



ENERGY AUDIT – FINAL REPORT

BUENA VISTA COMMUNITY CENTER

661 JACKSON ROAD

NEWTONVILLE, NJ 08346

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I. EXECUTIVE SUMMARY

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

Buena Vista Township
Martin Luther King Center
661 Jackson Road
Newtonville, NJ 08346

Contact Person: Ronald P. Trebing

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 | \$ 18,597 |
|-------------|-----------|

The Martin Luther King Center is an all electric building except for some limited propane gas usage for the kitchen oven.

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

Table 1
Energy Conservation Measures (ECM's)

| ECM NO. | DESCRIPTION | COST | ANNUAL SAVINGS | SIMPLE PAYBACK (YEARS) | SIMPLE RETURN ON INVESTMENT |
|---------|---|-----------|----------------|------------------------|-----------------------------|
| 1 | Lighting Upgrade - Fluorescent Lighting | \$7,545 | \$1,039 | 7.3 | 40.2 % |
| 2 | Lighting Upgrade – Compact Fluorescent | \$155 | \$160 | <1 | 207 % |
| 3 | Lighting Upgrade – Lighting Controls | \$825 | \$207 | 3.9 | 26.4 % |
| 4 | Cooling & Heating - Bard Unit Upgrade | \$100,000 | \$2,927 | 34.2 | (-6.9 %) |
| 5 | 40 KW PV Solar Panel System | \$362,250 | \$32,034 | 11.3 | 7.9 % |

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 Upgrade - Fluorescent Lighting | - | 6,493 | - |
| 2 | Lighting Upgrade – Compact Fluorescent | - | 1,002 | - |
| 3 | Lighting Upgrade – Lighting Controls | - | 1,295 | - |
| 4 | Cooling & Heating - Bard Unit Upgrade | - | 618 | - |
| 5 | 40 KW PV Solar Panel System | 40 | 62,812 | |

Recommendations:

Concord Engineering Group 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 economically justifiable. The following Energy Conservation Measures are recommended for the Martin Luther King Center:

- **ECM #1:** Interior T-8 Fluorescent Lighting Upgrades
- **ECM #2:** Install Compact Fluorescent Lamps
- **ECM #3:** Interior Lighting Controls – Occupancy Sensors

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II. INTRODUCTION

This comprehensive energy audit covers the 10,000 square foot Martin Luther King Center facility that includes; administration and mixed use offices, daycare rooms, museum, kitchen, community room, restrooms, utility rooms, and storage areas.

The first task was to collect and review one year's worth of utility energy data for electricity. 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/ft²/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 municipality 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 (ECM's). 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 ECM's.

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 higher 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.

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IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

