ENERGY AUDIT – FINAL REPORT

LOPATCONG
Fire Company No. 2

224 Strykers Road
Phillipsburg, NJ 08865
ATTN: Betty Dobes

CEG PROPOSAL NO. 9C09058

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:

Lopatcong Township
Fire Company Engine #2
224 Strykers Road
Phillipsburg, NJ 08865

Facility Contact Person: Betty Dobes

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	$5,930
Natural Gas	$4,225
Total	$10,155

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[B]	SIMPLE PAYBACK (YEARS)	SIMPLE LIFETIME ROI
1	Lighting Upgrades	$5,094	$1,802	2.9	34.5%
2	Lighting Controls	$495	$133	3.7	27%
3	Replacement: Heating Hot Water Boiler	$11,900	$280	42.5	2.4%
4	Install Programmable Thermostats	$540	$279	1.9	52.6%
5	LED Exit Sign Replacement	$166	$163	1.9	52.6%
6	12.88 KW PV Solar System	$115,920	$3,377	11.13	8.2%

Notes: A. Cost takes into consideration applicable NJ Smart Start™ incentives.

B. Savings takes into consideration applicable maintenance 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	4.20	10,240	-
2	Lighting Controls	-	782	-
3	Replacement: Heating Hot Water Boiler	-	-	197
4	Install Programmable Thermostats	-	-	-
5	LED Exit Sign Replacement	.08	700	-
6	12.88 KW PV Solar System	12.88	20,100	-

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 Lopatcong Fire Company #2:

- **ECM #1: Lighting Upgrades**
- **ECM #2: Lighting Controls**
- **ECM #4: Install Programmable Thermostats**
- **ECM #5: LED Exit Sign Replacement**

In addition to the above recommendations, CEG also recommends the installation of **ECM #3:** Replacement of hot water heating boiler. Even though this ECM has a payback greater than the seven (7) year threshold, CEG believes it can be a valuable upgrade to the facility. The life of this unit is beyond its recommended time and should definitely be considered for replacement.

II. INTRODUCTION

This comprehensive energy audit covers the 2,940 square foot Lopatcong Firehouse, Engine #2 that includes offices, lounge, bunk room, kitchen, restrooms, boiler room and engine bays.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Electric

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

Natural Gas

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facility from January-07 to December-07. Elizabethtown Gas supplies the natural gas commodity. Elizabethtown Gas charges a rate per therm for delivery of the natural gas via their pipelines to the burners under their Multi-Family/ Use rate.

Description	Average
Electricity	17¢ /kWh
Natural Gas	$1.42 /Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	3,253	8	$506
2/08	2,898	7	$457
3/08	2,781	13	$438
4/08	2,539	7	$390
5/08	2,465	11	$379
6/08	3,390	13	$607
7/08	3,389	10	$615
8/08	3,568	15	$669
9/08	3,071	14	$572
10/08	2,686	7	$439
11/08	2,809	7	$458
12/07	2,555[A]	11[A]	$400[A]
Totals	**35,404**	**15 Max**	**$5,931**

Notes: A. Utility information for 12/07 is estimated; utility bill was not provided by Owner for this month.

Figure 1
Electricity Usage Profile

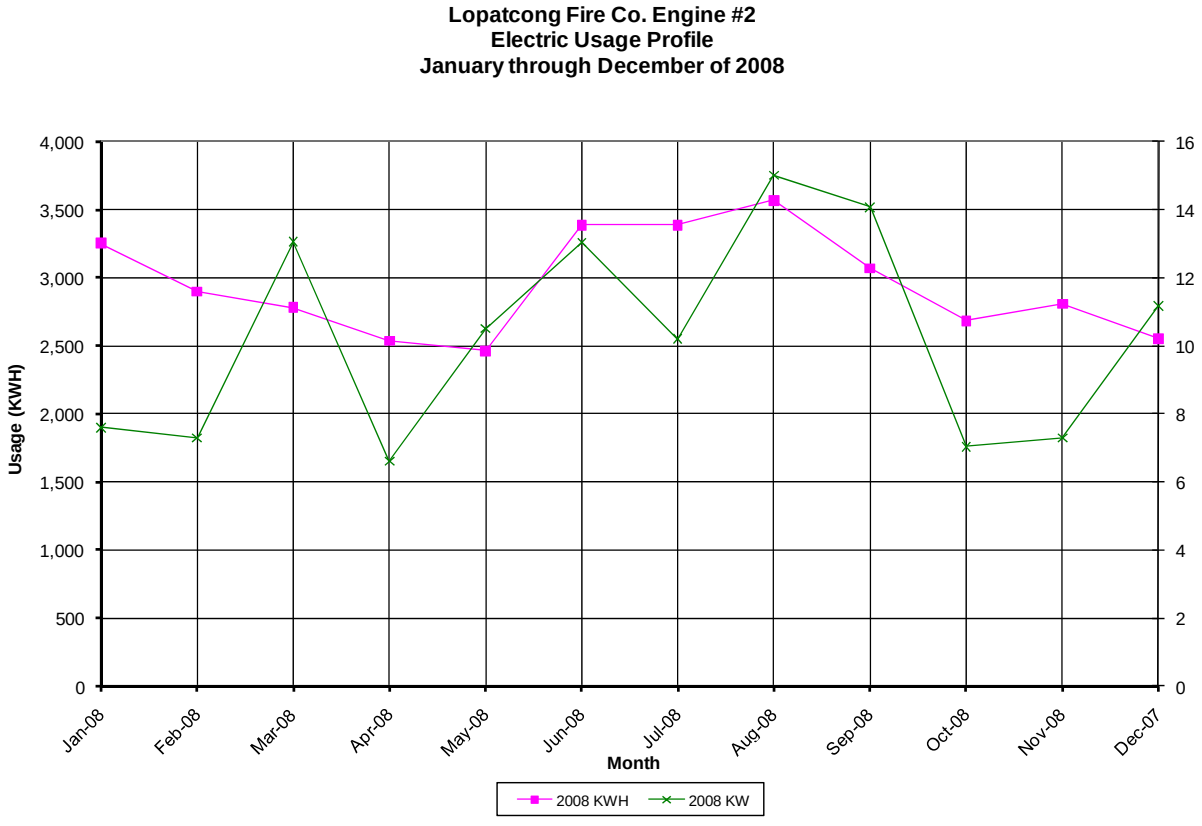
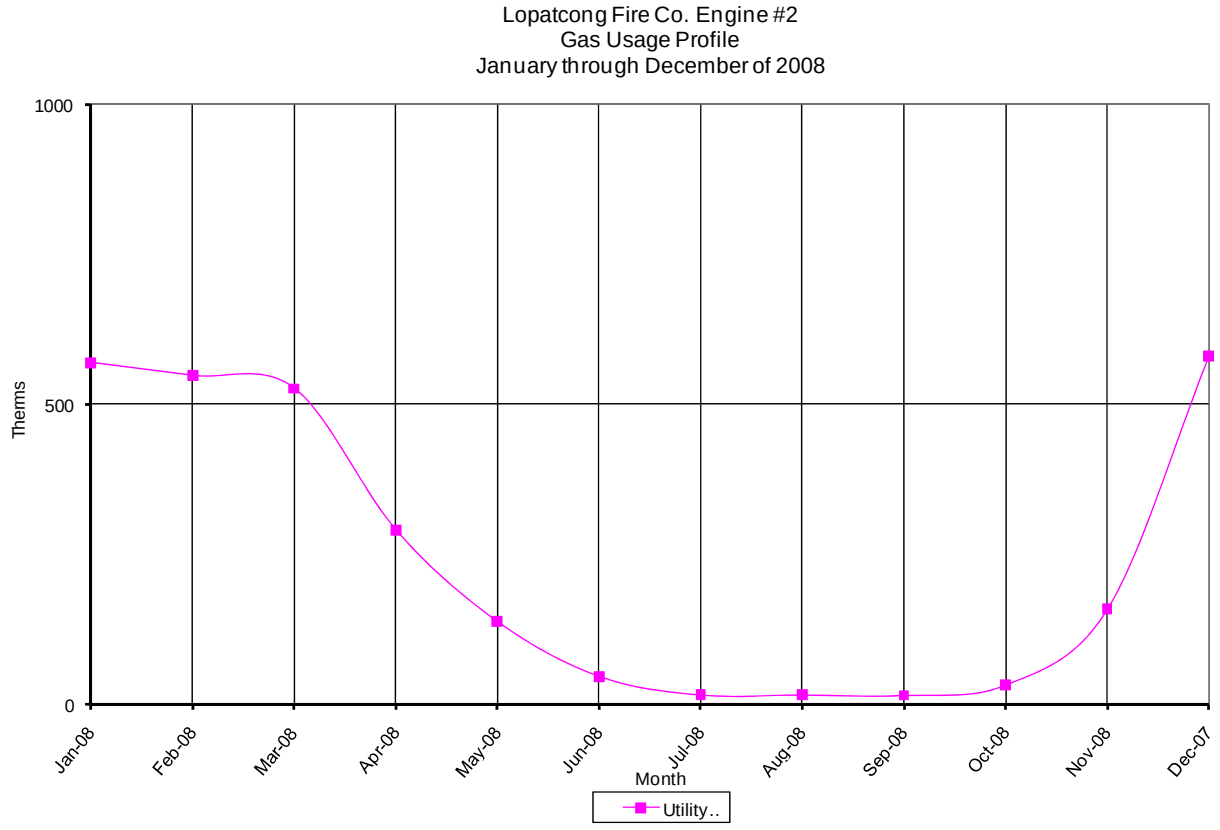


