ENERGY AUDIT – FINAL REPORT

OCEAN TOWNSHIP
BEECROFT GARAGE #1 AND #2
390 BEECROFT ROAD
OAKHURST, NJ 07755
ATTN: MR. ANDREW BRANNEN
TOWNSHIP MANAGER

CEG PROJECT NO. 9C09048

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I. EXECUTIVE SUMMARY

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

Ocean Township
Beecroft Garages #1 and #2
390 Beecroft Rd.
Oakhurst, NJ 07755

Municipal Contact Person: Bill McMahon
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	$ 7,151
Natural Gas	$ 9,177
Total	$ 16,328

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 Garage #1	$3,030	$610	5.0	403%
2	Lighting Upgrade Garage #2	$2,845	$532	5.3	367%
3	Gas Fired Unit Heater Upgrade	$6,524	$2,990	2.2	496%
4	Garage #1 Boiler Upgrade	$6,840	$132	51.8	(32%)

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)	NATURAL GAS (THERMS)
1	Lighting Upgrade Garage #1	1.16	2,328	-
2	Lighting Upgrade Garage #2	1.05	2,102	-
3	Gas Fired Unit Heater Upgrade	-	383	493
4	Garage #1 Boiler Upgrade	-	-	86

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 Beecroft Garage #1 and #2:

- **ECM #1:** Lighting Upgrade Garage #1
- **ECM #2:** Lighting Upgrade Garage #2
- **ECM #3:** Gas Fired Unit Heater Upgrade

CEG recommends the installation of ECM #3 even though it is past the recommended seven (7) year period. This ECM's payback period will be reduced once a custom measure incentive is applied for, and will add to value and occupant comfort of the facility.

II. INTRODUCTION

This comprehensive energy audit covers two (2) storage garages located within the Beecroft Public Works Complex; Garage #1 totals 5,655 square feet and Garage #2 totals 4,509 square feet. The Beecroft Garages include garage bays and storage areas of various sizes. These garages are utilized as indoor storage for Township Public Works Equipment and Vehicles.

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:

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

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

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

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

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 and Light (JCP&L) provides electricity to the facility under the General Service Secondary 3 Phase Rate Schedule. The Garages are metered independently from one another. 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.

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facility from January-08 to December-08. The Beecroft Garages receive natural gas via New Jersey Natural Gas under the Basic Generation Service (BGS) rate. The Garages share a common meter. This rate, combined with a delivery charge, makes up the total cost per therm.

Description	Average
Electricity Garage #1	18.6¢ / kWh
Electricity Garage #2	16.5¢ / kWh
Electricity Average	17.5¢ / kWh_{AVG}
Natural Gas	$1.533 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	3,660	7.4	$ 609
2/08	6,050	10.3	$ 931
3/08	5,909	10.4	$ 871
4/08	4,746	8.2	$ 739
5/08	2,605	7.1	$ 503
6/08	2,272	7.1	$ 459
7/08	1,938	7.1	$ 409
8/08	2,031	7.0	$ 423
9/08	1,175	4.2	$ 238
10/08	2,700	10.4	$ 484
11/08	2,487	8.2	$ 435
12/08	6,397	12.3	$ 1,051
Totals	**41,969**	**12.3 Max**	**$ 7,151**

This table and figure represents the total electrical consumption of the two (2) garages combined.

