ENERGY AUDIT – FINAL REPORT

OCEAN TOWNSHIP
BUILDINGS AND GROUNDS
EQUIPMENT GARAGE

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OAKHURST, NJ 07755
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CEG PROJECT NO. 9C09048

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I. EXECUTIVE SUMMARY

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

Ocean Township
Buildings and Grounds Garages
240 Whalepond Road
Oakhurst, NJ 07755

Municipal Contact Person: Andrew Brannen
Facility Contact Person: Mark Disakias

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

The annual energy costs at this facility are as follows:

Electricity	$ 2,478
Oil	$ 4,842
Total	$ 7,320

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	NET INSTALL COST[A]	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE LIFETIME ROI
1	Lighting Upgrade	$3,680	$1,137	3.2	509%
2	Lighting Controls	$840	$150	5.6	168%

Note: Net Installation Cost includes applicable incentives.

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

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	FUEL OIL (Gallons)
1	Lighting Upgrade	2.77	4,772	-
2	Lighting Controls	-	795	-

Recommendation:

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

ECM #1: Lighting Upgrade

ECM #2: Lighting Controls

II. INTRODUCTION

This comprehensive energy audit covers the 9,072 square foot Buildings and Grounds Equipment Storage Garage that includes large bay areas and storage rooms.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ 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:

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Jersey Central Power & Light (JCP&L) provides electricity to the facility under the General Service Secondary Rate. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

#2 fuel oil was delivered to the garage 3 times in the year 2008. The date, volume, and cost are listed below:

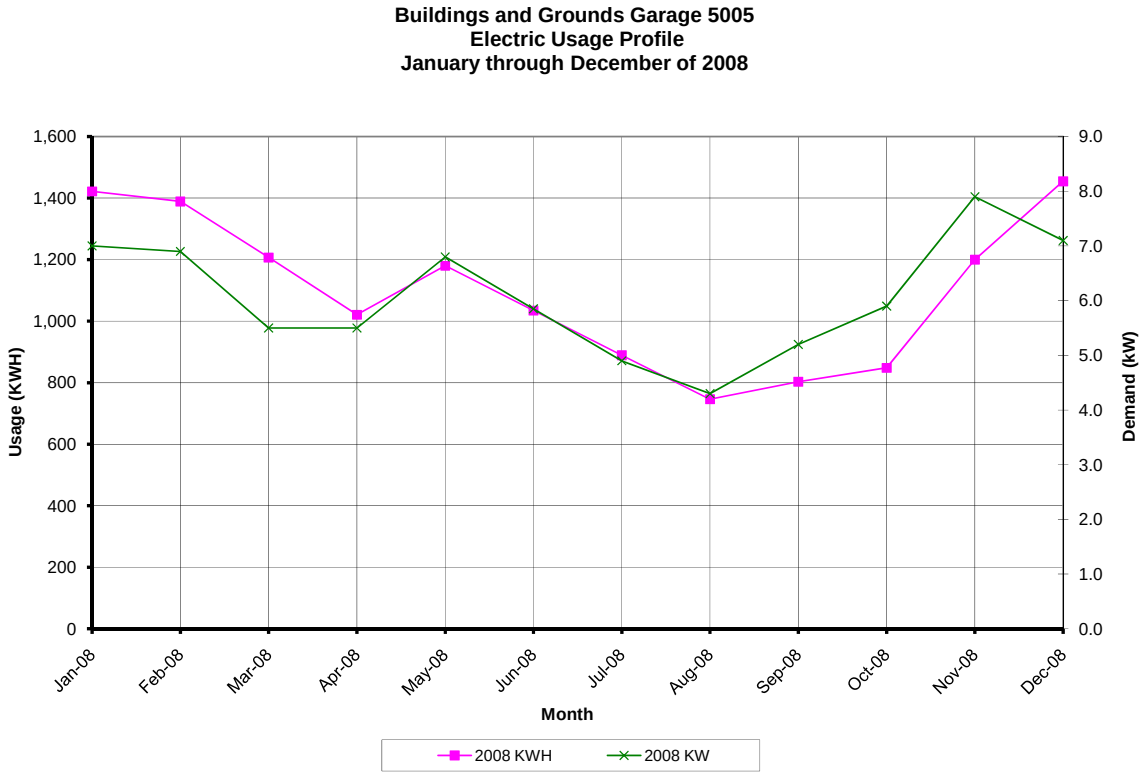
Delivery Date	Volume (gallons)	Cost ($)
1/23/08	646.8	$ 1,723.38
3/11/08	633.6	$ 2,084.54
10/23/08	353.2	$ 914.79
Total	1,633.6	$ 4,842.71