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/07	569.4	$728
2/07	547.8	$701
3/07	526.2	$674
4/07	290.3	$379
5/07	137.6	$188
6/07	46.6	$74
7/07	15.6	$36
8/07	15.7	$38
9/07	14.7	$36
10/07	32.4	$64
11/07	158.8	$275
12/07	580.9	$965
Totals	**2,936**	**$4,158**

Notes: A. Utility information for 02/07 is estimated; utility bill was not provided by Owner for this month.

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

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. Their website allows the user to determine how well the client's building energy use intensity (EUI) compares with similar facilities throughout the U.S. and in your specific region or state.

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

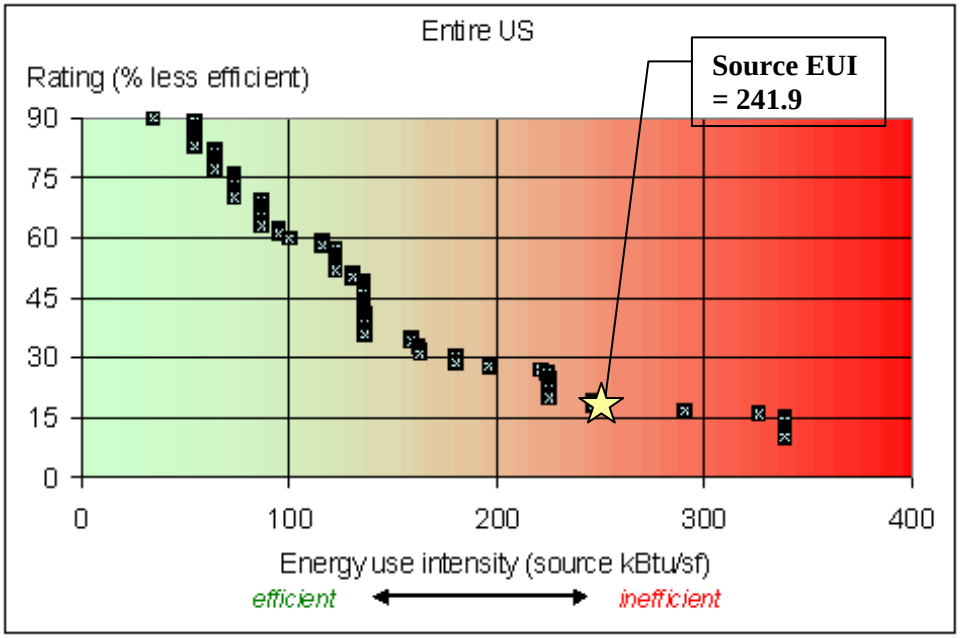
Electric = ((35,404 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 120,869 kBtu

Gas = ((2,936 therms) * (100,000 Btu/h / 1 Therm)) / (1000 Btu/h / 1 kBtu/h) = 293,600 kBtu

$$Building\ \ EUI = \frac{(120{,}869\ kBtu + 293{,}600\ kBtu)}{2940\ SF} = \frac{414{,}469\ kBtu}{2940\ SF}$$

Lopatcong Fire Company #2 EUI = 141 kBtu/SF (Site Energy); 241.9 kBtu/SF (Source Energy)

Figure 3
Source Energy Use Intensity Distributions: Fire and Police Stations



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: Lopatcongtwp
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.” Lopatcong Firehouse, Engine #2 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 D for the “Statement of Energy Performance” Report.

V. FACILITY DESCRIPTION

The City of Lopatcong's Fire Company Engine #2 consists of offices, lounges, engine bays, storage rooms, boiler room, locker room, bunk room, etc.; totaling approximately 2,940 SF. Fire Co. Engine #2 was originally constructed in 1973 and thereafter underwent a renovation in 1995. This addition in 1995 greatly increased the square footage of the facility by adding another engine bay. The building is constructed of typical cinder block framework and the roof is comprised of asphalt shingles. The windows in this facility are double pane with wood frame. Since this fire house is a volunteer facility it is only occupied for approximately 40 hours a week.

Heating System

The heating in the engine bays is taken care of by two (2) Vantage II infrared radiant tube heaters. The Vantage II units both have a 100 MBH input capacity and their thermal efficiency is approximately 83%. These units are located between the doors of each bay and are controlled via standard thermostats.

All the rooms except for the engine bays are heated by a Crown Aruba gas-fired boiler. The boiler has an input of 75,000 Btu/h and an output of 53,000 Btu/h. The boiler efficiency is 70.6%.

Domestic Hot Water

Domestic hot water for the restrooms is provided by a State gas-fired hot water heater, with a 50 gallon capacity and an input of 36 MBH.

Cooling System

The offices and lounge are cooled via two (2) Whirlpool window air conditioning units. Any other information regarding these units was unable to be attained during the time of the survey.

Controls System

There are 3 thermostats that control the heating from the boiler and the two (2) infrared heaters which are standard non-programmable thermostats.

Lighting

The office areas, bunk room, lounge, kitchen, boiler room, hallways and bathrooms are lit via several varieties of T12 lamps with magnetic ballasts. There are also a vast amount of incandescent bulbs in use. Throughout the whole facility only a few compact fluorescents and T8 fixtures were used. Standard switching is utilized and there are no other types of lighting controls present.