Figure 1
Electricity Usage Profile

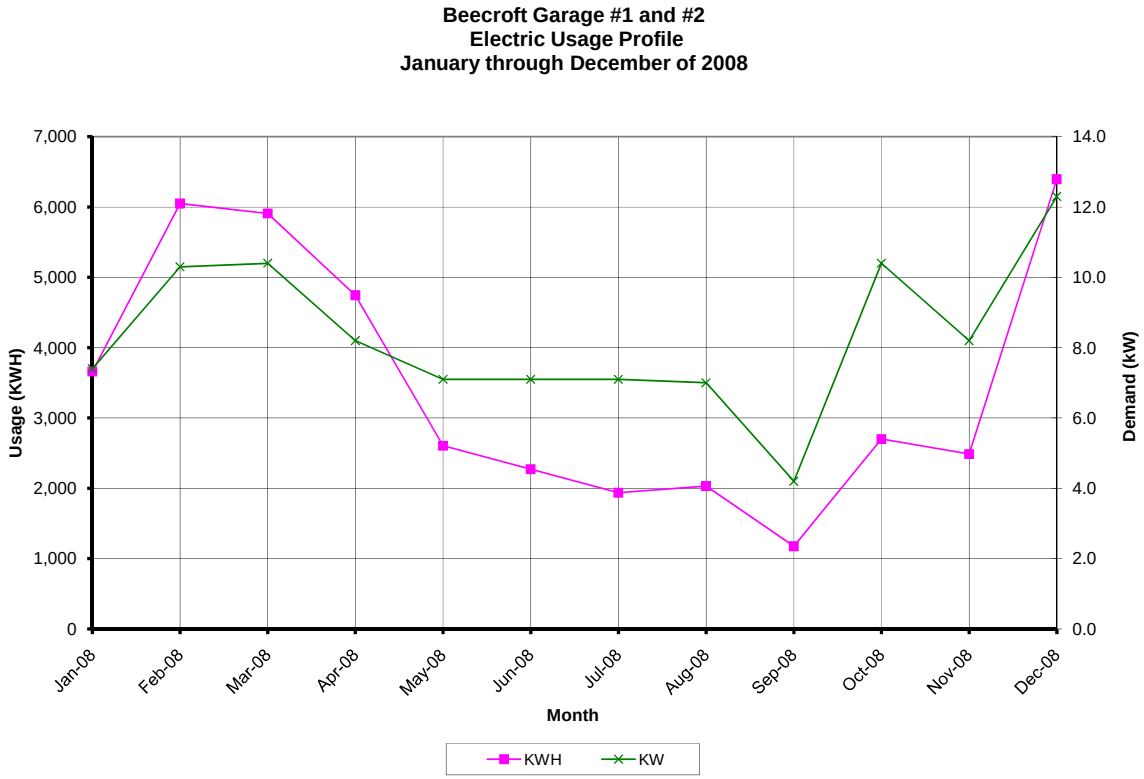
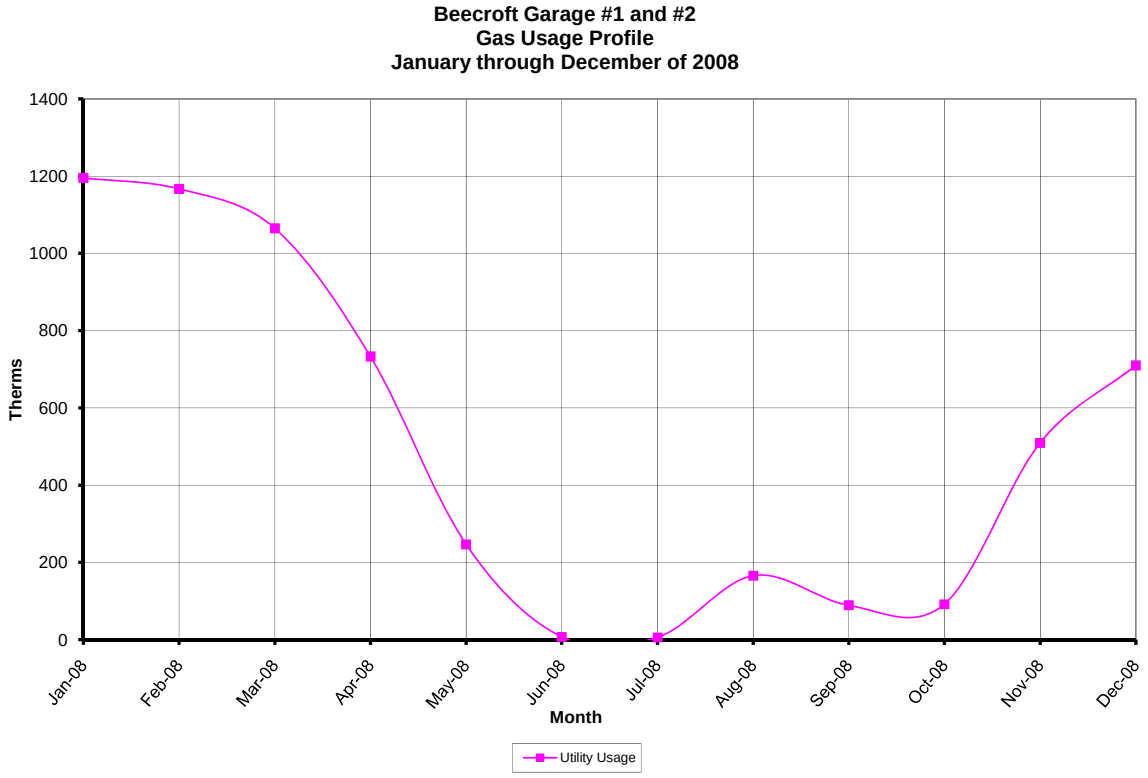


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	1,195.1	$ 1,637
2/08	1,166.7	$ 1,674
3/08	1,064.7	$ 1,649
4/08	733.2	$ 1,189
5/08	246.5	$ 448
6/08	7.3	$ 29
7/08	6.3	$ 28
8/08	165.9	$ 306
9/08	89.1	$ 151
10/08	92.1	$ 217
11/08	509.0	$ 798
12/08	709.8	$ 1,051
Totals	**5,985.8**	**$ 9,177**

This table and figure represents the total natural gas consumption of the two (2) garages combined.

