ENERGY AUDIT – FINAL REPORT

BOROUGH OF OLD TAPPAN

GOLF COURSE
83 DEWOLF ROAD
OLD TAPPAN, NJ 07675
ATTN: MR. PATRICK O'BRIEN

CEG PROJECT NO. 9C09017

CONCORD ENGINEERING GROUP

520 SOUTH BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CEG-INC.NET

CONTACT: RAYMOND JOHNSON
Cell: (609) 760-4057
rjohnson@ceg-inc.net

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I. EXECUTIVE SUMMARY

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

Borough of Old Tappan
Golf Course
83 DeWolf Road
Old Tappan, NJ 07675

Municipal Contact Person: Patrick O'Brien

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	$20,664
Natural Gas	$12,726
Total	$33,390

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 LIFETIME ROI
1	Lighting Upgrades	$6,364	$2,801	2.27	1,000 %
2	LED Exit Signs	$420	$1,298	0.32	7,630 %
3	Lighting Controls	$715	$406	1.76	752 %
4	Club House RTU-1, RTU-2 Replacement	$26,250	$939	27.9	-46.3 %
5	Split System Upgrade - Club House	$17,250	$624	27.6	-45.7 %
6	Furnace Upgrade – Maintenance Bldg	$2,700	$199	13.6	32.7 %

Note A: Includes applicable incentive savings.

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	Lighting Upgrades	4.07	15,084	-
2	LED Exit Signs	-	1,533	-
3	Lighting Controls	-	2,379	-
4	Club House RTU-1, RTU-2 Replacement	-	2,743	359
5	Split System Upgrade - Club House	-	982	348
6	Furnace Upgrade – Maintenance Bldg	-	-	152

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 Old Tappan's Storage Building:

- **ECM #1: Lighting Upgrades**
- **ECM #2: LED Exit Signs**
- **ECM #3: Lighting Controls**
- **ECM #6: Furnace Upgrade – Maintenance Bldg**

Although the energy savings does not exceed the cost of replacement over the life of the units, it is expected that the air conditioning units in the Club House will need replacement in the near future as the units are nearing or have reached the end of their expected life. CEG recommends the Borough consider replacing these units at an opportune time such as during the spring or fall season.

II. INTRODUCTION

This comprehensive energy audit covers the 6,000 square foot Club House and 2,100 square foot Maintenance Building that comprise the occupied spaces of the golf course.

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; calculating energy benchmarks for comparison to industry averages, estimating savings potential, and monitoring baseline usage/cost effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see Table 3 and Table 4).

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 and 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:

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Electric

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from May-08 to April-09. Rockland Electric Company provides electricity to the facility under the Electric Small C & I General Service Secondary rate. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

It should be noted that the Club House and Maintenance buildings' two (2) electrical services were combined for this report. This was due to the fact that there is a single natural gas service that serves both buildings. For purposes of charting electrical power demand and consumption for these buildings, data from both of these services was combined to generate the tabulated data and graph below.

Natural Gas

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facility from June-08 to May-09. Public Service Electric and Gas Company (PSE&G) supplies the natural gas commodity from the wellhead to the PSE&G pipelines. PSE&G charges a rate per therm for delivery of the natural gas via their pipelines to the burners under their Basic Gas Supply Service (BGSS) rate.

The existing natural gas service installed at the golf course serves both the Club House building and the Maintenance Building from a single meter. The data presented in the chart and plot below represent the natural gas consumption for both buildings during the year observed.

Utility	Average Cost*
Electricity	17.1¢ /kWh
Natural Gas	$1.31 /Therm

* - Includes both buildings

Table 3
Electricity Billing Data

Club House/Maint. Building Data		Acct. No. 60908-46009 Acct. No. 61118-46001	
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND**	**TOTAL BILL**
May-08	9,228	34.3	$1,336.88
Jun-08	12,768	43.2	$2,314.18
Jul-08	18,120	42.6	$3,249.17
Aug-08	10,392	41.2	$2,163.38
Sep-08	12,120	43.0	$2,242.89
Oct-08	9,216	36.7	$1,560.79
Nov-08	7,968	27.8	$1,339.02
Dec-08	8,724	25.6	$1,439.53
Jan-09	5,420	25.6	$1,031.89
Feb-09	10,108	30.4	$1,336.56
Mar-09	6,672	26.7	$1,170.10
Apr-09	9,780	37.6	$1,479.61
Totals	**120,516**	**43.2 Max**	**$20,664.00**

AVERAGE DEMAND	**34.6**	**KW average**
AVERAGE RATE	**$0.171**	**$/kWh**

Figure 1
Electricity Usage Profile

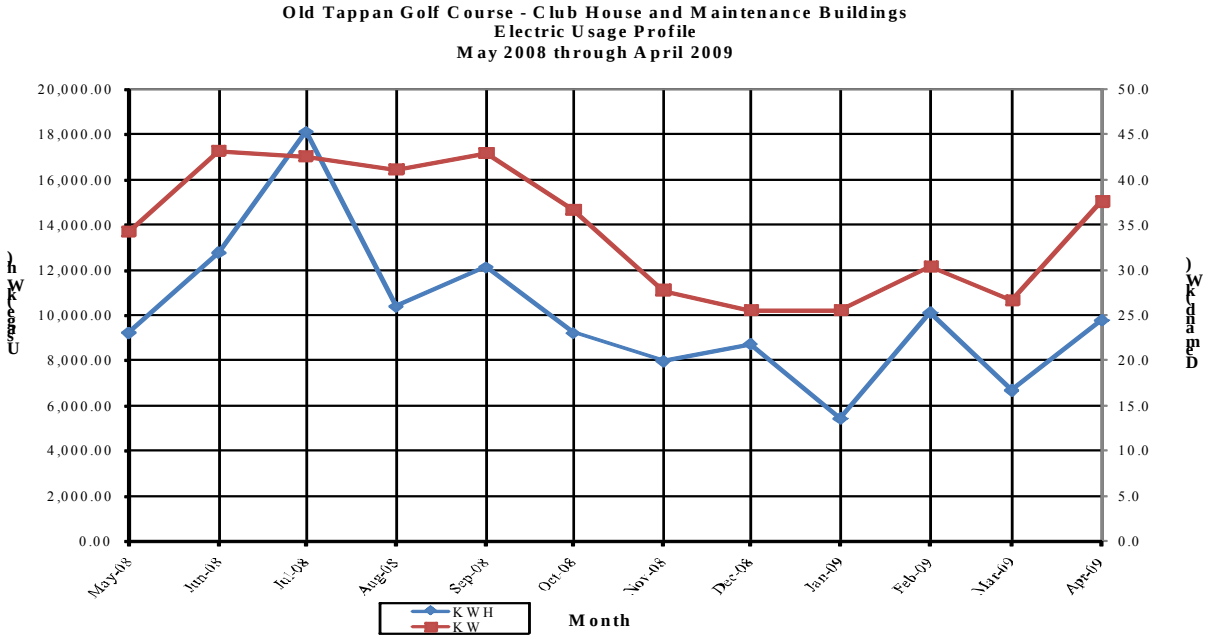
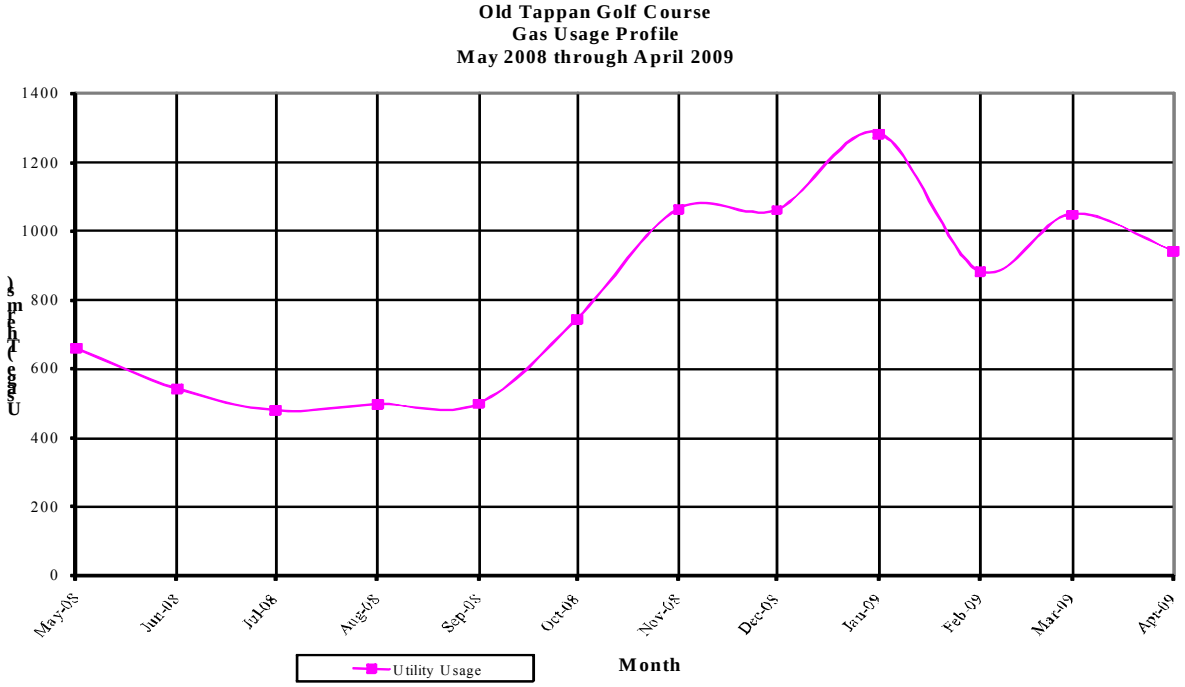


