ENERGY AUDIT – FINAL REPORT

GLOUCESTER CITY
POLICE ATHLETIC LEAGUE - PAL

51 SOUTH BROWN STREET
GLOUCESTER CITY, NJ 08030
ATTN: MR. JACK LIPSETT

CEG PROPOSAL NO. 9C08131

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

Table of Contents

REPORT DISCLAIMER

The information contained within this report, including any attachment(s), is intended solely for use by the named addressee(s). If you are not the intended recipient, or a person designated as responsible for delivering such messages to the intended recipient, you are not authorized to disclose, copy, distribute or retain this report, in whole or in part, without written authorization from Concord Engineering Group, Inc., 520 S. Burnt Mill Road, Voorhees, NJ 08043.

This report may contain proprietary, confidential or privileged information. If you have received this report in error, please notify the sender immediately. Thank you for your anticipated cooperation.

I. EXECUTIVE SUMMARY

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

Gloucester City PAL Building
51 South Brown Street
Gloucester City, NJ 08030

Facility Contact Person: Paul J. Kain
Municipal Contact Person: Jack Lipsett

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	$ 757
#2 Fuel Oil	$ 3,310
Total	$ 4,067

The potential annual energy cost savings are shown below in Table 1. 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	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Install T-8 Lighting System	$8,143	$783	10.3	9.2%
2	Install LED Exit Signs	$249	$275	0.9	109.1%
3	Install Compact Fluorescent Lamps	$200	$321	0.6	162.7%
4	Heat Pump Replacement	$17,448	$1,701	10.3	7.2%
5	Install High-Efficiency Oil-Fired HW Heating Boiler	$8,000	$960	8.3	10.6%
6	High-Efficiency Window Replacement	$12,900	$469	27.5	(4.8%)

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	TOTAL KW REDUCTION	TOTAL ANNUAL KWH REDUCTION	TOTAL GALLONS FUEL OIL REDUCED
1	Install T-8 Lighting System	3.9	3,760	-
2	Install LED Exit Signs	0.15	1,314	-
3	Install Compact Fluorescent Lamps	1.74	1,538	-
4	Heat Pump Replacement	-	8,140	-
5	Install High-Efficiency Oil-Fired HW Heating Boiler	-	-	279
6	High-Efficiency Window Replacement	-	253	121

Recommendation:

Concord Engineering Group (CEG) 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 Gloucester City's PAL building:

- **ECM #2:** Install LED Exit Signs
- **ECM #3:** Install Compact Fluorescent Lamps

CEG also recommends the owner review the implementation of ECM # 1: Install T8 Lighting System and ECM #5: Install High-Efficiency Oil-Fired HW Heating Boiler. Although the simple payback is above the standard seven (7) year payback threshold the systems in question are antiquated and are in need of replacement. Due to facility usage/operating hours (1040 hours) being low the resultant energy calculations do not provide a speedy return on investment. However, if the owner wishes to inhabit the facility for more hours per year, these ECM's would be of value to the owner to move forward with.

II. INTRODUCTION

The PAL Building is a 5,584 square feet facility that includes exercise & weight rooms, meeting room, game room, Gloucester Community TV rooms, Radio Club rooms, foyer, mechanical & electrical rooms, restrooms, etc. The facility was constructed in 1915 of concrete block and brick construction. The exterior windows are single pane aluminum units.

The first energy auditing task was to collect and review 2008 utility energy data for electricity and #2 burner fuel oil. This information was used to analyze operational characteristics, calculate energy benchmarks for comparison to industry averages, estimate savings potential, and establish a baseline to monitor the effectiveness of implemented measures. A computer spreadsheet was used to enter, sum, and calculate benchmarks and to graph utility information (see Appendix A).

The Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr) and can be 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 annual consumption of all fuels to BTU's then dividing by the area (gross square footage) of the building. EUI is a good indicator of the relative potential for energy savings. A comparatively low EUI indicates less potential for large energy savings. Blueprints (where available) were obtained from the municipal and were utilized to calculate/verify the gross area of the facility.

After gathering the utility data and calculating the EUI, the next step in the audit process is obtaining Architectural and Engineering drawings (where available). By reviewing the Architectural and Engineering drawings, questions regarding the building envelope, lighting systems/controls, HVAC equipment and controls are noted. These questions are then compared to the energy usage profiles developed during the utility data gathering step. Furthermore, 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. After this information is gathered the next step in the process is the site visit.

The site visit was spent inspecting the actual systems and answering specific questions from the preliminary review. The building manager provided occupancy schedules, O & M practices, the building energy management program, and other information that has an impact on energy consumption.

The post-site work includes evaluation of the information gathered during the site visit, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on mechanical, lighting and building envelope improvements.

III. METHOD OF ANALYSIS

CEG completed the preliminary audit tasks noted in Section II preparing for the site survey. The site survey is a critical input in deciphering where energy opportunities exist within a facility. The auditor walks the entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed using energy engineering calculations to calculate the anticipated energy usage for the proposed energy conservation measures (ECMs). The actual energy usage is entered directly from the utility bills provided by the Owner. The anticipated energy usage is compared to the actual usage to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not duplicative. The savings for each recommendation may actually be higher if the individual recommendations were installed instead of the entire project. For example, the lighting module calculates the change in wattage and multiplies it by the new operating hours instead of the existing operating hours (if there was a change in the hours at all). The lighting controls module calculates the change in hours and multiplies it by the new system wattage instead of the existing wattage. Therefore, if you chose to install the recommended lighting system but not the lighting controls, the savings achieved with the new lighting system would actually be less because there would have been no reduction in the hours of use.

The same principal follows for heating, cooling, and temperature recommendations – even with fuel switching. If there are recommendations to change the temperature settings to reduce fuel use, then the savings for the heating/cooling equipment recommendations are reduced, as well.