The engine bays have a mixture of fixtures including 4-foot by 2-foot T12 lamps, 4-foot industrial T12 lamps, 8-foot T12 lamps and some high hat compact fluorescents. All of the

fixtures in the engine room are devoid of a lens covering. The lights are switched via standard wall switching. No other lighting controls were being used.

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 E for the Major Equipment List.

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VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrades

Description:

1.1 Upgrade the Fluorescent Lighting

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 154 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

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

1.2 Install Compact Fluorescent Lighting

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light.

The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 25-Watt CFL for a 100-Watt incandescent lamp.
The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output.

A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures.

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

Energy Savings Calculations:

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

NJ Smart Start® Program Incentives are calculated as follows:

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

$$\text{Smart Start®}\ Incentive = (\#\ of\ 1-2\ lamp\ \ fixtures \times\ \$\ 25) + (\#\ of\ \ 3-4\ lamp\ \ fixtures \times\ \$\ 30)$$
$$\text{Smart Start®}\ Incentive = (30 \times\ \$\ 25) + (\ 2 \times\ \$\ 30) = \$810$$

Maintenance Savings are calculated as follows:

$$Maintenance\ Savings = (\#\ of\ \ lamps \times \%\ reduction \times \$\ \ per\ lamp) + Installation\ Labor$$
$$Maintenance\ Savings = (\ 93 \times 33\%\ reduction \times \$\ 2.00) = \$61$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,965
NJ Smart Start Equipment Incentive ($):	($810)
Net Installation Cost ($):	$5,155
Maintenance Savings ($ / yr):	*$61*
Energy Savings ($ / yr):	*$1,741*
Total Yearly Savings ($ / yr):	*$1,802*
Simple Payback (yrs):	*2.9*
Simple Lifetime ROI (%):	*773.9%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Savings ($):	*$45,050*

ECM #2: Lighting Controls

Description:

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

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

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G of the referenced standard, states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all areas of the facility except the engine bays (1,000 SF).

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the existing offices, locker rooms, storage rooms, etc. to be 3.76 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

Savings = 10% x 3.76 Watts/SF x 1,000 SF x 2080 hrs/yr. = 782 kWh x $0.17/kWh

Savings = $133 / 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 rooms to be retrofitted is 9. Total cost to install sensors is $55/unit x 9 units = $330.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$675
NJ Smart Start Equipment Incentive ($):	($180)
Net Installation Cost ($):	$495
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$133*
Total Yearly Savings ($ / yr):	*$133*
Simple Payback (yrs):	*3.7*
Simple Lifetime ROI (%):	*303%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$1,995*

ECM #3: Replace Hot Water Heating Boiler

Description:

Fire Co. Engine #2 in Lopatcong is heated by a 1990 Crown Aruba hot water boiler which presently is about 70% efficient. As an alternative energy conservation measure, the Concord team recommends that this boiler be replaced by a Trinity Ti100 high-efficiency boiler rated at 100 MBH and 92% efficient.

Existing Heating Hot Water Boiler:

Rated Capacity = 75 MBH (Natural Gas)

Combustion Efficiency = 70%

Radiation Losses = 5%

Thermal Efficiency = 65%

Replacement Boiler:

High Efficiency Trinity Ti or Equal (with Sequencing Control & O/A HW Reset)

Rated Capacity = 100 MBH (Natural Gas)

Combustion Efficiency = 92%

Radiation Losses = 0.5%

Thermal Efficiency = 91.5%

Operating Data:

Annual Fuel Consumption of Natural Gas is calculated as:
75,000 BTU x 6057 HDD65 x 0.15 diversity / (100,000 Btu/1 Therm of natural gas)
= 681 Therms

Average Cost of Natural Gas = $1.42/Therm

Energy Savings Calculations:

Energy Savings = Old Boiler Energy Input x ((New Boiler Efficiency – Old Boiler) / New Boiler Efficiency))

$$\text{Energy Savings} = 681 \text{ Therms} \times \frac{0.915-0.65}{0.915} = 197 \text{ Therms}$$

Cost Savings = Annual Energy Savings x $/Therm
= 197 Therms x $1.42/Therm = $280 / yr.

Installed cost of a Trinity Ti high-efficiency boiler = $12,075. The SmartStart Buildings® incentive is $1.75 per MBH which equates to $175. Net installation cost = $11,900

Simple Payback = $11,900 / $280 = 42.5 Years

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$12,075
NJ Smart Start Equipment Incentive ($):	($175)
Net Installation Cost ($):	$11,900
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$280*
Total Yearly Savings ($ / yr):	*$280*
Simple Payback (yrs):	*42.5*
Simple Lifetime ROI (%):	*-17.6%*
Estimated ECM Lifetime (yr):	*35*
Simple Lifetime Savings ($):	*$9,800*

ECM #4: Install Programmable Thermostats

Description:

Throughout the building there are standard, manual wall thermostats for various HVAC units that provide local control with adjustable settings for the conditioning equipment. These aged, indoor temperature controls are inaccurate due to temperature drift, age, and not having been re-calibrated. These units also do not have unoccupied setback features.

New programmable thermostats are available that utilize programming schedules for occupied and unoccupied times and can be set to vary space temperature at these respective times. In addition, the programmable thermostats can be used in conjunction with a motion sensor. When the space is not occupied the equipment can operate at the unoccupied setpoint. Once the space becomes occupied the motion sensor sends a signal to the thermostat to raise the temperature of the space to the occupied setpoint. This control system approach is ideal for facilities with low occupancy levels such as a volunteer fire house.

This energy conservation measure would replace the various HVAC unit thermostats with programmable 7-day thermostats with night time setback control. The recommended thermostat setpoints for heating are as follows:

Occupied Heating = 60° F

Unoccupied Heating = 55° F

CEG recommends replacement of the existing remote thermostats with Honeywell RTH7500D 7-day programmable thermostat or equivalent.

Energy Savings Calculations:

The energy savings of a 7-day programmable thermostat was calculated by using Energy Star Life Cycle Cost Estimate software for qualified programmable thermostats. The referenced calculator can be found at www.energystar.gov. Refer to Appendix H for the detailed calculation.

Calculated energy savings for heating only = $93/Unit

Cost of a 7-day programmable thermostat (installed) = $180/unit

Simple Payback = 1.3 Years

A detailed energy savings calculation can be found in Appendix H that outlines the savings from the use of programmable thermostats.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$540
NJ Smart Start Equipment Incentive ($):	($0)
Net Installation Cost ($):	*$540*
Maintenance Savings ($ / yr):	*$0*
Energy Savings ($ / yr):	*$279*
Total Yearly Savings ($ / yr):	*$279*
Simple Payback (yrs):	*1.9*
Simple Lifetime ROI (%):	*675%*
Estimated ECM Lifetime (yr):	*15*
Simple Lifetime Savings ($):	*$4,185*

ECM #5: Exit Sign Replacement: LED Type

Description:

LED stands for light-emitting-diode. LED's are very small light sources that people most readily associate with electronic equipment. LED exit signs have been made in a variety of shapes and sizes and there are also retrofit kits that allow you to simply modify your existing exit signs to accommodate the LED technology. The benefits of LED are twofold. First, you are installing an exit sign that will last for 20-30 years without maintenance. This results in tremendous maintenance savings because the incandescent or fluorescent lamps that you are currently using 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. The second benefit of LED is that it only uses 5 Watts of power per fixture. In comparison, your existing signs use approximately 20 Watts per fixture. It is highly recommended that sample installations of the LED exit signs be conducted to confirm that they are compatible with your electrical system.