Table 4
Natural Gas Billing Data

PSE&G Acct. No. 41 213 335 19	Meter No. 2784759	Tariff: GSGH
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
May-08	658.77	$1,168.00
Jun-08	541.51	$1,011.56
Jul-08	478.21	$888.72
Aug-08	495.91	$745.33
Sep-08	498.09	$705.17
Oct-08	743.28	$994.91
Nov-08	1,064.20	$1,371.61
Dec-08	1,061.70	$1,391.60
Jan-09	1,283.55	$1,608.94
Feb-09	881.93	$953.55
Mar-09	1,048.53	$1,027.74
Apr-09	941.12	$858.65
TOTALS	**9696.79**	**$12,725.78**
AVERAGE RATE:	**$1.31**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows. (See Table 5 for details):

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

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

Table 5
Old Tappan Golf Course EUI Calculations

ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu	RATIO	kBtu
ELECTRIC	120,516			411,442	3.340	1,374,215
NATURAL GAS		9,696.79		969,679	1.047	1,015,254
TOTAL				1,381,120		2,389,469
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		4,800		SQUARE FEET		
BUILDING SITE EUI		287.73		kBtu/SF/YR		
BUILDING SOURCE EUI		**497.81**		**kBtu/SF/YR**		

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 Start account for the municipal in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. This account can be used to calculate the EUI which can be used to monitor the energy performance of the building. The account can be accessed at the following address; the username and password are also listed below:

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

Username: oldtappan
Password: lgeaceg2009

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "Other" category. The "Other" category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Performance Rating cannot be calculated if more than 10% of a building is classified as "Other." DPW 25 Storage Building would be classified as "Other" and therefore cannot be given an Energy Performance Rating. However, Portfolio Manager can still be used to track the buildings energy use index.

Refer to Appendix C for detailed energy benchmarking report entitled "STATEMENT OF ENERGY PERFORMANCE."

Table 6

Energy Star Performance Rating		
Facility Name	Energy Performance Rating	National Average
Golf Course	N/A	N/A

V. FACILITY DESCRIPTION

Old Tappan's golf course includes two buildings, the Club House and the Maintenance Building, and a shed which is referred to as the "Pump House". The Pump House is an 8'x10' cedar shed that houses an electrical service that supports the 30 HP main irrigation pump and a 2 HP primer pump. As there are no energy conservation opportunities available for the pump house, this report will address the Club House and Maintenance Buildings only.

The Club House is a 6,000 square foot, two (2) story masonry structure with the first floor partially below grade. The building was originally constructed in 1969 and had an addition in 1989. The first floor includes storage rooms, men's and women's locker rooms, and a stairway entrance to the second floor. The second floor includes a bar, restaurant, small commercial kitchen, the Pro Shop, and men's and women's public restrooms. All areas of the second floor appear to be fairly new and in good condition.

The Maintenance Building is a 2,100 square foot masonry building that houses the superintendent's office, a break room, three (3) bay maintenance garage, and an employee toilet/shower area.

Heating and Air Conditioning System

Heating and air conditioning for the Club House is accomplished by the use of three (3) independent systems serving different parts of the building. Rooftop units (RTU) #1 and # 2 are identical Carrier single-package heating and cooling units. RTU-1 provides heating and cooling to the men's restroom and the bar area. RTU-2 serves the Dining Room, Pro Shop and women's restroom. Both units provide forced hot air heating from natural gas-fired burner sections that have an input of 115,000 Btu/Hr, an output of 92,000 Btu/Hr, and combustion efficiency of 80%. Cooling capacity for these two units is 5 tons of refrigeration or 60,000 Btu/Hr each with a SEER = 10.0. Each unit is installed on a curb adapter set on the original roof curb indicating they replaced previous units.

Unit #3 is a split system located in a storage room on the first floor consisting of a gas-fired furnace with add-on evaporator coil, and a remote, air-cooled condensing unit. This unit provides conditioned air to the first floor locker rooms and office, as well as floor diffusers in the bar and restaurant on the second floor. The furnace is a Carrier "Weathermaker 8000" model 58WAV110-LC with 132,000 Btu/Hr input and 107,000 Btu/Hr output, 81% efficient. The associated remote condensing unit is a Bryant model 598AN-060-A with 5 tons (60,000 Btu/Hr) cooling capacity and an SEER=11.0. Both pieces of equipment are in fair condition but nearing the end of their useful life.

The Maintenance Building is a "high-bay" concrete block building constructed approximately in 1987. A residential type gas-fired furnace located in the building's attic provides forced hot air heating to the superintendent's office, break room, and employees' toilet/shower room. The furnace is a Carrier model 58DHC 040 with 46,000 Btu/Hr input, 37,000 Btu/Hr output, and 80% efficiency. In addition to the forced hot air, the office has two sections of electric

baseboard heaters totaling 9 feet in length. The heating capacity of the baseboard is 250 watts/ft. or 2250 watts. This equates to an output of 7,650 Btu/Hr.