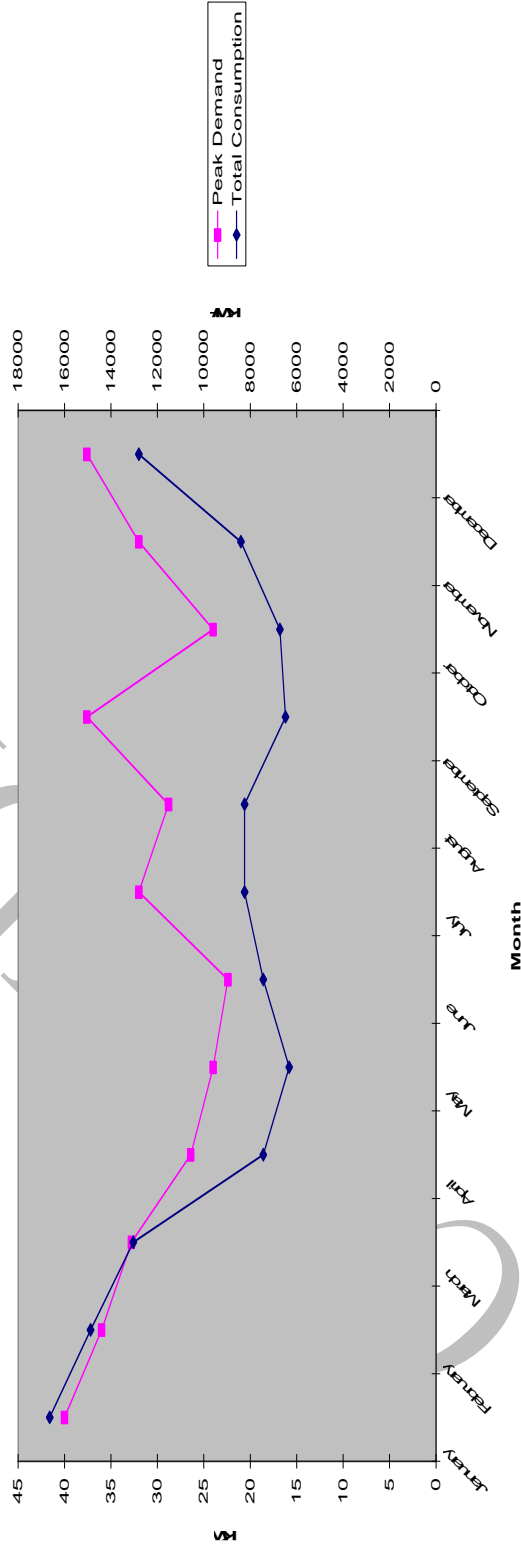
Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Atlantic City Electric provides electricity to the facility under the MGS / Monthly General Service Rate Schedule. This electric rate has a component for consumption that is measured in kilowatt-hours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

| <u>Description</u> | <u>Average</u> |
|--------------------|----------------|
| Electricity | 16¢/kWh |

**Table 3
Electricity Billing Data**

| Provider | Month | Start Date | End Date | Account | Utility Type | Billing Days | Peak Demand | Units | Load Factor (%) | Total Consumption | Units | Delivery Charge | Supply Charge | Total \$ |
|------------------------|-----------|------------|------------|----------------|--------------|--------------|-------------|-----------|-----------------|-------------------|-----------|-----------------|---------------|-----------------------------------|
| Atlantic City Electric | January | 12/21/2007 | 1/23/2008 | 0444 6499 9927 | Electric | 33 | 40 kw | 16640 kwh | 52.52 | 16640 kwh | 16640 kwh | \$ 900.22 | \$ 1,529.67 | \$ 2,429.89 |
| Atlantic City Electric | February | 1/23/2008 | 2/22/2008 | 0444 6499 9927 | Electric | 30 | 38 kw | 14880 kwh | 57.40 | 14880 kwh | 14880 kwh | \$ 792.29 | \$ 1,362.58 | \$ 2,154.87 |
| Atlantic City Electric | March | 2/22/2008 | 3/25/2008 | 0444 6499 9927 | Electric | 32 | 32.8 kw | 13040 kwh | 51.76 | 13040 kwh | 13040 kwh | \$ 707.60 | \$ 1,214.34 | \$ 1,921.94 |
| Atlantic City Electric | April | 3/25/2008 | 4/23/2008 | 0444 6499 9927 | Electric | 29 | 26.4 kw | 7440 kwh | 40.48 | 7440 kwh | 7440 kwh | \$ 425.23 | \$ 723.50 | \$ 1,148.73 |
| Atlantic City Electric | May | 4/23/2008 | 5/22/2008 | 0444 6499 9927 | Electric | 29 | 24 kw | 6320 kwh | 37.83 | 6320 kwh | 6320 kwh | \$ 367.17 | \$ 617.99 | \$ 985.16 |
| Atlantic City Electric | June | 5/22/2008 | 6/23/2008 | 0444 6499 9927 | Electric | 32 | 22.4 kw | 7440 kwh | 43.24 | 7440 kwh | 7440 kwh | \$ 355.66 | \$ 950.91 | \$ 1,306.57 |
| Atlantic City Electric | July | 6/23/2008 | 7/23/2008 | 0444 6499 9927 | Electric | 30 | 32 kw | 8240 kwh | 35.76 | 8240 kwh | 8240 kwh | \$ 391.86 | \$ 1,175.68 | \$ 1,567.54 |
| Atlantic City Electric | August | 7/23/2008 | 8/21/2008 | 0444 6499 9927 | Electric | 29 | 28.8 kw | 8240 kwh | 41.10 | 8240 kwh | 8240 kwh | \$ 372.62 | \$ 1,161.43 | \$ 1,534.05 |
| Atlantic City Electric | September | 8/21/2008 | 9/22/2008 | 0444 6499 9927 | Electric | 32 | 37.6 kw | 6480 kwh | 42.18 | 6480 kwh | 6480 kwh | \$ 290.62 | \$ 908.16 | \$ 1,198.78 |
| Atlantic City Electric | October | 9/22/2008 | 10/23/2008 | 0444 6499 9927 | Electric | 31 | 24 kw | 6720 kwh | 37.63 | 6720 kwh | 6720 kwh | \$ 286.59 | \$ 811.99 | \$ 1,098.58 |
| Atlantic City Electric | November | 10/23/2008 | 11/20/2008 | 0444 6499 9927 | Electric | 28 | 32 kw | 8400 kwh | 39.06 | 8400 kwh | 8400 kwh | \$ 347.96 | \$ 953.97 | \$ 1,301.93 |
| Atlantic City Electric | December | 11/20/2008 | 12/22/2008 | 0444 6499 9927 | Electric | 32 | 37.6 kw | 12800 kwh | 44.32 | 12800 kwh | 12800 kwh | \$ 509.28 | \$ 1,440.09 | \$ 1,949.37 |
| Total: | | | | | | | | | | 116640 kwh | | | | Total: \$ 18,597.41 |
| | | | | | | | | | | | | | | Avg. Cost per kwh: \$ 0.16 |

