ENERGY AUDIT – FINAL REPORT

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I. EXECUTIVE SUMMARY

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

Ocean Township
Beecroft Office
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	$ 8,849
Natural Gas	$ 2,496
Total	$ 11,345

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST[A]	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Lighting Upgrade	$3,450	$1,440	1.7	943%
2	Lighting Controls	$1,540	$240	6.4	134%
3	Hot Water Heater Conversion	$4,200	$886	4.7	153%
4	Split-System Upgrade (Heating and Cooling)	$3,636	$452	8.0	86%
5	Gas Furnace Upgrade (Heating Only)	$1,900	$216	8.8	298%

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	2.31	4,612	-
2	Lighting Controls	-	972	-
3	Hot Water Heater Conversion	-	3,587	-
4	Split-System Upgrade (Heating and Cooling)	-	956	133.5
5	Gas Furnace Upgrade (Heating Only)	-	0	133.5

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 Office:

- **ECM #1:** Lighting Upgrade
- **ECM #2:** Lighting Controls
- **ECM #3:** Hot Water Heater Conversion

CEG has a secondary recommendation that the Owner review the possible implementation of the solar array noted in Section VIII "Renewable / Distributed Energy Measures." The simple payback of 9.7 years in addition to the attractive return on investment percentages make this system's installation a viable option for the Owner.

II. INTRODUCTION

This comprehensive energy audit covers the 3,240 square feet, Beecroft Office that includes Supervisor Offices, an Employee Day Room, Locker Room, and Storage Areas.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see 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 and Light (JCP&L) provides electricity to the facility under the General Service Secondary 3 Phase Rate Schedule. 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 Office receives natural gas via New Jersey Natural Gas under the Basic Generation Service (BGS) rate. This rate, combined with a delivery charge, makes up the total cost per therm.

Description	Average
Electricity	24.7¢ / kWh
Natural Gas	$1.620 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	5,503	12.9	$1,076.13
2/08	4,996	12.8	$1,007.89
3/08	3,192	12.7	$ 744.2
4/08	2,063	8.9	$ 610.6
5/08	934	5.1	$ 477
6/08	1,671	7.0	$ 603.575
7/08	2,408	8.8	$ 730.15
8/08	1,994	8.6	$ 663.86
9/08	1,257	8.3	$ 511.18
10/08	868	5.1	$ 451.21
11/08	3,372	12.9	$ 801.34
12/08	7,566	13.7	$1,172.05
Totals	**35,824**	**13.7 MAX**	**$8,849.18**