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

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

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

$$Electric = \frac{(41{,}969\ kWh * 1000\,{}^{W}\!/_{kW} * 3.414\,{}^{btu}\!/_{hW})}{(\frac{1000\ {}^{Btu}\!/_{h}}{1\ {}^{kBtu}\!/_{h}})} = \underline{143{,}282.166\ \text{kBtu}}$$

$$Gas = \frac{(5{,}985.8\ therms * 100{,}000\,{}^{Btu}\!/_{1\ therms})}{(\frac{1000\ {}^{Btu}\!/_{h}}{1\ {}^{kBtu}\!/_{h}})} = \underline{598{,}580\ \text{kBtu}}$$

$$Building\ \ EUI = \frac{(143{,}282.166\ kBtu + 598{,}580\ kBtu)}{10{,}164\ SF} = \frac{741{,}862.166\ kBtu}{10{,}164\ SF}$$

Beecroft Garage #1 and #2 EUI = <u>72.99 kBtu/SF</u> (Site Energy); <u>108.7 kBtu/SF</u> (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 kBtu/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 5% lower 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
Beecroft Garages	N/A	50

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

V. FACILITY DESCRIPTION

The Beecroft Garages are multi-bay garages that are utilized for storage of Township vehicles and large equipment. Built in 1940's, the garages combined square footage is 10,164 ft^2 (Garage #1 5,655 ft^2, Garage #2 4,509 ft^2). The buildings are of standard frame and sheet construction with A-frame style, shingled roof on Building #1 and a flat rubber roof on Building #2. Exterior walls and ceiling of the facility appear to be well insulated in both garages. There are no windows in either of these garages. There is a storage room attached to the right most end of Garage #1 that is home to the Township's documents and blueprints.

Heating System

The bays of the garages are heated by gas-fired unit heaters made by Sterling, Dayton, Modine, and Reznor. The capacities of these unit heaters range from 48.6 MBH to 160 MBH (output capacity). Units are suspended from the ceiling and are controlled with standard wall mounted non-programmable thermostats. The ages of these units vary from brand new to 17 years of age, this style of heater has an expected service life of 13 years. A detailed description of the units and there locations can be found in Appendix E.

The records room attached to Garage #1 is heated by an American Standard gas fired boiler. The boiler has an input capacity of 90 MBH input and 72 MBH output. This boiler is approximately 41 years old and is well past its expected service life of 25 years. Hot water baseboard is mounted throughout this small storage area and is control via a standard wall mounted non-programmable thermostat.

Domestic Hot Water

No domestic hot water is provided to this facility.

Cooling System

No cooling system is present in this facility.

Lighting

The garages contain various sizes of T12 fluorescent lighting and utilize metal halides as exterior lighting. Standard wall switching is utilized for all areas of the garages, no lighting controls are present at the facility. A detailed lighting description can be found in Appendix F of this report.

VI. MAJOR EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial energy savings. In addition, the list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment if a 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 Appendix E for the detailed Major Equipment List.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade Garage #1

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 188 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

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

This ECM shall replace all T12 fixtures throughout the facility with new T8 fixtures.

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

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

$$\text{Smart Start®}\ Incentive = (30 \times\ \$\ 25) + (6 \times\ \$\ 30) = \$930$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (\ 78 \times 33\%\ reduction \times \$\ 2.00) + (\$5 \times 25) = \$177$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,960
NJ Smart Start Equipment Incentive ($):	($930)
Net Installation Cost ($):	$3,030
Annual Maintenance Savings ($ / yr):	*$177*
Annual Energy Savings ($ / yr):	*$433*
Annual Net Savings ($ / yr):	*$610*
Simple Payback (yrs):	*5.0*
Simple Lifetime Return On Investment (%):	*403%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Maintenance Savings ($)	*$4,425*
Simple Lifetime Energy Savings ($):	*$10,825*

ECM #2: Lighting Upgrade Garage #2

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 188 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

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

This ECM shall replace all T12 fixtures throughout the facility with new T8 fixtures.

