.Metalux BC132	28	0.03	66	$10.88	$166.00	$166.00	0.03	67.86	$11.26	14.74
204	253 Janitor's Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	18 W CFL Lamp	18	0.02	11	$1.75	$5.75	$5.75	0.04	24.57	$4.08	1.41
1202	254 Men's Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
1202	252 Women's Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60

1202	209 Corridor to Elevator	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	129	$21.36	$100.00	$100.00	0.04	91.26	$15.15	6.60
1216	Corridor along Plague Walls	2340	6	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.34	800	$132.85	6	1	4' 1-Lamp T-8 32W wall Mtd.Metalux BC132	28	0.17	393	$65.26	$166.00	$996.00	0.17	407.16	$67.59	14.74
1203	Main Corridor	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.00	2,342	$388.83	$140.00	$1,540.00	0.76	1776.06	$294.83	5.22
1202	Exit Area	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	129	$21.36	$100.00	$100.00	0.04	91.26	$15.15	6.60
1203	244 Copy Room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	245 Office of Aging and Nutrition	2340	12	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.92	4,493	$745.80	12	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.09	2,555	$424.18	$140.00	$1,680.00	0.83	1937.52	$321.63	5.22
1203	248A Office	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	426	$70.70	$140.00	$280.00	0.14	322.92	$53.60	5.22
1203	248B Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	247 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	246 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1202	243 Office	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
1203	242 Office	2340	5	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.80	1,872	$310.75	5	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.46	1,065	$176.74	$140.00	$700.00	0.35	807.3	$134.01	5.22
1210	242 Office	2340	1	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.06	140	$23.31	1	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.03	80	$13.21	$204.00	$204.00	0.03	60.84	$10.10	20.20
1203	241 Office	2340	1	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.16	374	$62.15	1	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	213	$35.35	$140.00	$140.00	0.07	161.46	$26.80	5.22
1203	239 Public Info. Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	240 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	236 Personnel Office	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1,704	$282.78	$140.00	$1,120.00	0.55	1291.68	$214.42	5.22

1203	235 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	233 Storage Area	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	426	$70.70	$140.00	$280.00	0.14	322.92	$53.60	5.22
1203	234 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1210	233B Small Sitting Area	2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.07	159	$26.41	$204.00	$408.00	0.05	121.68	$20.20	20.20
1210	233C Office	2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.07	159	$26.41	$204.00	$408.00	0.05	121.68	$20.20	20.20
1203	228 Data Center	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1,704	$282.78	$140.00	$1,120.00	0.55	1291.68	$214.42	5.22
1202	231 Telephone System	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
1202	229 Closet	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	32	$5.34	$100.00	$100.00	0.04	22.815	$3.79	26.40
1203	216 Payroll	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1,704	$282.78	$140.00	$1,120.00	0.55	1291.68	$214.42	5.22
1203	214 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	215 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	217 Files Mts/Room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	221 Treasurer	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1210		2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.07	159	$26.41	$204.00	$408.00	0.05	121.68	$20.20	20.20
1203	223 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	222 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
101		2340	4	0	1-Lamp Compact Flourescent	14	0.06	131	$21.75	4	0	No Change	14	0.06	131	$21.75	$0.00	$0.00	0.00	0	$0.00	0.00

1203	225 Office	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1,704	$282.78	$140.00	$1,120.00	0.55	1291.68	$214.42	5.22
1203	226 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	227 Data Processing	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	1,704	$282.78	$140.00	$1,120.00	0.55	1291.68	$214.42	5.22
1217	255 Stairwell	2340	3	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	94	0.28	660	$109.54	3	1	4' - 1-Lamp 32W T-8 Strip w/ Elect Ballast; Metalux M/N SNF132	56	0.17	393	$65.26	$246.00	$738.00	0.11	266.76	$44.28	16.67
1202		2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	129	$21.36	$100.00	$100.00	0.04	91.26	$15.15	6.60
1203	102 Co-op extension	2340	15	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	2.40	5,616	$932.26	15	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.37	3,194	$530.22	$140.00	$2,100.00	1.04	2421.9	$402.04	5.22
1210		2340	5	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.30	702	$116.53	5	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.17	398	$66.03	$204.00	$1,020.00	0.13	304.2	$50.50	20.20
1203	144 Mtg. Room	2340	16	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	2.56	5,990	$994.41	16	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.46	3,407	$565.57	$140.00	$2,240.00	1.10	2583.36	$428.84	5.22
1218	144 Kitchen Area	2340	2	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.16	370	$61.37	2	1	3' - 2-Lamp 25W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF225	53	0.11	248	$41.17	$119.00	$238.00	0.05	121.68	$20.20	11.78
1218	101 Exit Vestibule	2340	1	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.08	185	$30.69	1	1	3' - 2-Lamp 25W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF225	53	0.05	124	$20.59	$119.00	$119.00	0.03	60.84	$10.10	11.78
1203	103 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	104 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	105 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	106 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	109 Supply/Copier	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	426	$70.70	$140.00	$280.00	0.14	322.92	$53.60	5.22
1202		2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	129	$21.36	$100.00	$100.00	0.04	91.26	$15.15	6.60
1203	110 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22