Figure 1
Electricity Usage Profile

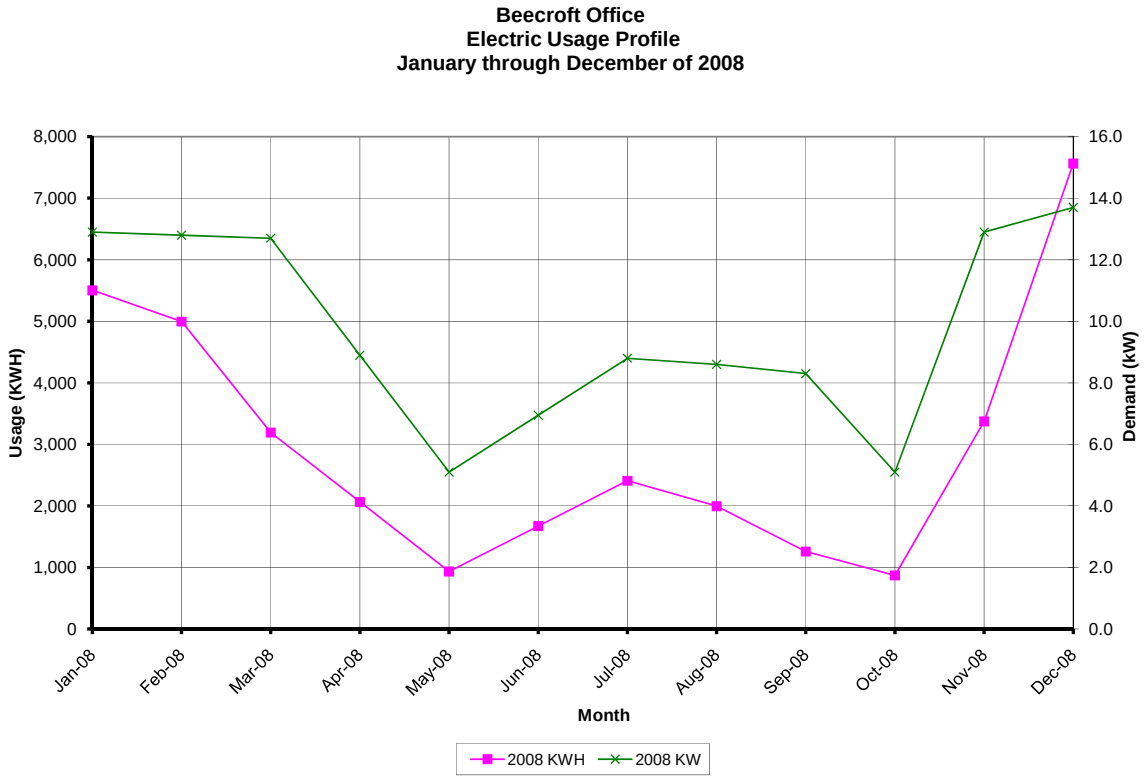
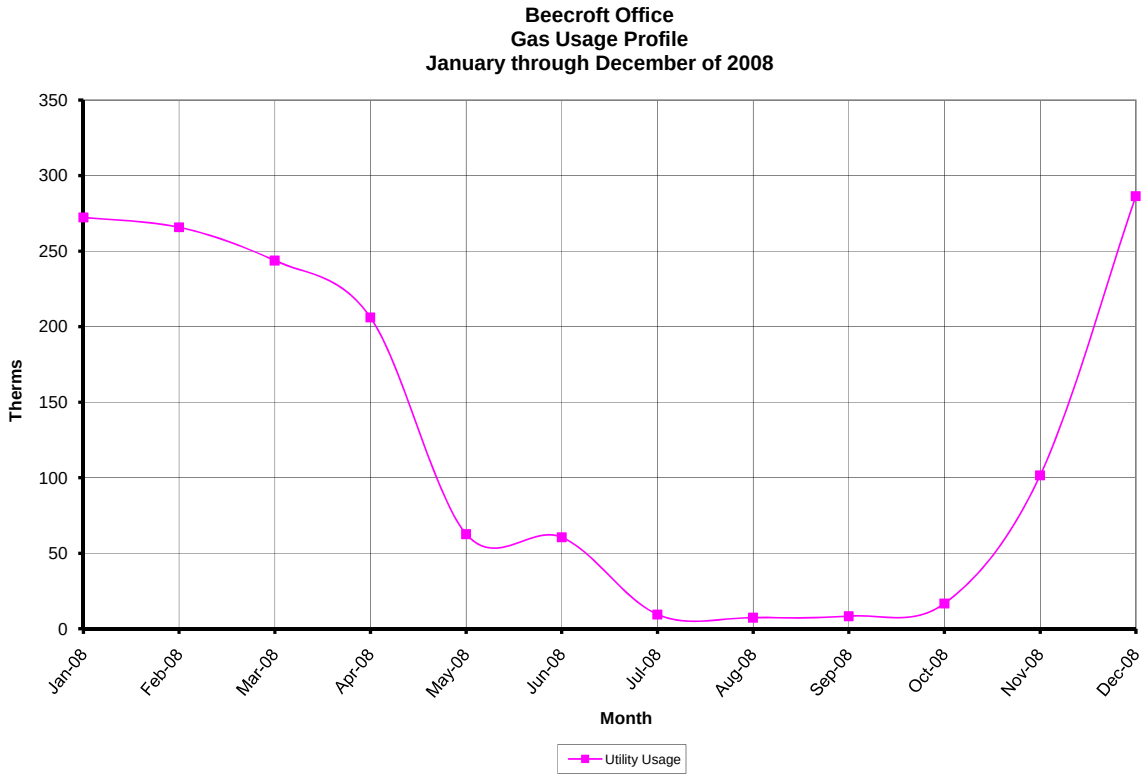


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	272.2	$408
2/08	265.7	$398
3/08	243.7	$366
4/08	206.1	$312
5/08	62.7	$105
6/08	60.6	$118
7/08	9.4	$29
8/08	7.4	$26
9/08	8.4	$27
10/08	16.8	$46
11/08	101.6	$185
12/08	286.3	$476
Totals	**1,540.7**	**$2,496**

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:

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

$$Electric = \frac{(35{,}824\ kWh * 1000\ {}^{W}\!/_{kW} * 3.414\ {}^{btu}\!/_{hW})}{(\frac{1000\ {}^{Btu}\!/_{h}}{1\ {}^{kBtu}\!/_{h}})} = \underline{122{,}303.14\ kBtu}$$

$$Gas = \frac{(1{,}540.7\ therms * 100{,}000\ {}^{Btu}\!/_{1\ hW})}{(\frac{1000\ {}^{Btu}\!/_{h}}{1\ {}^{kBtu}\!/_{h}})} = \underline{154{,}070\ kBtu}$$

$$Building\ \ EUI = \frac{(122{,}303.14\ kBtu + 154{,}070\ kBtu)}{3{,}240\ SF} = \frac{276{,}373.14\ kBtu}{3{,}240\ SF}$$

Beecroft Office EUI = 85.3 kBtu/SF (Site Energy); 175.9 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:

- Office: 77 kBtu/SF Site Energy, 182 kBtu/SF Source Energy.

Based on the information compiled for the studied facility, as compared to the national average the energy usage is approximately 11% higher than the baseline data for site energy.

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 Office	N/A	50

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

V. FACILITY DESCRIPTION

The Beecroft Office is an A-roof building that was constructed in the 1940's. It is 3,240 square feet, and in operation for 40 hours on a typical week. Building construction consists of standard sheet and frame construction, the amount of insulation in the walls and above the ceiling is unknown. Windows are standard double pane with vinyl frame. The facility consists of Offices, an Employee Day Room, Locker Room, and Storage Areas.