This measure consists of installing new LED exit sign fixtures in order to provide the Owner with a limited-maintenance, energy efficient signage system.

Energy Savings Calculations:

Existing exit sign energy costs: 4 units x 20 watts/unit x 8,760 hrs/yr x $0.168/kWh = $118

New LED exit sign energy costs: 4 units x 5 watts/unit x 8,760 hrs x $0.168/kWh = $29

Net energy savings = $118 - $29 = $89

Installed cost of new LED exit signs = $80 x 4 = $320

NJ Smart Start® Program Incentives are calculated as follows:

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

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ exit\ signs \times\ \$\ 20) = (4 \times \$20) = \$80$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (4 \times \$4.50) + (4 \times \$14) = \$74$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$320
NJ Smart Start Equipment Incentive ($):	($80)
Net Installation Cost ($):	*$240*
Maintenance Savings ($ / yr):	*$74*
Energy Savings ($ / yr):	*$89*
Total Yearly Savings ($ / yr):	*$163*
Simple Payback (yrs):	*1.47*
Simple Lifetime ROI (%):	*1597.9%*
Estimated ECM Lifetime (yr):	*25*
Simple Lifetime Savings ($):	*$4,075*

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 Lopatcong, 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 820 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in Renewable / Distributed Energy Measures Calculation appendix. Using this square footage it was determined that a system size of 12.88 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 20,100 KWh annually, reducing the overall utility bill by approximately 57% percent. A detailed financial analysis can be found in the Renewable / Distributed Energy Measures Calculation appendix. 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 via one of the methods noted in the Installation Funding Options section below. 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	11.13 Years	13.6%
Direct Purchase	11.13 Years	8.2%

The above information is concluded as ECM #6 showing installation costs, energy savings and other pertinent summarized information in section I of this report.

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

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed is not adequate, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

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

Electricity:

Section IV, Figure 1 demonstrates a flat (base-load) electric profile. The summer (June-September) is a typical load caused by air conditioning with some increased consumption. The balance of the year is very flat. There is a drop-off in electric use beginning January and falling to its lowest point in April. This base-load shaping is important because a flat consumption profile will yield more competitive energy prices when procuring energy.

Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load (January – April, October, November and December), and complimentary cooling load (May- September). Consequently there is a separation between summer and winter loads consistent with energy commodities traded on the New York Mercantile Exchange. Heating loads carry a much higher average cost because of the higher demand for natural gas to heat during the winter. This facility supplies heating needs through gas-fired boiler and gas fired hot water heater.

Tariff Analysis:

Electricity:
The Fire Co. Engine #2 receives electrical service through Jersey Central Power & Light (JCP&L) on a GSS (General Service Secondary) rate. Service classification GS is available for general service purposes on secondary voltages not included under Service Classifications RS, RT, RGT or GST. This is a single or three phase service at secondary voltages. For electric supply (generation), the customer will use the utilities Basic Generation Service (BGS) or a Third Party Supplier (TPS). If they use the utility BGS then they will pay according to the BGS default service. The Delivery Service includes the following charges: Customer Charge, Supplemental Customer Charge, Distribution Charge (kW Demand), kWh Charge, Non-utility Generation Charge, TEFA, SBC, SCC, Standby Fee and RGGI

Natural Gas:

Engine Co. #1 receives natural gas service through Elizabethtown Gas Company (Etown) on a SGS, (Small General Service) utility rate when not receiving commodity by a Third Party Supplier. The utility tariff rate SGS is available to those customers whose annual weather annualized usage as determined by the utility is less than 3,000 therms per year and where Gas Company's facilities are suitable and the quantity of gas is available for the service desired. In August of each year the Gas Company shall re-determine each customers eligibility based on their annual normalized usage.

This is a Continuous service with the following monthly charges: Service Charge, Distribution Charge and Commodity Charge as determined by Rider "A", and Monthly Service Charge .

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.

From review of the information provided, it appears that Lopatcong can improve its natural gas costs by about 20% as per current market rates.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the Township. CEG's primary observation is seen in the electric costs. The average price per kWh (kilowatt hour) for all buildings based on 1-year historical average price is $.145/kWh (kWh is the common unit of electric measure). The average price per decatherm for natural gas is $ 10.5 / 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 (January through December 2008) and current electric rates, the Township could see an improvement in its electric costs of up to 25% annually. (Note: Savings were calculated using Lopatcong's 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 Lopatcong's natural gas costs. Based on the current market, Lopatcong could improve its natural gas costs up to 25% annually. CEG recommends further advisement on these prices. The Township should also consider procuring energy (natural gas) through alternative supply sources. CEG recommends energy advisory services.

CEG also recommends that the city schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This

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

Finally, if Lopatcong changes or plans on changing its supplier for energy (natural gas), it needs to 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 the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

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

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

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

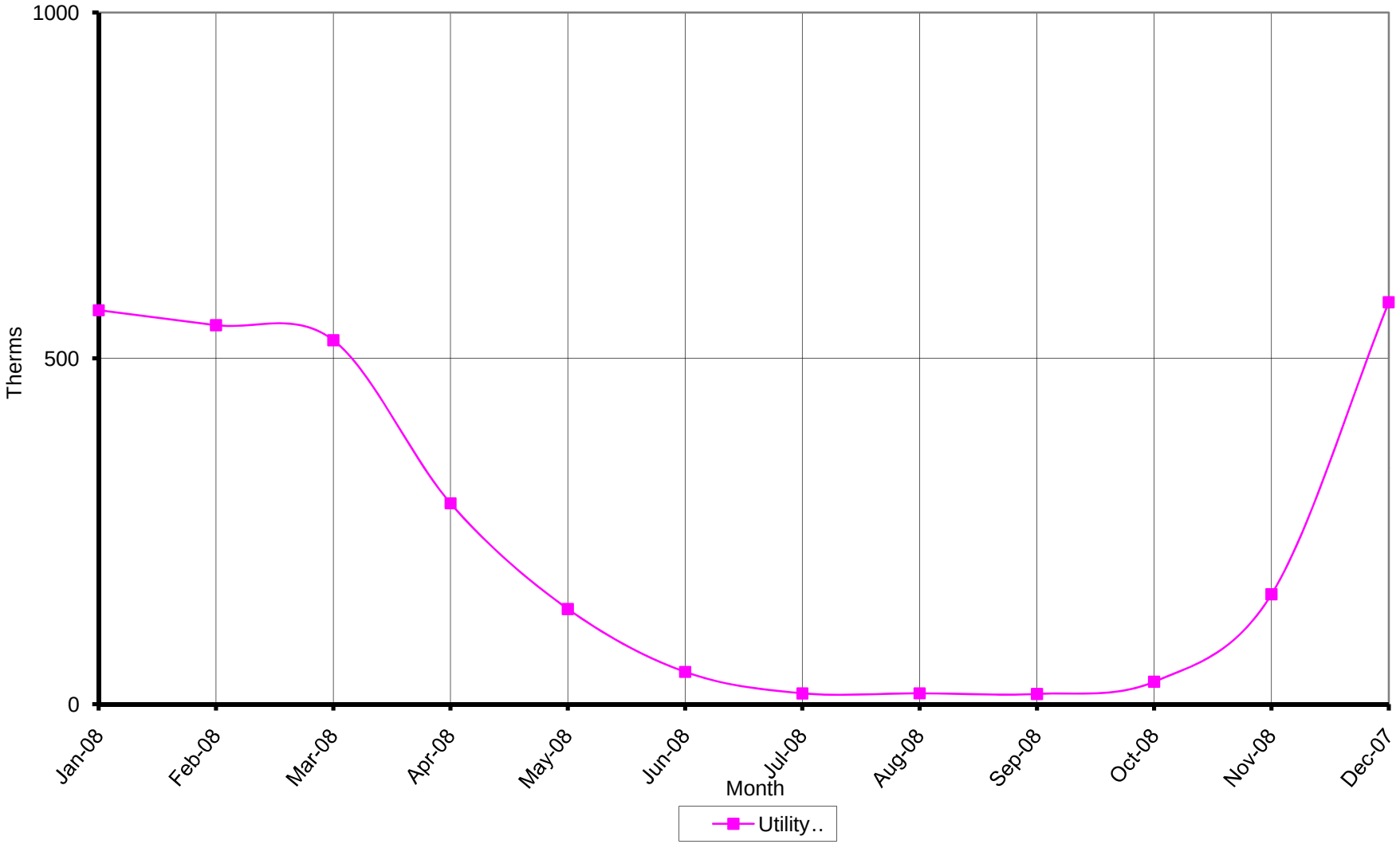
F. Recalibrate existing temperature sensors within the facility.