1203	113 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1,278	$212.09	$140.00	$840.00	0.41	968.76	$160.81	5.22
1202	139 Men Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
1202	137 Women Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
204	138 Janitor's Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	18 W CFL Lamp	18	0.02	11	$1.75	$5.75	$5.75	0.04	24.57	$4.08	1.41
1218	Elevator con.	2340	1	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.08	185	$30.69	1	1	3' - 2-Lamp 25W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF225	53	0.05	124	$20.59	$119.00	$119.00	0.03	60.84	$10.10	11.78
1203	146 Record/files storage	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1,278	$212.09	$140.00	$840.00	0.41	968.76	$160.81	5.22
1203	147 Records/Filing Room	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.82	1,916	$318.13	$140.00	$1,260.00	0.62	1453.14	$241.22	5.22
1203	141 First Aid	2340	1	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.16	374	$62.15	1	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	213	$35.35	$140.00	$140.00	0.07	161.46	$26.80	5.22
1203	135 Lunch Room	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.82	1,916	$318.13	$140.00	$1,260.00	0.62	1453.14	$241.22	5.22
1210		2340	1	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.06	140	$23.31	1	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.03	80	$13.21	$204.00	$204.00	0.03	60.84	$10.10	20.20
1202	132 Engine Room	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	32	$5.34	$100.00	$100.00	0.04	22.815	$3.79	26.40
1203	128 Storage	585	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	374	$62.15	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	213	$35.35	$140.00	$560.00	0.28	161.46	$26.80	20.89
1219	129 Mechanical Rm.	585	8	1	4 Foot, 2-Lamp T-12, Magnetic Ballast, Pendant	80	0.64	374	$62.15	8	1	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	73	0.58	342	$56.71	$123.00	$984.00	0.06	32.76	$5.44	180.94
1202	130 Elec. Rm.	585	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	110	$18.26	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	64	$10.68	$100.00	$200.00	0.08	45.63	$7.57	26.40
1202	127 Storage Rm.	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	32	$5.34	$100.00	$100.00	0.04	22.815	$3.79	26.40
1203	126 Mtg. Rm.	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	125 Kitchen	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1202	124 Copier/Supply Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	257	$42.73	$100.00	$200.00	0.08	182.52	$30.30	6.60
1203	123 Engineering Office	2340	20	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	3.20	7,488	$1,243.01	20	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.82	4,259	$706.96	$140.00	$2,800.00	1.38	3229.2	$536.05	5.22
1210		2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.07	159	$26.41	$204.00	$408.00	0.05	121.68	$20.20	20.20
1202	120 Storage files	2340	3	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.28	660	$109.54	3	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.17	386	$64.09	$100.00	$300.00	0.12	273.78	$45.45	6.60