Description	Average
Electricity	18.8¢/kWh
Oil	$2.96/gallon

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	1,422	7.0	$ 252
2/08	1,389	6.9	$ 241
3/08	1,207	5.5	$ 210
4/08	1,021	5.5	$ 185
5/08	1,180	6.8	$ 205
6/08	1,035	5.9	$ 204
7/08	889	4.9	$ 196
8/08	746	4.3	$ 165
9/08	803	5.2	$ 174
10/08	848	5.9	$ 163
11/08	1,200	7.9	$ 220
12/08	1,455	7.1	$ 263
Totals	**13,195**	**7.9 MAX**	**$2,478**

Figure 1
Electricity Usage Profile



B. Energy Use Index (EUI)

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

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

$$Electric = \frac{(13{,}195\ kWh \times 1{,}000\ \frac{W}{kW} \times \frac{3.414\ Btu/h}{1\ W})}{1000\ \ Btu\ /\ 1\ kBtu} = 45{,}047.73\ kBtu$$

$$Heating\ \ Oil = \frac{(1{,}633.6\ gallons \times 139{,}400\ \frac{Btu}{1\ gallon})}{1000\ Btu\ /\ 1\ kBtu} = 227{,}723.84\ kBtu$$

$$Building\ \ EUI = \frac{45{,}047.73\ kBtu + 227{,}723.84\ kBtu}{9{,}072\ \ SF}$$

Buildings and Grounds Equipment Garage EUI = 30.07 kBtu/SF Site Energy, 41.9 kBtu/SF Source Energy

As a comparison, data has been gathered by the US Department of Energy (DOE) for various facilities cataloguing the standard site and source energy utilization. This data has been published in the 2003 Commercial Building Energy Consumption Survey and is noted as follows for facilities of this type:

- Service (Vehicle Repair): 77 Btu/SF Site Energy, 150 kBtu/SF Source Energy.

Based on the information compiled for the studied facility, as compared to the national average the energy usage is approximately 50% less than the baseline data.

C. EPA Energy Benchmarking System

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

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

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the facility in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. The following is the user name and password for this account:

User Name:	oceantwp
Password:	lgeaceg2009
Security Question:	What is your birth city? ocean township

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

Table 5
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Buildings and Grounds Garage	N/A	50

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

V. FACILITY DESCRIPTION

Building 5005 on the Ocean Township Buildings and Grounds premises is a very simple concrete block building consisting of storage rooms, a bathroom, one main hall, and three garages. There is no insulation covering the walls or ceiling throughout the entire building. The roof is half shingle and half black rubber, and a 1,000 gallon oil tank is located above ground within a small room that is accessible from outside. The average occupancy is very minimal, due to its use which is used mainly for storage of township equipment.

Heating System

The task of heating building 5005 is carried out by the use of (2) vertical oil-fired furnaces in the mechanical room coupled with ceiling hung oil-fired unit heaters that are found in the center and left garages.

The oil-fired furnaces are both Ducane Air-Handling Units with 100 MBH and 125 MBH capacities and 0.9 GPH and 1.1 GPH flow rates, respectively. An A.O. Smith Type S pump provides oil to the furnace with a ¼ HP motor rotating at 1725 RPM. The furnaces supply heat to the hall and storage room section of the building through exposed ductwork. Air is returned to the furnaces through grilles located on walls near the ground.

The unit heaters in each garage are Modine oil-fired Unit Heaters running at 115 V/1 PH/60 Hz with outputs of 185 MBH each. Unit #3 in the center garage consumes 1.65 GPH while unit #4 and #5 in the left garage consumes 1.68 GPH.