Heating in the maintenance garage is accomplished with four (4) gas-fired unit heaters hung from the ceiling. Unit heaters are Reznor model F with 50,000 Btu/Hr input and 40,000 Btu/Hr output, and 80% combustion efficiency. Heaters appear to be original equipment, making them approximately 22 years old and at the end of their useful life.

Cooling in the Maintenance Building is limited to the superintendent's office. A small, residential, window type air conditioner is installed through an opening in the wood frame wall of the office. The make and model of the air conditioner is unknown and the cooling capacity and EER are estimated at 5,000 Btu/Hr and 8.0 respectively.

Domestic Hot Water

Domestic hot water for the Club House is provided by an A.O. Smith "Master Fit" gas-fired, hot water heater model BTR250 A 110, with 100 gallon capacity, 250,000 Btu/Hr input, and 242 gallons per hour (GPH) recovery at 90°F rise.

Domestic hot water for the Maintenance Building is generated from a A.O. Smith water heater model FSG 50 232 with 50 gallons storage, 40,000 Btu/Hr. input, and 37.9 gallons per hour (GPH) recovery at 90°F rise, manufactured in 1996.

Automatic Controls

Local programmable thermostats control all heating and cooling equipment in the Club House and local thermostats activate the associated piece of equipment in the Maintenance Building.

Exhaust Systems

The kitchen in the Club House has two (2) range hood exhaust fans controlled by local, manual switches, each serving a corresponding range hood. The exhaust capacity of the fans is unknown however, based on the size of the hoods served, it is estimated that approximately 5,000 cubic feet per minute (cfm) is being exhausted. Make-up air for the range hood exhaust is induced by the exhaust fans through a roof-mounted, intake air hood. The air outlets in the kitchen for the make-up air consist of ceiling diffusers with a 10" diameter neck. Based on the size and quantity (maximum of 2) of the air outlets in the kitchen, there is an insufficient amount of make-up air for the range hood exhaust. Installed in this fashion, each outlet has a capacity of approximately 400 cfm. Due to the imbalance between exhaust and make-up air in the kitchen, air for hood exhaust is provided by the "path of least resistance" to airflow. This path may be from the bar/restaurant or from infiltration of outdoor air. This situation places additional strain on the ability for other mechanical systems to maintain comfort conditions in the building and should be corrected.

Lighting

Lighting in the Club House is accomplished with a combination of ceiling recessed fluorescent lighting and incandescent down-lighting. The incandescent lighting is used throughout the bar

and dining room. All other areas of the building use fluorescent light fixtures. All lighting is controlled with local switches.

Lighting in the Maintenance building is accomplished using fluorescent light fixtures in all areas except the superintendent's office where incandescent down-lights are used. All lighting is controlled with local switches in the Maintenance building as well.

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. Additionally, 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 D for the Major Equipment List.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrades

Description:

The lighting in Club House consists of incandescent down-lights and accent lighting in the bar and Dining Rooms. All of the other areas in the building are lit with fluorescent fixtures using T12 lamps and magnetic ballasts. The Maintenance Building also is primarily lit with inefficient fluorescent fixtures.

This ECM investigates 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. The Owner will be changing approximately 33% less lamps per year.

This ECM replaces all T12 lighting fixtures with energy efficient T8 lighting, Cooper Metalux or equivalent fixture.

This ECM also includes replacement of all incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours and therefore will provide maintenance savings through the reduced number of lamps replaced per year.

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.

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

$$\text{Smart Start®}\ Incentive = (42 \times\ \$\ 25) + (\ 23 \times\ \$\ 30) = \$1{,}740$$

Maintenance Savings are calculated as follows:

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

Calculations based on the estimated burn-hours per year and the life expectancy of energy efficient lamps and ballasts produced a reduction in the number of "burnouts" of 12 lamps per year.

$$Savings = (12\ lamps\ \ per\ \ year) \times (\$4.50 + \$14.00) = \$222 / yr$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$8,104*
NJ Smart Start Equipment Incentive ($):	*($1,740)*
Net Installation Cost ($):	*$6,364*
Annual Maintenance Savings ($ / yr):	*$222*
Annual Energy Savings ($ / yr):	*$2,579*
Net Annual Savings ($ / yr):	*$2,801*
Simple Payback (yrs):	*2.27*
Estimated ECM Lifetime (yrs):	*25*
Simple Lifetime Return On Investment	*1,000 %*
Simple Lifetime Energy Savings ($):	*$64,475*
Simple Lifetime Maintenance Savings ($):	*$5,550*

ECM #2: Install LED Exit Signs

Description:

LED is an acronym for light-emitting-diode. LED's are small light sources that are readily associated with electronic equipment. LED exit signs have been manufactured in a variety of shapes and sizes. There are also retrofit kits that allow for simply modification of existing exit signs to accommodate LED technology. The benefits of LED technology are substantial. LED exit signs will last for 20-30 years without maintenance. This results in tremendous maintenance savings considering that incandescent or fluorescent lamps need to be replaced at a rate of 1-5 times per year. Lamp costs ($2-$7 each) and labor costs ($8-$20 per lamp) add up rapidly. Additionally, LED exit lights only uses 5 Watts. In comparison, conventional exit signs use 30 Watts. It is recommended that samples of the products be installed to confirm that they are compatible with the existing electrical system.

This ECM replaces the existing exit signs, three (3) total, throughout the building with highly energy efficient LED exit signs. A Pegasus Associates Lighting LED exit sign or equivalent was used for the basis of design.

Energy Savings Calculations:

Existing exit sign energy costs:

7 units x 30 watts/unit ÷ 1000 watts/kW x 8,760 hrs/yr x $0.171/kWh = $314.57

New LED exit sign energy costs:

7 units x 5 watts/unit ÷ 1000 watts/kW x 8,760 hrs x $0.171/kWh = $52.43

Net energy savings = $314 - $52 = $262/yr.

Installed cost of new LED exit signs = $80 x 7 = $560

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix B, the replacement of an incandescent exit sign warrants the following incentive: LED Exit Sign = $20 per fixture.

$$\text{Smart Start®}\ Incentive = (\#\ of\ exit\ signs \times\ \$\ 20) = (7 \times \$20) = \$140$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (56 \times \$4.50) + (1 \times \$14) = \$1036\ /\text{yr.}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$560*
NJ Smart Start Equipment Incentive ($):	*($140)*
Net Installation Cost ($):	*$420*
Annual Maintenance Savings ($/yr):	*$1036*
Annual Energy Savings ($ / yr):	*$262*
Net Annual Savings ($ / yr):	*$1298*
Simple Payback (yrs):	*0.32*
Estimated ECM Lifetime (yrs):	*25*
Simple Lifetime Return on Investment:	*7,630 %*
Simple Lifetime Energy Savings ($):	*$6,550*
Simple Lifetime Maintenance Savings ($):	*$25,900*

ECM #3: 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 more than a two minute interval, then it pays to shut them off.

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all areas of the facility.