1203	121 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	122 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1,278	$212.09	$140.00	$840.00	0.41	968.76	$160.81	5.22
1203	111 Planning	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.82	1,916	$318.13	$140.00	$1,260.00	0.62	1453.14	$241.22	5.22
204	112 Storage	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	18 W CFL Lamp	18	0.02	11	$1.75	$5.75	$5.75	0.04	24.57	$4.08	1.41
1203	114 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1,278	$212.09	$140.00	$840.00	0.41	968.76	$160.81	5.22
1203	145 files room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1203	115 Office Area	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.82	1,916	$318.13	$140.00	$1,260.00	0.62	1453.14	$241.22	5.22
1203	116 Office	2340	3	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.48	1,123	$186.45	3	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.27	639	$106.04	$140.00	$420.00	0.21	484.38	$80.41	5.22
1203	117 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.36	852	$141.39	$140.00	$560.00	0.28	645.84	$107.21	5.22
1202	Exit Door Area	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	129	$21.36	$100.00	$100.00	0.04	91.26	$15.15	6.60
1216	Middle of Corridor	2340	4	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.23	534	$88.56	4	1	4' 1-Lamp T-8 32W wall Mtd.Metalux BC132	28	0.11	262	$43.51	$166.00	$664.00	0.12	271.44	$45.06	14.74
1203	Main Corridor	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	1.00	2,342	$388.83	$140.00	$1,540.00	0.76	1776.06	$294.83	5.22
204		2340	5	0	1-Lamp Incandescent Fixture	60	0.30	702	$116.53	5	0	18 W CFL Lamp	18	0.09	211	$34.96	$5.75	$28.75	0.21	491.4	$81.57	0.35
304	First Parking Lot Main Area Outside	3640	13	0	1-Lamp Metal Halide Fixture	375	4.88	17,745	$2,945.67	13	0	No Change	375	4.88	17,745	$2,945.67	$0.00	$0.00	0.00	0	$0.00	0.00
1206	Outdoor Entry Way Outside	3640	9	1	1 X 4, 1-Lamp, T12, Magnetic Ballast, Prismatic Lens	50	0.45	1,638	$271.91	9	1	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.27	983	$163.14	$100.00	$900.00	0.18	655.2	$108.76	8.27
304	Back Parking Lot Outside	3640	5	0	1-Lamp Metal Halide Fixture	375	1.88	6,825	$1,132.95	5	0	No Change	375	1.88	6,825	$1,132.95	$0.00	$0.00	0.00	0	$0.00	0.00
205	Bottom Exit Area Outside	3640	2	0	1-Lamp Incandescent Fixture	40	0.08	291	$48.34	2	0	18 W CFL Lamp	18	0.04	131	$21.75	$5.75	$11.50	0.04	160.16	$26.59	0.43
205	Bottom of Stairwell Outside	3640	1	0	1-Lamp Incandescent Fixture	40	0.04	146	$24.17	1	0	18 W CFL Lamp	18	0.02	66	$10.88	$5.75	$5.75	0.02	80.08	$13.29	0.43
303	Building Wall Mounted Outside	3640	12	0	1-Lamp High Pressure Soduim Fixture	125	1.50	5,460	$906.36	12	0	No Change	125	1.50	5,460	$906.36	$0.00	$0.00	0.00	0	$0.00	0.00
205	Walkway Lights at 3 Entrances Outside	3640	12	0	1-Lamp Incandescent Fixture	40	0.48	1,747	$290.04	12	0	18 W CFL Lamp	18	0.22	786	$130.52	$5.75	$69.00	0.26	960.96	$159.52	0.43
	Totals		574	289			76.97	188,549	$31,299.20	574	233			47.38	119,922	$19,907.10		$78,380.50	29.60	68627	$11,392.10	6.88

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Some fixtures are estimated due to inaccessibility
3. Lamp totals only include T-12 tube replacment calculations

CEG Job #: 9C09086
Project: Warren County Administration Building
Address: 165 County Road
Belvidere, NJ 07823
Building SF: 24,320

"Warren County - Administration Building"

KWH COST: $0.166

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Savings (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
204	206 Office	2340	14	0	1-Lamp Incandescent Fixture	60	0.84	1,966	$326.29	14	0	Dual Technology Occupancy Sensor	60	10%	1,769	$293.66	$75.00	$75.00	0.00	196.56	$32.63	2.30
1213		2340	2	1	3 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	47	0.09	220	$36.51	2	1	Dual Technology Occupancy Sensor	47	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1214	204 Large Meeting Rm.	2340	67	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	94	6.30	14,737	$2,446.40	67	1	Dual Technology Occupancy Sensor	94	10%	13,264	$2,201.76	$75.00	$75.00	0.00	1473.732	$244.64	0.31
1203	207 Freeholders Office	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	Dual Technology Occupancy Sensor	160	10%	3,707	$615.29	$75.00	$75.00	0.00	411.84	$68.37	1.10
1210		2340	9	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.54	1,264	$209.76	9	2	Dual Technology Occupancy Sensor	60	10%	1,137	$188.78	$75.00	$75.00	0.00	126.36	$20.98	3.58
1202	212 Storage Closet	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	Dual Technology Occupancy Sensor	94	0%	55	$9.13	$0.00	$0.00	0.00	0	$0.00	0.00
1203	206 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	208 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	213 Meeting Room	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	Dual Technology Occupancy Sensor	160	10%	2,022	$335.61	$75.00	$75.00	0.00	224.64	$37.29	2.01
204	211 Storage Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	Dual Technology Occupancy Sensor	60	0%	35	$5.83	$0.00	$0.00	0.00	0	$0.00	0.00
1207	203 Lobby	2340	9	1	1 X 4, 1-Lamp, T12, Magnetic Ballast, Prismatic Lens	50	0.45	1,053	$174.80	9	1	Dual Technology Occupancy Sensor	50	28%	758	$125.85	$75.00	$313.00	0.00	294.84	$48.94	6.40
1214	202 Vestibule	2340	7	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Pendant	94	0.66	1,540	$255.59	7	1	Dual Technology Occupancy Sensor	94	28%	1,109	$184.03	$75.00	$313.00	0.00	431.1216	$71.57	4.37
1216	256 Phone in Lobby	2340	1	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.06	133	$22.14	1	1	Dual Technology Occupancy Sensor	57	10%	120	$19.93	$75.00	$75.00	0.00	13.338	$2.21	33.87
204	253 Janitor's Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	Dual Technology Occupancy Sensor	60	0%	35	$5.83	$0.00	$0.00	0.00	0	$0.00	0.00
1202	254 Men's Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
1202	252 Women's Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27

