



ENERGY AUDIT – FINAL REPORT

**OCEAN TOWNSHIP
HUMAN SERVICES DEPARTMENT
601 DEAL RD.
OCEAN, NJ 07712**

**ATTN: MR. ANDREW BRANNEN,
TOWNSHIP MANAGER**

CEG PROJECT NO. 9C09048

CONCORD ENGINEERING GROUP



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I. EXECUTIVE SUMMARY

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

Ocean Township
Human Services Department
601 Deal Rd.
Ocean, NJ 07712

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

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

The annual energy costs at this facility are as follows:

Electricity	\$9,762
Natural Gas	\$2,999
Total	\$12,761

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 $\pm 20\%$ until detailed engineering, specifications, and hard proposals are obtained.

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	NET INSTALLATION COST ^A	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE ROI
1	Indoor Lighting Controls	\$1,100	\$345	3.2	370%
2	Incandescent Lamp Replacement	\$91	\$198	0.5	5,334%
3	HVAC Upgrade	\$12,897	\$626	20.6	(27%)

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)	NAT GAS (THERMS)
1	Indoor Lighting Controls	---	1,883.4	
2	Incandescent Lamp Replacement	0.94	1079.4	
3	HVAC Upgrade	---	3,420	

Recommendation:

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

- **ECM #1: Indoor Lighting Controls**
- **ECM #2: Incandescent Lighting Replacement**

II. INTRODUCTION

This comprehensive energy audit covers the 4,080 square feet, 2-floor Ocean Township Human Services Department that includes fourteen (14) offices, and an attic.

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/ft²/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:

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

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

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

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

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 Ocean Township Human Services Department 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.

<u>Description</u>	<u>Average</u>
Electricity	18.3¢ / kWh
Natural Gas	\$1.542 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	4,720	13.8	\$ 736.38
2/08	3,720	8.3	\$ 580.4
3/08	3,080	8.1	\$ 460.98
4/08	3,480	12.5	\$ 516.79
5/08	3,960	12.9	\$ 587.77
6/08	5,440	15.5	\$ 1,072
7/08	6,920	17.6	\$1,556.6
8/08	5,680	17.4	\$1,271.9
9/08	5,160	17.3	\$1,127.7
10/08	3,960	14.7	\$ 640.04
11/08	3,520	9	\$ 571.88
12/08	3,800	10.7	\$ 639.97
Totals	53,440	17.6 (Max)	\$9,762.4

Figure 1
Electricity Usage Profile

Human Services Department
Electric Usage Profile
January through December of 2008

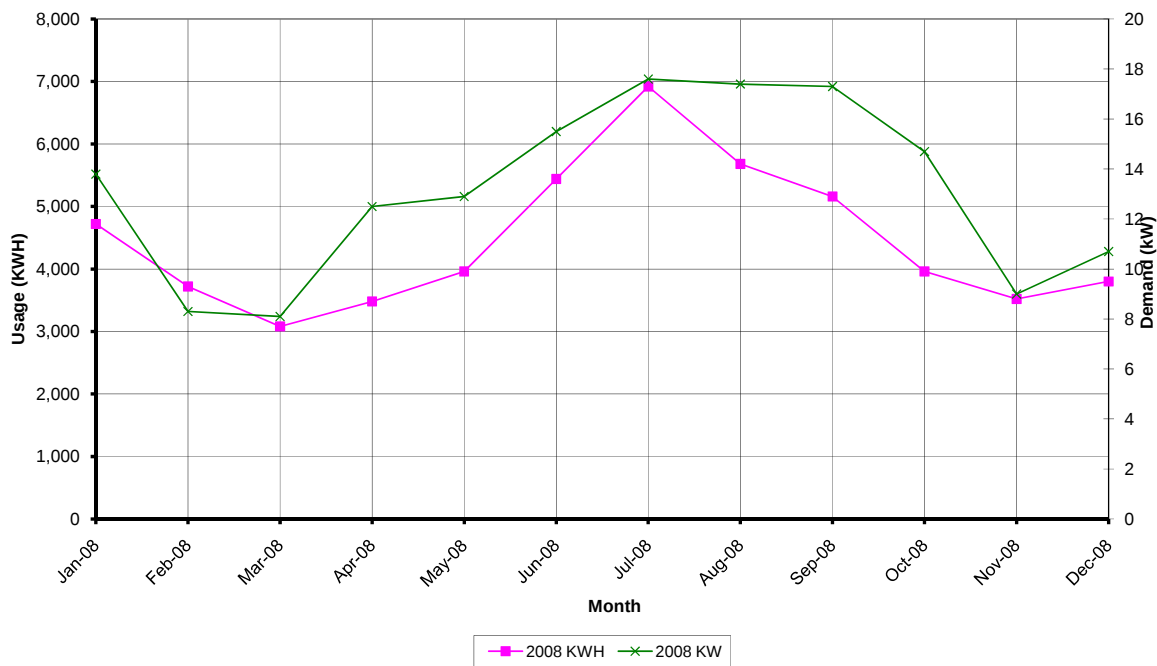
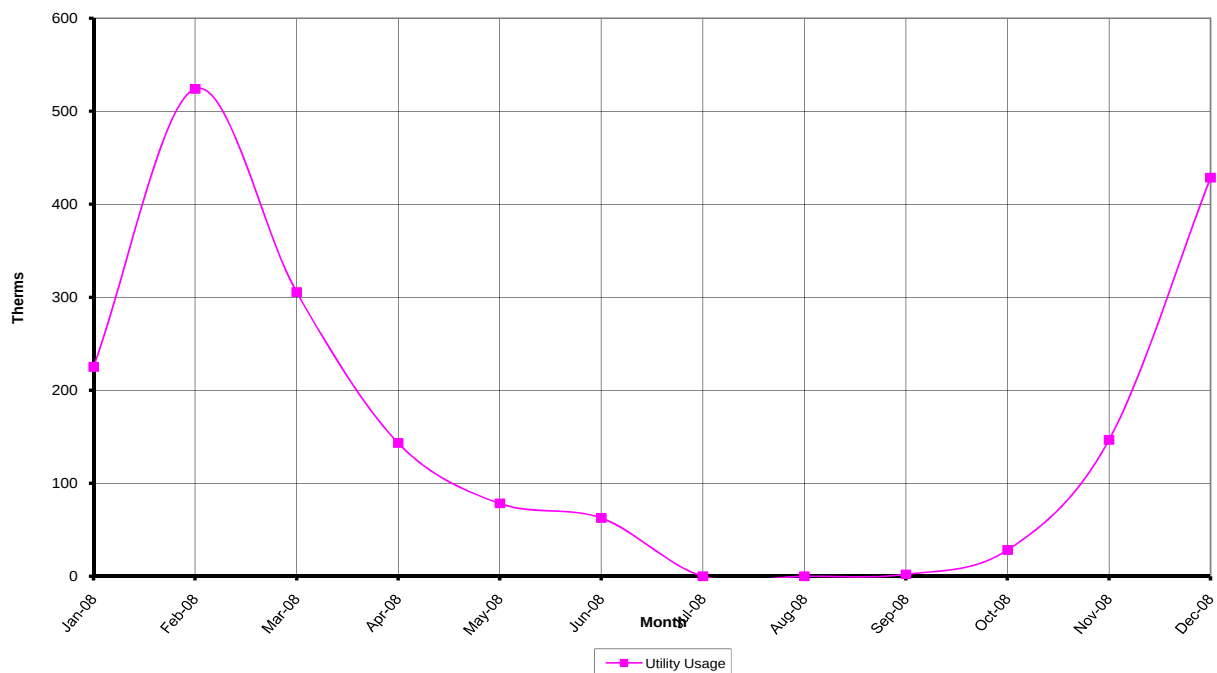