Energy Savings Calculations:

Appendix E of this report indicates the energy usage of the toilet rooms, locker rooms, storage rooms, break room, offices, etc. to be 23790.4 kWh/yr. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Energy Savings = 10% x 23,790.4 kWh/yr

Energy Savings = 2,379 kWh/yr

Cost Savings = 2,379 kWh/yr x $0.171/ kWh = $406 / yr

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is $75/unit including material and labor. The SmartStart Buildings® incentive is $20 per control which equates to an installed cost of $55/unit. Total number of switches to be retrofitted is 13. Total cost to install sensors is $55/unit x 13 units = $715.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$975*
NJ Smart Start Equipment Incentive ($):	*($260)*
Net Installation Cost ($):	*$715*
Annual Maintenance Savings ($ /yr):	*$0*
Annual Energy Savings ($ / yr):	*$406*
Net Annual Savings ($ / yr):	*$406*
Simple Payback (yrs):	*1.76*
Estimated ECM Lifetime (yrs):	*15*
Simple Lifetime Return on Investment:	*752 %*
Simple Lifetime Energy Savings ($):	*$6,090*
Simple Lifetime Maintenance Savings ($):	*$0*

ECM #4: Rooftop Unit Replacement

Description:

The two (2) Carrier gas-fired heating, DX cooling rooftop units (RTU) are excellent candidates for replacement. These units appear to be of 1989 vintage. These rooftop units have reached the end of their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating operating and maintenance costs, these units should be replaced.

This measure would replace these two units with new high efficiency heating and cooling rooftop units, equivalent to Carrier Weathermaster 48HEE006 Gas/Electric units. As both existing units are identical 5-ton units, this ECM will evaluate the energy usage and savings as though they were one unit.

RTU-1 and RTU-2:

Heating Energy Savings Calculations:

The combustion efficiency of the existing units was approximately 80% when new. At this point due to the age and condition of the existing units, the combustion efficiency of these units is estimated at 70%. This is typical for both RTU-1 and RTU-2.

To estimate the amount of energy consumed by the existing gas-fired unit throughout the heating season, the Degree Day method of energy estimating is be used.

$$EnergyUsed = \frac{H_L \times D \times 24}{\Delta t \times k \times V} \times (C_D)$$

where:

H_L = Building Heat Loss, BTU/Hr.

D = number of 65 F Heating Degree Days

Δt = Design temperature difference, deg. F

k = a correction factor that includes the effects of rated full load efficiency, part load performance, oversizing and energy conservation devices.

V = Heating value of fuel, BTU/Therm

C_D = empirical correction factor for heating effect vs. 65 F degree days

$$EnergyUsed = \frac{(160{,}000) \times (5945) \times 24}{70 \times .6 \times 100{,}000} \times (.6)$$

Energy Used = 3261 Therms/Year

As the proposed new unit's combustion efficiency is 81%, it is estimated to be 11% more efficient than the existing unit. The proposed energy used is;

Proposed Energy Used = 3261 x (1 - .11) = 2902 Therms/Year

Energy Savings = 3261 – 2902 = 359 Therms/Year

Cost Savings = $1.31/Therm x 359 Therms = $470/yr

Cooling Energy Savings Calculations:

$$EnergySavings = 2 \times \left[\frac{[CoolingTons \times 12{,}000\,Btu/ton\text{–}hr]}{[1000W/kW]} \times \left(\frac{1}{SEER_{OLD}} - \frac{1}{SEER_{NEW}} \right) \times EquivalentFullLoadHrs.ofCooling \right]$$

Existing Rooftop Units
Rated Capacity = 5 Tons per unit
Seasonal Energy Efficiency Ratio = 10.0 EER
Cooling Season Equivalent Full Load Hrs. of Operation = 800 hrs/yr.

Average Cost of Electricity - $0.171/kWh

Proposed High-Efficiency Rooftop Units

Rated Capacity = 5 Tons per Unit
New Cooling Unit Efficiency = 14 SEER

$$EnergySavings = 2 \times \left[\frac{[5\,Tons \times 12{,}000\,Btu/ton\text{–}hr]}{[1000\,W/kW]} \times \left(\frac{1}{10} - \frac{1}{14} \right) \times 800 \right] = 2742.8\,kWh$$

Energy Cost Savings = 2742.8 kWh * $0.171/kWh = $469/ Yr

Total Energy Cost Savings = $470 + $469 = $939/yr

Installation cost for the two (2) rooftop replacements is estimated at $27,000. It is pertinent to note that this estimate includes the demolition of the existing units and curb modifications (if required).

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix B, the rooftop unit replacement falls under the category "Unitary HVAC" and warrants an incentive based on efficiency (SEER) at a certain cooling tonnage.

$$\text{Smart Start® } Incentive\ (RTU - 10\ Tons) = (Cooling\ Tons \times\ RTU\ \ Incentive)$$
$$= (10\ Tons \times \$75/Ton) = \underline{\$750}$$

Energy Savings Summary:

ECM #4 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$27,000*
NJ Smart Start Equipment Incentive ($):	*($750)*
Net Installation Cost ($):	*$26,250*
Annual Maintenance Savings ($):	*$0*
Annual Energy Savings ($ / yr):	*$939*
Net Annual Savings	*$939*
Simple Payback (yrs):	*27.9*
Estimated ECM Lifetime (yrs):	*15*
Simple Lifetime Return on Investment:	*-46.3 %*
Simple Lifetime Energy Savings ($):	*$14,085*
Simple Lifetime Maintenance Savings ($):	*$0*

ECM #5: Split System Upgrade – Club House

Description:

Heating and cooling is provided for the downstairs areas and floor diffusers of the bar and dining room of the Club House via a split-system air-conditioning and gas-fired furnace. With respect to cooling, the installation is typical of residential applications having a 5-ton "add-on" evaporator coil and remote air-cooled condensing unit. The air-conditioning system is not as efficient as a new unit and has an estimated seasonal energy efficiency ratio (SEER) of 10.5. 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 units are 13 years old at this time. The estimated service life for split system air-conditioning unit is 15 years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook..

For heating, a Carrier gas-fired furnace provides forced hot air through the duct system. When new, the listed combustion efficiency of the installed unit was 81%. The natural gas firing rate of the furnace is 132,000 BTU/H.

This energy conservation measure would replace the furnace, cooling coil and condensing unit serving the aforementioned areas. The existing equipment will be replaced with an energy efficient, split system with heating and cooling capacities equivalent to the existing system. The SEER of the new cooling equipment will be 16.0 and the combustion efficiency for heating will be 94%. The energy efficiency of the new equipment is based on a Lennox G61 gas furnace, cased evaporator coil, and model SSB condensing unit.

Cooling Energy Savings Calculations:

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

Existing Air Conditioning Units

Rated Capacity = 5 Tons

Condensing Unit Efficiency = 10.5 SEER

Proposed High-Efficiency Air Conditioning Unit

Rated Capacity = 5 Tons

New Condensing Unit Efficiency = 16.0 SEER

Equivalent Full Load Hours of Cooling = 500 hrs/yr.

Average Cost of Electricity - $0.17/kWh

$$EnergySavings = \frac{[5Tons \times 12{,}000\,Btu/ton-hr]}{[1000W/kW]} \times \left(\frac{1}{10.5} - \frac{1}{16}\right) \times 500 = 982kWh$$

Cost Savings = (982 kWh) x $0.171/kWh = $168/ Yr.

Heating Energy Savings Calculations:

To estimate the amount of energy consumed by the existing furnace throughout the heating season, the Degree Day method of energy estimating is be used.

$$EnergyUsed = \frac{H_L \times D \times 24}{\Delta t \times k \times V} \times (C_D)$$

where:

H_L = Building Heat Loss, BTU/Hr.