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

H. Clean all light fixtures to maximize light output.

I. Confirm that outside air economizers on the rooftop units that serve the Office Areas are functioning properly to take advantage of free cooling.

Lopatcong Fire Co. Engine #2
Gas Usage Profile
January through December of 2008



Summary of Natural Gas Cost

PSE&G

Project #9C08143

224 Strykers Rd, Phillipsburg NJ, 08865 **2007**

Project #9C08143

Fire Co. Engine #2

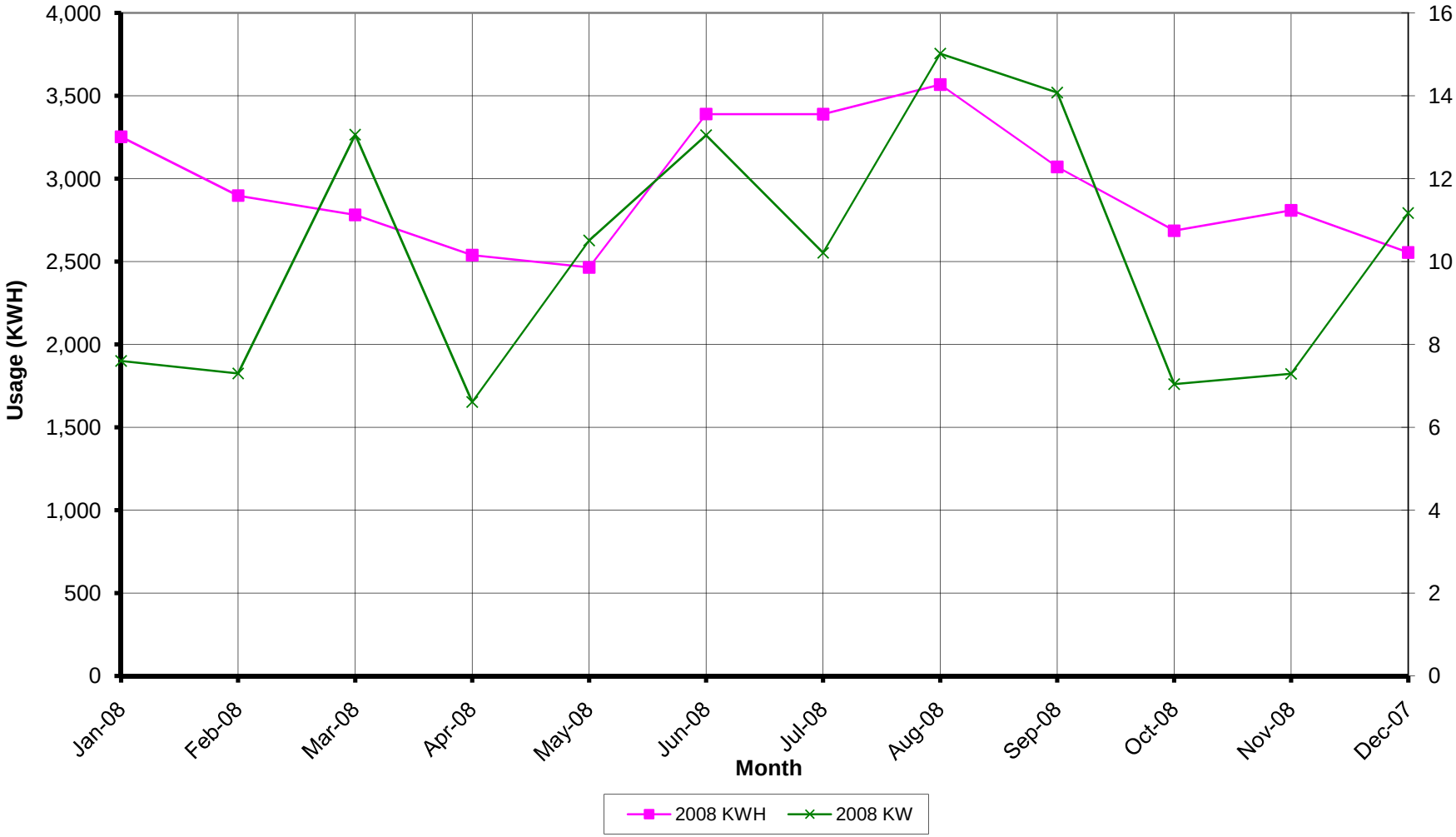
Account: 3652356541

Meter: 0P643655

Month	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31		
Therms (Burner Tip)	569.4	547.8	526.2	290.3	137.6	46.6	15.6	15.7	14.7	32.4	158.8	580.9	2936.0	
Total Distribution Cost	$140	134.76	$130	$79	$46	$26	$20	$22	$21	$27	$72	$222	939	Utility Charge
Cost per Therm	$0.245	$0.25	$0.247	$0.271	$0.333	$0.562	$1.251	$1.377	$1.441	$31.060	$0.454	$0.382	$0.320	
Total Commodity Cost	$588	$566.02	$544	$300	$142	$48	$16	$16	$15	$36	$203	$744	3,220	Current Charg
Cost per Therm	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03	$56.23	$1.28	$1.28	$1.10	
Total Cost	$728	$700.78	$674	$379	$188	$74	$36	$38	$36	$64	$275	$965	$4,158	
Cost per Therm	$1.278	$1.28	$1.280	$1.305	$1.367	$1.596	$2.285	$2.411	$2.476	$1.970	$1.734	$1.662	**$1.416**	

.=Utility information estimated. Utility bill not provided by owner.