Heating System

The building is split into two different zones for heating: the Offices and the Employee Common Areas/Large Storage Area.

The Offices are heated via a standard split system that consists of a Comfortmaker RPJ II furnace and a remote condensing unit located at grade. Both pieces of equipment are approximately seventeen (17) years old. The furnace is natural-gas fired and has an input and output capacity of 100 MBh and 80 MBh, respectively. The temperature is controlled by a programmable thermostat.

The Common Areas of the building are heated by a Dayton gas-fired furnace that is located in a closet off of the common room. It has an input capacity of 125 MBh. The furnace was manufactured in 1989 and has exceeded its expected service life.

Domestic Hot Water

Domestic hot water is provided by an A.O. Smith water heater that has a 40 gallon capacity. The water heater operates at 240 V, and contains a 4.5 kW heating element. The water heater was manufactured in 1995. Standard service life for a domestic hot water heater is approximately ten (10) years, therefore, this unit about two (2) years past its expected operational life.

Cooling System

Cooling is provided for the offices via the Comfortmaker split system mentioned in the heating system section. This split system is coupled to a 2 Ton Rheem condensing unit with an EER of 10.0 that is located at grade outside of the facility. The condensing unit is approximately seventeen (17) years old and is approaching its expected useful life.

The common area is cooled by a thru the wall air conditioning unit that is completely self contained. The unit operates at 9.0 EER and 7.08 full-load amps with a cooling capacity of 15,800 Btu/h. The unit is controlled via the integral control panel.

Lighting

Lighting in the building consists of standard T-12 lay-in fixtures of various sizes. A detailed lighting description can be found in Appendix F. Standard switching is used throughout the facility.

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

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.

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

$$\text{Smart Start®}\ Incentive = (10 \times\ \$\ 25) + (\ 27 \times\ \$\ 30) = \$1{,}060$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (\ 128 \times 33\%\ reduction \times \$\ 2.00) + (\$5 \times 43) = \$300$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,510
NJ Smart Start Equipment Incentive ($):	($1,060)
Net Installation Cost ($):	$3,450
Annual Maintenance Savings ($ / yr):	$300
Annual Energy Savings ($ / yr):	$1,140
Annual Net Savings ($ / yr):	*$1,440*
Simple Payback (yrs):	*1.7*
Simple Lifetime Return On Investment (%):	*943%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Maintenance Savings ($)	*$7,500*
Simple Lifetime Energy Savings ($):	*$28,500*

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 F of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings. CEG recommends the installation of dual technology occupancy sensors in all areas of the facility (approximately 3,240 SF).

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the existing offices, locker rooms, storage rooms, etc. to be 1.5 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 1.5 Watts/SF x 3,240 SF x 2,000 hrs/yr. = 972 kWh x $0.247/kWh

Savings = $240 / yr

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 11. Total cost to install sensors is $140/unit x 11 units = $1,540.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,760
NJ Smart Start Equipment Incentive ($):	($220)
Net Installation Cost ($):	$1,540
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$240*
Annual Net Savings ($ / yr):	*$240*
Simple Payback (yrs):	*6.4*
Simple Lifetime Return On Investment (%):	*134%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$3,600*

ECM #3: Hot Water Heater Conversion

Description:

The existing domestic hot water heater is powered by a 4,500W electric heating element. This style of hot water heating, although 100% efficient (100% of Btu's from electricity transferred into heating the water), is very expensive due to the high cost of electricity.

This energy conservation measure will replace the existing electric, 40-gallon capacity domestic hot water heater with a 96% thermal efficient A.O. Smith Cyclone HE gas fired domestic hot water heater with 50-gallon storage capacity or equivalent. This ECM requires coordination with the utility due to increase in natural gas demand for the facility. CEG advises the owner to contact the utility provider regarding the installation of this ECM.

Energy Savings Calculations:

Existing Electric DHW Heater

Rated Capacity = 4,500 Watt (154 MBH) input; 40 gallons storage

Proposed Natural Gas-Fired, High-Efficiency DHW Heater

Rated Capacity = 76 MBH input; 50 gallons storage

Thermal Efficiency = 90%
Radiation Losses = 0.5%
Net Efficiency = 89.5%

Operating Data for DHW Heater

Estimated Daily DHW Load = 40 gal/h

DHW Boiler Operating Hrs/Yr. = 2,750 Hrs.

Electric Heating Consumption = 4,674.5 kWh = $1,155/year

Natural Gas Heating Consumption = 165.8 Therms = $269/year

Yearly Savings = $1,155/year - $269/year = $886/year

Cost of Domestic Hot Water Heater and Installation = $4,200

Simple Payback = $4,200 / $886= 4.7 years

Refer to Appendix G for a detailed domestic hot water calculation.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,200
NJ Smart Start Equipment Incentive ($):	-
Net Installation Cost ($):	$4,200
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$886*
Annual Net Savings ($ / yr):	*$886*
Simple Payback (yrs):	*4.7*
Simple Lifetime Return On Investment (%):	*153%*
Estimated ECM Lifetime (yr):	*12*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$10,632*

ECM #4: Split System Upgrade (heating and cooling)

Description:

Air-conditioning is provided to the office area by an outdated Confortmaker split system air conditioning and heating unit. The existing furnace and condensing unit are inefficient with a combustion efficiency of 80% for heating and an estimated seasonal energy efficiency ratio (SEER) of 10.6 for cooling. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 12.0 SEER for units of this type. The existing split system unit is aged and is approaching its service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a condensing unit is twenty (20) years; the service life for the gas fired furnace is eighteen (18) years.