Domestic Hot Water

Domestic hot water for the restrooms/showers is provided by a 30 gallon Quaker electric hot-water heater which consists of 4,500 W upper and lower elements.

Cooling System

There is no cooling system in this building.

Controls System

A standard thermostat with no set back controls the temperature in the building.

Unit Heater and Furnace Exhaust System

There is no exhaust system in place at this facility.

Lighting

Interior lighting throughout the facility is provided by light fixtures of various sizes containing T-12 lamps and magnetic ballasts. Fixture type varies from prismatic lens fixtures to industrial.

Exterior lighting is provided via 150 W Metal-Halide lights mounted on the building exterior.

VI. MAJOR EQUIPMENT LIST

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

Table 5 thru 6
Existing Equipment Listing

HEATING EQUIPMENT						
Description	**Qty**	**Rated Capacity(BTUH)**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
Ducane AHU M/N: UHZ8125A58K	1	125,000	Oil	12	18	6
Ducane AHU M/N:UHZ8100A5AK	1	100,000	Oil	12	18	6
Modine UH M/N:P0H185A	3	185,000	Oil	11	13	2

DOMESTIC HOT WATER SYSTEM						
Description	**Qty**	**Capacity**	**Fuel Type**	**Approx. Age (yrs)**	**ASHRAE Service Life (yrs)**	**Remaining Life (yrs)**
Quaker HWH M/N: ER32D	1	4,500 Watts	Electric	23	12	(11)

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Replacement

Description:

The existing lighting within the Buildings and Grounds Garage consists of inefficient fluorescent fixtures containing T12 lamps and magnetic ballasts. The standard fixture type throughout is an industrial-type fixture with symmetrical reflectors. The inefficiency in the existing magnetic ballasts causes the existing fixtures to have a high input wattage as compared to new electronic ballasted fixtures.

CEG recommends a replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the Owner on electrical costs due to the better performance of the electronic ballasts. In addition to functional cost savings, the fixture replacement will also provide operational cost savings. The operational cost savings will be realized through the lesser number of lamps that will be required to be replaced per year. The expected lamp life of a T8 lamp, approximately 30,000 burn-hours, in comparison to the existing T12 lamps, approximately 20,000 burn-hours, will provide the Owner with fewer lamps to replace per year. Based on the operating hours of this portion of the facility, approximately 2080 hours per year, the Owner will be changing approximately 33% less lamps per year.

In addition, CEG recommends the replacement of all incandescent lamps with compact fluorescent bulbs of similar lumens.

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

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

$$\text{Smart Start®}\ Incentive = (14\ x\ \$25) + (19\ x\ \$\ 30) = \underline{\$920}$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (104 \times 33\%\ reduction \times \$\ 2.00) + (\$5 \times 34) = \underline{\$240}$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,600
NJ Smart Start Equipment Incentive ($):	($920)
Net Installation Cost ($):	*$3,680*
Annual Maintenance Savings ($ / yr):	*$240*
Annual Energy Savings ($ / yr):	*$897*
Annual Net Savings ($ / yr):	*$1,137*
Simple Payback (yrs):	*3.2*
Simple Lifetime Return On Investment (%):	*509%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Maintenance Savings ($)	*$6,000*
Simple Lifetime Energy Savings ($):	*$22,425*

ECM #2: Lighting Controls

Description:

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

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, restrooms, lunch rooms, storage rooms, locker rooms, workshops, etc. (approximately 8,500 SF).

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

Energy Savings Calculations:

From Appendix E of this report, we calculated the lighting power density (Watts/ft^2) of the existing offices, locker rooms, storage rooms, small shops, etc. to be ±0.45 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 0.45 Watts/SF x 8,500 SF x 2,080 hrs/yr. = 795 kWh x $0.188/kWh

Savings = $\underline{\$150}$ per year

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is $160/unit including material and labor.

The SmartStart Buildings® incentive is $20 per control which equates to an installed cost of $140/unit. Total number of rooms to be retrofitted is 6 with a total of 6 sensors required.