Our thermal module calculates the savings for temperature reductions utilizing automated engineering calculations within Microsoft Excel™ spreadsheets. The savings are calculated in "output" values – meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel.

Thermal recommendations (insulation, windows, etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the "thermal load" is the thermal load after the other recommendations have been accounted for.

Lastly, installation costs, refer to Appendix B, are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers. The NJ SmartStart Building® program incentives (refer to Appendix C) are calculated for the appropriate ECM's and subtracted from the installed cost prior to calculation of the simple payback. In addition, where applicable, maintenance cost savings are estimated and applied to the net savings. Simple return on investment is calculated using the standard formula of the difference of gains minus investments, divided by the investments.

Included within the gains are the annual energy savings, utility incentives and maintenance savings as a total sum. The calculation is completed assuming the project is 100% direct purchased by the Owner with an energy cost escalation of 2.4% for natural gas and 2.2% for electricity.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Public Service Electric and Gas Company (PSE&G) provides electricity to the facility under the General Lighting and Power Service (GLP) 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.

Table 4 shows the fuel oil purchased for the surveyed facility from January-08 to December-08. A local fuel oil supply company supplies the burner fuel oil to the facility. Below is the average unit cost for the utilities at this facility. A natural gas account exists for the building although there is no natural gas usage in the building. An account service fee is charged to the account every month even in the absence of natural gas usage. It is recommended that this account is closed unless future gas usage is anticipated.

Description	Average
Electricity	20.9¢ / kWh
No. 2 Burner Fuel Oil	$3.44 / Gallon

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	300	10	$69
2/08	300	10	$62
3/08	300	10	$55
4/08	300	10	$54
5/08	300	10	$55
6/08	300	10	$55
7/08	300	2	$79
8/08	300	2	$80
9/08	24	2	$42
10/08	612	2	$94
11/08	300	2	$57
12/08	288	2	$55
Totals	**3,624**	**10 Max**	**$757.00**

Figure 1
Electricity Usage Profile

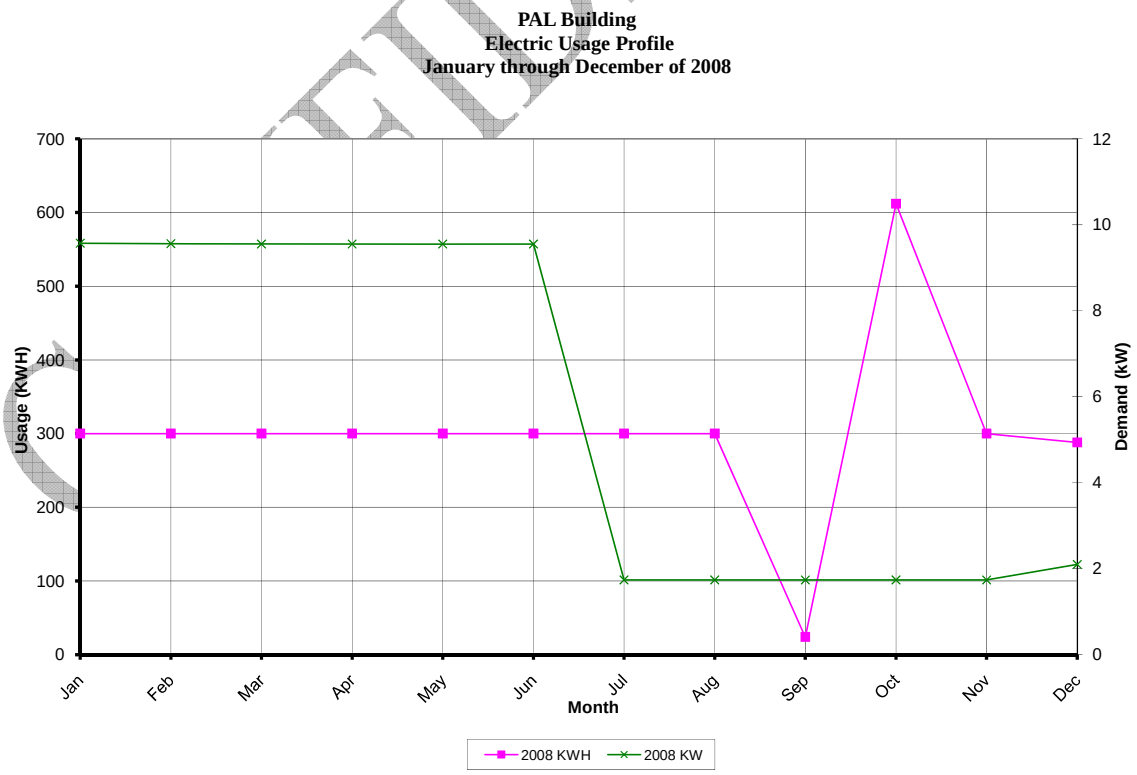

Table 4
No. 2 Heating Fuel Oil Billing Data

DATE OF PURCHASE	PURCHASED (GALLONS)	TOTAL BILL
4/9/08	953.6	$3,277.52
4/28/08	9.2	32.68
Totals	**962.8**	**$3,310.20**

B. Energy Use Index (EUI)

The Energy Use Index is a measure of the total energy consumed in cooling and heating a building or facility in a year, expressed in British thermal units (Btu) per conditioned gross square footage.

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

Electric = [(3,624 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W)]/ (1000 Btu/h / 1 kBtu/h)
= 12,372 kBtu

Fuel Oil = 962.8Gallons * 140,000 Btu/Gallon = 134,792 kBtu

EUI = (12,372 kBtu + 134,792 kBtu) / (5,584SF)

PAL Building EUI = 26.4 kBtu/SF

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 priorites and goals. Saving energy will in-turn save the environement.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star 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: Gloucestercity
Password: lgeaceg2009

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an “Other” category. The PAL Building falls under this “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.” The majority of the PAL Building would be classified as “Other” and therefore cannot be given an Energy Performance Rating.