1202	209 Corridor to Elevator	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	Dual Technology Occupancy Sensor	94	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1216	Corridor along Plague Walls	2340	6	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.34	800	$132.85	6	1	Dual Technology Occupancy Sensor	57	10%	720	$119.56	$75.00	$75.00	0.00	80.028	$13.28	5.65
1203	Main Corridor	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	Dual Technology Occupancy Sensor	160	10%	3,707	$615.29	$75.00	$75.00	0.00	411.84	$68.37	1.10
1202	Exit Area	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	Dual Technology Occupancy Sensor	94	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1203	244 Copy Room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	245 Office of Aging and Nutrition	2340	12	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.92	4,493	$745.80	12	3	Dual Technology Occupancy Sensor	160	10%	4,044	$671.22	$75.00	$75.00	0.00	449.28	$74.58	1.01
1203	248A Office	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	Dual Technology Occupancy Sensor	160	10%	674	$111.87	$75.00	$75.00	0.00	74.88	$12.43	6.03
1203	248B Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	247 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	246 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1202	243 Office	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
1203	242 Office	2340	5	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.80	1,872	$310.75	5	3	Dual Technology Occupancy Sensor	160	10%	1,685	$279.68	$75.00	$75.00	0.00	187.2	$31.08	2.41
1210	242 Office	2340	1	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.06	140	$23.31	1	2	Dual Technology Occupancy Sensor	60	10%	126	$20.98	$75.00	$75.00	0.00	14.04	$2.33	32.18
1203	241 Office	2340	1	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.16	374	$62.15	1	3	Dual Technology Occupancy Sensor	160	10%	337	$55.94	$75.00	$75.00	0.00	37.44	$6.22	12.07
1203	239 Public Info. Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	240 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	236 Personnel Office	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	Dual Technology Occupancy Sensor	160	10%	2,696	$447.48	$75.00	$75.00	0.00	299.52	$49.72	1.51

1203	235 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	233 Storage Area	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	Dual Technology Occupancy Sensor	160	10%	674	$111.87	$75.00	$75.00	0.00	74.88	$12.43	6.03
1203	234 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1210	233B Small Sitting Area	2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	Dual Technology Occupancy Sensor	60	10%	253	$41.95	$75.00	$75.00	0.00	28.08	$4.66	16.09
1210	233C Office	2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	Dual Technology Occupancy Sensor	60	10%	253	$41.95	$75.00	$75.00	0.00	28.08	$4.66	16.09
1203	228 Data Center	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	Dual Technology Occupancy Sensor	160	10%	2,696	$447.48	$75.00	$75.00	0.00	299.52	$49.72	1.51
1202	231 Telephone System	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
1202	229 Closet	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	Dual Technology Occupancy Sensor	94	0%	55	$9.13	$0.00	$0.00	0.00	0	$0.00	0.00
1203	216 Payroll	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	Dual Technology Occupancy Sensor	160	10%	2,696	$447.48	$75.00	$75.00	0.00	299.52	$49.72	1.51
1203	214 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	215 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	217 Files Mts/Room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	221 Treasurer	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1210		2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	Dual Technology Occupancy Sensor	60	10%	253	$41.95	$75.00	$75.00	0.00	28.08	$4.66	16.09
1203	223 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	222 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
101		2340	4	0	1-Lamp Compact Flourescent	14	0.06	131	$21.75	4	0	Dual Technology Occupancy Sensor	14	10%	118	$19.58	$75.00	$75.00	0.00	13.104	$2.18	34.48