Lopatcong Fire Co. Engine #2
Electric Usage Profile
January through December of 2008



Electric Cost Summary

JCP&L

224 Strykers Rd, Phillipsburg NJ, 08865

Project #9C08143

Fire Co. Engine #2 **2008**

Account # 100005540008

Meter # ----------

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-07	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	3,253	2,898	2,781	2,539	2,465	3,390	3,389	3,568	3,071	2,686	2,809	2,555	35,404	
KW	8	7	13	7	11	13.05	10	15	14	7	7	11	15	Max
Monthly Load Factor	58%	59%	29%	53%	32%	36%	45%	32%	30%	51%	54%	31%	42%	
Electric Cost, $	$ 506	$ 457	$ 438	$ 390	$ 379	$ 607	$ 615	$ 669	$ 572	$ 439	$ 458	$ 400	$5,931	
$/KWH	$0.156	$0.158	$0.157	$0.154	$0.154	$0.179	$0.182	$0.187	$0.186	$0.163	$0.163	$0.157	**$0.168**	

December of 2007 has been used as a substitute for December of 2008, for which there is no billing information

ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu	RATIO	kBtu
ELECTRIC	35,404			120,869	3.340	403,703
NATURAL GAS		2,936.00		293,600	1.047	307,399
FUEL OIL			0.00	0	1.010	0
PROPANE			0.00	0	1.010	0
TOTAL				414,469		711,103

*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.

BUILDING AREA	2,940	SQUARE FEET
BUILDING SITE EUI	140.98	kBtu/SF/YR
BUILDING SOURCE EUI	**241.87**	**kBtu/SF/YR**

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

LOPATCONG FIRE COMPANY ENGINE #2

ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$4,777	$0	$0	$4,777
Total Cost			$0	$0	$4,777
Utility Incentive - NJ Smart Start ($30 per 3-4 lamp fixture)					($871)
Total Cost Less Incentive					$3,906

ECM 1 Compact Flourescent Lighting

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$1,188	$0	$0	$1,188
Total Cost			$0	$0	$1,188

ECM 2 LIGHTING CONTROLS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	9	$75	$675	$0	$675
Total Cost			$675	$0	$675
Utility Incentive - NJ Smart Start					($180)
Total Cost Less Incentive ($20 per Sensor)					$495

ECM 3 HOT WATER HEATING BOILER REPLACEMENT

	Qty	Unit Cost $	Material $	Labor $	Total $
New High Efficiency Hot Water Heating Boiler	1	$3,075	$3,075	$9,000	$12,075
Total Cost			$3,075	$9,000	$12,075
Utility Incentive - $1.75/ MBH					$175
Total Cost Less Incentive					$11,900

*Demolition of Exist. Burner is included in total price.

ECM 4 PROGRAMMABLE THERMOSTATS

	Qty	Unit Cost $	Material $	Labor $	Total $
Programable T-stat	3	$120	$360	$180	$540
Total Cost			$360	$180	$540
Utility Incentive - N/A					$0
Total Cost Less Incentive					$540

ECM 5 EXIT SIGN REPLACEMENT - LED TYPE

	Qty	Unit Cost $	Material $	Labor $	Total $
Retrofit Exit Sign to LED	4	$80	$160	$160	$320
Total Cost			$160	$160	$320
Utility Incentive - NJ Smart Start					($154)
Total Cost Less Incentive					$166

ECM 6 12.88 KW PV Solar System

	Qty	Unit Cost $	Material $	Labor $	Total $
Conergy Photovoltaic Modules	56	$2,070	$0	$0	$115,920
Total Cost					$115,920

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
Fire Co. Engine #2

Building ID: 1793380
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 18, 2009

Facility
Fire Co. Engine #2
224 Strykers Road
Phillipsburg, NJ 08865

Facility Owner
Lopatcong Township
232 South Third Street
Phillipsburg, NJ 08865

Primary Contact for this Facility
Ray Johnson
520 South Burnt Mill Road
Voorhees, NJ 08043

Year Built: 1973
Gross Floor Area (ft²): 2,940

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

Site Energy Use Summary[3]

Electricity (kBtu)	120,798
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	120,798

Energy Intensity[5]

Site (kBtu/ft²/yr)	41
Source (kBtu/ft²/yr)	137

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	18

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-13%
Building Type	Fire Station/Police Station

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
Ray 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	Fire Co. Engine #2	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	224 Strykers Road, Phillipsburg, NJ 08865	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		☐

Fire Co. Engine #2 (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	2,940 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	N/A(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	6 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: Fire Co. Engine #2 (kWh (thousand Watt-hours)) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/01/2008	12/31/2008	2,555.00
11/01/2008	11/30/2008	2,809.00
10/01/2008	10/31/2008	2,686.00
09/01/2008	09/30/2008	3,071.00
08/01/2008	08/31/2008	3,568.00
07/01/2008	07/31/2008	3,389.00
06/01/2008	06/30/2008	3,390.00
05/01/2008	05/31/2008	2,465.00
04/01/2008	04/30/2008	2,539.00
03/01/2008	03/31/2008	2,781.00
02/01/2008	02/29/2008	2,898.00
01/01/2008	01/31/2008	3,253.00
Fire Co. Engine #2 Consumption (kWh (thousand Watt-hours))		**35,404.00**
Fire Co. Engine #2 Consumption (kBtu)		**120,798.45**
Total Electricity Consumption (kBtu)		**120,798.45**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Fire Co. Engine #2
224 Strykers Road
Phillipsburg, NJ 08865

Facility Owner
Lopatcong Township
232 South Third Street
Phillipsburg, NJ 08865

Primary Contact for this Facility
Ray Johnson
520 South Burnt Mill Road
Voorhees, NJ 08043

General Information

Fire Co. Engine #2	
Gross Floor Area Excluding Parking: (ft^2)	2,940
Year Built	1973
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Fire Co. Engine #2	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	2,940
Number of PCs[o]	2
Weekly operating hours[o]	N/A
Workers on Main Shift[o]	6

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2007)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	41	100	0	N/A	78
Source (kBtu/ft^2)	137	105	0	N/A	157
Energy Cost					
$/year	$ 5,930.00	$ 4,158.00	N/A	N/A	$ 11,256.75
$/$ft^2$/year	$ 2.02	$ 1.41	N/A	N/A	$ 3.83
Greenhouse Gas Emissions					
$MtCO_2e$/year	18	16	0	N/A	34
$kgCO_2e/ft^2$/year	6	5	0	N/A	11

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Lopatcong Fire Co. Engine #2"

Boiler

Location	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Boiler Room	Crown Aruba	1	DG75	68557	75	53	70.6	Nat. Gas	19	35	16	

Domestic Hot Water Heater

Location	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Boiler Room	State	1	PRV 50 N0RT6	K89590756	36	-	50	-	Nat. Gas	20	10	-10	

Unit Heaters and Cabinet Unit Heaters

Location	Manufacturer	Qty.	Model #	Serial #	Heating Type	Heating Capacity (MBH)	CFM	RPM / HP	GPM	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Old Garage	Robert Gordon	1	Vantage II CTH2-100	9201-013-100-0132	Infrared Gas Fired	100,000 Btu/h	-	-	-	17	13	-4	
New Garage	Robert Gordon	1	Vantage II CTH2-100	0607-030-100-0213	Infrared Gas Fired	100,000 Btu/h	-	-	-	3	13	10	

PTAC - Units

Location	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - HW	Fan HP	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Lounge	Whirlpool	1	-	-	-	-	-	-	-	-	20	10	-10	
Lounge	Whirlpool	1	-	-	-	-	-	-	-	-	20	10	-10	

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C09058
Project: Lopatcong Energy Audit
Address: 224 Strykers Road
City: Phillipsburg, NJ
Building SF: 2,940

"Lopatcong Fire Co. Engine #2"