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

V. FACILITY DESCRIPTION

The PAL Building is a 5,584 square feet facility that includes exercise & weight rooms, meeting room, game room, Gloucester Community TV rooms, Radio Club rooms, foyer mechanical/electrical rooms, restrooms, etc. The facility was constructed in 1915 of concrete block and brick construction. The exterior windows are single pane aluminum units.

Heating System

The PAL Building is heated by a H. B. Smith oil-fired, hot water boiler rated at 250,000 Btu/hr input and 150,000 Btu/hr (70% thermal efficiency at full load). This hot water boiler is approximately 28 years old. Due to age and radiation losses, the present thermal efficiency is estimated to be 60%. The boilers are approximately 30 years old.

Hot water is distributed to hot water coils in unit heaters and to fin-tube radiators via six circulating pumps. There are also several Nesbitt oil-fired unit heaters that appear to also be 28 years old.

Domestic Hot Water

Domestic hot water is provided by an electric, 30-gallon capacity hot water heater with a rating of 2,500 kW. This water heater is 2 years old.

Cooling System

Cooling is provided by window AC units of varying capacity.

Controls System

Local thermostats control the heating units. The window AC units are controlled via their integral controls.

Lighting

The majority of the facility lighting is provided by 2-foot by 4-foot lay-in fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

VI. EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial energy savings. In addition, the list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to Appendix E for the Major Equipment List for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Upgrade Fluorescent Lighting System

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (34 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 about 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 1460 hours per year, the Owner will be changing approximately 33% less lamps 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.

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

$$\text{Smart Start®}\ Incentive = (16 \times \$25) + (63 \times\ \$\ 30) = \$2{,}290$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (221 \times 33\%\ reduction \times \$\ 2.00) = \$147$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$10,580**
NJ Smart Start Equipment Incentive ($):	**($2,290)**
Maintenance Savings ($):	**($147)**
Net Installation Cost ($):	***$8,143***
Total Energy Savings ($ / yr):	***$785***
Simple Payback (yrs):	***10.3***
Simple Return on Investment:	***9.2%***

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 2 Watts. In comparison, conventional exit signs use 10-40 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 all of the existing exit signs, twelve (12) in total, throughout the building with highly energy efficient LED exit signs. A Pegasus Associates Lighting LED exit sign or equivalent was used for the bases of design.

Energy Savings Calculations:

Existing exit sign energy costs: 6 units x 30 watts/unit x 8,760 hrs/yr x $0.209/kWh = $329

New LED exit sign energy costs: 6 units x 5 watts/unit x 8,760 hrs x $0.209/kWh = $54

Net energy savings = $329 - $54 = $275

Installed cost of new LED exit signs = $80 x 6 = $480

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.

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ exit\ signs \times\ \$\ 20) = (6 \times \$20) = \$120$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (6 \times \$4.50) + (6 \times \$14) = \$111$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$480**
NJ Smart Start Equipment Incentive ($):	**($120)**
Maintenance Savings ($):	**($111)**
Net Installation Cost ($):	***$249***
Total Energy Savings ($ / yr):	***$275***
Simple Payback (yrs):	***0.9***
Simple Return on Investment:	***109.1%***

ECM #3: Install Compact Fluorescent Lamp (CFL)

Description:

The weight room, stairways, boiler room and Gloucester Community TV spaces are lit by incandescent lamps. An ENERGY STAR qualified compact fluorescent light bulb (CFL) will save about $30 over its lifetime and pay for itself in about 6 months. It uses 75 percent less energy and lasts about 10 times longer than an incandescent bulb.

This ECM replaces all incandescent lamps in the facility with energy efficient compact fluorescent lamps. Lamp wattage were chosen to match existing lighting output.

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.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$200**
NJ Smart Start Equipment Incentive ($):	**($0)**
Maintenance Savings ($):	**-**
Net Installation Cost ($):	***$200***
Total Energy Savings ($ / yr):	***$321***
Simple Payback (yrs):	***0.6***
Simple Return on Investment:	***162.7%***

ECM #4: Replace Window AC Units with Split Heat Pumps

Description:

There are six (6) window air conditioning units that are very inefficient. This measure would replace all window AC units with high-efficiency split heat pump units.

The following assumptions are used in the savings analysis below:

- The existing energy rating of the window AC units is an average of 6 EER.
- The energy efficiency rating of the new heat pump units is 14 EER
- The various rooms need cooling approximately 1,800 hours per cooling season.

Energy Savings Calculations:

Gross annual energy savings = Units x Tons/Unit x RLF x $[12/EER_{exist} - 12/EER_{new}]$ x CLH

Where:

RLF = the ***rated load factor*** which is the ratio of the peak cooling load imposed on the cooling equipment to the total rated cooling capacity. This factor compensates for oversizing of the air conditioning unit. Recommended value is 0.8.

CLH = ***Cooling load hours*** are defined as the ratio of the annual cooling load to the peak cooling load. The cooling load hours for Gloucester, NJ area is 1,484 as obtained from the Philadelphia Airport weather data.