D = number of 65 F Heating Degree Days

Δt = Design temperature difference, deg. F

k = a correction factor that includes the effects of rated full load efficiency, part load performance, oversizing and energy conservation devices.

V = Heating value of fuel, BTU/Therm

C_D = empirical correction factor for heating effect vs. 65 F degree days

$$EnergyUsed = \frac{(100{,}000) \times (5945) \times 24}{70 \times .6 \times 100{,}000} \times (.6)$$

Energy Used = 2038 Therms/Year

As the proposed furnace is 14% more efficient than the existing furnace, the proposed energy savings is

$$EnergySavings = EnergyUsed \times \left(\frac{1}{Eff._{OLD}} - \frac{1}{Eff._{NEW}}\right)$$

Energy Savings = 2038 x (1/.81 – 1/.94) = 348 Therms/Year

Cost Savings = $1.31/Therm x 348 Therms/yr. = $456/Year

Installed cost of the replacement equipment is estimated at $18,000. It is pertinent to note that this estimate includes the demolition of the existing equipment.

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix B, the replacement falls under the category "Unitary HVAC and Split Systems" and warrants an incentive based on efficiency (SEER) at a certain cooling tonnage.

$$\text{SmartStart® } Incentive = (Cooling\ Tons \times Incentive) = (5\ Tons \times \$80/Ton) = \$400$$

For heating, The NJ Smart Start Program offers an incentive based on the "Gas Furnace" installed.

$$\text{SmartStart® } Incentive = (No\ of\ Furnaces \times Incentive) = (1\ Furnace \times \$350) = \$350$$

Energy Savings Summary:

ECM #5 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$18,000*
NJ Smart Start Equipment Incentive ($):	*($750)*
Net Installation Cost ($):	*$17,250*
Annual Maintenance Savings ($):	*$0*
Annual Energy Savings ($ / yr):	*$624*
Net Annual Savings	*$624*
Simple Payback (yrs):	*27.6*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Return on Investment:	*-45.7 %*
Simple Lifetime Energy Savings ($):	*$9,360*
Simple Lifetime Maintenance Savings ($):	*$0*

ECM #6: Furnace Upgrade – Maintenance Building

Description:

Heating in all areas of the Maintenance Building except the 3-bay garage is provided by a horizontal, residential type, gas-fired furnace. The Carrier furnace provides forced hot air through a ducted air distribution system. When new, the listed combustion efficiency of the installed unit was 80%. The firing rate of the furnace is 46,000 BTU/H and its listed output is 37,000 Btu/Hr. The existing units are approximately 20 years old at this time. The estimated service life for fuel-fired furnaces is 18 years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook..

This energy conservation measure would replace the furnace serving the aforementioned areas. The existing equipment will be replaced with an energy efficient unit with heating capacity equal to the existing unit. The combustion efficiency of the new unit will be 94%. The energy efficiency of the new equipment is based on a Lennox G61 gas furnace, cased evaporator coil, and model SSB condensing unit.

Heating Energy Savings Calculations:

To estimate the amount of energy consumed by the existing furnace throughout the heating season, the Degree Day method of energy estimating is be used.

$$EnergyUsed = \frac{H_L \times D \times 24}{\Delta t \times k \times V} \times (C_D), \text{ where:}$$

H_L = Building Heat Loss, BTU/Hr.

D = number of 65 F Heating Degree Days

Δt = Design temperature difference, deg. F

k = a correction factor that includes the effects of rated full load efficiency, part load performance, oversizing and energy conservation devices.

V = Heating value of fuel, BTU/Therm

C_D = empirical correction factor for heating effect vs. 65 F degree days

$$EnergyUsed = \frac{(40{,}000) \times (5945) \times 24}{70 \times .6 \times 100{,}000} \times (.6)$$

Energy Used = 815.3 Therms/Year

As the proposed furnace is 14% more efficient than the existing furnace, the proposed energy savings is

$$EnergySavings = EnergyUsed \times \left(\frac{1}{Eff._{OLD}} - \frac{1}{Eff._{NEW}} \right)$$

Energy Savings = 815.3 x (1/.80 – 1/.94) = 152 Therms/Year

Cost Savings = $1.31/Therm x 152 Therms/yr. = $199/Year

Installed cost of the replacement equipment is estimated at $3,000. It is pertinent to note that this estimate includes the demolition of the existing equipment.

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix B, the replacement falls under the category "Gas Heating" and warrants an incentive based on the "Gas Furnace" installed.

$$\text{SmartStart® } Incentive = (No\ of\ Furnaces \times Incentive) = (1\ Furnace \times \$300) = \$300$$

Energy Savings Summary:

ECM #6 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	*$3,000*
NJ Smart Start Equipment Incentive ($):	*($300)*
Net Installation Cost ($):	*$2,700*
Annual Maintenance Savings ($):	*$0*
Annual Energy Savings ($ / yr):	*$199*
Net Annual Savings	*$199*
Simple Payback (yrs):	*13.6*
Estimated ECM Lifetime (yrs):	*18*
Simple Lifetime Return on Investment:	*32.7 %*
Simple Lifetime Energy Savings ($):	*$3,582*
Simple Lifetime Maintenance Savings ($):	*$0*

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 Old Tappan, 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 is 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 1710 S.F. can be utilized for a PV system on the Storage Building. A depiction of the area utilized is shown in Appendix F. Using this square footage it was determined that a system size of 26.9 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 41,994 KWh annually, reducing the overall utility bill by 34.8 % percent. A detailed financial analysis can be found in Appendix F. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The solar panel system analysis is based on Sun Power SPR-230 panels. The panel efficiency is 18% with an inverter efficiency of 95%. This region allows for a typical range of sunlight between 4.5 and 4.9 hours per day. The calculations are based on an average 4.68 hours per day. The operating hours are calculated based on 351 days per year accounting for two weeks per year of service down time. The calculations are also based on a solar PV system which utilizes the New Jersey guidelines for net metering. Net metering allows excess energy generated at production peaks to flow onto the grid. The excess energy is metered and subtracted from the facility's total energy usage on an annual basis. Due to this allowance the system design excludes the use of inefficient battery storage.

CEG has reviewed financing options for the owner. Two options were studied and they are as follows: Self-financed and direct purchase without finance. Self-finance was calculated with 95% of the total project cost financed at a 7% interest rate over 25 years. Direct purchase involves the local government paying for 100% of the total project cost upfront. 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	11.07 Years	14.3%
Direct Purchase	11.07 Years	8.2%

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 Storage Building and has determined it is not a viable option. The electrical demand of the Storage Building is not large enough to satisfy the need for 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 the Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

This load profile narrative is the summary of the Golf Course –Club House and Maintenance Buildings.

The Electric Usage Profile demonstrates a fairly flat yearly load profile. The one exception, which has been a constant throughout the Old Tappan usage profile, is the month of July. A very large peak is observed in this combination profile. It is assumed that the month of July was warmer than normal and air conditioning was the reason for the peak. Cooling is supplied by three independent systems: Systems #1 and #2 are identical Roof Top Units. System #3 is a split system. There is a window-type air-conditioning unit in the Maintenance Building as well. The electric load throughout the year is slightly elevated. A flatter load profile will allow for more competitive energy prices when shopping with alternative suppliers.