Total cost to install sensors is $140/unit x 6 units = $\underline{\$840}$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$960
NJ Smart Start Equipment Incentive ($):	($120)
Net Installation Cost ($):	*$840*
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$150*
Annual Net Savings ($ / yr):	*$150*
Simple Payback (yrs):	*5.6*
Simple Lifetime Return On Investment (%):	*168%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$2,250*

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 Ocean Township, 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 450 S.F. can be utilized for a PV system on the facility. A depiction of the area utilized is shown in Appendix F. Using this square footage it was determined that a system size of 7.13 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 11,127 KWh annually, reducing the overall utility bill by 84% percent. A detailed financial analysis can be found in Appendix F. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a

customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

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

PAYMENT TYPE	SIMPLE PAYBACK	INTERNAL RATE OF RETURN
Self-Finance	10.72 Years	18.3%
Direct Purchase	10.72 Years	8.7%

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

Wind energy production is another option available through the Renewable Energy Incentive Program. Small wind turbines can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG has reviewed the applicability of wind energy for the Buildings and Grounds Garage and has determined it is not a viable option. The electrical usage of the facility is not large enough to justify the installation of a wind turbine.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

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

Electricity:

Section IV, Figure 1 demonstrates a fairly flat usage profile, meaning consumption is consistent throughout the year. The consistent electric usage is in part due to the fact that the domestic hot water is supplied with an electric hot water heater. There is no cooling system in this facility. There is however, an increase it electric in usage throughout the winter period (January –May, October, November, and December). This base-load shaping is important because a flat consumption will yield more competitive pricing when shopping for energy from an alternative supplier.

Natural Gas:

There is no natural gas service at this location.

Fuel Oil:

While there is no natural gas service at this location, the heating furnaces are supplied by Fuel Oil. Heating Oil (#2 Fuel Oil) is prevalent in commercial buildings for heating. Heating Oil (HO) depending on the percentage of sulfur, is traded on the New York Mercantile Exchange. Heating Oil is refined from crude oil and distributed through small suppliers called jobbers to commercial facilities.

Tariff Analysis:

Electricity:

This facility receives electrical service through Jersey Central Power & Light (JCP&L) on a GSS (General Service Secondary) rate. Service classification GS is available for general service purposes on secondary voltages not included under Service Classifications RS, RT, RGT or GST. This 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). If they use the utility BGS then 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:

There is no natural gas service at this location.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within The Township of Ocean. CEG's observations are seen in both commodities. The average price per kWh (kilowatt hour) for all buildings is $.134/kWh (kWh is the common unit of electric measure). The average price per decatherm for natural gas is $11.52/dth (dth is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Ocean Township could realize significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (January –December 2008) and current fixed electric rates, the Township could see an improvement of 20%. (Note: Savings were calculated using Ocean Townships Average Annual Consumption of 1,382,755 kWh and an Average fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's other recommendation coincides with the natural gas cost. CEG recognized that the Township could also see improvement in its natural gas costs by a factor of over 20%. And CEG recommends further advisement on these prices. The Township should consider procuring energy (natural gas) on its own. CEG recommends alternative sourcing strategies through energy advisement.

CEG recommends that the town schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the town will learn more about the competitive supply process. The utility can provide a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu, and should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, Ocean Township should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

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

X. INSTALLATION FUNDING OPTIONS

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

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

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

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

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

A. Maintain all weather stripping on windows and doors.

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

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

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

E. Recalibrate existing sensors serving the Garage

F. Clean all light fixtures to maximize light output.

Electric Cost Summary

JCP&L (Rate - BGS)