Energy Savings = 6 units x 1 ton/unit x 0.8 x [12/6 – 12/14] x 1,484 = 8,140 kWh

Energy cost savings = 8,140 kWh x $0.209/kWh = $1,701

Cost of six (6) high-efficiency split heat pumps with a SEER = 14 is $18,000. The SmartStart Buildings® incentive is $92/Ton x 6 Tons = $552 which equates to a net installed cost of $17,448

Simple Payback = 10.3 years

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$18,000**
NJ Smart Start Equipment Incentive ($):	**($552)**
Maintenance Savings ($):	**-**
Net Installation Cost ($):	***$17,448***
Total Energy Savings ($ / yr):	***$1,701***
Simple Payback (yrs):	***10.3***
Simple Return on Investment:	***7.2%***

ECM #5: Install High-Efficiency Oil-Fired Boiler

Description:

The PAL Building is heated by a H. B. Smith oil-fired, tubular, 250 MBH hot water boiler which presently is about 60% efficient. As an alternative energy conservation measure, the Concord team recommends that this boiler be replaced by a H. B. Smith High-Efficiency Oil-Fired Boiler that is 85% efficient.

Existing Heating Hot Water Boiler:

Rated Capacity = 250 MBH (No. 2 Burner Fuel Oil)

Combustion Efficiency = 70%
Age & Radiation Losses = 10%
Thermal Efficiency = 60%

Replacement Boiler:

High-Efficiency Oil-Fired Boiler (with O/A HW Reset)

Rated Capacity = 249 MBH (No. 2 Burner Fuel Oil)

Combustion Efficiency = 85%
Radiation Losses = 0.5%
Thermal Efficiency = 84.5%

Operating Data:

Heating Season Fuel Consumption = 962.8 gallons (based on fuel oil billing data)
Average Cost of Fuel Oil = $3.44/Gallon

Energy Savings Calculations:

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

$$\text{Energy Savings} = 962.8 \text{ Gallons} \times \frac{0.845-0.60}{0.845} = 279 \text{ Gallons}$$

Cost Savings = Annual Energy Savings x $/Gallon

= 279 gallons x $3.44/gallon = $960/ yr.

Installed cost of a H. B. Smith high-efficiency, oil-fired hot water boiler including removal of existing unit, all piping changes and controls = $8,000.

Simple Payback = $8,000 / $960 = 8.3 Years

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$8,000**
NJ Smart Start Equipment Incentive ($):	**-**
Maintenance Savings ($):	**-**
Net Installation Cost ($):	***$8,000***
Total Energy Savings ($ / yr):	***$960***
Simple Payback (yrs):	***8.3***
Simple Return on Investment:	***10.6%***

ECM #6: High Efficiency Window Replacements

Description:

The PAL Building window system consists of single pane, old-style, wooden frames with a very poor insulation value (estimated at U_{exist} = 0.85 Btu/hr – ft^2 - °F). This ECM would replace all the existing single pane windows with energy-efficient double pane, low-E units. Upgrading the windows would save heating/cooling energy as well as improve comfort for the occupants.

Energy Savings Calculations:

For the following energy savings calculations, we obtained heating and cooling degree days from the Philadelphia Airport weather data and the window areas from the site inspection for this facility.

Heating Degree Days = 4,866°F – day/yr.

Cooling Degree Days = 1,484 – day/yr.

Total window area to be retrofitted = 510 SF

Existing air conditioning window unit SEER = 6.0

U_{exist} = 0.85 Btu/hr – ft^2 - °F

CEG would recommend replacement of the existing single pane windows with Andersen Vinyl-Clad Wood Frame, Dual-Pane, Low-E, SmartSun® Glazing with Argon Gas Blend Window System or equal with U-Factor = 0.28, Solar Heat Gain Coefficient = 0.21 and Visible Transmittance = 0.49.

U_{new} = 0.28 Btu/hr – ft^2 - °F

Annual Energy Savings (Heating) =

$$\frac{12 \text{ hrs}}{\text{Day}} * \text{Window Areas} * (U_{exist}-U_{new}) * \text{HDD}$$

= 12 * 510 * (0.85-0.28) * 4,866 = 16,974,554 Btu ÷ 140,000 Btu/Gallon #2 Oil = 121 gallons

Annual Energy Savings (Cooling) =

$$\frac{12 \text{ hrs/day} * \text{Window Areas} * (U_{EXIST} - U_{NEW}) * CDD}{\text{Existing AC EER}} =$$

$$\frac{12 * 510 * (0.85-0.28) * 1,484}{6.0} = 862,798 \text{ BTU} \div 3,412 \text{ BTU/kWh} = 253 \text{ kWh}$$

Total Energy Savings = 121 gallons x $3.44 + 253 kWh x $0.209 = $469

Upgraded Window Cost = $12,900

Simple Payback for Upgraded Windows = 27.5 Years

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	**$12,900**
NJ Smart Start Equipment Incentive ($):	**-**
Maintenance Savings ($):	**-**
Net Installation Cost ($):	***$12,900***
Total Energy Savings ($ / yr):	***$469***
Simple Payback (yrs):	***27.5***
Simple Return on Investment:	***(4.8%)***

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 Gloucester City, 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 330 S.F. can be utilized for a PV system on the PAL building. A depiction of the area utilized is shown in Appendix G. Using this square footage it was determined that a system size of 5.29 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 8,255 KWh annually, reducing the overall utility bill by 100% percent. A detailed financial analysis can be found in Appendix G. 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.

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	10.3 Years	22.8%
Direct Purchase	10.3 Years	7.9%

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 PAL building and has determined it is not a viable option. There is not enough free land available on the site to accommodate the installation of a wind turbine.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to Section IV, Figure 1 included within this report to reference the electricity usage load profile for January 2008 through December 2008.

Electricity:

Section IV, Figure 1 demonstrates a typical cooling profile, (April –October), complimenting the heating load. It is evident that there is a significant reduction in the On Peak Load from October 2008 to November 2008 and a substantial increase from June 2008 to July 2008. The Off Peak load is typical, with some expected increase in consumption during the June-September period. The base-load shaping is important because a flat consumption profile will yield more competitive pricing when trying to procure third party supply.

Fuel Oil:

Fuel oil is utilized as the heating fuel source for the facility. There was no fluctuation in oil use during the study period.