Natural Gas:

The Natural Gas Usage Profile demonstrates a fairly typical natural gas (heat load) profile. The winter months (November – March) demonstrate normal activity which is demonstrated by a larger consumption due to heating load. Obviously natural gas is in higher demand in the winter period for heating purposes. Heating is also supplied in these facilities by the same (3) three systems mentioned above. The (3) three units are all natural gas-fired, adding to significant winter usage. Unit (3) three, is also a furnace. The Maintenance Building also has a residential style natural gas-fired furnace. Domestic hot-water for the Club House is supplied by a 100 gallon natural gas-fired unit. This facility has a restaurant that seats about 50, with a full kitchen. This is seen as the cause of the increased summer-time elevation in natural gas usage. Domestic hot-water in the Maintenance Building is supplied through a 50 gallon natural gas fired hot water heater. A base-load shaping (flat) will secure more competitive energy prices when procuring energy through an alternative energy source.

Tariff Analysis:

Electricity:

This facility receives electrical service through Orange and Rockland (O&R) on a C&I General Service Secondary (GSS) tariff rate structure, Service Classification No. 2. This service is for Sales and delivery of electric power supply, provided by the Company or delivery of electric power supply provided by an electric generation supplier (TPS) under the Company's (O&R) Retail Access Program to general secondary or primary customers. Customers under this rate schedule will use less than 1000 kW during any month or be switched to Service Classification No. 7. The character of service is for continuous electrical service is for 60 cycle A.C. single or three phase secondary voltage. The Delivery Charges are as follows: Customer Charge, Distribution Charges, Demand Charges, and Usage Charges. Supply Charges: If customer is taking Basic Generation Charges from the utility (not a Third Party Supplier), they will pay: Transmission Charges, Demand Charges, Usage Charges, and Transmission Surcharges. Monthly Charges are as follows: Societal Benefits Charges, Regional Greenhouse Gas Initiative Surcharge, Securitization Charges, Basic Generation and Minimum Monthly Charges.

Natural Gas:

This facility receives natural gas service through Public Service Electric and Gas Company (PSE&G) on a GSGH (General Service Gas-Heating) rate when not receiving commodity by a Third Party Supplier. The utility tariff rate (GSGH) is for General Service. This is a firm delivery service (higher level of delivery) for general purposes where 1) customer does not qualify for RSG (residential) and 2) customers usage does not exceed 3,000 therms in any month. 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.
The service described above has a much higher priority of delivery, based on the pipeline capacity. When the pipelines capacity was unbundled (much like the telecom service), it was divided into various levels of service. The "firm" service is the highest priority, and does not get interrupted (but can be interrupted).

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). 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. Should the TPS under-deliver to the utility on behalf of the client, the utility will automatically supply this default service to the client.

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. The primary area for potential improvement is seen in the electric costs. The average price per kWh (kilowatt hour) for all buildings based on 1-year historical average price is $.1529/kWh (this is the average "price to compare" if the client intends to shop for energy). The average price per decatherm for natural gas is $ 9.7155 / 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. The Township could see improvement in its energy costs if it were to take advantage of these current market prices quickly, before energy increases. Based on annual historical consumption (June 2008 through May 2009) and current electric rates, the Township could see an improvement in its electric costs of up to 30% annually. (Note: Savings were calculated using Average Annual Consumption and a variance to a Fixed Average One-Year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with the natural gas costs. Based on the current market, Old Tappan could improve its natural gas costs by up to 15%. CEG recommends that Old Tappan receive further advisement on these prices through an energy advisor. The Township should also consider procuring energy (natural gas) through an alternative supply source.

CEG also recommends that the municipality schedule a meeting with the current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the municipality can learn more about the competitive supply process. The municipality can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. They should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the information for ongoing demand-side management projects. Furthermore, special attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with the utility representative. The Township should ask the utility representative about alternative billing options, such as consolidated billing when utilizing the service of a Third Party Supplier. Finally, if the supplier for energy (natural gas) is changed, closely monitor balancing, particularly when the contract is close to termination. This could be performed with the aid of an "energy advisor".

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the 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 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. Recalibrate existing temperature sensors within the facility.

F. Clean all light fixtures to maximize light output.

G. Confirm that outside air economizers are functioning properly to take advantage of free

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

Old Tappan Golf Course

ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$8,104	$0	$0	$8,104
Total Cost			$0	$0	$8,104
Utility Incentive - NJ Smart Start					($1,740)
Total Cost Less Incentive					$6,364

ECM 2 LED Exit Signs

	Qty	Unit Cost $	Material $	Labor $	Total $
New LED Exit Signs	7	$80	$50	$30	$560
Total Cost			$50	$30	$560
Utility Incentive - NJ Smart Start ($20 per Exit Sign)					($140)
Total Cost Less Incentive					$420

ECM 3 Lighting Controls

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	13	$75	$455	$520	$975
Total Cost			$455	$520	$975
Utility Incentive - NJ Smart Start ($20 per Sensor)					($260)
Total Cost Less Incentive					$715

ECM 4 Rooftop Unit Replacement

	Qty	Unit Cost $	Material $	Labor $	Total $
New RTU's	LS	$27,000	$0	$0	$27,000
Total Cost			$0	$0	$27,000
Utility Incentive - NJ Smart Start					($750)
Total Cost Less Incentive					$26,250

ECM 5 Split System Upgrade - Club House

	Qty	Unit Cost $	Material $	Labor $	Total $
New Split System Components	LS	$18,000	$0	$0	$18,000
Total Cost			$0	$0	$18,000
Utility Incentive - NJ Smart Start					($750)
Total Cost Less Incentive					$17,250

ECM 6 Furnace Upgrade - Maintenance Building

	Qty	Unit Cost $	Material $	Labor $	Total $
New High Efficiency Furnace	LS	$3,000	$0	$0	$3,000
Total Cost			$0	$0	$3,000
Utility Incentive - NJ Smart Start					($300)
Total Cost Less Incentive					$2,700

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Old Tappan Golf Course

Building ID: 1847838
For 12-month Period Ending: April 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: September 09, 2009

Facility
Old Tappan Golf Course
83 DeWolf Road
Old Tappan, NJ 07675

Facility Owner
Borough of Old Tappan
227 Old Tappan Road
Old Tappan, NJ 07675

Primary Contact for this Facility
Patrick O'Brien
227 Old Tappan Road
Old Tappan, NJ 07675

Year Built: 1969
Gross Floor Area (ft²): 7,200

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	411,201
Natural Gas (kBtu)[4]	1,969,680
Total Energy (kBtu)	2,380,881

Energy Intensity[5]

Site (kBtu/ft²/yr)	331
Source (kBtu/ft²/yr)	477

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	144

Electric Distribution Utility
Rockland Electric Co

National Average Comparison

National Average Site EUI	66
National Average Source EUI	143
% Difference from National Average Source EUI	234%
Building Type	Other