**Figure 1
Electricity Usage Profile**
Martin Luther King Center



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building’s energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building’s energy use and is utilized regularly for comparison of energy performance among buildings of similar type. The EUI for this facility is calculated as follows:

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

$$\begin{aligned} \text{Electric} &= ((116,640 \text{ kWh}) * (1000 \text{ W/kW}) * (3.414 \text{ Btu/h} / 1 \text{ W})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) \\ &= 398,209 \text{ kBtu/h} \end{aligned}$$

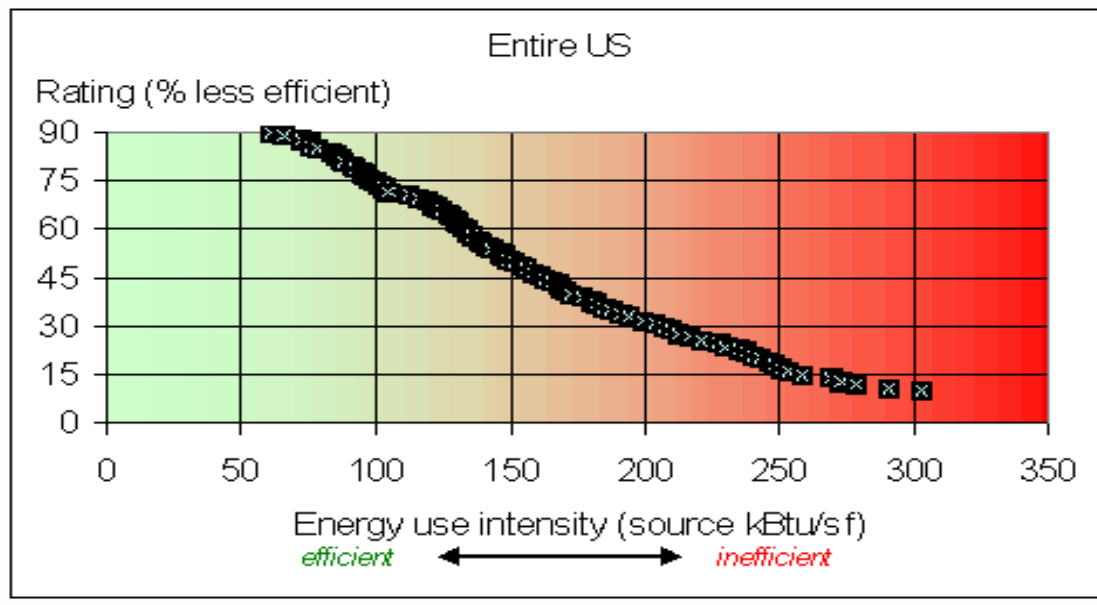
$$\text{Gas} = ((0 \text{ therms}) * (100,000 \text{ Btu/h} / 1 \text{ W})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) = 0 \text{ kBtu/h}$$