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

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

$$\text{Smart Start®}\ Incentive = (31 \times\ \$\ 25) + (4 \times\ \$\ 30) = \$895$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (\ 74 \times 33\%\ reduction \times \$\ 2.00) + (\$5 \times 25) = \$175$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,740
NJ Smart Start Equipment Incentive ($):	($895)
Net Installation Cost ($):	$2,845
Annual Maintenance Savings ($ / yr):	*$175*
Annual Energy Savings ($ / yr):	*$357*
Annual Net Savings ($ / yr):	*$532*
Simple Payback (yrs):	*5.3*
Simple Lifetime Return On Investment (%):	*367%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Maintenance Savings ($)	*$4,375*
Simple Lifetime Energy Savings ($):	*$8,925*

ECM #3: Gas Fired Unit Heater Upgrade

Description:

The Vehicle Bays are heated by eight (8) individual gas-fired unit heaters. The remote thermostat that controls this heating unit is set at 60ºF. These units do not provide adequate heating because of losses through the garage door when open. In addition, some of these units are beyond their expected service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, these units should be replaced.

Our team recommends replacing the existing unit heaters with a low intensity infrared (IR) tube heating system. When compared to convective heating systems, IR heaters provide more efficient heating in large areas and warehouses for two reasons: they only heat people and objects (not air); they can be conveniently located and directed to provide heat to only a smaller section occupied by workers.

This ECM recommends the installation of IR heaters by Sterling Model SLR or equivalent in place of the unit heaters that have met or exceeded where expected service life. The Owner can choose to abandon the existing units in place or remove the heaters. CEG believes that abandoning the heaters in place is the best option because the demolition will add cost to the project.

Energy Savings Calculations:

Garage Heat Loss Calculations:

Based on the size of the existing gas-fired heating unit and the use of engineering calculations, the heat loss for the Garage has been calculated to be approximately 295,000 Btu/h (65 Btu/h per SF, 4,575 SF). The Base Building Heat Loss calculation is based on maintaining a 60 º F delta in temperature between indoor and outdoor ambient, respectively.

The heat loss that the warm-air system needs to overcome is actually greater than the base heat loss because infrared systems provides a higher mean radiant temperature (MRT) through warm floors, equipment, etc., and because stratification is lower than forced-air systems. Traditionally, warm air systems in industrial and commercial applications will usually require approximately 10 º F higher average air temperatures to provide equivalent comfort as provided by an infrared system. Due to this fact, the following is the calculation of the heat loss the warm air system will be required to meet:

$$\text{Heat Loss}_{WA} = (\text{Base Building Heat Loss} \times \text{Revised } \Delta T\ (70\ ^\circ F)) / \text{Standard } \Delta T\ (60\ ^\circ F)$$
$$= (295{,}000\ \text{Btu/h} \times 70\ ^\circ F) / (60\ ^\circ F)$$
$$= 344{,}167\ \text{Btu/h}$$

Estimated Fan Energy Savings:

The gas-fired unit heaters have varying size fans that run each time the unit calls for heating. Assuming that these motors are 80% efficient and the total run hours is 2,800/year, this equates to an electrical savings of:

Fan Energy Savings = {0.746 kW/HP x Motor HP x Load Factor (0.75) x Hours of Operation x Cost of Electricity ($0.178)] ÷ Motor Efficiency

Existing Motor HP	Electrical Savings (kWh)	Fan Energy Savings
1/20	98	$17
1/20	98	$17
1/35	56	$10
1/15	131	$23

Total Fan energy Savings = $17 + $17 + $10 + $23 = $67

Natural Gas Energy Savings:

To estimate the amount of energy consumed by the existing unit heaters or the infrared heaters throughout the heating season, the Degree Day method of energy estimating is being utilized. The equation is as follows:

$$EnergyUsed = \frac{H_L \times HDD \times Hrs}{\Delta t \times Eff \times V}$$

Where:

H_L = Building Heat Loss, BTU/Hr. (Warm Air = 344,167 Btu/h, Infrared = 295,000 Btu/h)

HDD = number of Heating Degree Days as Specified Base Temperature
(Warm Air $DD_{60^\circ F}$ = 6,280; Infrared $DD_{70^\circ F}$ = 3,878for Newark, NJ)

Hrs = Hours per Day

Δt = Design temperature difference, º F (Warm Air = 70 º F, Infrared = 60 º F)

Eff = Efficiency of Energy Utilization (Existing NG Heater = 0.80, Vented Infrared Heater = 0.84)

V = Heating value of fuel, BTU/Therm (Natural Gas = 100,000 Btu = 1 Therm)