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	225.1	\$331.24
2/08	524.0	\$762.36
3/08	305.6	\$445.36
4/08	143.3	\$213.16
5/08	78.4	\$119.54
6/08	62.6	\$103.53
7/08	0	\$ 6.60
8/08	0	\$ 7.00
9/08	2.1	\$ 9.62
10/08	28.3	\$ 51.88
11/08	146.6	\$ 245.51
12/08	428.5	\$ 703.40
Totals	1,944.4	\$2,999.20

Figure 2
Natural Gas Usage Profile

Human Services Department
Gas Usage Profile
January through December of 2008



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:

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

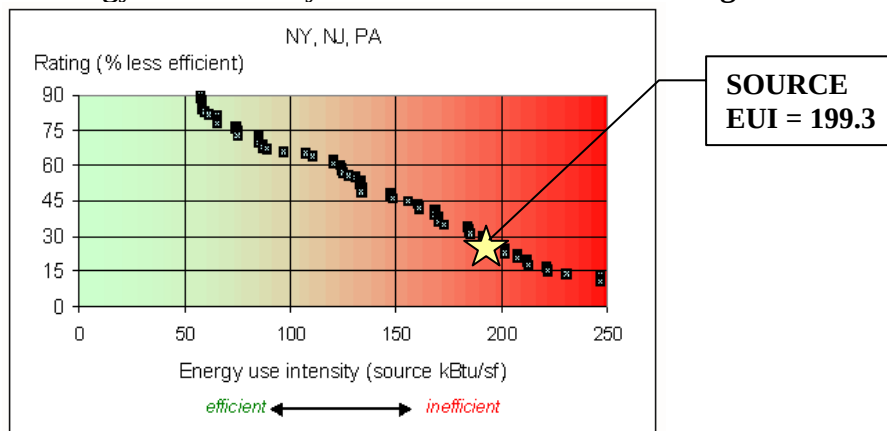
$$\begin{aligned} \text{Electric} &= \frac{(53,440 \text{ kWh} * 1000 \frac{\text{W}}{\text{kW}} * 3.414 \frac{\text{Btu}}{\text{Wh}})}{(\frac{1000 \text{ Btu}}{1 \text{ kBtu}})} \\ &= \mathbf{182,444.16 \text{ kBtu}} \end{aligned}$$

$$\begin{aligned} \text{Gas} &= \frac{(1,944.4 \text{ therms} * 100,000 \frac{\text{Btu}}{1 \text{ therm}})}{(\frac{1000 \text{ Btu}}{1 \text{ kBtu}})} \\ &= \mathbf{194,440 \text{ kBtu}} \end{aligned}$$

$$\text{Building EUI} = \frac{(182,444.16 \text{ kBtu} + 194,440 \text{ kBtu})}{4,080 \text{ SF}} = \frac{376,884.16 \text{ kBtu}}{4,080 \text{ SF}}$$

Human Services Department EUI = 92.4 kBtu/SF (Site Energy); 199.3 kBtu/SF (Source Energy)

Figure 3
Source Energy Use Intensity Distributions: Office Building



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
Human Services Dept.	N/A	50

The Human Services Department falls under the accepted minimum floor area. An Energy Performance Rating cannot be calculated if the building SF is less than 5000 SF. Despite this, the Portfolio Manager calculates the building EUI. The EUI is an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the

municipality can strive to meet. CEG strongly urges Ocean Township to keep their Portfolio Manager account up to date to monitor the performance of the building.