Tariff Analysis:

Electricity:

Gloucester City receives electrical service through Public Service Electric and Gas Company (PSE&G) on a GLP (General Lighting and Power) rate. This utility tariff is for delivery service for general purposes at secondary distribution voltages. The rate schedule has a Delivery Charge, Societal Benefits Charge, Non-utility Generation Charge, Securitization Charge, System Control Charge, Customer Account Services Charge, Standby Fee, Base Rate Distribution Adjustment Charge, Solar Pilot Recovery Charge and RGGI Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS).

Recommendations:

CEG's recommendation pertains to Gloucester City's electric costs (mainly because Gloucester City does not have a large Natural Gas Critical Mass). CEG recognized the electric cost is competitive with current market prices for a single facility. However, there are opportunities available by aggregation of all facilities and procuring energy from third party suppliers.

CEG advises Gloucester City take a global approach that will be consistent for all facilities within the municipality. Gloucester City's "weighted average price" per kWh (kilowatt hour) for all

buildings is approximately $0.1225 per kWh (kWh is the common unit of electric measure). The weighted average price per dekatherm for natural gas is $11.37/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. Gloucester City could realize savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (January through December 2008) and current electric rates, Gloucester City would see savings of over $10,000 per year (Note: Savings were calculated using Gloucester City's Average Annual Consumption of 490,135 kWh and a variance of $.02258 /kWh utilizing a fixed one-year commodity contract). Gloucester City should aggregate its entire electric load to gain the most optimal energy costs. CEG recommends advisory services for alternative sourcing and supply of energy on a "managed approach."

Lastly, CEG recommends that Gloucester City schedule a meeting with their current utility provider to review their utility charges and current tariff structure for electricity. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), Gloucester City will learn more about the competitive supply process. Gloucester City 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, Gloucester City 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.

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 in the window AC units periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%. The 3-step process includes cleaning of the coils, rinsing and a microbicide treatment. Thoroughly cleaned coils are not as susceptible to re-fouling so they stay clean longer, reducing the cleaning cycle frequency

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. Repair/replace damaged or missing piping and ductwork insulation in the ceiling spaces.

E. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc. During the site survey, some areas were measured at over 100 foot candles.

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

G. Recalibrate existing sensors serving the hot water unit heaters and fin-tube radiators. Sensors are currently ~ 5°F off desired setpoint.

H. Clean all fixtures to maximize light output.

I. Feel for air drafts around electrical outlets. Inexpensive pads are available, as are plugs for unused sockets.

Electric Cost Summary

PSE&G - Electric (rate - GLP)

PAL Building **2008**

Account # 61 858 180 19

Meter # 626028609

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31		
KWH	300	300	300	300	300	300	300	300	24	612	300	288	3,624	
KW	10	10	10	10	10	10	2	2	2	2	2	2	10	Max
Monthly Load Factor	4%	5%	4%	4%	4%	4%	23%	23%	2%	47%	24%	18%	14%	
Electric Delivery, $	$ 19	19	$ 19	$ 19	19	$ 19	$ 35	$ 35	$ 28	$ 27	$ 20	$ 20	$279	
Delivery $/kwh	$0.064	$0.064	$0.063	$0.063	$0.063	$0.063	$0.117	$0.117	$1.179	$0.043	$0.065	$0.068	$0.077	
Electric Supply, $	$ 49	43	$ 36	$ 35	36	$ 36	$ 44	$ 45	$ 14	$ 67	$ 38	$ 36	$478	
Supply $/kwh	$0.164	$0.142	$0.120	$0.118	$0.119	$0.120	$0.147	$0.150	$0.563	$0.110	$0.125	$0.124	$0.132	
Total Cost, $	$69	$62	$55	$54	$55	$55	$79	$80	$42	$94	$57	$55	$757	
$/KWH	$0.229	$0.206	$0.183	$0.182	$0.182	$0.183	$0.264	$0.268	$1.741	$0.154	$0.190	$0.192	**$0.209**	

Yellow Area Indicates Estimated Value Due to Missing Information.

Summary of Natural Gas Cost

PSE&G - Natural Gas (Rate - GSG)

PAL Building **2008**

Account# 61 858 180 19

Meter# 2174609

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	**Total**
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	
Therms (Burner Tip)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Distribution Cost	$9.93	$0.00	$9.93	$9.93	$0.00	$9.93	$9.93	$9.93	$9.93	$9.93	$9.93	$9.93	$99.30
Cost per Therm	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Commodity Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0
Cost per Therm	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Cost	$9.93	$0.00	$9.93	$9.93	$0.00	$9.93	$9.93	$9.93	$9.93	$9.93	$9.93	$9.93	$99.30
Cost per Therm	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	**$0.000**

There is currently no equipment on site utilizing the natual gas service. It is advised that the account should be closed unless a high efficiency gas boiler is recommended.

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

PAL

ECM 1 Install T-8 Lighting System

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$10,580	$0	$0	$10,580
Total Cost			$0	$0	$10,580
Utility Incentive - NJ Smart Start ($30 per 3-4 lamp fixture)					($2,290)
Total Cost Less Incentive					$8,290

ECM 2 Install LED Exit Signs

	Qty	Unit Cost $	Material $	Labor $	Total $
New LED Exit Signs	6	$80	$50	$30	$480
Total Cost			$50	$30	$480
Utility Incentive - NJ Smart Start ($20 per Sign)					($120)
Total Cost Less Incentive					$360

ECM 3 Install Compact Fluorescent Lamps

	Qty	Unit Cost $	Material $	Labor $	Total $
CFL Lamps	LS	$200	$0	$0	$200
Total Cost			$0	$0	$200
Utility Incentive - N/A					$0
Total Cost Less Incentive ($20 per Sensor)					$200