Estimated Energy Consumption – Gas Fired Unit Heaters:

$$EnergyUsed = \frac{(344{,}167 Btu/h) \times (6{,}280°F) \times 12h}{70°F \times 80\% \times 100{,}000 Btu/Therm}$$

Energy Used = 4,631 Therms/Year

Estimated Energy Consumption – Infrared Heaters:

$$EnergyUsed = \frac{(295{,}000 Btu/h) \times (3{,}878°F) \times 12h}{60°F \times 84\% \times 100{,}000 Btu/Therm}$$

Energy Used = 2,724 Therms/Year

Energy Savings = 4,631 – 2,724 = 1,907 Therms per year

Cost Savings = 1,907 Therms/yr x $1.533/Therm = $2,923 per year

Total Energy Savings = Fan Energy Savings + Natural Gas Savings
= $67 + $2,923 = $2,990 per year

CEG believes that this ECM can be filed under NJ Smart Start's Custom Equipment incentive, yielding a faster payback. However, further investigation and conversation would be required to occur with the NJ Smart Start program administrator if the Owner decides to move forward with this ECM.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,524
NJ Smart Start Equipment Incentive ($):	($0)
Net Installation Cost ($):	$6,524
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$2,990*
Annual Net Savings ($ / yr):	*$2,990*
Simple Payback (yrs):	*2.2*
Simple Lifetime Return On Investment (%):	*496%*
Estimated ECM Lifetime (yr):	*13*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$38,870*

ECM #4: Garage #1 Boiler Upgrade

Description:

Heating is provided to the file storage room by an outdated American Standard gas fired Boiler. The existing unit is inefficient with an estimated combustion efficiency of 80% for heating, when new. The estimated service life for this type of gas fired boiler is twenty-five (25) years; the boiler is approximately 41 years old and has greatly exceeded its life expectancy.

This energy conservation measure will replace the gas fired boiler serving the file storage room. Calculation is based on the following equipment: Lochinvar Knight KBN080 condensing boiler or equivalent. The existing unit will be replaced with a high energy efficient unit with capacities typical of the existing unit.

Energy Savings Calculations:

Existing Gas Fired Boiler:

Rated Capacity = 90 MBh Input, 72 MBh Output (Natural Gas)

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

Replacement Gas Fired Boiler:

High-Efficiency Gas Fired Boiler

Rated Capacity = 80 MBh Input, 73.6 MBh Output (Natural Gas)

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

Operating Data:

Heating Season Fuel Consumption = 478.9 Therms of natural (based on natural gas billing data and the square footage of the facility).

$$Heating\ Energy\ Savings = Fuel\ Consumption \times \frac{(New\ Furnace\ Efficiency - Old\ Furnace\ Efficiency)}{New\ Furnace\ Efficiency}$$

Heating Energy Savings = 478.9 Therms x $\frac{(91.5\% - 75\%)}{(91.5\%)}$ = 86 Therms

Heating Energy Cost Savings = Annual Energy Savings x $/Therm

Heating Energy Cost Savings = 86 Therms x $1.533/Therm = $132/ yr.

Installed cost of a new gas fired furnace $7,000.

Equipment Incentives:

Heating Smart Start Equipment Incentive = ($2/MBh) = (80 MBh x $2) = $160

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$7,000
NJ Smart Start Equipment Incentive ($):	($160)
Net Installation Cost ($):	$6,840
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$132*
Annual Net Savings ($ / yr):	*$132*
Simple Payback (yrs):	*51.8*
Simple Lifetime Return On Investment (%):	*(32%)*
Estimated ECM Lifetime (yr):	*35*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$4,620*

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 Beecroft Garage #1 and #2, and concluded that there is not a feasible potential for solar and wind energy generation at this site. In regards to renewable energy, CEG comments and findings are as follows:

- *Photovoltaic System*: CEG does not recommend the installation of a PV system for the Beecroft Garage #1 and #2 due to the fact that the facility is a very low consumer of energy and the cost / benefit of the PV system installation does not favor the Owner's interest.

- *Wind Energy*: CEG does not recommend the installation of a Wind system because of the lack of free land available on the site to accommodate the installation of a wind turbine and the ground issues surrounding the facility. Furthermore, the electric demand on the facility is moderate to low because of facility size and operational characteristics. The afore-mentioned characteristics do not lend themselves to a successful wind energy application.

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 IV, Figures 1 and 2 included within this report to reference the respective electricity and natural gas usage load profile for January 2008 through December 2008.