1203	225 Office	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	Dual Technology Occupancy Sensor	160	10%	2,696	$447.48	$75.00	$75.00	0.00	299.52	$49.72	1.51
1203	226 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	227 Data Processing	2340	8	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.28	2,995	$497.20	8	3	Dual Technology Occupancy Sensor	160	10%	2,696	$447.48	$75.00	$75.00	0.00	299.52	$49.72	1.51
1217	255 Stairwell	2340	3	1	6 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	94	0.28	660	$109.54	3	1	Dual Technology Occupancy Sensor	94	10%	594	$98.59	$75.00	$75.00	0.00	65.988	$10.95	6.85
1202		2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	Dual Technology Occupancy Sensor	94	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1203	102 Co-op extension	2340	15	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	2.40	5,616	$932.26	15	3	Dual Technology Occupancy Sensor	160	10%	5,054	$839.03	$75.00	$75.00	0.00	561.6	$93.23	0.80
1210		2340	5	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.30	702	$116.53	5	2	Dual Technology Occupancy Sensor	60	10%	632	$104.88	$75.00	$75.00	0.00	70.2	$11.65	6.44
1203	144 Mtg. Room	2340	16	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	2.56	5,990	$994.41	16	3	Dual Technology Occupancy Sensor	160	10%	5,391	$894.97	$75.00	$75.00	0.00	599.04	$99.44	0.75
1218	144 Kitchen Area	2340	2	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.16	370	$61.37	2	1	Dual Technology Occupancy Sensor	79	10%	333	$55.24	$75.00	$75.00	0.00	36.972	$6.14	12.22
1218	101 Exit Vestibule	2340	1	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.08	185	$30.69	1	1	Dual Technology Occupancy Sensor	79	10%	166	$27.62	$75.00	$75.00	0.00	18.486	$3.07	24.44
1203	103 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	104 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	105 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	106 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	109 Supply/Copier	2340	2	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.32	749	$124.30	2	3	Dual Technology Occupancy Sensor	160	10%	674	$111.87	$75.00	$75.00	0.00	74.88	$12.43	6.03
1202		2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	Dual Technology Occupancy Sensor	94	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1203	110 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02

1203	113 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	Dual Technology Occupancy Sensor	160	10%	2,022	$335.61	$75.00	$75.00	0.00	224.64	$37.29	2.01
1202	139 Men Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
1202	137 Women Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
204	138 Janitor's Closet	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	Dual Technology Occupancy Sensor	60	0%	35	$5.83	$0.00	$0.00	0.00	0	$0.00	0.00
1218	Elevator con.	2340	1	1	3 Foot, 2-Lamp T-12, Magnetic Ballast, Prismatic Lens	79	0.08	185	$30.69	1	1	Dual Technology Occupancy Sensor	79	10%	166	$27.62	$75.00	$75.00	0.00	18.486	$3.07	24.44
1203	146 Record/files storage	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	Dual Technology Occupancy Sensor	160	10%	2,022	$335.61	$75.00	$75.00	0.00	224.64	$37.29	2.01
1203	147 Records/Filing Room	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	Dual Technology Occupancy Sensor	160	10%	3,033	$503.42	$75.00	$75.00	0.00	336.96	$55.94	1.34
1203	141 First Aid	2340	1	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.16	374	$62.15	1	3	Dual Technology Occupancy Sensor	160	10%	337	$55.94	$75.00	$75.00	0.00	37.44	$6.22	12.07
1203	135 Lunch Room	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	Dual Technology Occupancy Sensor	160	10%	3,033	$503.42	$75.00	$75.00	0.00	336.96	$55.94	1.34
1210		2340	1	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.06	140	$23.31	1	2	Dual Technology Occupancy Sensor	60	10%	126	$20.98	$75.00	$75.00	0.00	14.04	$2.33	32.18
1202	132 Engine Room	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	Dual Technology Occupancy Sensor	94	0%	55	$9.13	$0.00	$0.00	0.00	0	$0.00	0.00
1203	128 Storage	585	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	374	$62.15	4	3	Dual Technology Occupancy Sensor	160	0%	374	$62.15	$0.00	$0.00	0.00	0	$0.00	0.00
1219	129 Mechanical Rm.	585	8	1	4 Foot, 2-Lamp T-12, Magnetic Ballast, Pendant	80	0.64	374	$62.15	8	1	Dual Technology Occupancy Sensor	80	0%	374	$62.15	$0.00	$0.00	0.00	0	$0.00	0.00
1202	130 Elec. Rm.	585	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	110	$18.26	2	2	Dual Technology Occupancy Sensor	94	0%	110	$18.26	$0.00	$0.00	0.00	0	$0.00	0.00
1202	127 Storage Rm.	585	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	55	$9.13	1	2	Dual Technology Occupancy Sensor	94	0%	55	$9.13	$0.00	$0.00	0.00	0	$0.00	0.00
1203	126 Mtg. Rm.	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	125 Kitchen	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1202	124 Copier/Supply Room	2340	2	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.19	440	$73.03	2	2	Dual Technology Occupancy Sensor	94	10%	396	$65.72	$75.00	$75.00	0.00	43.992	$7.30	10.27
1203	123 Engineering Office	2340	20	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	3.20	7,488	$1,243.01	20	3	Dual Technology Occupancy Sensor	160	10%	6,739	$1,118.71	$75.00	$75.00	0.00	748.8	$124.30	0.60
1210		2340	2	2	2 X 2, 2-Lamp, T12 U-Tube, Magnetic Ballast, Prismatic Lens	60	0.12	281	$46.61	2	2	Dual Technology Occupancy Sensor	60	10%	253	$41.95	$75.00	$75.00	0.00	28.08	$4.66	16.09
1202	120 Storage files	2340	3	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.28	660	$109.54	3	2	Dual Technology Occupancy Sensor	94	10%	594	$98.59	$75.00	$75.00	0.00	65.988	$10.95	6.85