ECM 4 Heat Pump Replacement

	Qty	Unit Cost $	Material $	Labor $	Total $
New Heat Pump	6	$3,000	$2,000	$1,000	$18,000
Total Cost			$2,000	$1,000	$18,000
Utility Incentive - NJ Smart Start ($92 per Ton)					($523)
Total Cost Less Incentive					$17,477

ECM 5 Install High-Efficiency Oil-Fired Boiler

	Qty	Unit Cost $	Material $	Labor $	Total $
New Oil-Fired Boiler	1	$8,000	$5,500	$2,500	$8,000
Total Cost			$5,500	$2,500	$8,000
Utility Incentive - N/A					$0
Total Cost Less Incentive					$8,000

ECM 6 High-Efficiency Window Replacement

	Qty	Unit Cost $	Material $	Labor $	Total $
New Windows	LS	$12,900	$0	$0	$12,900
Total Cost			$0	$0	$12,900
Utility Incentive - N/A					$0
Total Cost Less Incentive					$12,900

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

	$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters >50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 - $30 per fixture, (depending on quantity)
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive

STATEMENT OF ENERGY PERFORMANCE
PAL

Building ID: 1773123
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 08, 2009

Facility
PAL
51 South Brown St.
Gloucester City, NJ 08030

Facility Owner
Gloucester City
512 Monmouth St.
Gloucester City, NJ 08030

Primary Contact for this Facility
Jack Lipsett
512 Monmouth St.
Gloucester City, NJ 08030

Year Built: 1915
Gross Floor Area (ft²): 5,584

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

Site Energy Use Summary[3]

Electricity (kBtu)	12,365
Fuel Oil (No. 2) (kBtu)	315,294
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	327,659

Energy Intensity[5]

Site (kBtu/ft²/yr)	59
Source (kBtu/ft²/yr)	64

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	27

Electric Distribution Utility
PSE&G - Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	136
% Difference from National Average Source EUI	-53%
Building Type	Recreation

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 Rd.
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	PAL	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Recreation	Is this an accurate description of the space in question?		☐
Location	51 South Brown St., Gloucester City, NJ 08030	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		☐

PAL (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	5,584 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	9 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	20 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	N/A(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: PSE&G - Public Service Elec & Gas Co

Fuel Type: Electricity		
Meter: Electric - 626028609 (kWh) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	288.00
11/01/2008	11/30/2008	300.00
10/01/2008	10/31/2008	612.00
09/01/2008	09/30/2008	24.00
08/01/2008	08/31/2008	300.00
07/01/2008	07/31/2008	300.00
06/01/2008	06/30/2008	300.00
05/01/2008	05/31/2008	300.00
04/01/2008	04/30/2008	300.00
03/01/2008	03/31/2008	300.00
02/01/2008	02/29/2008	300.00
01/01/2008	01/31/2008	300.00
Electric - 626028609 Consumption (kWh)		**3,624.00**
Electric - 626028609 Consumption (kBtu)		**12,365.09**
Total Electricity Consumption (kBtu)		**12,365.09**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)		
Meter: Fuel Oil (Gallons) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (Gallons)**
12/01/2008	12/31/2008	1,001.70
11/01/2008	11/30/2008	287.60
10/01/2008	10/31/2008	0.00
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	0.00
05/01/2008	05/31/2008	0.00
04/01/2008	04/30/2008	962.80

03/01/2008	03/31/2008	0.00
02/01/2008	02/29/2008	0.00
01/01/2008	01/31/2008	0.00
Fuel Oil Consumption (Gallons)		**2,252.10**
Fuel Oil Consumption (kBtu)		**315,293.55**
Total Fuel Oil (No. 2) Consumption (kBtu)		**315,293.55**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) 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
PAL
51 South Brown St.
Gloucester City, NJ 08030

Facility Owner
Gloucester City
512 Monmouth St.
Gloucester City, NJ 08030

Primary Contact for this Facility
Jack Lipsett
512 Monmouth St.
Gloucester City, NJ 08030

General Information

PAL	
Gross Floor Area Excluding Parking: (ft^2)	5,584
Year Built	1915
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

PAL	
Space Type	Other - Recreation
Gross Floor Area(ft^2)	5,584
Number of PCs[o]	9
Weekly operating hours[o]	20
Workers on Main Shift[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	59	59	0	N/A	65
Source (kBtu/ft^2)	64	64	0	N/A	136
Energy Cost					
$/year	$ 6,409.93	$ 6,409.93	N/A	N/A	$ 7,100.30
$/$ft^2$/year	$ 1.15	$ 1.15	N/A	N/A	$ 1.27
Greenhouse Gas Emissions					
$MtCO_2e$/year	27	27	0	N/A	30
$kgCO_2e/ft^2$/year	5	5	0	N/A	6

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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"PAL"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	Entire Facility	H.B. Smith	1	-	-	250	-	70	#2 Fuel Oil	30	35	5

Boiler - Burner

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	Entire Facility	Beckett	1	R7184B1032	-	250 min		#2 Fuel Oil	30	21	9

Boiler - Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	Entire Facility	-	6	6	6	0.75	-	-	-	-	-	8	10	2

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (W)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	Entire Facility	Bradford White	1	M-2-30R6DS	-	-	-	30	-	Electric	14	12	-2

Split Systems and AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life
PAL Building	Multiple	GE	3	-	-	3/4 - Ton	6 EER	R-22	-	-	-	**7**	**10**	**3**
PAL Building	Multiple	Goodman	3	1RC10190A10	-	1 - Ton	6EER	R-22	-	-	-	**7**	**10**	**3**

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C08131
Project: PAL BUILDING Energy Audit -
Address: 51 South Brown Street
City: Gloucester City, NJ
Building SF: 5584

"PAL BUILDING"