Buildings and Grounds Garage 5005 **2008**

Account # 10 00 28 7740 2 2

Meter # G17783718

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	1,422	1,389	1,207	1,021	1,180	1,035	889	746	803	848	1,200	1,455	13,195	
KW	7.0	6.9	5.5	5.5	6.8	5.9	4.9	4.3	5.2	5.9	7.9	7.1	7.9	Max
Monthly Load Factor	27%	30%	29%	26%	23%	25%	24%	23%	21%	19%	21%	28%	25%	
Electric Delivery, $	83.90	87.76	76.06	70.76	73.51	71.42	67.68	56.79	57.25	55.67	68.29	80.32	$849	
Delivery $/kwh	$0.059	$0.063	$0.063	$0.069	$0.062	$0.069	$0.076	$0.076	$0.071	$0.066	$0.057	$0.055	$0.064	
Electric Supply, $	168.51	153.62	133.92	113.79	130.99	132.48	128.63	108.47	116.50	107.41	151.56	183.09	$1,629	
Supply $/kwh	$0.119	$0.111	$0.111	$0.111	$0.111	$0.128	$0.145	$0.145	$0.145	$0.127	$0.126	$0.126	$0.123	
Total Cost, $	$252	$241	$210	$185	$205	$204	$196	$165	$174	$163	$220	$263	$2,478	
$/KWH	$0.178	$0.174	$0.174	$0.181	$0.173	$0.197	$0.221	$0.222	$0.216	$0.192	$0.183	$0.181	**$0.188**	

Estimated utility information. Utility bill no provided by owner.

CONSTRUCTION COST AND REBATES

CONCORD ENGINEERING GROUP

Ocean Township - Buildings and Grounds Garage

ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$4,600	$0	$0	$4,600
Total Cost			$0	$0	$4,600
Utility Incentive - NJ Smart Start					($920)
Total Cost Less Incentive					$3,680

ECM 2 LIGHTING CONTROLS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	6	$160	$480	$480	$960
Total Cost			$480	$480	$960
Utility Incentive - NJ Smart Start					($120)
Total Cost Less Incentive					$840

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

STATEMENT OF ENERGY PERFORMANCE
Buildings and Grounds Equipment Garage

Building ID: 1774595
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 07, 2009

Facility
Buildings and Grounds Equipment Garage
240 Whalepond Rd.
Oakhurst, NJ 07755

Facility Owner
Township of Ocean
399 Monmouth Rd.
Oakhurst, NJ 07755

Primary Contact for this Facility
Andrew Brennan
399 Monmouth Rd.
Oakhurst, NJ 07755

Year Built: 1940
Gross Floor Area (ft²): 9,072

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

Site Energy Use Summary[3]

Fuel Oil (No. 2) (kBtu)	228,704
Electricity (kBtu)	44,858
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	273,562

Energy Intensity[5]

Site (kBtu/ft²/yr)	30
Source (kBtu/ft²/yr)	42

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	25

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	25
National Average Source EUI	56
% Difference from National Average Source EUI	-25%
Building Type	Storage/Shipping/Non-Refrigerated Warehouse

Stamp of Certifying Professional

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

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

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Buildings and Grounds Equipment Garage	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Storage/Shipping/Non-Refrigerated Warehouse	Is this an accurate description of the space in question?		☐
Location	240 Whalepond Rd., Oakhurst, NJ 07755	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		☐

Garage (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	9,072 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	0 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	40 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	13 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Jersey Central Power & Lt Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	1,455.00
11/01/2008	11/30/2008	1,200.00
10/01/2008	10/31/2008	848.00
09/01/2008	09/30/2008	803.00
08/01/2008	08/31/2008	746.00
07/01/2008	07/31/2008	889.00
06/01/2008	06/30/2008	905.00
05/01/2008	05/31/2008	1,180.00
04/01/2008	04/30/2008	1,021.00
03/01/2008	03/31/2008	1,207.00
02/01/2008	02/29/2008	1,389.00
01/01/2008	01/31/2008	1,504.00
Electric Consumption (kWh (thousand Watt-hours))		**13,147.00**
Electric Consumption (kBtu)		**44,857.56**
Total Electricity Consumption (kBtu)		**44,857.56**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)

Meter: Fuel Oil (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
12/01/2008	12/31/2008	0.00
11/01/2008	11/30/2008	0.00
10/01/2008	10/31/2008	353.20
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	0.00
05/01/2008	05/31/2008	0.00
04/01/2008	04/30/2008	0.00

03/01/2008	03/31/2008	633.60
02/01/2008	02/29/2008	0.00
01/01/2008	01/31/2008	646.80
Fuel Oil Consumption (Gallons)		**1,633.60**
Fuel Oil Consumption (kBtu)		**228,703.67**
Total Fuel Oil (No. 2) Consumption (kBtu)		**228,703.67**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		☐