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

V. FACILITY DESCRIPTION

General Description

The 4,080 ft² human services building is a two story office building with a basement and attic for storage and HVAC equipment. The hours of operation exceed a typical office schedule totaling 66.5 hours per week. The building houses 36 employees (10 full time and 26 part time.) The building was built in 2005 with new HVAC equipment and lighting installed at the time of construction. The building's construction is wood frame construction, shingle roof, vinyl siding and double pane vinyl windows.

HVAC System

The Human Services Department is heated by a Crown gas fired boiler. Heating hot water is pumped through the building to four (4) zones of baseboard radiators. Three DX split systems with gas heat provide additional heating and cooling to the offices through a ducted air distribution system and diffusers.

Domestic Hot Water

Domestic hot water for the restrooms and kitchenette is provided by a gas fired American Water Heater, 50-gallon capacity rated at 40 MBH input.

Lighting

The offices are lit with 2-foot by 4-foot lay-in fixtures containing T8 fluorescent lamps and electronic ballasts. Some areas including corridors, the basement and attic are lit with incandescent lamps. Standard switching is utilized and there are no other types of lighting controls present. The exit signs throughout the facility contain LEDs lights. The exterior lighting is mounted on the building and consists of nine (9) compact fluorescent wall pack fixtures.

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.

Table 6 thru 8
Existing Equipment Listing

HEATING EQUIPMENT						
Description	Qty	Rated Capacity (BTU/HR)	Fuel Type	Approx. Age (yrs)	ASHRAE Service Life (yrs)	Remaining Life (yrs)
Crown Boiler Gas-Fired M/N: CWI345ENLT1PSL 1	1	345,000 (Input) 288,000 (Output)	Nat Gas	5	35	30
Taco Zone circulator pump M/N: SR506	4		Elec.	5	10	5

Description	Qty	Cooling Capacity (Tons)	Fuel Type	Eff.	Approx. Age (yrs)	ASHRAE Service Life (yrs)	Remaining Life (yrs)
Goodman DX split system (AHU) M/N: ARUF061-00A (CU) M/N: CLJ60-1C	1	5	Elec.	12 SEER 10.5 EER	5	15	10
Goodman DX split system (AHU) M/N: ARUF032-00A (CU) M/N: CLJ24-1C	1	2	Elec.	12 SEER 10.5 EER	5	15	10
Goodman DX split system (AHU) M/N: ARUF032-00A (CU) M/N: CLJ30-1C	1	2.5	Elec.	12 SEER 10.5 EER	5	15	10

DOMESTIC HOT WATER SYSTEM						
Description	Qty	Capacity	Fuel Type	Approx. Age (yrs)	ASHRAE Service Life (yrs)	Remaining Life (yrs)
American Water Heater M/N: FG6150T403NOV	1	50 gallon (40 MBH)	Nat Gas	5	12	7

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Interior 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 at least a two minute interval, then it pays to shut them off.

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 15% lighting power adjustment factor for daytime occupancies for buildings under 5,000 SF. This ECM requires the installation of dual technology occupancy sensors in all private office rooms, conference rooms, restrooms, storage rooms; file rooms, etc.

CEG recommends wall switches for individual rooms and ceiling mount motion sensors for large areas or restrooms. The library shall consist of ceiling mounted daylight sensors. Sensors shall be by Sensorswitch, Watt Stopper, or equal.

Energy Savings Calculations:

The lighting power usage (kWh) is calculated in Appendix D. The total savings is conservatively estimated to be as shown below. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Light Energy	=16,014.6 kWh
Energy Savings	=15% x 12,556 kWh/Yr. = 1,883.4 kWh/Yr. <u>= 1,883.4 kWh/Yr. x \$0.183/kWh = \$345/Yr.</u>
Installation Cost	= \$75 x 20 motion sensors = <u>\$1,500</u>

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

From Appendix C, the installation of a lighting control device warrants the following incentive:
occupancy = \$20 per fixture.

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\# \text{ of wall mount devices} \times \$20) = (20 \times \$20) = \$400$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,500
NJ Smart Start Equipment Incentive (\$):	(\$400)
Net Installation Cost (\$):	\$1100
Annual Maintenance Savings (\$ / yr):	-
Annual Energy Savings (\$ / yr):	\$345
Annual Net Savings (\$ / yr):	\$345
Simple Payback (yrs):	3.2
Simple Lifetime Return On Investment (%):	370%
Estimated ECM Lifetime (yr):	15
Simple Lifetime Maintenance Savings (\$)	-
Simple Lifetime Energy Savings (\$):	\$5,175

ECM #2: Incandescent Lamp Replacement

Description:

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: an 18-Watt CFL for a 60-Watt incandescent lamp, a 21-Watt CFL for a 75-Watt incandescent lamp, and a 23-Watt CFL for a 100-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures.

This ECM involves replacing all incandescent lamps in the facility with energy efficient compact fluorescent lamps.