This energy conservation measure will replace the split system unit serving the office area; this involves the replacement of the condensing unit, evaporator coil and furnace unit. Calculation is based on the following equipment: Trane XL15i condensing unit, Trane XT90 gas fired furnace with matching evaporator coil or equivalent.. The existing units will be replaced with high energy efficient, units with capacities typical of the existing units.

Cooling Energy Savings Calculations:

Existing Air Conditioning Units

Rated Capacity = 2 Tons

Condenser Unit Efficiency = 10.6 SEER

Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity = $0.247/kWh

Proposed High-Efficiency Air Conditioning Unit

Rated Capacity = 2 Tons

New Condenser Unit Efficiency = 15.0 SEER

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

$$EnergySavings = \frac{[2\ CoolingTons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{10.6\ SEER_{OLD}} - \frac{1}{15.0\ SEER_{NEW}} \right) \times 0.80 \times 1{,}800\ hours$$

$$= 956\ kWh/yr$$

Cooling Cost Savings = (956 kWh) * $0.247/kWh = $236 / Yr.

Heating Energy Savings Calculations:

Existing Gas Fired Furnace:

Rated Capacity = 100 MBh (Natural Gas)

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

Replacement Gas Fired Furnace:

High-Efficiency Gas Fired Furnace

Rated Capacity = 80 MBh (Natural Gas) – Current Unit is Oversized

Combustion Efficiency = 92.1%
Radiation Losses = 0.5%
Thermal Efficiency = 91.6%

Operating Data:

Heating Season Fuel Consumption = 736.5 Therms of natural (based on natural gas billing data); approximately 50% of facility natural gas usage.

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

Heating Energy Savings = 736.5 Therms x $\frac{91.6\% - 75\%}{(91.6\%)}$ = 133.5 Therms

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

Heating Energy Cost Savings = 133.5 Therms x $1.62/Therm = $216/ yr.

Total Energy Savings = Cooling Energy Cost Savings + Heating Energy Cost Savings

Total Energy Savings = $236/yr + $216/yr = $452/yr

Installed cost of a new condensing unit, gas furnace and evaporator coil is $3,980.

Equipment Incentives:

Cooling Smart Start Equipment Incentive = ($92/Ton) = (2 Tons x $92) = $184

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

Total Smart Start Incentive = $184 + $160 = $344

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,980
NJ Smart Start Equipment Incentive ($):	($344)
Net Installation Cost ($):	$3,636
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$452*
Annual Net Savings ($ / yr):	*$452*
Simple Payback (yrs):	*8.0*
Simple Lifetime Return On Investment (%):	*86%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$6,780*

ECM #5: Gas Furnace Upgrade (heating only)

Description:

Heating is provided to the day room and the storage area by an outdated Dayton gas fired furnace. The existing unit is inefficient with an estimated combustion efficiency of 80% for heating. The estimated service life for gas fired furnace is eighteen (18) years.

This energy conservation measure will replace the gas fired furnace serving the office area. Calculation is based on the following equipment: Trane XT90 gas fired furnace or equivalent. The existing unit will be replaced with high energy efficient a unit with capacities typical of the existing units.

Heating Energy Savings Calculations:

Existing Gas Fired Furnace:

Rated Capacity = 125 MBh (Natural Gas)

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

Replacement Gas Fired Furnace:

High-Efficiency Gas Fired Furnace

Rated Capacity = 100 MBh (Natural Gas) – Current Unit is Oversized

Combustion Efficiency = 92.1%
Radiation Losses = 0.5%
Thermal Efficiency = 91.6%

Operating Data:

Heating Season Fuel Consumption = 736.5 Therms of natural (based on natural gas billing data); approximately 50% of facility natural gas usage.

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

Heating Energy Savings = 736.5 Therms x $\frac{91.6\% - 75\%}{(91.6\%)}$ = 133.5 Therms

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

Heating Energy Cost Savings = 133.5 Therms x $1.62/Therm = $216/ yr.

Installed cost of a new gas fired furnace $2,100.

Equipment Incentives:

Heating Smart Start Equipment Incentive = ($2/MBh) = (100 MBh x $2) = $200

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,100
NJ Smart Start Equipment Incentive ($):	($200)
Net Installation Cost ($):	*$1,900*
Annual Maintenance Savings ($ / yr):	-
Annual Energy Savings ($ / yr):	*$216*
Annual Net Savings ($ / yr):	*$216*
Simple Payback (yrs):	*8.8*
Simple Lifetime Return On Investment (%):	*298%*
Estimated ECM Lifetime (yr):	*35*
Simple Lifetime Maintenance Savings ($)	-
Simple Lifetime Energy Savings ($):	*$7,560*

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 the Township of Ocean, and concluded that there is potential for solar and wind energy generation.