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 South Burnt Mill Road
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Old Tappan Golf Course	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Other	Is this an accurate description of the space in question?		☐
Location	83 DeWolf Road, Old Tappan, NJ 07675	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		☐
Pro Shop (Retail)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	120 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	60 Hours	Is this the total number of hours per week that the retail store is open for business excluding hours when the building is occupied only by maintenance, security, or other support personnel? For buildings with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Number of open or closed refrigeration/freezer cases	0	Is this the total number of commercial refrigeration units (cases) used for the sale or storage of perishable goods? This includes display type refrigerated open or closed cases and cabinets as well as display type freezer units typically found on the sales floor. Each case or cabinet section, typically 4 to 12 feet in length, should be considered 1 unit. Include those cases located inside and immediately adjacent to the facility. This should not include any refrigerated vending (soda) machines.		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of large walk-in refrigeration or freezer units in use within the retail store? This typically includes large refrigeration units located in the back of a retail store in storage and receiving areas and used to store refrigerated goods.		☐
Workers on Main Shift	1	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 15 workers each, the Workers on Main Shift value is 15.		☐

Number of PCs	0	Is this the total number of personal computers and data servers in the retail store? Personal computers are not used to check out customers and are generally located in manager offices, break rooms, and/or storage and inventory areas.		☐
Number of Cash Registers	1	Is this the total number of cash registers in the retail store? Cash registers are defined as business machines that are used primarily for conducting transactions and indicating to customers the amounts of individual sales; they record and total receipts, may automatically calculate the change due, and often include a money drawer from which to make change.		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Percent Cooled	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Exterior Entrance to the Public	Yes	Does this retail store have an exterior entrance to the public? Answer yes if this store has an exterior entrance through which customers enter to shop. Answer no if there is no exterior entrance available to the public.		☐

Club House (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	2,580 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	2 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	60 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	4 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

Maintenance Building (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	1,800 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	1 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	60 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐

Workers on Main Shift	4 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐
Restaurant (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	2,700 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	3 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	60 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	10 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Rockland Electric Co

Fuel Type: Electricity		
Meter: 60908-46009 (kWh (thousand Watt-hours)) **Space(s):** Club House, Pro Shop, Restaurant **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
04/01/2009	04/30/2009	8,580.00
03/01/2009	03/31/2009	5,160.00
02/01/2009	02/28/2009	8,040.00
01/01/2009	01/31/2009	3,420.00
12/01/2008	12/31/2008	7,020.00
11/01/2008	11/30/2008	6,420.00
10/01/2008	10/31/2008	8,100.00
09/01/2008	09/30/2008	11,100.00
08/01/2008	08/31/2008	9,420.00
07/01/2008	07/31/2008	17,100.00
06/01/2008	06/30/2008	11,940.00
05/01/2008	05/31/2008	8,220.00
60908-46009 Consumption (kWh (thousand Watt-hours))		**104,520.00**
60908-46009 Consumption (kBtu (thousand Btu))		**356,622.24**
Meter: 61118-46001 (kWh (thousand Watt-hours)) **Space(s):** Maintenance Building **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
04/01/2009	04/30/2009	1,200.00
03/01/2009	03/31/2009	1,512.00
02/01/2009	02/28/2009	2,000.00
01/01/2009	01/31/2009	2,068.00
12/01/2008	12/31/2008	1,704.00
11/01/2008	11/30/2008	1,548.00
10/01/2008	10/31/2008	1,116.00
09/01/2008	09/30/2008	1,020.00
08/01/2008	08/31/2008	972.00
07/01/2008	07/31/2008	1,020.00
06/01/2008	06/30/2008	828.00
05/01/2008	05/31/2008	1,008.00
61118-46001 Consumption (kWh (thousand Watt-hours))		**15,996.00**

61118-46001 Consumption (kBtu (thousand Btu))	**54,578.35**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**411,200.59**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas

Meter: 41 213 335 19 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
04/01/2009	04/30/2009	941.12
03/01/2009	03/31/2009	1,048.53
02/01/2009	02/28/2009	881.93
01/01/2009	01/31/2009	1,283.55
12/01/2008	12/31/2008	1,061.70
11/01/2008	11/30/2008	11,064.20
10/01/2008	10/31/2008	743.28
09/01/2008	09/30/2008	498.09
08/01/2008	08/31/2008	495.91
07/01/2008	07/31/2008	478.21
06/01/2008	06/30/2008	541.51
05/01/2008	05/31/2008	658.77

41 213 335 19 Consumption (therms)	**19,696.80**
41 213 335 19 Consumption (kBtu (thousand Btu))	**1,969,680.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**1,969,680.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Old Tappan Golf Course
83 DeWolf Road
Old Tappan, NJ 07675

Facility Owner
Borough of Old Tappan
227 Old Tappan Road
Old Tappan, NJ 07675

Primary Contact for this Facility
Patrick O'Brien
227 Old Tappan Road
Old Tappan, NJ 07675

General Information

Old Tappan Golf Course	
Gross Floor Area Excluding Parking: (ft^2)	7,200
Year Built	1969
For 12-month Evaluation Period Ending Date:	April 30, 2009

Facility Space Use Summary

Pro Shop	
Space Type	Retail
Gross Floor Area(ft^2)	120
Weekly operating hours	60
Number of open or closed refrigeration/freezer cases	0
Number of walk-in refrigeration/freezer units	0
Workers on Main Shift	1
Number of PCs	0
Number of Cash Registers	1
Percent Heated	100
Percent Cooled	100
Exterior Entrance to the Public	Yes

Club House	
Space Type	Other - Recreation
Gross Floor Area(ft^2)	2,580
Number of PCs°	2
Weekly operating hours°	60
Workers on Main Shift°	4

Maintenance Building	
Space Type	Other - Service (Vehicle Repair/Service, Postal Service)
Gross Floor Area(ft^2)	1,800
Number of PCs°	1
Weekly operating hours°	60
Workers on Main Shift°	4

Restaurant	
Space Type	Other - Restaurant/Cafeteria
Gross Floor Area(ft^2)	2,700
Number of PCs°	3
Weekly operating hours°	60
Workers on Main Shift°	10

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2009)	**Baseline** (Ending Date 04/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	331	331	1184	N/A	66
Source (kBtu/ft^2)	477	477	1708	N/A	143
Energy Cost					
$/year	$ 33,389.78	$ 33,389.78	$ 119,534.97	N/A	$ 6,664.22
$/$ft^2$/year	$ 4.64	$ 4.64	$ 16.61	N/A	$ 0.93
Greenhouse Gas Emissions					
$MtCO_2e$/year	144	144	516	N/A	29
$kgCO_2e/ft^2$/year	20	20	72	N/A	4

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Old Tappan Golf Course"

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Club House	Club House	A.O.Smith	1	BTR 250 A110	Unknown	250	242	100	75.6	Natural Gas	20	15	0	
Maintenance Bldg	Maint Bldg	A.O.Smith	1	FSG50 232	Unknown	40	37.9	50	71	Natural Gas	13	15	2	

DHW - Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Volts	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Club House	Club House	Taco	1	006-BT3	Unknown	Fractinal	120	0.25	13	10	0	

Rooftop Packaged Units

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (SEER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Club House	Bar, Men's Rm	Carrier	1	48TME006	Unknown	-	10	60,000 Btu/Hr	Forced Hot Air	115	97	80%	Natural Gas	208	1	Unknown	20	15	0	
Club House	Dining Rm, Pro Shop	Carrier	1	48TME006	Unknown	-	10	60,000 Btu/Hr	Forced Hot Air	115	97	80%	Natural Gas	208	1	Unknown	20	15	0	