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

Certifying Professional

(When applying for the ENERGY STAR, this must be the same PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Buildings and Grounds Equipment Garage
240 Whalepond Rd.
Oakhurst, NJ 07755

Facility Owner
Township of Ocean
399 Monmouth Rd.
Oakhurst, NJ 07755

Primary Contact for this Facility
Andrew Brennan
399 Monmouth Rd.
Oakhurst, NJ 07755

General Information

Buildings and Grounds Equipment Garage	
Gross Floor Area Excluding Parking: (ft^2)	9,072
Year Built	1940
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Garage	
Space Type	Other - Storage/Shipping/Non-Refrigerated Warehouse
Gross Floor Area(ft^2)	9,072
Number of PCs[o]	0
Weekly operating hours[o]	40
Workers on Main Shift[o]	13

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	30	30	0	N/A	25
Source (kBtu/ft^2)	42	42	0	N/A	56
Energy Cost					
$/year	$ 7,306.71	$ 7,306.71	N/A	N/A	$ 6,058.63
$/$ft^2$/year	$ 0.81	$ 0.81	N/A	N/A	$ 0.67
Greenhouse Gas Emissions					
$MtCO_2e$/year	25	25	0	N/A	21
$kgCO_2e/ft^2$/year	3	3	0	N/A	2

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

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

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C09048
Project: Ocean Twp. Energy Audit
Address: 240 Whalepond Rd
City: Oakhurst, NJ
Building SF: 9,072

"Buildings and Ground Garage"

DATE: 07/07/2009
KWH COST: $0.188

EXISTING LIGHTING										PROPOSED LIGHTING							SAVINGS			
Line No.	CEG Type	Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Replacement-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Payback
1	-	Furnace Room	1	2'x4' 4-Lamp T-12 Prism Lens, Magnetic Ballast	520	160	0.16	83.2	$15.64	1	Metalux 2GC8-332-UNV (3)F32T8 Lamps Electronic Ballast	91	0.09	47.32	$8.90	$140.00	$140.00	0.07	35.88	$6.75	20.75
2	-	Hallway	4	4'x1' 4-Lamp T-12 Prism Lens, Magnetic Ballast	2080	160	0.64	1331.2	$250.27	4	Metalux GC-332-UNV (3)F32T8 Lamps Electronic Ballast	81	0.32	673.92	$126.70	$100.00	$400.00	0.32	657.28	$123.57	3.24
3	-		1	2'x2' 2-Lamp T-12 Prism Lens, Magnetic Ballast	2080	60	0.06	124.8	$23.46	1	Metalux GC-2U6T8A (2)U6T832 Lamps Electronic Ballast	58	0.06	120.64	$22.68	$80.00	$80.00	0.00	4.16	$0.78	102.29
4	-	Right Garage	6	2'x4' 4-Lamp T-12 Prism Lens, Magnetic Ballast	2080	160	0.96	1996.8	$375.40	6	Metalux 2GC8-332-UNV (3)F32T8 Lamps Electronic Ballast	91	0.55	1135.68	$213.51	$140.00	$840.00	0.41	861.12	$161.89	5.19
5	-		5	4'x1' 4-Lamp T-12 Prism Lens, Magnetic Ballast	2080	160	0.80	1664	$312.83	5	Metalux GC-332-UNV (3)F32T8 Lamps Electronic Ballast	81	0.41	842.4	$158.37	$100.00	$500.00	0.40	821.6	$154.46	3.24
6	-	Storage Rm 1	2	8' 2-Lamp T-12 No Lens, Magnetic Ballast	520	222	0.44	230.88	$43.41	2	Metalux DI-296T8 (2)59WF96T8/SPX35 Magnetek Triad Ballast	123	0.25	127.92	$24.05	$175.00	$350.00	0.20	102.96	$19.36	18.08
7	-	Storage Rm 2	2	8' 2-Lamp T-12 No Lens, Magnetic Ballast	520	222	0.44	230.88	$43.41	2	Metalux DI-296T8 (2)59WF96T8/SPX35 Magnetek Triad Ballast	123	0.25	127.92	$24.05	$175.00	$350.00	0.20	102.96	$19.36	18.08
8	-	Storage Rm 3	1	8' 2-Lamp T-12 No Lens, Magnetic Ballast	520	222	0.22	115.44	$21.70	1	Metalux DI-296T8 (2)59WF96T8/SPX35 Magnetek Triad Ballast	123	0.12	63.96	$12.02	$175.00	$175.00	0.10	51.48	$9.68	18.08
9	-	Center Garage	3	8' 2-Lamp T-12 No Lens, Magnetic Ballast	2080	222	0.67	1385.28	$260.43	3	Metalux DI-296T8 (2)59WF96T8/SPX35 Magnetek Triad Ballast	123	0.37	767.52	$144.29	$175.00	$525.00	0.30	617.76	$116.14	4.52
10	-	Compressor Rm	1	2'x4' 4-Lamp T-12 Prism Lens, Magnetic Ballast	520	160	0.16	83.2	$15.64	1	Metalux 2GC8-332-UNV (3)F32T8 Lamps Electronic Ballast	91	0.09	47.32	$8.90	$140.00	$140.00	0.07	35.88	$6.75	20.75
11	-	Left Garage	4	8' 2-Lamp T-12 No Lens, Magnetic Ballast	2080	222	0.89	1847.04	$347.24	4	Metalux DI-296T8 (2)59WF96T8/SPX35 Magnetek Triad Ballast	123	0.49	1023.36	$192.39	$175.00	$700.00	0.40	823.68	$154.85	4.52
12	-		4	4'x1' 4-Lamp T-12 Prism Lens, Magnetic Ballast	2080	160	0.64	1331.2	$250.27	4	Metalux GC-332-UNV (3)F32T8 Lamps Electronic Ballast	81	0.32	673.92	$126.70	$100.00	$400.00	0.32	657.28	$123.57	3.24
13	-	Outdoor	3	150 W Metal Halide	3285	180	0.54	1773.9	$333.49	3	No Change Required	180	0.54	1773.9	$333.49	$0.00	$0.00	0.00	0	$0.00	0.00
		Totals	37				6.62	12197.82	$2,293.19	37			3.86	7425.78	$1,396.05		$4,600.00	2.77	4772.04	$897.14	5.13