Energy Savings Calculations:

There are four thirteen (10) 100-Watt incandescent lamps in the attic and basement and three (3) 100-Watt incandescent lamps in the corridor of the facility that can be upgraded to 23 Watt CFLs. The average operating hours for the utility areas and corridor is estimated to be 400 hours and 3458 hours respectively per year.

Energy cost savings:

$$\begin{aligned}\text{Energy Savings} &= [10 \times (100\text{W} - 23\text{W})] \times 400 \text{ hours} \times 1 \text{ kW}/1,000\text{W} = 400.4 \text{ kWh/Yr.} \\ &[3 \times (100\text{W} - 23\text{W})] \times 2939 \text{ hours} \times 1 \text{ kW}/1,000\text{W} = 679.0 \text{ kWh/Yr.} \\ &= (400.4\text{kWh/Yr.} + 679.0\text{kWh/Yr.}) \times \$0.183/\text{kWh} = \underline{\$197.53/\text{Yr.}}\end{aligned}$$

The cost of thirteen (13) 23-Watt CFL's is \$90.87

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$90.87
NJ Smart Start Equipment Incentive (\$):	-
Net Installation Cost (\$):	\$90.87
Annual Maintenance Savings (\$ / yr):	-
Annual Energy Savings (\$ / yr):	\$197.53
Annual Net Savings (\$ / yr):	\$197.53
Simple Payback (yrs):	0.5
Simple Lifetime Return On Investment (%):	5,334%
Estimated ECM Lifetime (yr):	25
Simple Lifetime Maintenance Savings (\$)	-
Simple Lifetime Energy Savings (\$):	\$4,938

ECM #3: HVAC Upgrade

Description:

The cooling only split systems consisting of air handling unit in the building and condensing unit outside are not high efficiency units. The existing units have a seasonal energy efficiency ratio (SEER) of 12.0.

This measure would replace only the condensing unit portion of the split systems to minimize installation cost while providing efficiency increase. Calculation is based on the following equipment: Trane XL15i condensing unit. The existing units will be replaced with high energy efficient condensing units with capacities typical of the existing units. Condensing unit compatibility should be confirmed for the equipment before implementing this ECM.

Total Rated Capacity (all units) = 9.5 Tons

Existing System Efficiency = 12.0 SEER

Proposed System Efficiency = 15.0 SEER

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

Average Cost of Electricity - \$0.183/kWh

Energy Savings Calculations:

$$\text{Energy Savings} = \frac{[\text{Cooling Tons} \times 12,000 \text{ Btu/ton}]}{[1000 \text{ W/kW}]} \times \left(\frac{1}{\text{SEER}_{\text{OLD}}} - \frac{1}{\text{SEER}_{\text{NEW}}} \right) \times \text{Hrs. of Cooling}$$

$$\text{Energy Savings} = \frac{[9.5 \text{ Cooling Tons} \times 12,000 \text{ Btu/ton}]}{[1000 \text{ W/kW}]} \times \left(\frac{1}{12.0 \text{ SEER}_{\text{OLD}}} - \frac{1}{15.0 \text{ SEER}_{\text{NEW}}} \right) \times 1,800 \text{ hours}$$

$$= 3420 \text{ kWh / yr}$$

$$\text{Cooling Cost Savings} = (3420 \text{ kWh}) \times \$0.183/\text{kWh} = \$625.86 / \text{Yr.}$$

Installation cost for the three (3) split system condensing units is estimated at \$13,600. It is pertinent to note that this estimate includes the demolition of the existing units

NJ Smart Start[®] Program Incentives are calculated as follows:

From Appendix C, the condensing unit replacement falls under the category “Split Systems” and warrants an incentive based on efficiency (EER) at a certain cooling tonnage.

$$\begin{aligned} \text{Smart Start}^{\text{®}} \text{ Incentive} &= (\text{Cooling Tons} \times \$ / \text{Ton Incentive}) \\ &= (9.5 \text{ Tons} \times \$74 / \text{Ton}) = \$703 \end{aligned}$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$13,600
NJ Smart Start Equipment Incentive (\$):	(\$703)
Net Installation Cost (\$):	\$12,897
Annual Maintenance Savings (\$ / yr):	-
Annual Energy Savings (\$ / yr):	\$626
Annual Net Savings (\$ / yr):	\$626
Simple Payback (yrs):	20.6
Simple Lifetime Return On Investment (%):	(27%)
Estimated ECM Lifetime (yr):	15
Simple Lifetime Maintenance Savings (\$)	-
Simple Lifetime Energy Savings (\$):	\$9,390

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy technologies for Ocean Twp, and concluded that there is potential for solar energy generation.

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 320 S.F. can be utilized for a PV system on the Human Services Department building. A depiction of the area utilized is shown in Appendix E. Using this square footage it was determined that a system size of 5.06 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 7,896 KWh annually, reducing the overall utility bill by 15% percent. A detailed financial analysis can be found in Appendix E. 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	SIMPLE ROI	INTERNAL RATE OF RETURN
Self-Finance	10.8 Years	9.3%	17.1%
Direct Purchase	10.8 Years	9.3%	8.6%

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 Human Services Department and has determined it is not a viable option. There is not enough free land available on the site to accommodate 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 very flat load usage profile. The load profile is relatively flat with some summertime increase, which is typical for a cooling load or air-conditioning load. The Trane air-handlers and motors are probably adding to the summertime load. The balance of the year is slightly lower in use but consistent all the same. One contributor to the added year long electric load is the presence of electric hot-water heaters. 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. There are some anomalies in the load shape with spikes in June and October. But the winter load is strong (November –March) as expected with heating loads. 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 a boiler which pumps hot water through baseboards. Domestic hot water is supplied through a natural gas fired hot water heater as well.