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 485 S.F. can be utilized for a PV system on the Facility. A depiction of the area utilized is shown in Appendix H. Using this square footage it was determined that a system size of 7.6 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 11,845 KWh annually, reducing the overall utility bill by 33% percent. A detailed financial analysis can be found in Appendix H. 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	9.7 Years	35.6%
Direct Purchase	9.7 Years	10.2%

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 Beecroft Complex and has determined it is not a viable option. There is not electrical demand 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 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, (May –October), complimenting the heating load. It is evident that there is a slight increase in the summertime profile, typically due to air-conditioning load. The cooling is supplied by a split system and window unit. The winter time load (January –April, October, November and December), has some increased consumption, which is due in part to the electric water heater supplying domestic hot water. 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.

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 Office utilizes the GSS rate schedule, and it is available to any Customer in the entire territory served by the Company whose 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 by 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, and 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. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

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

D. Recalibrate existing temperature sensors for more accurate control.

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

F. Clean all light fixtures to maximize light output.

Electric Cost Summary

Jersey Centrel Power and Light
General Service Secondary 3 Phase

Beecroft Office **2008**

Account # 10 00 13 3578 3 3
Meter # W66484067

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	365	
KWH	5,503	4,996	3,192	2,063	934	1,671	2,408	1,994	1,257	868	3,372	7,566	35,824	
KW	12.9	12.8	12.7	8.9	5.1	7.0	8.8	8.6	8.3	5.1	12.9	13.7	13.7	Max
Monthly Load Factor	57%	58%	34%	32%	25%	33%	37%	31%	21%	23%	36%	74%	38%	
Electric Delivery, $	$468	$455	$387	$366	$346	$362	$379	$371	$345	$333	$373	$225	$4,412	
Delivery $/kwh	$0.085	$0.091	$0.121	$0.178	$0.370	$0.217	$0.157	$0.186	$0.275	$0.383	$0.111	$0.030	$0.123	
Electric Supply, $	$608	$552	$357	$244	$131	$241	$351	$293	$166	$118	$428	$947	$4,437	
Supply $/kwh	$0.110	$0.111	$0.112	$0.118	$0.140	$0.144	$0.146	$0.147	$0.132	$0.136	$0.127	$0.125	$0.124	
Total Cost, $	$1,076	$1,008	$744	$611	$477	$604	$730	$664	$511	$451	$801	$1,172	$8,849	
$/KWH	$0.196	$0.202	$0.233	$0.296	$0.511	$0.361	$0.303	$0.333	$0.407	$0.520	$0.238	$0.155	**$0.247**	

Estimated utility information. Utility bill no provided by owner.

Summary of Natural Gas Cost

New Jersey Natural Gas (Rate - BGS)

Beecroft Office **2008**

Account # 07-3131-4660-15

Meter # 00365688

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	
Total MCF	260	254	233	197	60	58	9	7	8	16	97	274	1,473
BTU Factor	1.05	1.05	1.05	1.05	1.05	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Therms (Burner Tip)	272.2	265.7	243.7	206.1	62.7	60.6	9.4	7.4	8.4	16.8	101.6	286.3	1540.7
Total Distribution Cost	$272	$266	$244	$206	$63	$61	$9	$7	$8	$22	$160	$451	1,768
Cost per Therm	$1.000	$1.000	$0.999	$0.999	$0.999	$1.000	$0.999	$1.000	$0.998	$37.340	$1.573	$1.574	$1.148
Total Commodity Cost	$135	$133	$123	$106	$43	$57	$19	$18	$19	$24	$25	$25	727
Cost per Therm	$0.50	$0.50	$0.50	$0.52	$0.68	$0.94	$2.04	$2.50	$2.24	$1.43	$0.25	$0.09	$0.47
Total Cost	$408	$398	$366	$312	$105	$118	$29	$26	$27	$46	$185	$476	$2,496
Cost per Therm	$1.497	$1.499	$1.503	$1.514	$1.682	$0.000	$0.000	$3.497	$3.242	$2.773	$1.819	$1.661	**$1.620**

CONSTRUCTION COST AND REBATES

CONCORD ENGINEERING GROUP

Ocean Township - Beecroft Office

ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$4,510	$0	$0	$4,510
Total Cost			$0	$0	$4,510
Utility Incentive - NJ Smart Start					($1,060)
Total Cost Less Incentive					$3,450

ECM 2 LIGHTING CONTROLS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	11	$160	$880	$880	$1,760
Total Cost			$880	$880	$1,760
Utility Incentive - NJ Smart Start					($220)
Total Cost Less Incentive					$1,540

ECM 3 HOT WATER HEATER CONVERSION

	Qty	Unit Cost $	Material $	Labor $	Total $
New Hot Water Heater	1	$4,200	$2,100	$2,100	$4,200
Total Cost			$2,100	$2,100	$4,200
Utility Incentive - NJ Smart Start					$0
Total Cost Less Incentive					$4,200