1203	121 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	122 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	Dual Technology Occupancy Sensor	160	10%	2,022	$335.61	$75.00	$75.00	0.00	224.64	$37.29	2.01
1203	111 Planning	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	Dual Technology Occupancy Sensor	160	10%	3,033	$503.42	$75.00	$75.00	0.00	336.96	$55.94	1.34
204	112 Storage	585	1	0	1-Lamp Incandescent Fixture	60	0.06	35	$5.83	1	0	Dual Technology Occupancy Sensor	60	0%	35	$5.83	$0.00	$0.00	0.00	0	$0.00	0.00
1203	114 Office	2340	6	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.96	2,246	$372.90	6	3	Dual Technology Occupancy Sensor	160	10%	2,022	$335.61	$75.00	$75.00	0.00	224.64	$37.29	2.01
1203	145 files room	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1203	115 Office Area	2340	9	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.44	3,370	$559.35	9	3	Dual Technology Occupancy Sensor	160	10%	3,033	$503.42	$75.00	$75.00	0.00	336.96	$55.94	1.34
1203	116 Office	2340	3	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.48	1,123	$186.45	3	3	Dual Technology Occupancy Sensor	160	10%	1,011	$167.81	$75.00	$75.00	0.00	112.32	$18.65	4.02
1203	117 Office	2340	4	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	0.64	1,498	$248.60	4	3	Dual Technology Occupancy Sensor	160	10%	1,348	$223.74	$75.00	$75.00	0.00	149.76	$24.86	3.02
1202	Exit Door Area	2340	1	2	1 X 4, 2-Lamp, T12, Magnetic Ballast, Prismatic Lens	94	0.09	220	$36.51	1	2	Dual Technology Occupancy Sensor	94	10%	198	$32.86	$75.00	$75.00	0.00	21.996	$3.65	20.54
1216	Middle of Corridor	2340	4	1	4 Foot, 1-Lamp T-12, Magnetic Ballast, Wall Mount	57	0.23	534	$88.56	4	1	Dual Technology Occupancy Sensor	57	10%	480	$79.71	$75.00	$75.00	0.00	53.352	$8.86	8.47
1203	Main Corridor	2340	11	4	2 X 4, 4-Lamp, T12, Magnetic Ballast, Prismatic Lens	160	1.76	4,118	$683.65	11	3	Dual Technology Occupancy Sensor	160	10%	3,707	$615.29	$75.00	$75.00	0.00	411.84	$68.37	1.10
204		2340	5	0	1-Lamp Incandescent Fixture	60	0.30	702	$116.53	5	0	Dual Technology Occupancy Sensor	60	10%	632	$104.88	$75.00	$75.00	0.00	70.2	$11.65	6.44
304	First Parking Lot Main Area Outside	3640	13	0	1-Lamp Metal Halide Fixture	375	4.88	17,745	$2,945.67	13	0	No Change	375	0%	17,745	$2,945.67	$0.00	$0.00	0.00	0	$0.00	0.00
1206	Outdoor Entry Way Outside	3640	9	1	1 X 4, 1-Lamp, T12, Magnetic Ballast, Prismatic Lens	50	0.45	1,638	$271.91	9	1	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	50	0%	1,638	$271.91	$0.00	$0.00	0.00	0	$0.00	0.00
304	Back Parking Lot Outside	3640	5	0	1-Lamp Metal Halide Fixture	375	1.88	6,825	$1,132.95	5	0	No Change	375	0%	6,825	$1,132.95	$0.00	$0.00	0.00	0	$0.00	0.00
205	Bottom Exit Area Outside	3640	2	0	1-Lamp Incandescent Fixture	40	0.08	291	$48.34	2	0	18 W CFL Lamp	40	0%	291	$48.34	$0.00	$0.00	0.00	0	$0.00	0.00
205	Bottom of Stairwell Outside	3640	1	0	1-Lamp Incandescent Fixture	40	0.04	146	$24.17	1	0	18 W CFL Lamp	40	0%	146	$24.17	$0.00	$0.00	0.00	0	$0.00	0.00
303	Building Wall Mounted Outside	3640	12	0	1-Lamp High Pressure Soduim Fixture	125	1.50	5,460	$906.36	12	0	No Change	125	0%	5,460	$906.36	$0.00	$0.00	0.00	0	$0.00	0.00
205	Walkway Lights at 3 Entrances Outside	3640	12	0	1-Lamp Incandescent Fixture	40	0.48	1,747	$290.04	12	0	18 W CFL Lamp	40	0%	1,747	$290.04	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		574	289			76.97	188,549	$31,299.20	574	233			9.36	172,735	$28,673.99		$7,226.00	0.00	15815	$2,625.21	2.75