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 Human Resources Department receives natural gas service through Public Service Electric and Gas Company (PSE&G) on a LVG (Large Volume Gas Service) rate class, when not receiving commodity by a Third Party Supplier. The utility tariff rate (LVG) is for firm delivery service for general purposes. Customers may either purchase gas supply from a Third Party (TPS) or from Public Services Basic Gas Supply Service default service as detailed in the rate schedule.

This rate schedule has a Delivery Charge Mechanism which includes: Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

Recommendations:

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

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

CEG recommends that the town schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its

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

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

X. INSTALLATION FUNDING OPTIONS

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

- i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay 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. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.
- D. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.
- 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

JCP&L

Project #: 100042792323

Human Services 701 Deal Road

Account # 10 00 42 7923 2 3

Meter # G28658071

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	365
KWH	4,720	3,720	3,080	3,480	3,960	5,440	6,920	5,680	5,160	3,960	3,520	3,800	53,440
KW	14	8	8	13	13	16	18	17	17	15	9	11	18
Monthly Load Factor	46%	67%	51%	39%	41%	49%	53%	44%	41%	36%	54%	48%	47%
Electric Delivery, \$	\$ 248	\$ 578	\$ 297	\$ 185	\$ 210	\$ 404	\$ 598	\$ 486	\$ 437	\$ 210	\$ 190	\$ 205	\$4,048
Delivery \$/kwh	\$0.05	\$0.16	\$0.10	\$0.05	\$0.05	\$0.07	\$0.09	\$0.09	\$0.08	\$0.05	\$0.05	\$0.05	\$0.08
Electric Supply, \$	\$ 488	\$ 2	\$ 164	\$ 332	\$ 377	\$ 668	\$ 959	\$ 786	\$ 691	\$ 430	\$ 382	\$ 435	\$5,714
Supply \$/kwh	\$0.10	\$0.00	\$0.05	\$0.10	\$0.10	\$0.12	\$0.14	\$0.14	\$0.13	\$0.11	\$0.11	\$0.11	\$0.11
Total Cost, \$	\$736	\$580	\$461	\$517	\$588	\$1,072	\$1,557	\$1,272	\$1,128	\$640	\$572	\$640	\$9,762
\$/KWH	\$0.16	\$0.16	\$0.15	\$0.15	\$0.15	\$0.20	\$0.22	\$0.22	\$0.22	\$0.16	\$0.16	\$0.17	\$0.18

Summary of Natural Gas Cost

PSE&G - LVG Multi Family

Human Services Department

Account # 22-0007-7216-10

Meter # 00321672

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	
Total MCF	215	501	291	137	75	60	0	0	2	27	140	410	1,858
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)	225.1	524.0	305.6	143.3	78.4	62.6	0.0	0.0	2.1	28.3	146.6	428.5	1944.4
Total Distribution Cost	\$325	\$756	\$439	\$207	\$113	\$90	\$0	\$0	\$3	\$44	\$237	\$694	2,907
Cost per Therm	\$1.442	\$1.442	\$1.436	\$1.441	\$1.441	\$0.000	\$0.000	#DIV/0!	\$1.441	\$37.340	\$1.619	\$1.619	\$1.495
Total Commodity Cost	\$7	\$7	\$7	\$7	\$7	\$13	\$7	\$7	\$7	\$8	\$8	\$10	92
Cost per Therm	\$0.03	\$0.01	\$0.02	\$0.05	\$0.08	\$0.00	\$0.00	#DIV/0!	\$3.15	\$0.27	\$0.06	\$0.02	\$0.05
Total Cost	\$331	\$762	\$445	\$213	\$120	\$104	\$7	\$7	\$10	\$52	\$246	\$703	\$2,999
Cost per Therm	\$1.471	\$1.455	\$1.458	\$1.487	\$1.525	\$0.000	\$0.000	#DIV/0!	\$4.590	\$1.835	\$1.675	\$1.642	\$1.542

CONSTRUCTION COST AND REBATES

CONCORD ENGINEERING GROUP

Ocean Township - Human Services Department

ECM 1: INTERIOR LIGHTING CONTROLS

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
Dual - Technology Sensor	20	\$32	\$640	\$860	\$1,500
Utility Incentive - NJ Smart Start					(\$400)
Total Cost Less Incentive					<u>\$1,100</u>

ECM 2: INCANDESCENT LAMP REPLACEMENT

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
Compact Fluorescent Lamp - 23 Watt	13	\$7	\$91	\$0	\$91
Utility Incentive - NJ Smart Start					\$0
Total Cost Less Incentive					<u>\$91</u>

ECM 3: HVAC UPGRADE

	Qty	Unit Cost \$	Material \$	Labor \$	Total \$
2 Ton CU replacement	1	\$2,000	\$2,000	\$1,400	\$3,400
2.5 Ton CU replacement	1	\$2,000	\$2,000	\$1,400	\$3,400
5 Ton CU replacement	1	\$4,000	\$4,000	\$2,800	\$6,800
Utility Incentive - NJ Smart Start					(\$703)
Total Cost Less Incentive					<u>\$12,897</u>



Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

Desiccant Systems	\$1.00 per cfm – gas or electric
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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
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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
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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

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

DATE: 9/29/2009
KWH COST: **\$0.183**

"Human Services Department"

CEG Job #: 9C09048
Project: Ocean Twp.
Address: 601 Deal Rd.
City: Ocean, NJ 07712
Building SF: 4,080

EXISTING LIGHTING			PROPOSED LIGHTING CONTROLS										SAVINGS							
Line No.	Fixture Location	No. eFixs	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. rFixs	Retro-Unit rDescription	% Save	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Payback
1	B Vestibule	1	2' x 4' 4-Lamp T-8, Prism Lens	3458	109	0.11	376.9	\$68.98	1	Occupancy Sensor	15%	0.11	320.4	\$58.63	\$75.00	\$75.00	0.00	56.5	\$10.35	7.25
2	a Office 101	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
3	c Office 102	2	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.12	401.1	\$73.41	2	Occupancy Sensor	15%	0.12	341.0	\$62.40	\$75.00	\$75.00	0.00	60.2	\$11.01	6.81
4	c Office 103	2	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.12	401.1	\$73.41	2	Occupancy Sensor	15%	0.12	341.0	\$62.40	\$75.00	\$75.00	0.00	60.2	\$11.01	6.81
5	c Office 104	2	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.12	401.1	\$73.41	2	Occupancy Sensor	15%	0.12	341.0	\$62.40	\$75.00	\$75.00	0.00	60.2	\$11.01	6.81
6	a Office 107	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
7	a Office108	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
8	b Reception 109	4	2' x 4' 4-Lamp T-8, Prism Lens	3458	109	0.44	1507.7	\$275.91	4	Occupancy Sensor	15%	0.44	1281.5	\$234.52	\$75.00	\$75.00	0.00	226.2	\$41.39	1.81
9	c Storage 112	1	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.06	200.6	\$36.70	1	Occupancy Sensor	15%	0.06	170.5	\$31.20	\$75.00	\$75.00	0.00	30.1	\$5.51	13.62
10	c Kitchenette 113	4	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.23	802.3	\$146.81	4	Occupancy Sensor	15%	0.23	681.9	\$124.79	\$75.00	\$75.00	0.00	120.3	\$22.02	3.41
11	c Corridor	4	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.23	802.3	\$146.81	4	Occupancy Sensor	15%	0.23	681.9	\$124.79	\$75.00	\$75.00	0.00	120.3	\$22.02	3.41
	d	3	100 W IC Lamp High Hat	3458	100	0.30	1037.4	\$189.84	3	Occupancy Sensor	15%	0.30	881.8	\$161.37	\$0.00	\$0.00	0.00	155.6	\$28.48	0.00
12	e Toilet Room	1	1' x 2' 2-Lamp T-8 Prism Lens	3458	34	0.03	117.6	\$21.52	1	Occupancy Sensor	15%	0.03	99.9	\$18.29	\$75.00	\$75.00	0.00	17.6	\$3.23	23.24
13	a Office 201	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
14	a Office 203	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
15	a Office 204	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
16	a Office 205	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
17	a Office 206	2	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.16	567.1	\$103.78	2	Occupancy Sensor	15%	0.16	482.0	\$88.21	\$75.00	\$75.00	0.00	85.1	\$15.57	4.82
18	a Office 207	3	2' x 4' 3-Lamp T-8, Prism Lens	3458	82	0.25	850.7	\$155.67	3	Occupancy Sensor	15%	0.25	723.1	\$132.32	\$75.00	\$75.00	0.00	127.6	\$23.35	3.21
19	c Corridor	5	1' x 4' 2-Lamp T-8, Prism Lens	3458	58	0.29	1002.8	\$183.52	5	Occupancy Sensor	15%	0.29	852.4	\$155.99	\$75.00	\$75.00	0.00	150.4	\$27.53	2.72
20	e Toilet Room	1	1' x 2' 2-Lamp T-8 Prism Lens	3458	34	0.03	117.6	\$21.52	1	Occupancy Sensor	15%	0.03	99.9	\$18.29	\$75.00	\$75.00	0.00	17.6	\$3.23	23.24
21	f Basement	7	100 W IC Lamp - No Housing	400	100	0.70	280.0	\$51.24	7	None	0%	0.16	64.4	\$11.79	\$6.99	\$48.93	0.54	215.6	\$39.45	1.24
22	f Attic	3	100 W IC Lamp - No Housing	400	100	0.30	120.0	\$21.96	3	None	0%	0.07	27.6	\$5.05	\$6.99	\$20.97	0.23	92.4	\$16.91	1.24
23	Exit Areas	5	LED with Emergency Lights	8760	2	0.01	87.6	\$16.03	5	None	0%	0.01	87.6	\$16.03		\$0.00	0.00	0.0	\$0.00	#DIV/0!
Totals		64				4.64	13043.6	\$2,386.98	64			3.87	10852.2	\$1,985.95		\$1,569.90	0.77	2191.4	\$401.03	3.91