DATE: 05/20/2009
KWH COST: $0.209

ECM #1: Lighting Retrofits

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS			
Line No.	CEG Type	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 Simple Payback
1	B	Meeting Room	10	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	1.36	1414.4	$295.61	10	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.91	946.4	$197.80	$140.00	$1,400.00	0.45	468	$97.81	14.31
2	B	Game Room	8	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	1.09	1131.52	$236.49	8	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.73	757.12	$158.24	$140.00	$1,120.00	0.36	374.4	$78.25	14.31
3	E	Stair Landing	2	1'X4' 2-Lamp T-12 White Reflector Magnetic Ballast	1,040	68	0.14	141.44	$29.56	2	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.06	62.4	$13.04	$110.00	$220.00	0.08	79.04	$16.52	13.32
4	B	Weight Room	10	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	1.36	1414.4	$295.61	10	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.91	946.4	$197.80	$140.00	$1,400.00	0.45	468	$97.81	14.31
5	-	Weight Room	2	60 W Incandensant	1,040	60	0.12	124.8	$26.08	2	15 W CFL	15	0.03	31.2	$6.52	$10.00	$20.00	0.09	93.6	$19.56	1.02
6	E	Hallway	2	1'X4' 2-Lamp T-12 White Reflector Magnetic Ballast	1,040	68	0.14	141.44	$29.56	2	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.06	62.4	$13.04	$110.00	$220.00	0.08	79.04	$16.52	13.32
7	B	Hallway	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	0.27	282.88	$59.12	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	189.28	$39.56	$140.00	$280.00	0.09	93.6	$19.56	14.31
8	B	Exercise Room	10	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	1.36	1414.4	$295.61	10	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.91	946.4	$197.80	$140.00	$1,400.00	0.45	468	$97.81	14.31
9	E	Stair Landing	3	1'X4' 2-Lamp T-12 White Reflector Magnetic Ballast	1,040	68	0.20	212.16	$44.34	3	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.09	93.6	$19.56	$110.00	$330.00	0.11	118.56	$24.78	13.32
10		Stairwells	4	60 W Incandensant	1,040	60	0.24	249.6	$52.17	4	15 W CFL	15	0.06	62.4	$13.04	$10.00	$40.00	0.18	187.2	$39.12	1.02
11	E	Entrance	2	1'X4' 2-Lamp T-12 White Reflector Magnetic Ballast	1,040	116	0.23	241.28	$50.43	2	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.06	62.4	$13.04	$110.00	$220.00	0.17	178.88	$37.39	5.88

12		Basement Stairs	8	60 W Incandensant	1,040	154	1.23	1281.28	$267.79	8	15 W CFL	15	0.12	124.8	$26.08	$10.00	$80.00	1.11	1156.48	$241.70	0.33
13	A	Computer Room	2	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	116	0.23	241.28	$50.43	2	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.18	189.28	$39.56	$140.00	$280.00	0.05	52	$10.87	25.76
14	E	Glou Community TV	5	1'X8' 2-Lamp T-12 White Reflector Magnetic Ballast	600	192	0.96	576	$120.38	5	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.46	273	$57.06	$140.00	$700.00	0.51	303	$63.33	11.05
15		Glou Community TV	1	100 W Incandescent	600	100	0.10	60	$12.54	1	28 W CFL	28	0.03	16.8	$3.51	$12.00	$12.00	0.07	43.2	$9.03	1.33
16		Weight Room	4	2'X2' 2-Lamp T-12 Prism Lens Magnetic Ballast	1,040	88	0.35	366.08	$76.51	4	2'X2' 2-Lamp 17W T-8 Prism Lens/Elect Ballast	38	0.15	158.08	$33.04	$110.00	$440.00	0.20	208	$43.47	10.12
17	A	Restrooms	6	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	0.82	848.64	$177.37	6	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.546	567.84	$118.68	$140.00	$840.00	0.27	280.8	$58.69	14.31
18		Boiler Room	4	100 W Incandescent	200	100	0.40	80	$16.72	4	28 W CFL	28	0.11	22.4	$4.68	$12.00	$48.00	0.29	57.6	$12.04	3.99
19	E	Boiler Room	1	1'X4' 2-Lamp T-12 White Reflector Magnetic Ballast	200	116	0.12	23.2	$4.85	1	1'X4' 1-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	30	0.03	6	$1.25	$110.00	$110.00	0.09	17.2	$3.59	30.60
20	A	Radio Club	10	2'X4' 4-Lamp T-12 Prism Lens Magnetic Ballast	1,040	136	1.36	1414.4	$295.61	10	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	91	0.91	946.4	$197.80	$140.00	$1,400.00	0.45	468	$97.81	14.31
21		Radio Club	2	2'X2' 2-Lamp T-12 Prism Lens Magnetic Ballast	1,040	88	0.18	183.04	$38.26	2	2'X2' 2-Lamp 17W T-8 Prism Lens/Elect Ballast	38	0.08	79.04	$16.52	$110.00	$220.00	0.10	104	$21.74	10.12
22		All Exits	6	2L 15 W Incandescent Exit Signs	8,760	30	0.18	1576.8	$329.55	6	5 Watt LED Exit Signs	5	0.03	262.8	$54.93	$80.00	$480.00	0.15	1314	$274.63	1.75
						2376															
		Totals	104				12.43	13419.04	2804.58	104			6.64	6806.44	$1,422.55		$11,260.00	5.79	6,612.60	$1,382.03	8.15

NOTE: Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

Project Name: LGEA Solar PV Project - PAL
Location: Gloucester City, NJ
Description: Photovoltaic System 95% Financing