$$\text{Building EUI} = \frac{(398,209 \text{ kBtu/h} + 0 \text{ kBtu/h})}{9,000 \text{ SF}} = \frac{398,209 \text{ kBtu/h}}{10,000 \text{ SF}} = 39.82 \text{ kBtu/SF}$$

$$\text{Community Center EUI} = 39.82 \text{ kBtu/SF}$$

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 in the U.S. and NJ.

Figure 2
Energy Use Intensity Distributions: Offices



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows you to track and assess energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and more emphasis is being placed throughout multiple arenas on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than \$10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. Therefore, it is vital that local government municipalities assess their energy usage, benchmark this usage utilizing Portfolio Manager, set priorities and goals to lessen their energy usage and move forward with these priorities and goals. Saving energy will in-turn save the environment.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the municipality in order to allow access to monitor their yearly energy usage as it compares to facilities of similar type. The following is the user name and password for this account:

| | |
|------------|-----------------|
| User Name: | concordatlantic |
| Password: | password |

Utilizing the utility bills and other information gathered during the energy audit process, CEG entered the respective data into Portfolio Manager and the following is a summary of the results:

Table 5
ENERGY STAR Performance Rating

| FACILITY DESCRIPTION | ENERGY PERFORMANCE RATING | NATIONAL AVERAGE |
|-----------------------------|----------------------------------|-------------------------|
| Martin Luther King Center | 54 | 50 |

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "Other" category. Refer to Appendix G for detailed energy benchmarking report entitled "STATEMENT OF ENERGY PERFORMANCE."

V. FACILITY DESCRIPTION

The Martin Luther King Community Center Building is actually a series of construction trailers or mobile office trailers that have been placed on a permanent foundation and joined together to form a single building. Fourteen (14) 12 ft. x 60 ft. trailers form the Community Center for a total area of just over 10,000 square feet. The Center houses a Day Care Center, the African American Heritage Museum, the Community Food Bank, offices, a kitchen, pantry and social hall.

Heating

Each architectural section of the Community Center at one time was an individual mobile office trailer. As such, each twelve (12) foot wide section has a wall mounted mechanical unit hung on the west exterior wall of the building section. Several of the wall mounted units have been deactivated as the overall, cumulative capacity of these wall mounted units far exceeds the demand for the building. Units mounted on the exterior wall are manufactured by Bard Manufacturing Co. and are model WA484-A10B with 10KW electric heaters. Four (4) of the wall mounted Bard units have been deactivated and are not in service.

Heat is distributed to the numerous spaces within the Community Center by ductwork located above ceilings.

Cooling System

The wall mounted Bard air handler is rated for four (4) tons of air conditioning and is a packaged unit, containing all components necessary for the air conditioning. All ten (10) active units are identical.

Controls

All units are controlled by digital, programmable thermostats.

Domestic Hot Water

Domestic hot water for restrooms and the kitchen is provided by an electric water heater; State model CD 5 40 2DR5973 with 40 gallons of storage and 4,500 watt heating element.

Lighting

The offices are lit by 2-foot by 4-foot lay-in fixtures containing T8 lamps.

The reception area and corridors are lit by 2-foot by 4-foot lay-in fixtures containing T8 lamps and incandescent par lamp fixtures.

The toilet rooms are lit by 4-foot fixtures containing T8 lamps.