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

Project Name: LGEA Solar PV Project - Buildings and Grounds Garage - Ocean Township
Location: Oakhurst, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$64,170
Annual kWh Production	11,127
Annual Energy Cost Reduction	$2,092
Annual SREC Revenue	$3,894
First Cost Premium	**$64,170**
Simple Payback:	**10.72** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.188**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$3,209	0	0	0	$0	0	0	(3,209)	0
1	$0	11,127	$2,092	$0	$3,894	$4,221	$1,450	$315	($2,894)
2	$0	11,071	$2,155	$0	$3,875	$4,117	$1,555	$358	($2,536)
3	$0	11,016	$2,219	$0	$3,855	$4,004	$1,667	$403	($2,133)
4	$0	10,961	$2,286	$0	$3,836	$3,884	$1,788	$450	($1,683)
5	$0	10,906	$2,354	$112	$3,817	$3,754	$1,917	$387	($1,295)
6	$0	10,851	$2,425	$112	$3,798	$3,616	$2,056	$440	($856)
7	$0	10,797	$2,498	$111	$3,779	$3,467	$2,205	$494	($362)
8	$0	10,743	$2,573	$111	$3,760	$3,308	$2,364	$550	$189
9	$0	10,689	$2,650	$110	$3,741	$3,137	$2,535	$609	$798
10	$0	10,636	$2,729	$110	$3,723	$2,954	$2,718	$671	$1,469
11	$0	10,583	$2,811	$109	$3,704	$2,757	$2,914	$735	$2,204
12	$0	10,530	$2,896	$108	$3,685	$2,546	$3,125	$801	$3,004
13	$0	10,477	$2,982	$108	$3,667	$2,320	$3,351	$870	$3,874
14	$0	10,425	$3,072	$107	$3,649	$2,078	$3,593	$942	$4,816
15	$0	10,373	$3,164	$107	$3,630	$1,818	$3,853	$1,016	$5,832
16	$0	10,321	$3,259	$106	$3,612	$1,540	$4,132	$1,093	$6,925
17	$0	10,269	$3,357	$106	$3,594	$1,241	$4,430	$1,174	$8,099
18	$0	10,218	$3,457	$105	$3,576	$921	$4,751	$1,257	$9,356
19	$0	10,167	$3,561	$105	$3,558	$578	$5,094	$1,343	$10,699
20	$0	10,116	$3,668	$104	$3,541	$209	$5,462	$1,433	$12,132
21	$0	10,065	$3,778	$104	$3,523	$177	$5,022	$1,998	$14,130
22	$0	10,015	$3,891	$103	$3,505	$121	$4,132	$3,040	$17,170
23	$0	9,965	$4,008	$103	$3,488	$0	$0	$7,393	$24,563
24	$0	9,915	$4,128	$102	$3,470	$0	$0	$7,497	$32,060
25	$0	9,866	$4,252	$102	$3,453	$0	$0	$7,604	$39,663
	Totals:	212,274	$56,208	$1,731	$74,296	$52,471	$60,961	$70,115	$185,225
					Net Present Value (NPV)			**$8,061**	
					Internal Rate of Return (IRR)			**18.3%**	