DATE: 10/8/2009
KWH COST: $0.170

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		Garage 1 (New)	4	8' 2L T12 110W Magnetic Ballast/ No lens	2080	230	0.92	1913.6	$325.31	8	4' 2 Lamp T-8, no lens, Electronic Balast Cooper Metalux DIM248	44	0.35	732.16	$124.47	$160.00	$1,280.00	0.57	1181.44	$200.84	6.37
			2	2' x 4' 2L T12 34W Magnetic Ballast/ Prism Lens	2080	80	0.16	332.8	$56.58	2	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.12	253.76	$43.14	$120.00	$240.00	0.04	79.04	$13.44	17.86
			3	4' 2L T12 34W Magnetic Ballast/ No lens/ Industrial	2080	80	0.24	499.2	$84.86	3	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	73	0.22	455.52	$77.44	$160.00	$480.00	0.02	43.68	$7.43	64.64
2		Garage 2 (Old)	6	8" 2L T12 110W Magnetic Ballast/ No lens	2080	230	1.38	2870.4	$487.97	12	4' 2 Lamp T-8, no lens, Electronic Balast Cooper Metalux DIM248	44	0.53	1098.24	$186.70	$160.00	$1,920.00	0.85	1772.16	$301.27	6.37
			4	High Hat 13W CFL	2080	18	0.07	149.76	$25.46	4	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.07	149.76	$25.46	0.00
3		Refrigerator Room	1	13W CFL	2080	18	0.02	37.44	$6.36	1	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.02	37.44	$6.36	0.00
4		Vestibule	1	13W CFL	2080	18	0.02	37.44	$6.36	1	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.02	37.44	$6.36	0.00

5		Fire Alarm Closet	1	1' 1L T12 15W No lens/ Magnetic Ballast	2080	21	0.02	43.68	$7.43	1	1' 3.6W T5 LED Tube Light	3.6	0.00	7.488	$1.27	$16.50	$16.50	0.02	36.192	$6.15	2.68
6		Kitchen	2	4' 2L T12 34W Magnetic Ballast/ No lens/ Industrial	2080	80	0.16	332.8	$56.58	2	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	73	0.15	303.68	$51.63	$160.00	$320.00	0.01	29.12	$4.95	64.64
7		Furnace Room	1	60W Incandescent/ Porceline	2080	60	0.06	124.8	$21.22	1	Eiko-15w mini sprial	15	0.02	31.2	$5.30	$4.92	$4.92	0.05	93.6	$15.91	0.31
8		Stairs	1	60W Incandescent High Hat	2080	60	0.06	124.8	$21.22	1	18 W CFL Lamp	18	0.02	37.44	$6.36	$5.75	$5.75	0.04	87.36	$14.85	0.39
			1	13W CFL High Hat	2080	18	0.02	37.44	$6.36	1	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.02	37.44	$6.36	0.00
9		2nd Floor Office	2	T-12 Fluorescent Ring 8" Diameter 22W	2080	36	0.07	149.76	$25.46	2	Pegasus Circline T9 Fluorescent Light Bulbs 22W Electronic Ballast	22	0.04	91.52	$15.56	$3.90	$7.80	0.03	58.24	$9.90	0.79
10		Storage	2	65W Incandescent High Hat	2080	65	0.13	270.4	$45.97	2	18 W CFL Lamp	18	0.04	74.88	$12.73	$5.75	$11.50	0.09	195.52	$33.24	0.35
11		Ladies Room	1	2'x4' 4L T12 34W Prism Lens/ Magnetic Ballast	2080	160	0.16	332.8	$56.58	1	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	189.28	$32.18	$140.00	$140.00	0.07	143.52	$24.40	5.74
12		Mens Room	1	2'x4' 4L T12 34W Prism Lens/ Magnetic Ballast	2080	160	0.16	332.8	$56.58	1	2'x4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.09	189.28	$32.18	$140.00	$140.00	0.07	143.52	$24.40	5.74
13		Lounge	4	2x2 2L U-tube T8 Prism Lens/ Electronic Ballast	2080	73	0.29	607.36	$103.25	4	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.29	607.36	$103.25	0.00
			9	Halogen Wall Washer Fixture	2080	72	0.65	1347.84	$229.13	9	Iris P532ICAT E5TWW IC Compact Fluorescent Wall Wash Energy Star	32	0.29	599.04	$101.84	$120.00	$1,080.00	0.36	748.8	$127.30	8.48
			7	Bar High Hat 60W Candle-abra/ Standard Base	2080	60	0.42	873.6	$148.51	7	18 W CFL Lamp	18	0.13	262.08	$44.55	$5.75	$40.25	0.29	611.52	$103.96	0.39
			3	Ceiling Fan 60W colored Lamps	2080	60	0.18	374.4	$63.65	3	18 W CFL Lamp	18	0.05	112.32	$19.09	$5.75	$17.25	0.13	262.08	$44.55	0.39
			3	Metal Halide on photo cell	2080	72	0.22	449.28	$76.38	3	28 W CFL Lamp	28	0.08	174.72	$29.70	$6.88	$20.64	0.13	274.56	$46.68	0.44
14		Front Entrance (outside)	2	Flood Light (Halogen)	3640	125	0.25	910	$154.70	2	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.25	910	$154.70	0.00
			4	Metal Halide Outside Lamp	3640	180	0.72	2620.8	$445.54	4	No Change Required (N.C.R.)	0	0.00	0	$0.00	$0.00	$0.00	0.72	2620.8	$445.54	0.00
15		Small Shed	2	2' x 4' 2L T12 34W Magnetic Ballast/ Prism Lens	2080	80	0.16	332.8	$56.58	2	2'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	61	0.12	253.76	$43.14	$120.00	$240.00	0.04	79.04	$13.44	17.86
		Totals	67				6.54	15106	$2,568.02	77			2.34	4866.368	$827.28		$5,964.61	4.20	10239.63	$1,740.74	3.43

Project Name: LGEA Solar PV Project - Lopatcong Fire Co. Engine #2
Location: Phillipsburg, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$115,920
Annual kWh Production	20,100
Annual Energy Cost Reduction	$3,377
Annual SREC Revenue	$7,035
First Cost Premium	**$115,920**
Simple Payback:	**11.13** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.168**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$5,796	0	0	0	$0	0	0	(5,796)	0
1	$0	20,100	$3,377	$0	$7,035	$7,626	$2,620	$166	($5,630)
2	$0	19,999	$3,478	$0	$7,000	$7,436	$2,809	$232	($5,397)
3	$0	19,899	$3,582	$0	$6,965	$7,233	$3,012	$302	($5,096)
4	$0	19,800	$3,690	$0	$6,930	$7,015	$3,230	$374	($4,721)
5	$0	19,701	$3,801	$203	$6,895	$6,782	$3,464	$247	($4,474)
6	$0	19,602	$3,915	$202	$6,861	$6,532	$3,714	$328	($4,146)
7	$0	19,504	$4,032	$201	$6,827	$6,263	$3,982	$412	($3,734)
8	$0	19,407	$4,153	$200	$6,792	$5,975	$4,270	$500	($3,234)
9	$0	19,310	$4,278	$199	$6,758	$5,667	$4,579	$592	($2,642)
10	$0	19,213	$4,406	$198	$6,725	$5,336	$4,910	$687	($1,955)
11	$0	19,117	$4,538	$197	$6,691	$4,981	$5,265	$787	($1,168)
12	$0	19,022	$4,674	$196	$6,658	$4,600	$5,646	$890	($278)
13	$0	18,926	$4,814	$195	$6,624	$4,192	$6,054	$998	$721
14	$0	18,832	$4,959	$194	$6,591	$3,754	$6,491	$1,111	$1,831
15	$0	18,738	$5,108	$193	$6,558	$3,285	$6,960	$1,227	$3,059
16	$0	18,644	$5,261	$192	$6,525	$2,782	$7,464	$1,349	$4,407
17	$0	18,551	$5,419	$191	$6,493	$2,242	$8,003	$1,475	$5,882
18	$0	18,458	$5,581	$190	$6,460	$1,664	$8,582	$1,606	$7,488
19	$0	18,366	$5,749	$189	$6,428	$1,043	$9,202	$1,742	$9,230
20	$0	18,274	$5,921	$188	$6,396	$378	$9,867	$1,883	$11,114
21	$0	18,183	$6,099	$187	$6,364	$321	$9,071	$2,884	$13,997
22	$0	18,092	$6,282	$186	$6,332	$219	$7,465	$4,743	$18,741
23	$0	18,001	$6,470	$185	$6,300	$0	$0	$12,585	$31,326
24	$0	17,911	$6,664	$184	$6,269	$0	$0	$12,749	$44,075
25	$0	17,822	$6,864	$184	$6,238	$0	$0	$12,918	$56,993
	Totals:	383,463	$90,735	$3,128	$134,212	$94,786	$110,124	$126,660	$166,390
				Net Present Value (NPV)				**$9,151**	
				Internal Rate of Return (IRR)				**13.6%**	