Simple Payback Analysis

	Photovoltaic System 95% Financing
Total Construction Cost	$47,610
Annual kWh Production	8,255
Annual Energy Cost Reduction	$1,725
Annual SREC Revenue	$2,889
First Cost Premium	**$47,610**
Simple Payback Calculation:	**10.3** **Years**

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.209**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/kWh) $0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$2,381	0	0	0	$0	0	0	(2,381)	0
1	$0	8,255	$1,725	$0	$2,889	$3,132	$1,076	$407	($1,974)
2	$0	8,173	$1,777	$0	$2,860	$3,054	$1,154	$430	($1,544)
3	$0	8,091	$1,830	$0	$2,832	$2,971	$1,237	$454	($1,090)
4	$0	8,010	$1,885	$0	$2,804	$2,881	$1,327	$481	($609)
5	$0	7,930	$1,942	$41	$2,775	$2,785	$1,423	$469	($140)
6	$0	7,851	$2,000	$40	$2,748	$2,683	$1,525	$500	$359
7	$0	7,772	$2,060	$40	$2,720	$2,572	$1,636	$532	$892
8	$0	7,694	$2,122	$40	$2,693	$2,454	$1,754	$567	$1,459
9	$0	7,618	$2,186	$39	$2,666	$2,327	$1,881	$605	$2,064
10	$0	7,541	$2,251	$39	$2,639	$2,191	$2,017	$644	$2,707
11	$0	7,466	$2,319	$38	$2,613	$2,046	$2,162	$685	$3,393
12	$0	7,391	$2,388	$38	$2,587	$1,889	$2,319	$729	$4,122
13	$0	7,317	$2,460	$38	$2,561	$1,722	$2,486	$775	$4,897
14	$0	7,244	$2,534	$37	$2,535	$1,542	$2,666	$824	$5,721
15	$0	7,172	$2,610	$37	$2,510	$1,349	$2,859	$875	$6,596
16	$0	7,100	$2,688	$37	$2,485	$1,143	$3,065	$929	$7,525
17	$0	7,029	$2,769	$36	$2,460	$921	$3,287	$985	$8,510
18	$0	6,959	$2,852	$36	$2,436	$683	$3,525	$1,044	$9,553
19	$0	6,889	$2,937	$35	$2,411	$429	$3,779	$1,105	$10,658
20	$0	6,820	$3,025	$35	$2,387	$155	$4,053	$1,169	$11,828
21	$1	6,752	$3,116	$35	$2,363	$132	$3,726	$1,587	$13,415
22	$2	6,685	$3,210	$34	$2,340	$90	$3,066	$2,359	$15,774
23	$3	6,618	$3,306	$34	$2,316	$0	$0	$5,588	$21,362
24	$4	6,552	$3,405	$34	$2,293	$0	$0	$5,664	$27,026
25	$5	6,486	$3,507	$33	$2,270	$0	$0	$5,744	$32,770
	Totals:	150,323	$46,361	$607	$52,613	$38,930	$45,229	$52,021	$35,151
				Net Present Value (NPV)			**$7,458**		
				Internal Rate of Return (IRR)			**22.8%**		

Project Name:	**LGEA Solar PV Project - PAL**
Location:	**Gloucester City, NJ**
Description:	**Photovoltaic System**

Simple Payback Analysis

	Photovoltaic System
Total Construction Cost	$47,610
Annual kWh Production	8,255
Annual Energy Cost Reduction	$1,725
Annual SREC Revenue	$2,889
First Cost Premium	**$47,610**
Simple Payback Calculation:	**10.3**
	Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.209**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$47,610	0	0	0	$0	(47,610)	0
1	$0	8,255	$1,725	$0	$2,889	$4,615	($42,995)
2	$0	8,173	$1,777	$0	$2,860	$4,638	($38,358)
3	$0	8,091	$1,830	$0	$2,832	$4,662	($33,695)
4	$0	8,010	$1,885	$0	$2,804	$4,689	($29,007)
5	$0	7,930	$1,942	$41	$2,775	$4,677	($24,330)
6	$0	7,851	$2,000	$40	$2,748	$4,707	($19,623)
7	$0	7,772	$2,060	$40	$2,720	$4,740	($14,882)
8	$0	7,694	$2,122	$40	$2,693	$4,775	($10,107)
9	$0	7,618	$2,186	$39	$2,666	$4,813	($5,294)
10	$0	7,541	$2,251	$39	$2,639	$4,852	($442)
11	$0	7,466	$2,319	$38	$2,613	$4,893	$4,451
12	$0	7,391	$2,388	$38	$2,587	$4,937	$9,388
13	$0	7,317	$2,460	$38	$2,561	$4,983	$14,372
14	$0	7,244	$2,534	$37	$2,535	$5,032	$19,403
15	$0	7,172	$2,610	$37	$2,510	$5,083	$24,486
16	$0	7,100	$2,688	$37	$2,485	$5,136	$29,623
17	$0	7,029	$2,769	$36	$2,460	$5,193	$34,815
18	$0	6,959	$2,852	$36	$2,436	$5,251	$40,067
19	$0	6,889	$2,937	$35	$2,411	$5,313	$45,380
20	$0	6,820	$3,025	$35	$2,387	$5,377	$50,757
21	$1	6,752	$3,116	$35	$2,363	$5,445	$56,202
22	$2	6,685	$3,210	$34	$2,340	$5,515	$61,717
23	$3	6,618	$3,306	$34	$2,316	$5,588	$67,305
24	$4	6,552	$3,405	$34	$2,293	$5,664	$72,969
25	$5	6,486	$3,507	$33	$2,270	$5,744	$78,713
	Totals:	150,323	$46,361	$607	$52,613	$126,323	$98,367
				Net Present Value (NPV)		**$50,782**	
				Internal Rate of Return (IRR)		**7.9%**	

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
PAL	330	Sunpower SPR230	23	14.7	338	5.29	8,255	759	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.