Storage and utility closets are lit using a mixture of 2-foot by 2-foot recessed linear T8 lamps and 4-foot fixtures containing T8 lamps.

The kitchen is lit by 2-foot by 4-foot lay-in fixtures containing T8 lamps.

The museum is lit using a mixture of 2-foot by 4-foot lay-in fixtures containing T8 lamps, 18-inch linear T8 lamps, 2-foot linear T8 lamps, 3-foot linear T8 lamps, and 4-foot linear T8 lamps.

The community room is lit by 2-foot by 4-foot lay-in fixtures containing T8 lamps.

The preschool classrooms and preschool offices are lit by a mixture of 2-foot by 4-foot lay-in fixtures containing T8 lamps and 2-foot by 2-foot recessed T8 U-Tube lamps.

The preschool toilet rooms and utility room and lit by 2-foot by 2-foot recessed T8 U-Tube lamps.

Standard switching is utilized throughout the facility.

The exterior lighting is mounted on the building and includes an assortment of wall packs.

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

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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 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 manufacturer's 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.

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, lack of nameplates, etc.

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

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VII. ENERGY CONSERVATION MEASURES (ECM)

ECM #1: Lighting Upgrade - Upgrade the Fluorescent Lighting

Description:

Improved fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple retrofit of the existing fixture can provide substantial savings. A conventional drop-ceiling lay in fixture with four, 4-foot lamps (34 Watt lamps with a magnetic ballast) has a total wattage of 108 Watts per fixture. By using the improved lamps and ballasts, the total wattage would be reduced to 84 Watts. The light levels would increase by about 15% and the light quality would increase by 35%.

CEG recommends replacement of the existing T8 lamps and ballasts with the latest technology T8 lamps and high efficiency electronic ballasts. The new energy efficient, T8 lamps 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 the latest high efficiency T8 lamps is approximately 30,000 burn-hours, requiring fewer lamps to replace per year. Based on the operating hours of this portion of the facility, approximately 1872-4176 hours per year, the Owner will be changing approximately 33% less lamps per year.

In addition, a single electronic ballast can operate one, two, three, or four lamps in a fixture. The existing magnetic ballasts can only operate up to two lamps. The electronic ballasts could reduce the amount of ballasts in the facility by half. This can be taken advantage of with “tandem wiring” of ballasts. Instead of using one electronic ballast for every one fixture it is sometimes feasible to use one electronic ballast for every two or more fixtures. The electrician wires a single ballast to operate the lamps in adjacent light fixtures which further reduces the amount of ballasts needed.

Energy Savings Calculations:

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

Maintenance Savings are calculated as follows:

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

Maintenance Savings = (432 x 33% reduction x \$2.00) + (\$20 x 142) = \$3125.12

Energy Savings Summary:

| ECM #1 - ENERGY SAVINGS SUMMARY | |
|---|------------------|
| Installation Cost (\$): | \$10,670 |
| NJ Smart Start Equipment Incentive (\$): | \$0 |
| Maintenance Savings (\$): | (\$3,125) |
| Net Installation Cost (\$): | \$7545 |
| Total Energy Savings (\$ / yr): | \$1039 |
| Simple Payback (yrs): | 7.3 |
| Simple Return on Investment: | 40.2 % |

ECM #2: Lighting Upgrade – Install Compact Fluorescent Lighting**Description:**

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

The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: 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 existing fixtures, or hardwired into existing fixtures.

Energy Savings Calculations:

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

Maintenance Savings are calculated as follows:

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

Maintenance Savings = (5 x 75% reduction x \$22) + (\$15 x 5) = \$158

Energy Savings Summary:

| ECM #2 - ENERGY SAVINGS SUMMARY | |
|---|-------------------|
| Installation Cost (\$): | \$155 |
| NJ Smart Start Equipment Incentive (\$): | \$0 |
| Annual Maintenance Savings (\$): | (\$158) |
| Net Installation Cost (\$) After 1 Year: | \$0 |
| Total Energy Savings (\$ / yr): | \$160 |
| Simple Payback (yrs): | < 1Year |
| Simple Return on Investment: | 207 % |

ECM #3: Lighting Upgrade – Install Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. There has been a belief 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 determined that the best option is to turn the lights off whenever possible. Although this practice reduces the lamp life, the energy savings far outweigh the lamp replacement costs.