Project Name: LGEA Solar PV Project - Lopatcong Fire Co. Engine #2
Location: Phillipsburg, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$115,920
Annual kWh Production	20,100
Annual Energy Cost Reduction	$3,377
Annual SREC Revenue	$7,035
First Cost Premium	**$115,920**
Simple Payback:	**11.13** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.168**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$115,920	0	0	0	$0	(115,920)	0
1	$0	20,100	$3,377	$0	$7,035	$10,412	($105,508)
2	$0	19,999	$3,478	$0	$7,000	$10,478	($95,030)
3	$0	19,899	$3,582	$0	$6,965	$10,547	($84,483)
4	$0	19,800	$3,690	$0	$6,930	$10,620	($73,863)
5	$0	19,701	$3,801	$203	$6,895	$10,493	($63,370)
6	$0	19,602	$3,915	$202	$6,861	$10,574	($52,797)
7	$0	19,504	$4,032	$201	$6,827	$10,658	($42,139)
8	$0	19,407	$4,153	$200	$6,792	$10,745	($31,394)
9	$0	19,310	$4,278	$199	$6,758	$10,837	($20,557)
10	$0	19,213	$4,406	$198	$6,725	$10,933	($9,624)
11	$0	19,117	$4,538	$197	$6,691	$11,032	$1,408
12	$0	19,022	$4,674	$196	$6,658	$11,136	$12,544
13	$0	18,926	$4,814	$195	$6,624	$11,244	$23,788
14	$0	18,832	$4,959	$194	$6,591	$11,356	$35,144
15	$0	18,738	$5,108	$193	$6,558	$11,473	$46,617
16	$0	18,644	$5,261	$192	$6,525	$11,594	$58,211
17	$0	18,551	$5,419	$191	$6,493	$11,720	$69,931
18	$0	18,458	$5,581	$190	$6,460	$11,851	$81,783
19	$0	18,366	$5,749	$189	$6,428	$11,988	$93,770
20	$0	18,274	$5,921	$188	$6,396	$12,129	$105,899
21	$1	18,183	$6,099	$187	$6,364	$12,275	$118,175
22	$2	18,092	$6,282	$186	$6,332	$12,428	$130,602
23	$3	18,001	$6,470	$185	$6,300	$12,585	$143,187
24	$4	17,911	$6,664	$184	$6,269	$12,749	$155,936
25	$5	17,822	$6,864	$184	$6,238	$12,918	$168,855
Totals:		383,463	$90,735	$3,128	$134,212	$284,775	$221,819
				Net Present Value (NPV)		**$168,880**	
				Internal Rate of Return (IRR)		**8.2%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Fire Co. Engine #2	820	Sunpower SPR230	56	14.7	823	12.88	20,100	1,848	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.

Products that earn the ENERGY STAR prevent greenhouse gas emissions by meeting strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy.
www.energystar.gov

CHANGE FOR THE BETTER WITH ENERGY STAR

Life Cycle Cost Estimate for 3 ENERGY STAR Qualified Programmable Thermostat(s)

This energy savings calculator was developed by the U.S. EPA and U.S. DOE and is provided for estimating purposes only. Actual energy savings may vary based on use and other factors.

Enter your own values in the gray boxes or use our default values.

Number of Units	3
Initial Cost per ENERGY STAR Unit (retail price)	$180
Initial Cost per Conventional Unit (retail price)	$73
Unit Fuel Cost (Cooling) ($/kWh)	$0.170
Unit Fuel Cost (Heating) ($/Therm)	$1.42

24 Hour Typical Usage Patterns*

	Weekday	Weekend
Nighttime Set-Back/Set-Up Hours	16	16
Daytime Set-Back/Set-Up Hours	0	0
Hours without Set-Back/Set-Up	8	8

Choose your city from the drop-down menu: **City** NJ-Newark

Heating Season*

Typical Indoor Temperature w/o Set-Back	60
Nighttime Set-Back Temperature (Average)	55
Daytime Set-Back Temperature (Average)	60
Heating System Type	Gas Boiler

Cooling Season*

Typical Indoor Temperature w/o Set-Up	78
Nighttime Set-Up Temperature (Average)	82
Daytime Set-Up Temperature (Average)	85
Cooling System Type	None

**All temperatures are in degrees Fahrenheit. Setpoint is defined as the temperature setting for any given time period. Set-back temperature is defined as the lower setpoint temperature for the energy-savings periods during the heating season, generally nighttime and daytime. Set-up temperature is defined as the higher setpoint temperature for the energy-savings periods during the cooling season, generally nighttime and daytime.*

Annual and Life Cycle Costs and Savings for 3 Programmable Thermostat(s)

	3 ENERGY STAR Unit(s)	3 Conventional Unit(s)	Savings with ENERGY STAR
Annual Energy Costs			
Heating Energy Cost	$558	$651	$93
Heating Energy Consumption (MBTU)	*39*	*46*	*7*
Cooling Energy Cost	$0	$0	$0
Cooling Energy Consumption (MBTU)	*0.0*	*0.0*	*0*
Total	**$558**	**$651**	**$93**
Life Cycle Costs			
Energy Costs	$6,208	$7,242	$1,035
Heating Energy Costs	*$6,208*	*$7,242*	*$1,035*
Heating Energy Consumption (MBTU)	590	688	98
Cooling Energy Costs	$0	$0	$0
Cooling Energy Consumption (MBTU)	0	0	0
Purchase Price for 3 Unit(s)	*$540*	*$219*	*-$321*
Total	**$6,748**	**$7,461**	**$714**
		Simple payback of initial cost (years)	**3.4**

Summary of Benefits for 3 Programmable Thermostat(s)

Initial cost difference	**$321**
Life cycle savings	**$1,035**
Net life cycle savings (life cycle savings - additional cost)	**$714**
Life cycle energy saved (MBTU)-includes both Heating and Cooling	**98**
Simple payback of additional cost (years)	**3.4**
Life cycle air pollution reduction (lbs of CO_2)	**11,501**
Air pollution reduction equivalence (number of cars removed from the road for a year)	**1**
Air pollution reduction equivalence (acres of forest)	**1**
Savings as a percent of retail price	**132%**