Electricity:

Section IV, Figure 1 demonstrates a typical cooling profile for a Garage facility. The lack of summertime consumption is due to the facility having no cooling or domestic hot water. The summer consumption drops off between May and September. And consumption picks up again in the winter period (November –March). Base-load shaping is important because a flat consumption profile will yield more competitive pricing when shopping for alternative energy solutions.

Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load (November –March), and complimentary cooling load (April –October). Consequently there is a clear separation between summer and winter loads consistent with the manner in which energy is traded on the New York Mercantile Exchange. Heating loads carry a much higher average cost because of the higher demand for natural gas during the winter season. This facility utilizes natural gas to supply energy to its heating systems.

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:

The Township receives natural gas Delivery Service through New Jersey Natural Gas Company on a GSS (General Service Small) or GSL (General Service Large) tariff rate schedule. The Beecroft Garage utilizes the GSS rate schedule, and it is available to any Customer in the entire territory served by the Company who use is *less* than 5,000 therms annually and uses gas for all purposes other than residential and interruptible service. Where the customer uses the Cooling, Air Conditioning and Pool Heating Service (CAC) under Special Provision 1 applicable to customers purchasing gas supply under Rider "A", the Company will, upon application of the Customer, meter the space heating and the "CAC" separately. This service is considered a "firm" service, where the customer may either purchase gas from Company's Rider "A", for Basic Gas Supply Service (BGSS) or from a Marketer or Broker. The basic charges under this tariff are for: Customer Charge, Demand Charge, Delivery Charge and if the customer elects, the BGSS Supply Charge.

The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, and the customer will receive replacement service from the utility which carries an extremely high penalty cost of service. Imbalances can occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, under delivery can occur, jeopardizing economics and scheduling.

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 township 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 decides to utilize a TPS, it is recommended that the account balancing is closely monitored, 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 and seals around garage doors.

B. Recalibrate existing temperature sensors to provide more accurate temperature control.

C. Clean all light fixtures to maximize light output.

Electric Cost Summary

Jersey Centrel Power and Light-General Service Secondary

Beecroft Garage Building #1

390 Beecroft Rd, Oakhurst NJ, 07755

2008

Account # 10 00 13 3579 6 5

Meter # S31116350

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	1,277	1,557	1,802	1,328	853	646	438	434	441	918	501	1,113	11,307	
KW	0	0	0	0	0	0	0	0	0	0	0	0	0	Max
Total Cost, $	$226.50	$263.84	$283.87	$242.36	$176.58	$139.54	$98.37	$97.50	$86.44	$176.38	$98.07	$215.15	$2,105	
$/KWH	$0.177	$0.169	$0.158	$0.183	$0.207	$0.216	$0.225	$0.225	$0.196	$0.192	$0.196	$0.193	**$0.186**	

Estimated utility information. Utility bill no provided by owner.

Beecroft Garage Building #2

390 Beecroft Rd, Oakhurst NJ, 07755

2008

Account # 10 00 13 3578 8 2

Meter # G28017013

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	2,383	4,493	4,107	3,418	1,752	1,626	1,500	1,597	734	1,782	1,986	5,284	30,662	
KW	7.4	10.3	10.4	8.2	7.1	7.1	7.1	7.0	4.2	10.4	8.2	12.3	12.3	Max
Monthly Load Factor	43%	65%	53%	58%	33%	32%	28%	31%	24%	23%	34%	58%	40%	
Total Cost, $	$383	$667	$587	$496	$326	$320	$310	$326	$151	$308	$337	$836	$5,047	
$/KWH	$0.161	$0.148	$0.143	$0.145	$0.186	$0.197	$0.207	$0.204	$0.206	$0.173	$0.170	$0.158	**$0.165**	

Total Cost Summary

2008

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	3,660	6,050	5,909	4,746	2,605	2,272	1,938	2,031	1,175	2,700	2,487	6,397	41,969	
KW	7.4	10.3	10.4	8.2	7.1	7.1	7.1	7.0	4.2	10.4	8.2	12.3	12.3	Max
Monthly Load Factor	66%	87%	76%	80%	49%	44%	37%	39%	39%	35%	42%	70%	55%	
Total Cost, $	$609	$931	$871	$739	$503	$459	$409	$423	$238	$484	$435	$1,051	$7,151	
$/KWH	$0.166	$0.154	$0.147	$0.156	$0.193	$0.202	$0.211	$0.208	$0.202	$0.179	$0.175	$0.164	**$0.170**	

Demand (KW) not provided on all bills from utility, actual demand is not zero (0).