Lighting controls are available in many forms. Lighting controls can be as simplistic as an additional switch. Time-clocks are often used which allows the user to set an on/off schedule. Time-clocks range from a dial clock with on/off indicators to a small box the size of a thermostat with user programs for on/off schedule in a digital format. 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 E 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 private offices, conference rooms, mechanical rooms, storage rooms, file rooms, etc.

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper, etc.

Energy Savings Calculations:

From Appendix E of this report, we calculated the lighting power density (Watts/ft²) of the existing facility to be 1.33 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

$$\text{Savings} = 10\% \times 1.33 \text{ Watts/SF} \times 5,200 \text{ SF} \times 1,872 \text{ hrs/yr.}$$

$$= 1,295 \text{ kWh/yr.} \times \$0.16/\text{kWh}$$

$$\text{Annual Savings} = \underline{\$207 / \text{yr}}$$

Installation cost per dual-technology sensor is \$75/unit.

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 15 (5,200 SF).

Total cost to install sensors is \$55 x 15 units = \$825.

Energy Savings Summary:

| ECM #3 - ENERGY SAVINGS SUMMARY | |
|---|----------------|
| Installation Cost (\$): | \$1125 |
| NJ Smart Start Equipment Incentive (\$): | (\$300) |
| Maintenance Savings (\$): | \$0 |
| Net Installation Cost (\$): | \$825 |
| Total Energy Savings (\$ / yr): | \$207 |
| Simple Payback (yrs): | 3.9 |
| Simple Return on Investment: | 26.4 % |

ECM #4: Bard Unit Upgrade

Description:

Heating and cooling is provided throughout the building by a packaged heating and air-conditioning unit mounted on the exterior wall of each building section. With respect to cooling, those particular air-conditioning units are inefficient with an estimated seasonal energy efficiency ratio (SEER) of 11.0. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 12.0 SEER for units of this type. The wall mounted air-conditioner utilizes a 10 kw electric heater to provide forced hot air through the ducted system for heating. The existing units are aged and are at the end of their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for packaged air-conditioning units is 15 years.

This energy conservation measure would replace the exterior mounted units with more efficient units that have an integral burner to use propane instead of electricity for heating. The existing equipment will be replaced with equipment having heating and cooling capacities equal to the existing units. The average EER of the new cooling equipment will be 12.2 EER and the combustion efficiency for heating will be 81%. The energy efficiency of the new equipment is based on a Bard WG4S1 with R-410A refrigerant and a Model A Heating System.

Cooling Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12,000 \text{ Btu} / ton \div 1000 \text{ W} / kW]}{[(EER_{NEW} - EER_{OLD})]} \times Avg. Load Factor \times Hrs. of Cooling$$

Existing Air Conditioning Units

Rated Capacity = 4 Tons

Unit Efficiency = 11.0 EER

Proposed High-Efficiency Air Conditioning Unit

Rated Capacity = 4 Tons

New Unit Efficiency = 12.2 EER

Number of Units = 10

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

Average Cost of Electricity - \$0.16/kWh

$$EnergySavings = \frac{[CoolingTons \times 12,000 \text{ Btu} / ton \div 1000 \text{ W} / kW]}{[(EER_{NEW} - EER_{OLD})]} \times Avg. Load Factor \times Hrs. of Cooling$$

$$\text{Energy Savings} = \frac{[4\text{CoolingTons} \times 12,000 \text{Btu/ton} + 1000 \text{W/kW}]}{[(12.2 \text{EER}_{\text{NEW}} - 11.0 \text{EER}_{\text{OLD}})]} \times 0.80 \times 1800$$

$$= 618 \text{ kWh/yr./Unit}$$

$$\text{Cost Savings} = 10 \text{ Units} \times (618 \text{ kWh/Yr/Unit}) \times \$0.16/\text{kWh} = \$990 / \text{Yr.}$$

Heating Energy Savings Calculations:

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

Error! Bookmark not defined.