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

2. Some fixtures are estimated due to inaccessibility

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

Project Name: LGEA Solar PV Project - Warren County Administration Building
Location: Belvidere, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$761,760
Annual kWh Production	97,806
Annual Energy Cost Reduction	$16,236
Annual SREC Revenue	$34,232
First Cost Premium	**$761,760**
Simple Payback:	**15.09** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.166**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/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	$38,088	0	0	0	$0	0	0	(38,088)	0
1	$0	97,806	$16,236	$0	$34,232	$50,112	$17,216	($16,860)	($54,948)
2	$0	97,317	$16,723	$0	$34,061	$48,867	$18,460	($16,544)	($71,491)
3	$0	96,830	$17,225	$0	$33,891	$47,533	$19,795	($16,212)	($87,703)
4	$0	96,346	$17,741	$0	$33,721	$46,102	$21,226	($15,865)	($103,568)
5	$0	95,865	$18,274	$987	$33,553	$44,567	$22,760	($16,489)	($120,057)
6	$0	95,385	$18,822	$982	$33,385	$42,922	$24,406	($16,103)	($136,161)
7	$0	94,908	$19,386	$978	$33,218	$41,158	$26,170	($15,701)	($151,861)
8	$0	94,434	$19,968	$973	$33,052	$39,266	$28,062	($15,280)	($167,142)
9	$0	93,962	$20,567	$968	$32,887	$37,237	$30,090	($14,842)	($181,983)
10	$0	93,492	$21,184	$963	$32,722	$35,062	$32,265	($14,384)	($196,368)
11	$0	93,024	$21,820	$958	$32,558	$32,730	$34,598	($13,908)	($210,275)
12	$0	92,559	$22,474	$953	$32,396	$30,228	$37,099	($13,411)	($223,686)
13	$0	92,096	$23,148	$949	$32,234	$27,547	$39,781	($12,894)	($236,580)
14	$0	91,636	$23,843	$944	$32,073	$24,671	$42,657	($12,356)	($248,936)
15	$0	91,178	$24,558	$939	$31,912	$21,587	$45,740	($11,796)	($260,732)
16	$0	90,722	$25,295	$934	$31,753	$18,281	$49,047	($11,214)	($271,947)
17	$0	90,268	$26,054	$930	$31,594	$14,735	$52,592	($10,610)	($282,556)
18	$0	89,817	$26,835	$925	$31,436	$10,933	$56,394	($9,981)	($292,538)
19	$0	89,368	$27,640	$920	$31,279	$6,856	$60,471	($9,329)	($301,867)
20	$0	88,921	$28,470	$916	$31,122	$2,485	$64,843	($8,651)	($310,518)
21	$0	88,476	$29,324	$911	$30,967	$2,107	$59,610	($2,338)	($312,856)
22	$0	88,034	$30,203	$907	$30,812	$1,442	$49,054	$9,613	($303,243)
23	$0	87,594	$31,109	$902	$30,658	$0	$0	$60,865	($242,378)
24	$0	87,156	$32,043	$898	$30,505	$0	$0	$61,650	($180,728)
25	$0	86,720	$33,004	$893	$30,352	$0	$0	$62,463	($118,266)
	Totals:	1,865,933	$436,262	$15,220	$653,077	$622,877	$723,672	$832,336	($5,068,389)
				Net Present Value (NPV)			**($134,463)**		
				Internal Rate of Return (IRR)			**-3.13%**		