CONSTRUCTION COST AND REBATES

CONCORD ENGINEERING GROUP

Ocean Township - Beecroft Garage #1 and #2

ECM 1 LIGHTING UPGRADE GARAGE #1

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$3,960	$0	$0	$3,960
Total Cost			$0	$0	$3,960
Utility Incentive - NJ Smart Start					($930)
Total Cost Less Incentive					$3,030

ECM 2 LIGHTING UPGRADE GARAGE #2

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$3,740	$0	$0	$3,740
Total Cost			$0	$0	$3,740
Utility Incentive - NJ Smart Start					($895)
Total Cost Less Incentive					$2,845

ECM 3 GAS FIRED UNIT HEATER UPGRADE

\	Qty	Unit Cost $	Material $	Labor $	Total $
New Sterling Infrared Heaters	LS	$6,524	$3,262	$3,262	$6,524
Total Cost			$3,262	$3,262	$6,524
Utility Incentive - NJ Smart Start					$0
Total Cost Less Incentive					$6,524

ECM 4 GARAGE #1 BOILER UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
New Lochinvar Knight Boiler	1	$7,000	$3,500	$3,500	$7,000
Total Cost			$3,500	$3,500	$7,000
Utility Incentive - NJ Smart Start					($160)
Total Cost Less Incentive					$6,840

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
Beecroft Garages

Building ID: 1774531
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 06, 2009

Facility
Beecroft Garages
390 Beecroft 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): 10,164

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

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	598,460
Electricity (kBtu)	143,202
Total Energy (kBtu)	741,662

Energy Intensity[5]

Site (kBtu/ft²/yr)	73
Source (kBtu/ft²/yr)	109

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	54

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	94%
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.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

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	Beecroft Garages	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	390 Beecroft 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 1 (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	5,655 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	14 (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.		☐

Garage 2 (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	4,509 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	14 (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: Garage 1 Electric (kWh (thousand Watt-hours)) **Space(s):** Garage 1		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/01/2008	12/31/2008	1,113.00
11/01/2008	11/30/2008	501.00
10/01/2008	10/31/2008	918.00
09/01/2008	09/30/2008	441.00
08/01/2008	08/31/2008	434.00
07/01/2008	07/31/2008	438.00
06/01/2008	06/30/2008	646.00
05/01/2008	05/31/2008	853.00
04/01/2008	04/30/2008	1,328.00
03/01/2008	03/31/2008	1,802.00
02/01/2008	02/29/2008	1,557.00
01/01/2008	01/31/2008	1,277.00
Garage 1 Electric Consumption (kWh (thousand Watt-hours))		**11,308.00**
Garage 1 Electric Consumption (kBtu)		**38,582.90**
Meter: Garage 2 Electric (kWh (thousand Watt-hours)) **Space(s):** Garage 2		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/01/2008	12/31/2008	5,284.00
11/01/2008	11/30/2008	1,986.00
10/01/2008	10/31/2008	1,782.00
09/01/2008	09/30/2008	734.00
08/01/2008	08/31/2008	1,597.00
07/01/2008	07/31/2008	1,500.00
06/01/2008	06/30/2008	1,626.00
05/01/2008	05/31/2008	1,752.00
04/01/2008	04/30/2008	3,418.00
03/01/2008	03/31/2008	4,107.00
02/01/2008	02/29/2008	4,493.00
01/01/2008	01/31/2008	2,383.00
Garage 2 Electric Consumption (kWh (thousand Watt-hours))		**30,662.00**
Garage 2 Electric Consumption (kBtu)		**104,618.74**

Total Electricity Consumption (kBtu)	**143,201.64**
Is this the total Electricity consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas		
Meter: Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/01/2008	12/31/2008	709.60
11/01/2008	11/30/2008	508.80
10/01/2008	10/31/2008	92.10
09/01/2008	09/30/2008	89.10
08/01/2008	08/31/2008	165.90
07/01/2008	07/31/2008	6.30
06/01/2008	06/30/2008	7.30
05/01/2008	05/31/2008	246.60
04/01/2008	04/30/2008	733.20
03/01/2008	03/31/2008	1,064.80
02/01/2008	02/29/2008	1,166.30
01/01/2008	01/31/2008	1,194.60
Gas Consumption (therms)		**5,984.60**
Gas Consumption (kBtu)		**598,460.00**
Total Natural Gas Consumption (kBtu)		**598,460.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Beecroft Garages
390 Beecroft 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