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

where:

H_L = Building Heat Loss, BTU/Hr.

D = number of 65 F Heating Degree Days

Δt = Design temperature difference, deg. F

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

V = Heating value of fuel, BTU/Gallon

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

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$$\text{Energy Used} = \frac{(36,000) \times (5169) \times 24}{70 \times .6 \times 91,600} \times (.6)$$

$$\text{Energy Used} = 697 \text{ Gallons/Year/Unit}$$

As this ECM recommends using propane instead of electricity to heat the building, the savings will result from using a less expensive fuel to produce the same amount of energy.

$$\text{Current Energy Cost} = 697 \text{ gal/yr/unit} \times 27 \text{ kWh/gal} \times \$0.16/\text{kWh} \times 10 \text{ Units}$$

$$= \$30,110/\text{Year}$$

$$\text{Proposed Energy Cost} = 697 \text{ gal/yr/unit} \times 10 \text{ Units} \times \$3.90/\text{gallon} = \$27,183 / \text{Year}$$

$$\text{Cost Savings} = \$30,110 - \$27,183 = \$2,927/\text{Year}$$

Energy Savings Summary:

| ECM #4 - ENERGY SAVINGS SUMMARY | |
|---|------------------|
| Installation Cost (\$): | \$100,000 |
| NJ Smart Start Equipment Incentive (\$): | (\$0) |
| Maintenance Savings (\$): | (\$0) |
| Net Installation Cost (\$): | \$100,000 |
| Total Energy Savings (\$ / yr): | \$2,927 |
| Simple Payback (yrs): | 34.2 |
| Simple Return on Investment: | (-6.9 %) |

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES (ECM #5)

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 Buena, and concluded that there is potential for solar energy generation.

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

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of approximately 10,000 S.F. is available and can be utilized for a PV system on the Public Works building roof. A depiction of the area utilized is shown in Appendix F following the financial calculations. Using this square footage it was determined that a system size of 40.25 kilowatts could be installed to match the maximum peak monthly demand. The required square footage for a system of this size is 2,573 S.F. and has an estimated kilowatt hour production of 62,812 KWh annually, reducing the overall electric consumption by approximately 53%. A detailed financial analysis can be found in Appendix F. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

CEG has reviewed financing options for the owner. Two options were studied and they are as follows: Self-financed and direct purchase without finance. Self-finance was calculated with 95% of the total project cost financed at a 7% interest rate over 25 years. Direct purchase involves the local government paying for 100% of the total project cost upfront. Both of these calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following are the payback periods for the respective method of payment:

| PAYMENT TYPE | SIMPLE PAYBACK | INTERNAL RATE OF RETURN |
|---------------------|-----------------------|--------------------------------|
| Self-Finance | 11.3 Years | 11.9 % |
| Direct Purchase | 11.3 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 Buena Vista Township and has determined it is not a viable option. Low average wind speeds for the area are not adequate for wind turbine generation. Typical wind turbines start producing energy at 8 mph wind speeds. Buena Vista Township averages 4 mph wind speeds making this application impractical.

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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 respective electricity usage load profile for January 2007 through December 2008.

Electricity:

Section IV, Figure 1 demonstrates a typical electric heating load profile, (November-March) with possible summertime air conditioning consumption. It is evident that there is a significant reduction in the On Peak Load from April through October 2008 and an increase from November through March 2008. The Off Peak load is typical, with some expected increased consumption in the June-September period. The base-load shaping is important because a flat consumption profiles will yield more competitive pricing. The township might look into why the Demand (kW) has extreme peaks in July and September. This can be investigated with the Local Utility Company, Atlantic City Electric.

Natural Gas:

Per the data provided, Buena Vista does not utilize Natural Gas service at the Community Center facility.