Split System AC & Htg

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (SEER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Club House	Downstairs	Carrier	1	58WAV110-LC	Unknown	Yes	12	60,000 Btu/Hr	Forced Hot Air	132	107	81%	Natural Gas	120	1	Unknown	13	15	2	
Maintenance Bldg	Office, Break Rm	Carrier	1	58DHC 040	Unknown	None	N/A	N/A	Forced Hot Air	46	37	80%	Natural Gas	120	1	Unknown	13	15	2	

Unit Heaters and Cabinet Unit Heaters

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Fuel	Heating Capacity (MBH)	Input (MBH)	Output (MBH)	Heating Eff. (%)	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Maintenance Bldg	Garage	Reznor	4	F	Unknown	Natural Gas	40,000 Btu/Hr	50	40	80%	22	13	0	

Condensing Units

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Club House	Downstairs	Bryant	1	598AN 060-A	Unknown	5 Tons	12	R-22	208	1	Unknown	13	15	0	

PTAC - Units

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - HW	Fan HP	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Maintenance Bldg	Office	Unknown	1	Unknown	Unknown	5000 Btu/Hr	N/A	Fractional	120	1	15	13	10	0	

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C09017
Project: Old Tappan
Address: 83 DeWolf Rd
City: Old Tappan
Building SF: 4,285

"Old Tappan Golf Course"

DATE: 9/28/2009
KWH COST: $0.171

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	Kitchen	3	2'X4' 4-Lamp T-8 Recessed Prismatic Lens 32W	3800	128	0.38	1459.2	$249.52	3	No Replacement	128	0.38	1459.2	$249.52	$0.00	$0.00	0.00	0	$0.00	0.00
2	Bar	7	65W Incandescent	3800	65	0.46	1729	$295.66	7	18 W CFL Lamp	18	0.13	478.8	$81.87	$5.75	$40.25	0.33	1250.2	$213.78	0.19
3		12	20W Incandescent	3800	20	0.24	912	$155.95	12	No Replacement	20	0.24	912	$155.95	$0.00	$0.00	0.00	0	$0.00	0.00
4	Dining	19	65W Incandescent	3800	65	1.24	4693	$802.50	19	18 W CFL Lamp	18	0.34	1299.6	$222.23	$5.75	$109.25	0.89	3393.4	$580.27	0.19
5		2	2'X2' 2-Lamp T-12 Recessed Prismatic Lens 40W	3800	94	0.19	714.4	$122.16	2	2'x2' 2-Lamp T-8, Prism Lens Electronic Ballast, Architectural surface or Recessed static METALUX 2AC-217-UNV-EB81-U	34	0.07	258.4	$44.19	$204.00	$408.00	0.12	456	$77.98	5.23
6		9	20W Incandescent	3800	20	0.18	684	$116.96	9	No Replacement	20	0.18	684	$116.96	$0.00	$0.00	0.00	0	$0.00	0.00
7	Mens Bathroom	2	2'X4' 3-Lamp T-12 Recessed Parabolic 40W	3800	151	0.30	1147.6	$196.24	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	691.6	$118.26	$120.00	$240.00	0.12	456	$77.98	3.08
8		1	1'X4' 2-Lamp T-12 Surface Mounted Vanity 40W	3800	94	0.09	357.2	$61.08	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	209	$35.74	$100.00	$100.00	0.04	148.2	$25.34	3.95
9	Womens Bathroom	2	2'X4' 3-Lamp T-12 Recessed Parabolic 40W	3800	151	0.30	1147.6	$196.24	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	691.6	$118.26	$120.00	$240.00	0.12	456	$77.98	3.08
10		1	1'X4' 2-Lamp T-12 Surface Mounted Vanity 40W	3800	94	0.09	357.2	$61.08	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	209	$35.74	$100.00	$100.00	0.04	148.2	$25.34	3.95
11	Pro Shop	6	2'X4' 3-Lamp T-12 Recessed Prismatic 40W	3400	151	0.91	3080.4	$526.75	6	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.55	1856.4	$317.44	$120.00	$720.00	0.36	1224	$209.30	3.44
12	Men's Locker Room	4	2'X4' 4-Lamp T-12 Recessed Prismatic 40W	3800	188	0.75	2857.6	$488.65	4	2'x4' 4-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	122	0.49	1854.4	$317.10	$160.00	$640.00	0.26	1003.2	$171.55	3.73
13	Womens Locker	4	2'X4' 4-Lamp T-12 Recessed Prismatic 40W	3800	188	0.75	2857.6	$488.65	4	2'x4' 4-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC9	123	0.49	1869.6	$319.70	$160.00	$640.00	0.26	988	$168.95	3.79
14	Entrance	1	2'X4' 2-Lamp T-12 Recessed Prismatic 40W	3800	94	0.09	357.2	$61.08	1	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.06	231.8	$39.64	$120.00	$120.00	0.03	125.4	$21.44	5.60
15	Storage	4	2'X4' 2-Lamp T-12 Recessed Prismatic 40W	3800	94	0.38	1428.8	$244.32	4	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.24	927.2	$158.55	$120.00	$480.00	0.13	501.6	$85.77	5.60
16	Storage #2	4	2'X4' 2-Lamp T-12 Recessed Prismatic 40W	3800	94	0.38	1428.8	$244.32	4	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.24	927.2	$158.55	$120.00	$480.00	0.13	501.6	$85.77	5.60

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
17	Mech Room	2	2'X4' 2-Lamp T-12 Recessed Prismatic 40W	750	94	0.19	141	$24.11	2	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.12	91.5	$15.65	$120.00	$240.00	0.07	49.5	$8.46	28.35
18	Food Storage	4	23W CFL	3800	23	0.09	349.6	$59.78	4	No Replacement	23	0.09	349.6	$59.78	$0.00	$0.00	0.00	0	$0.00	0.00
19	Office	1	2'X4' 4-Lamp T-12 Recessed Prismatic 40W	3800	188	0.19	714.4	$122.16	1	2'x4' 4-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	122	0.12	463.6	$79.28	$160.00	$160.00	0.07	250.8	$42.89	3.73
20	Maintenance Shop	23	1'X4' 2-Lamp T-12 Industrial 40W	3780	94	2.16	8172.36	$1,397.47	23	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	73	1.68	6346.62	$1,085.27	$123.00	$2,829.00	0.48	1825.74	$312.20	9.06
21		1	1'X4' 4-Lamp T-12 Industrial 40W	3780	188	0.19	710.64	$121.52	1	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF233	74	0.07	279.72	$47.83	$123.00	$123.00	0.11	430.92	$73.69	1.67
22	Office	6	75W Incandescent	3780	75	0.45	1701	$290.87	6	18 W CFL Lamp	18	0.11	408.24	$69.81	$5.75	$34.50	0.34	1292.76	$221.06	0.16
23	Break Room	2	1'X4' 2-Lamp T-12 Surface Prismatic 40W	3780	94	0.19	710.64	$121.52	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	415.8	$71.10	$100.00	$200.00	0.08	294.84	$50.42	3.97
24		2	1'X4' 2-Lamp T-12 40W	3780	94	0.19	710.64	$121.52	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	56	0.11	423.36	$72.39	$100.00	$200.00	0.08	287.28	$49.12	4.07
	Totals	122				10.37	38421.9	$6,570.14	122			6.31	23338.2	$3,990.84		$8,104.00	4.07	15083.6	$2,579.30	3.14

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
Golf Course	1710	Sunpower SPR230	117	14.7	1,720	26.91	41,994	3,861	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.