ECM 4 SPLIT SYSTEM UPGRADE (HEATING AND COOLING)

	Qty	Unit Cost $	Material $	Labor $	Total $
New Condensing Units	1	$1,800	$1,200	$600	$1,800
New Evaporator Coil	1	$460	$300	$160	$460
New Furnace	1	$1,720	$1,200	$520	$1,720
Total Cost			$2,700	$1,280	$3,980
Utility Incentive - NJ Smart Start					($344)
Total Cost Less Incentive					$3,636

ECM 5 GAS FURNACE UPGRADE (HEATING ONLY)

	Qty	Unit Cost $	Material $	Labor $	Total $
New Furnace	1	$2,800	$1,400	$700	$2,100
Total Cost			$1,400	$700	$2,100
Utility Incentive - NJ Smart Start					($200)
Total Cost Less Incentive					$1,900

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 Road Office

Building ID: 1774451
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 04, 2009

Facility
Beecroft Road Office
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): 3,240

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

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	154,090
Electricity (kBtu)	122,231
Total Energy (kBtu)	276,321

Energy Intensity[5]

Site (kBtu/ft²/yr)	85
Source (kBtu/ft²/yr)	176

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	27

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	-3%
Building Type	Office

Stamp of Certifying Professional

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

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

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

Certifying Professional
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	Beecroft Road Office	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	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		☐

Beecroft Road Office (Office)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	3,240 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	14	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	2	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

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	7,566.00
11/01/2008	11/30/2008	3,372.00
10/01/2008	10/31/2008	868.00
09/01/2008	09/30/2008	1,257.00
08/01/2008	08/31/2008	1,994.00
07/01/2008	07/31/2008	2,408.00
06/01/2008	06/30/2008	1,671.00
05/01/2008	05/31/2008	934.00
04/01/2008	04/30/2008	2,063.00
03/01/2008	03/31/2008	3,192.00
02/01/2008	02/29/2008	4,996.00
01/01/2008	01/31/2008	5,503.00
Electric Consumption (kWh (thousand Watt-hours))		**35,824.00**
Electric Consumption (kBtu)		**122,231.49**
Total Electricity Consumption (kBtu)		**122,231.49**
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	286.30
11/01/2008	11/30/2008	101.60
10/01/2008	10/31/2008	16.80
09/01/2008	09/30/2008	8.40
08/01/2008	08/31/2008	7.40
07/01/2008	07/31/2008	9.40
06/01/2008	06/30/2008	60.60
05/01/2008	05/31/2008	62.70
04/01/2008	04/30/2008	206.10

03/01/2008	03/31/2008	243.70
02/01/2008	02/29/2008	265.70
01/01/2008	01/31/2008	272.20
Gas Consumption (therms)		**1,540.90**
Gas Consumption (kBtu)		**154,090.00**
Total Natural Gas Consumption (kBtu)		**154,090.00**
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 Road Office
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 Road Office	
Gross Floor Area Excluding Parking: (ft^2)	3,240
Year Built	1940
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Beecroft Road Office	
Space Type	Office
Gross Floor Area(ft^2)	3,240
Weekly operating hours	40
Workers on Main Shift	14
Number of PCs	2
Percent Cooled	50% or more
Percent Heated	50% or more

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)	85	85	35	N/A	77
Source (kBtu/ft^2)	176	176	73	N/A	182
Energy Cost					
$/year	$ 11,345.00	$ 11,345.00	$ 4,717.33	N/A	$ 10,243.49
$/$ft^2$/year	$ 3.50	$ 3.50	$ 1.46	N/A	$ 3.16
Greenhouse Gas Emissions					
$MtCO_2e$/year	27	27	11	N/A	24
$kgCO_2e/ft^2$/year	8	8	3	N/A	7

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Beecroft Office"

Air Handling Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Office Closet	Office Area	Comfort Maker	1	GUI100A012AIN	L923847701	DX R-22	10.0	2 Ton	Gas HX	100	80	80%	Nat. Gas	115-120	1	60	17	18	1
Day Room Closet	Day Room & Storage	Dayton	1	3E253E	L893020800	N/A	-	-	Gas HX	125	-	-	Nat. Gas	115-120	1	60	20	18	-2

Thru the Wall AC Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Day Room	Day Room	Friedrich	1	WS16B30A-B	LEEP12075	DX R-22	9.0	15,800 Btu/h	208-230	1	60	8	15	7

AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Cooling Eff. (EER)	Refrigerant	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Outside on Grade	Office Area	Rheem	1	RAGA - 025JAQ	1322 - F1078 - 7396	2 Ton	10.0	R-22	208-230	1	60	17	20	3

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (kW)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Day Room Closet	Entire Facility	A.O. Smith	1	PEC 40-914	MH95-0023673-914	4.5	-	40	-	Electric	240	1	60	14	12	-2

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C09048
Project: Ocean Twp.
Address: 390 Beecroft Rd.
City: Oakhurst, NJ 07755
Building SF: 3,240

"Beecroft Office"