Beecroft Garages	
Gross Floor Area Excluding Parking: (ft^2)	10,164
Year Built	1940
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Garage 1		Garage 2	
Space Type	Other - Storage/Shipping/Non-Refrigerated Warehouse	Space Type	Other - Storage/Shipping/Non-Refrigerated Warehouse
Gross Floor Area(ft^2)	5,655	Gross Floor Area(ft^2)	4,509
Number of PCs[o]	0	Number of PCs[o]	0
Weekly operating hours[o]	40	Weekly operating hours[o]	40
Workers on Main Shift[o]	14	Workers on Main Shift[o]	14

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)	73	73	0	N/A	25
Source (kBtu/ft^2)	109	109	0	N/A	56
Energy Cost					
$/year	$ 16,312.00	$ 16,312.00	N/A	N/A	$ 5,588.60
$/$ft^2$/year	$ 1.60	$ 1.60	N/A	N/A	$ 0.55
Greenhouse Gas Emissions					
$MtCO_2e$/year	54	54	0	N/A	19
$kgCO_2e/ft^2$/year	5	5	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.

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Beecroft Garage #1 and #2"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Garage #1	File Storage	American Standard	1	BNSE-J66-24-DPT	-	90	72	80%	Natural Gas	41	25	-16

Boiler - Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Frame Size	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Garage #1	File Storage	Bell and Gosset	1	118844	-	-	-	-	-	-	-	-	8	10	2

Unit Heaters and Cabinet Unit Heaters

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Heating Type	Heating Input (MBH)	Heating Output (MBH)	Efficiency	Motor HP	Approx. Age	ASHRAE Service Life	Remaining Life
Garage #1	Bay 2, 3	Modine	1	PDP175AA0111	30101024297-0396	Gas HX	175	140	80%	1/20	13	13	0
Garage #1	Bay 4, 5	Modine	1	PDP175AA0111	-	Gas HX	175	140	80%	1/20	13	13	0
Garage #1	Bay 6, 7, 8	Sterling	1	QV2	-	Gas HX	100 MBH	80	80%	1/30	3	13	10
Garage #1	Bay 6, 7, 8	Dayton	1	3E369	-	Gas HX	100 MBH	80	80%	1/30	3	13	10
Garage #2	Bay 1, 2, 3	Dayton	2	3E232D	D08583623000002	Gas HX	200	160	80%	1/20	1	13	12
Garage #2	Bay 4, 5,	Dayton	1	3E406D	E97G009039	Gas HX	60	48.6	80%	1/35	17	13	-4
Garage #2	Bay 6, 7	Reznor	1	F	-	Gas HX	75	60	80%	1/15	17	13	-4

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C09048
Project: Project Name
Address: 390 Beecroft Rd.
City: Oakhurst, NJ 07755
Building SF: 4,509

Beecroft Garage #2

DATE: 8/7/2009
KWH COST: $0.170

ECM #2:

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.		Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Payback
1		Bay 1, 2, 3	9	2 Lamp, 8', T-12, Industrial lens, Magnetic Ballast, Industrial Fixture	2000	160	1.44	2880	$489.60	18	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.99	1980	$336.60	$100.00	$1,800.00	0.45	900	153	11.76
2		Bay 1, 2, 3 Storage and Work Area	1	2 Lamp, 8', T-12, Industrial lens, Magnetic Ballast, Industrial Fixture	2000	160	0.16	320	$54.40	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	220	$37.40	$100.00	$200.00	0.05	100	17	11.76
3		Storage and Work Area	2	2' x 4' 4 Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.32	640	$108.80	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	364	$61.88	$160.00	$320.00	0.14	276	46.92	6.82
4		Storage and Work Area	2	2' x 4' 2 Lamp T-12, Prism Lens, Magnetic Ballast	2000	80	0.16	320	$54.40	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	220	$37.40	$100.00	$200.00	0.05	100	17	11.76
5		Bay 1, 2, 3 Oil Storage Area	1	2 Lamp, 4', T-12, Industrial lens, Magnetic Ballast, Industrial Fixture	2000	80	0.08	160	$27.20	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	110	$18.70	$100.00	$100.00	0.03	50	8.5	11.76
6		Bay 1, 2, 3 Top Storage	2	2' x 4' 4 Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.32	640	$108.80	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	364	$61.88	$160.00	$320.00	0.14	276	46.92	6.82
7		Bay 4, 5, 6, 7	4	2 Lamp, 8', T-12, Industrial lens, Magnetic Ballast, Industrial Fixture	2000	160	0.64	1280	$217.60	8	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.44	880	$149.60	$100.00	$800.00	0.20	400	68	11.76
		Totals	21				3.12	6240	$1,060.80	35			2.07	4138	$703.46		$3,740.00	1.05	2102	$357.34	10.47