Project Name: LGEA Solar PV Project - Warren County Administration Building
Location: Belvidere, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$761,760
Annual kWh Production	97,806
Annual Energy Cost Reduction	$16,236
Annual SREC Revenue	$34,232
First Cost Premium	**$761,760**
Simple Payback:	**15.09** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.166**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$761,760	0	0	0	$0	(761,760)	0
1	$0	97,806	$16,236	$0	$34,232	$50,468	($711,292)
2	$0	97,317	$16,723	$0	$34,061	$50,784	($660,508)
3	$0	96,830	$17,225	$0	$33,891	$51,115	($609,393)
4	$0	96,346	$17,741	$0	$33,721	$51,462	($557,931)
5	$0	95,865	$18,274	$987	$33,553	$50,839	($507,092)
6	$0	95,385	$18,822	$982	$33,385	$51,224	($455,868)
7	$0	94,908	$19,386	$978	$33,218	$51,627	($404,241)
8	$0	94,434	$19,968	$973	$33,052	$52,047	($352,194)
9	$0	93,962	$20,567	$968	$32,887	$52,486	($299,708)
10	$0	93,492	$21,184	$963	$32,722	$52,943	($246,765)
11	$0	93,024	$21,820	$958	$32,558	$53,420	($193,345)
12	$0	92,559	$22,474	$953	$32,396	$53,916	($139,429)
13	$0	92,096	$23,148	$949	$32,234	$54,433	($84,995)
14	$0	91,636	$23,843	$944	$32,073	$54,972	($30,024)
15	$0	91,178	$24,558	$939	$31,912	$55,531	$25,507
16	$0	90,722	$25,295	$934	$31,753	$56,113	$81,621
17	$0	90,268	$26,054	$930	$31,594	$56,718	$138,338
18	$0	89,817	$26,835	$925	$31,436	$57,346	$195,684
19	$0	89,368	$27,640	$920	$31,279	$57,999	$253,683
20	$0	88,921	$28,470	$916	$31,122	$58,676	$312,359
21	$1	88,476	$29,324	$911	$30,967	$59,379	$371,738
22	$2	88,034	$30,203	$907	$30,812	$60,108	$431,847
23	$3	87,594	$31,109	$902	$30,658	$60,865	$492,712
24	$4	87,156	$32,043	$898	$30,505	$61,650	$554,361
25	$5	86,720	$33,004	$893	$30,352	$62,463	$616,824
Totals:		1,865,933	$436,262	$15,220	$653,077	$1,378,584	$1,074,119
				Net Present Value (NPV)		**$616,849**	
				Internal Rate of Return (IRR)		**5.0%**	

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
Warren County Administration Building	5403	Sunpower SPR230	368	14.7	5,411	84.64	97,806	12,144	15.64

.= Proposed PV Layout Area

Notes:

1. Estimated kWH based on National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	84.6 kW
DC to AC Derate Factor:	0.810
AC Rating:	68.6 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	16.4 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.39	5078	832.79
2	3.17	6156	1009.58
3	4.07	8616	1413.02
4	4.83	9546	1565.54
5	5.70	11358	1862.71
6	5.94	11098	1820.07
7	5.77	11012	1805.97
8	5.38	10200	1672.80
9	4.65	8775	1439.10
10	3.61	7224	1184.74
11	2.35	4608	755.71
12	2.01	4134	677.98
Year	4.16	97806	16040.18

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data

Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

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