DATE: 8/7/2009
KWH COST: $0.247

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		Office 1	2	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.32	640	$158.08	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.16	328	$81.02	$140.00	$280.00	0.16	312	$77.06	3.63
2		Office 2	3	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.48	960	$237.12	3	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.25	492	$121.52	$140.00	$420.00	0.23	468	$115.60	3.63
3		Hall	4	2' x 2' 2-Lamp T-12 U-Tube, Prism Lens, Magnetic Ballast	2000	70	0.28	560	$138.32	4	2'x2' 3-Lamp 17W T-8 Prism Lens Electronic Ballast	47	0.19	376	$92.87	$95.00	$380.00	0.09	184	$45.45	8.36
4		Storage	2	8' 2-Lamp T-12, No Lens, Magnetic Ballast	2000	222	0.44	888	$219.34	4	4' 2 Lamp T-8, no lens, Electronic Balast Cooper Metalux DIM248	58	0.23	464	$114.61	$100.00	$400.00	0.21	424	$104.73	3.82
5		Bathroom	1	2' x 2' 2-Lamp T-12 U-Tube, Prism Lens, Magnetic Ballast	2000	70	0.07	140	$34.58	1	2'x2' 3-Lamp 17W T-8 Prism Lens Electronic Ballast	47	0.05	94	$23.22	$95.00	$95.00	0.02	46	$11.36	8.36
6		Kitchen	1	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.16	320	$79.04	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.08	164	$40.51	$140.00	$140.00	0.08	156	$38.53	3.63
7			1	2' x 2' 2-Lamp T-12 U-Tube, Prism Lens, Magnetic Ballast	2000	70	0.07	140	$34.58	1	2'x2' 3-Lamp 17W T-8 Prism Lens Electronic Ballast	47	0.05	94	$23.22	$95.00	$95.00	0.02	46	$11.36	8.36
8		Day Room	8	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	1.28	2560	$632.32	8	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.66	1312	$324.06	$140.00	$1,120.00	0.62	1248	$308.26	3.63
9		Bathroom	1	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.16	320	$79.04	1	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.08	164	$40.51	$140.00	$140.00	0.08	156	$38.53	3.63

10		Furnace Closet	1	8' 2-Lamp T-12, No Lens, Magnetic Ballast	2000	222	0.22	444	$109.67	2	4' 2 Lamp T-8, no lens, Electronic Balast Cooper Metalux DIM248	58	0.12	232	$57.30	$100.00	$200.00	0.11	212	$52.36	3.82
11		Locker Room	2	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.32	640	$158.08	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.16	328	$81.02	$140.00	$280.00	0.16	312	$77.06	3.63
12		Open Room	4	2' x 4' 4-Lamp T-12, Prism Lens, Magnetic Ballast	2000	160	0.64	1280	$316.16	4	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	82	0.33	656	$162.03	$140.00	$560.00	0.31	624	$154.13	3.63
13		File Storage	2	8' 2-Lamp T-12, No Lens, Magnetic Ballast	2000	222	0.44	888	$219.34	4	4' 2 Lamp T-8, no lens, Electronic Balast Cooper Metalux DIM248	58	0.23	464	$114.61	$100.00	$400.00	0.21	424	$104.73	3.82
		Totals	32				4.89	9780	$2,415.66	37			2.58	5168	$1,276.50		$4,510.00	2.31	4612	$1,139.16	3.96

Domestic Hot Water Calculator

About

Water Heater Characteristics

Physical		Thermal	
? Diameter (feet)	1.5	? Water Inlet Temperature (Degrees F)	58
? Capacity (gallons)	40	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	17.79	? Hot Water Temperature (Degrees F)	135
? Effective R-value	12.7	? Hot Water Usage (Gallons per Day)	64.3

Energy Use

1694	? Heat Delivered in Hot Water (BTU/hr)
91.05	? Heat loss through insulation (BTU/hr)

Gas vs. Electric Water Heating

Gas		Electric
0.895	? Overall Efficiency	0.93
0.9431	? Conversion Efficiency	0.98
1893 BTU/hr	? Power Into Water Heater	1822 BTU/hr

Cost

$ 1.62 /Therm	? Utility Rates	$ 0.247 /kWh
$ 268.6394160	? Yearly Water Heating Cost	$ 1154.600479

Do Alternative Energy Measures Make Sense?

? Alternative Measure Cost: $ 2000		? Percentage Solar: 70
10.63560 years for gas	? Payback Time for Alternative Measure	2.474572 years for electric

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Close

Project Name: LGEA Solar PV Project -Beecroft Office
Location: Ocean Township, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$68,310
Annual kWh Production	11,845
Annual Energy Cost Reduction	$2,926
Annual SREC Revenue	$4,146
First Cost Premium	**$68,310**
Simple Payback:	**9.7** Years