Project Name: LGEA Solar PV Project - Buildings and Grounds Garage - Ocean Township
Location: Oakhurst, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$64,170
Annual kWh Production	11,127
Annual Energy Cost Reduction	$2,092
Annual SREC Revenue	$3,894
First Cost Premium	**$64,170**
Simple Payback:	**10.72** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.188**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$64,170	0	0	0	$0	(64,170)	0
1	$0	11,127	$2,092	$0	$3,894	$5,986	($58,184)
2	$0	11,071	$2,155	$0	$3,875	$6,029	($52,154)
3	$0	11,016	$2,219	$0	$3,855	$6,075	($46,080)
4	$0	10,961	$2,286	$0	$3,836	$6,122	($39,958)
5	$0	10,906	$2,354	$112	$3,817	$6,059	($33,899)
6	$0	10,851	$2,425	$112	$3,798	$6,111	($27,787)
7	$0	10,797	$2,498	$111	$3,779	$6,165	($21,622)
8	$0	10,743	$2,573	$111	$3,760	$6,222	($15,400)
9	$0	10,689	$2,650	$110	$3,741	$6,281	($9,119)
10	$0	10,636	$2,729	$110	$3,723	$6,342	($2,776)
11	$0	10,583	$2,811	$109	$3,704	$6,406	$3,630
12	$0	10,530	$2,896	$108	$3,685	$6,473	$10,102
13	$0	10,477	$2,982	$108	$3,667	$6,542	$16,644
14	$0	10,425	$3,072	$107	$3,649	$6,613	$23,257
15	$0	10,373	$3,164	$107	$3,630	$6,688	$29,945
16	$0	10,321	$3,259	$106	$3,612	$6,765	$36,710
17	$0	10,269	$3,357	$106	$3,594	$6,845	$43,555
18	$0	10,218	$3,457	$105	$3,576	$6,928	$50,483
19	$0	10,167	$3,561	$105	$3,558	$7,015	$57,498
20	$0	10,116	$3,668	$104	$3,541	$7,104	$64,602
21	$1	10,065	$3,778	$104	$3,523	$7,197	$71,800
22	$2	10,015	$3,891	$103	$3,505	$7,293	$79,093
23	$3	9,965	$4,008	$103	$3,488	$7,393	$86,486
24	$4	9,915	$4,128	$102	$3,470	$7,497	$93,983
25	$5	9,866	$4,252	$102	$3,453	$7,604	$101,586
	Totals:	212,274	$56,208	$1,731	$74,296	$165,756	$128,772
				Net Present Value (NPV)		**$101,611**	
				Internal Rate of Return (IRR)		**8.7%**	

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
Buildings and Grounds Garage	450	Sunpower SPR230	31	14.7	456	7.13	11,127	1,023	15.64

.= Proposed PV Layout

Notes:

1. Estimated kWH based on 4.68 hours full output per day per 365 day year. Actual kWH will vary day to day.