Project Name: LGEA Solar PV Project - Ocean Twp Human Services Department											
Location: 601 Deal Rd, Ocean NJ											
Description: Photovoltaic System 95% Financing - 20 year											
Simple Payback Analysis											
		Photovoltaic System 95% Financing - 20 year									
Total Construction Cost		\$45,540									
Annual kWh Production		7,896									
Annual Energy Cost Reduction		\$1,445									
Annual SREC Revenue		\$2,764									
First Cost Premium		\$45,540									
Simple Payback:		10.82									
		Years									
Life Cycle Cost Analysis											
Analysis Period (years):		25						Financing %:		95%	
Financing Term (mths):		240						Maintenance Escalation Rate:		3.0%	
Average Energy Cost (\$/kWh):		\$0.183						Energy Cost Escalation Rate:		3.0%	
Financing Rate:		7.00%						SREC Value (\$/kWh)		\$0.350	
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow		
0	\$2,277	0	0	0	\$0	0	0	(2,277)	0		
1	\$0	7,896	\$1,445	\$0	\$2,764	\$2,996	\$1,029	\$184	(\$2,093)		
2	\$0	7,857	\$1,488	\$0	\$2,750	\$2,921	\$1,104	\$213	(\$1,880)		
3	\$0	7,818	\$1,533	\$0	\$2,736	\$2,842	\$1,183	\$244	(\$1,636)		
4	\$0	7,779	\$1,579	\$0	\$2,722	\$2,756	\$1,269	\$276	(\$1,359)		
5	\$0	7,740	\$1,626	\$80	\$2,709	\$2,664	\$1,361	\$231	(\$1,129)		
6	\$0	7,701	\$1,675	\$79	\$2,695	\$2,566	\$1,459	\$266	(\$863)		
7	\$0	7,662	\$1,725	\$79	\$2,682	\$2,461	\$1,565	\$303	(\$559)		
8	\$0	7,624	\$1,777	\$79	\$2,668	\$2,347	\$1,678	\$342	(\$217)		
9	\$0	7,586	\$1,831	\$78	\$2,655	\$2,226	\$1,799	\$382	\$165		
10	\$0	7,548	\$1,885	\$78	\$2,642	\$2,096	\$1,929	\$425	\$590		
11	\$0	7,510	\$1,942	\$77	\$2,629	\$1,957	\$2,068	\$468	\$1,058		
12	\$0	7,473	\$2,000	\$77	\$2,615	\$1,807	\$2,218	\$514	\$1,572		
13	\$0	7,435	\$2,060	\$77	\$2,602	\$1,647	\$2,378	\$561	\$2,133		
14	\$0	7,398	\$2,122	\$76	\$2,589	\$1,475	\$2,550	\$610	\$2,743		
15	\$0	7,361	\$2,186	\$76	\$2,576	\$1,291	\$2,734	\$661	\$3,405		
16	\$0	7,324	\$2,251	\$75	\$2,564	\$1,093	\$2,932	\$714	\$4,119		
17	\$0	7,288	\$2,319	\$75	\$2,551	\$881	\$3,144	\$770	\$4,888		
18	\$0	7,251	\$2,388	\$75	\$2,538	\$654	\$3,371	\$827	\$5,715		
19	\$0	7,215	\$2,460	\$74	\$2,525	\$410	\$3,615	\$886	\$6,601		
20	\$0	7,179	\$2,534	\$74	\$2,513	\$149	\$3,876	\$948	\$7,549		
21	\$0	7,143	\$2,610	\$74	\$2,500	\$126	\$3,564	\$1,347	\$8,896		
22	\$0	7,107	\$2,688	\$73	\$2,488	\$86	\$2,933	\$2,084	\$10,979		
23	\$0	7,072	\$2,769	\$73	\$2,475	\$0	\$0	\$5,171	\$16,151		
24	\$0	7,037	\$2,852	\$72	\$2,463	\$0	\$0	\$5,242	\$21,393		
25	\$0	7,001	\$2,937	\$72	\$2,450	\$0	\$0	\$5,316	\$26,709		
Totals:		150,646	\$38,829	\$1,229	\$52,726	\$37,237	\$43,263	\$49,759	\$114,929		
Net Present Value (NPV)							\$5,198				
Internal Rate of Return (IRR)							17.1%				