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.247**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/kWh) $0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$3,416	0	0	0	$0	0	0	(3,416)	0
1	$0	11,845	$2,926	$0	$4,146	$4,494	$1,544	$1,034	($2,382)
2	$0	11,785	$3,013	$0	$4,125	$4,382	$1,655	$1,101	($1,281)
3	$0	11,726	$3,104	$0	$4,104	$4,262	$1,775	$1,170	($111)
4	$0	11,668	$3,197	$0	$4,084	$4,134	$1,903	$1,243	$1,132
5	$0	11,609	$3,293	$120	$4,063	$3,997	$2,041	$1,199	$2,331
6	$0	11,551	$3,392	$119	$4,043	$3,849	$2,189	$1,278	$3,610
7	$0	11,494	$3,493	$118	$4,023	$3,691	$2,347	$1,360	$4,970
8	$0	11,436	$3,598	$118	$4,003	$3,521	$2,516	$1,445	$6,415
9	$0	11,379	$3,706	$117	$3,983	$3,339	$2,698	$1,534	$7,949
10	$0	11,322	$3,817	$117	$3,963	$3,144	$2,893	$1,626	$9,575
11	$0	11,265	$3,932	$116	$3,943	$2,935	$3,103	$1,721	$11,296
12	$0	11,209	$4,050	$115	$3,923	$2,711	$3,327	$1,820	$13,116
13	$0	11,153	$4,171	$115	$3,904	$2,470	$3,567	$1,922	$15,038
14	$0	11,097	$4,296	$114	$3,884	$2,212	$3,825	$2,029	$17,067
15	$0	11,042	$4,425	$114	$3,865	$1,936	$4,102	$2,139	$19,206
16	$0	10,987	$4,558	$113	$3,845	$1,639	$4,398	$2,253	$21,458
17	$0	10,932	$4,695	$113	$3,826	$1,321	$4,716	$2,371	$23,829
18	$0	10,877	$4,836	$112	$3,807	$980	$5,057	$2,493	$26,322
19	$0	10,823	$4,981	$111	$3,788	$615	$5,423	$2,620	$28,942
20	$0	10,769	$5,130	$111	$3,769	$223	$5,815	$2,751	$31,692
21	$0	10,715	$5,284	$110	$3,750	$189	$5,345	$3,389	$35,082
22	$0	10,661	$5,442	$110	$3,731	$129	$4,399	$4,536	$39,618
23	$0	10,608	$5,606	$109	$3,713	$0	$0	$9,209	$48,827
24	$0	10,555	$5,774	$109	$3,694	$0	$0	$9,359	$58,186
25	$0	10,502	$5,947	$108	$3,676	$0	$0	$9,515	$67,701
	Totals:	225,969	$78,612	$1,843	$79,089	$55,856	$64,894	$74,639	$489,589
					Net Present Value (NPV)			**$17,952**	
					Internal Rate of Return (IRR)			**35.6%**	

Project Name: LGEA Solar PV Project -Beecroft Office
Location: Ocean Township, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$68,310
Annual kWh Production	11,845
Annual Energy Cost Reduction	$2,926
Annual SREC Revenue	$4,146
First Cost Premium	**$68,310**
Simple Payback:	**9.7** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.247**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$68,310	0	0	0	$0	(68,310)	0
1	$0	11,845	$2,926	$0	$4,146	$7,071	($61,239)
2	$0	11,785	$3,013	$0	$4,125	$7,138	($54,101)
3	$0	11,726	$3,104	$0	$4,104	$7,208	($46,893)
4	$0	11,668	$3,197	$0	$4,084	$7,281	($39,612)
5	$0	11,609	$3,293	$120	$4,063	$7,237	($32,375)
6	$0	11,551	$3,392	$119	$4,043	$7,316	($25,060)
7	$0	11,494	$3,493	$118	$4,023	$7,398	($17,662)
8	$0	11,436	$3,598	$118	$4,003	$7,483	($10,179)
9	$0	11,379	$3,706	$117	$3,983	$7,572	($2,608)
10	$0	11,322	$3,817	$117	$3,963	$7,663	$5,056
11	$0	11,265	$3,932	$116	$3,943	$7,759	$12,814
12	$0	11,209	$4,050	$115	$3,923	$7,857	$20,672
13	$0	11,153	$4,171	$115	$3,904	$7,960	$28,632
14	$0	11,097	$4,296	$114	$3,884	$8,066	$36,698
15	$0	11,042	$4,425	$114	$3,865	$8,176	$44,874
16	$0	10,987	$4,558	$113	$3,845	$8,290	$53,164
17	$0	10,932	$4,695	$113	$3,826	$8,408	$61,572
18	$0	10,877	$4,836	$112	$3,807	$8,531	$70,103
19	$0	10,823	$4,981	$111	$3,788	$8,657	$78,760
20	$0	10,769	$5,130	$111	$3,769	$8,788	$87,548
21	$1	10,715	$5,284	$110	$3,750	$8,924	$96,472
22	$2	10,661	$5,442	$110	$3,731	$9,064	$105,536
23	$3	10,608	$5,606	$109	$3,713	$9,209	$114,745
24	$4	10,555	$5,774	$109	$3,694	$9,359	$124,105
25	$5	10,502	$5,947	$108	$3,676	$9,515	$133,619
	Totals:	225,969	$78,612	$1,843	$79,089	$201,929	$155,858
				Net Present Value (NPV)		**$133,644**	
				Internal Rate of Return (IRR)		**10.2%**	

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
Beecroft Office	484	Sunpower SPR230	33	14.7	485	7.6	11,845	1,089	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.