Project Name: LGEA Solar PV Project - Ocean Twp Human Services Department							
Location: 601 Deal Rd, Ocean NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
		Photovoltaic System - Direct Purchase					
Total Construction Cost		\$45,540					
Annual kWh Production		7,896					
Annual Energy Cost Reduction		\$1,445					
Annual SREC Revenue		\$2,764					
First Cost Premium		\$45,540					
Simple Payback:		10.82					Years
Life Cycle Cost Analysis							
Analysis Period (years):		25		Financing %:		0%	
Financing Term (mths):		0		Maintenance Escalation Rate:		3.0%	
Average Energy Cost (\$/kWh)		\$0.183		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	\$45,540	0	0	0	\$0	(45,540)	0
1	\$0	7,896	\$1,445	\$0	\$2,764	\$4,209	(\$41,331)
2	\$0	7,857	\$1,488	\$0	\$2,750	\$4,238	(\$37,093)
3	\$0	7,818	\$1,533	\$0	\$2,736	\$4,269	(\$32,824)
4	\$0	7,779	\$1,579	\$0	\$2,722	\$4,302	(\$28,522)
5	\$0	7,740	\$1,626	\$80	\$2,709	\$4,256	(\$24,267)
6	\$0	7,701	\$1,675	\$79	\$2,695	\$4,291	(\$19,976)
7	\$0	7,662	\$1,725	\$79	\$2,682	\$4,328	(\$15,647)
8	\$0	7,624	\$1,777	\$79	\$2,668	\$4,367	(\$11,280)
9	\$0	7,586	\$1,831	\$78	\$2,655	\$4,407	(\$6,873)
10	\$0	7,548	\$1,885	\$78	\$2,642	\$4,450	(\$2,423)
11	\$0	7,510	\$1,942	\$77	\$2,629	\$4,493	\$2,070
12	\$0	7,473	\$2,000	\$77	\$2,615	\$4,539	\$6,609
13	\$0	7,435	\$2,060	\$77	\$2,602	\$4,586	\$11,195
14	\$0	7,398	\$2,122	\$76	\$2,589	\$4,635	\$15,830
15	\$0	7,361	\$2,186	\$76	\$2,576	\$4,686	\$20,517
16	\$0	7,324	\$2,251	\$75	\$2,564	\$4,739	\$25,256
17	\$0	7,288	\$2,319	\$75	\$2,551	\$4,795	\$30,051
18	\$0	7,251	\$2,388	\$75	\$2,538	\$4,852	\$34,902
19	\$0	7,215	\$2,460	\$74	\$2,525	\$4,911	\$39,813
20	\$0	7,179	\$2,534	\$74	\$2,513	\$4,973	\$44,786
21	\$1	7,143	\$2,610	\$74	\$2,500	\$5,036	\$49,822
22	\$2	7,107	\$2,688	\$73	\$2,488	\$5,103	\$54,925
23	\$3	7,072	\$2,769	\$73	\$2,475	\$5,171	\$60,096
24	\$4	7,037	\$2,852	\$72	\$2,463	\$5,242	\$65,338
25	\$5	7,001	\$2,937	\$72	\$2,450	\$5,316	\$70,654
Totals:		150,646	\$38,829	\$1,229	\$52,726	\$116,194	\$90,326
Net Present Value (NPV)						\$70,679	
Internal Rate of Return (IRR)						8.6%	

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
Ocean Twp. Library	320	Sunpower SPR230	22	14.7	323	5.06	7,896	726	15.64



[Red Rectangle] = 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.



STATEMENT OF ENERGY PERFORMANCE

Human Services Department

Building ID: 1774667

For 12-month Period Ending: December 31, 2008¹

Date SEP becomes ineligible: N/A

Date SEP Generated: August 06, 2009

Facility

Human Services Department
601 Deal Rd.
Ocean, NJ 07712

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: 2005

Gross Floor Area (ft²): 4,080

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Natural Gas (kBtu) ⁴	194,420
Electricity (kBtu)	182,337
Total Energy (kBtu)	376,757

Energy Intensity⁵

Site (kBtu/ft ² /yr)	92
Source (kBtu/ft ² /yr)	199

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	39
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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	10%
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 Standards⁶ 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	Human Services Department	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	601 Deal Rd., Ocean, NJ 07712	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		☐
Human Services Department (Office)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☒
Gross Floor Area	4,080 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	67 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	36	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	20	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: Human Services Department (kWh (thousand Watt-hours)) Space(s): Entire Facility		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	3,800.00
11/01/2008	11/30/2008	3,520.00
10/01/2008	10/31/2008	3,960.00
09/01/2008	09/30/2008	5,160.00
08/01/2008	08/31/2008	5,680.00
07/01/2008	07/31/2008	6,920.00
06/01/2008	06/30/2008	5,440.00
05/01/2008	05/31/2008	3,960.00
04/01/2008	04/30/2008	3,480.00
03/01/2008	03/31/2008	3,080.00
02/01/2008	02/29/2008	3,720.00
01/01/2008	01/31/2008	4,720.00
Human Services Department Consumption (kWh (thousand Watt-hours))		53,440.00
Human Services Department Consumption (kBtu)		182,337.28
Total Electricity Consumption (kBtu)		182,337.28
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	428.50
11/01/2008	11/30/2008	146.60
10/01/2008	10/31/2008	28.30
09/01/2008	09/30/2008	2.10
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	62.60
05/01/2008	05/31/2008	78.40
04/01/2008	04/30/2008	143.00

03/01/2008	03/31/2008	305.60
02/01/2008	02/29/2008	524.00
01/01/2008	01/31/2008	225.10
Gas Consumption (therms)		1,944.20
Gas Consumption (kBtu)		194,420.00
Total Natural Gas Consumption (kBtu)		194,420.00
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

Human Services Department
601 Deal Rd.
Ocean, NJ 07712

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

Human Services Department	
Gross Floor Area Excluding Parking: (ft ²)	4,080
Year Built	2005
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Human Services Department	
Space Type	Office
Gross Floor Area(ft ²)	4,080
Weekly operating hours	67
Workers on Main Shift	36
Number of PCs	20
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	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)	92	92	72	N/A	77
Source (kBtu/ft ²)	199	199	155	N/A	182
Energy Cost					
\$/year	\$ 12,763.00	\$ 12,763.00	\$ 9,904.66	N/A	\$ 10,642.74
\$/ft ² /year	\$ 3.13	\$ 3.13	\$ 2.43	N/A	\$ 2.61
Greenhouse Gas Emissions					
MtCO ₂ e/year	39	39	30	N/A	33
kgCO ₂ e/ft ² /year	10	10	8	N/A	8

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.