Tariff Analysis:

Electricity:

The Community Center receives electrical service through Atlantic City Electric on a BGS (Basic Generation Service) rate. Since the passing and implementation of the Electricity Discount and Energy Competition Act (EDECA) in 1999, there have been many changes brought about by the deregulation of the electric industry in New Jersey. Since that time, customers in New Jersey have been able to choose their electrical supplier. Customers who do not choose to switch to a Third Party Supplier (TPS), or who leave a TPS to return to their Electric Delivery Company are supplied with Basic Generation Service.

While Buena Vista may be on a typical rate structure with the local utility (BSG), some variations in price do cause some concern, and are worth investigating further. The rates in the summertime (July – September) are in the \$.14 / kWh range. If the township were to shop for its supply, these high summertime rates could be avoided.

Natural Gas:

The Community Center does not receive natural gas service according to the data supplied.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the scope. CEG's observations are seen in both the electric and natural gas costs. The average price per kWh (kilowatt hour) for all buildings is \$0.1335 / kWh (kWh is the common unit of electric measure). The average price per decatherm for natural gas is \$15.26 /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. Buena could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (January – December 2008) and current electric rates, a savings of over \$7000.00 per year can be realized (Note: Savings were calculated using Buena's Average Annual Consumption of 228,409 kWh and a variance of \$3.35/kWh utilizing a fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with Buena's natural gas costs and the Third Party Supplier, Woodruff Energy. CEG recognized a segment of the natural gas cost is not competitive with current market prices. Based on the current market, Buena is paying approximately \$7.83 per unit above market in the South Jersey Gas Company service territory. CEG recommends further advisement on these prices. CEG would also recommend Buena procuring energy (natural gas) on its own. CEG recommends alternative sourcing strategies.

CEG recommends that Buena 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), Buena will learn more about the competitive supply process. The town 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 given 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 Buena frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

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

- i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The “Energy Savings Improvement Program (ESIP)” law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.
- ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.
- iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as “power purchase agreements.” These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party’s work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.
- D. 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 sensors serving the office spaces
- 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.

APPENDIX

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Electric Cost Summary
Martin Luther King
Center
ATLANTIC CITY
ELECTRIC
Acct.No:0444 6499 9927

Appendix A

| 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 |
|-------------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| Last Meter Read Date | 12/21/2007 | 1/23/2008 | 2/22/2008 | 3/25/2008 | 4/23/2008 | 5/22/2008 | 6/23/2008 | 7/23/2008 | 8/21/2008 | 9/22/2008 | 10/23/2008 | 11/20/2008 | 12/21/2007 |
| Current Meter Read Date | 1/23/2008 | 2/22/2008 | 3/25/2008 | 4/23/2008 | 5/22/2008 | 6/23/2008 | 7/23/2008 | 8/21/2008 | 9/22/2008 | 10/23/2008 | 11/20/2008 | 12/22/2008 | 12/22/2008 |
| Billing Days | 33 | 30 | 32 | 29 | 29 | 32 | 30 | 29 | 32 | 31 | 28 | 32 | 367 |
| KWH | 16,640 | 14,880 | 13,040 | 7,440 | 6,320 | 7,440 | 8,240 | 8,240 | 6,480 | 6,720 | 8,400 | 12,800 | 116,640 |
| KW | 40 | 36 | 33 | 26 | 24 | 22 | 32 | 29 | 38 | 24 | 32 | 38 | 40 |
| Monthly Load Factor | 53% | 57% | 52% | 40% | 38% | 43% | 36% | 41% | 22% | 38% | 39% | 44% | 42% |
| Electric Delivery, \$ | \$900 | \$792 | \$708 | \$425 | \$367 | \$356 | \$392 | \$373 | \$291 | \$287 | \$348 | \$509 | \$5,747 |
| Delivery \$/kwh | \$0.054 | \$0.053 | \$0.054 | \$0.057 | \$0.058 | \$0.048 | \$0.048 | \$0.045 | \$0.045 | \$0.043 | \$0.041 | \$0.040 | \$0.049 |
| Electric Supply, \$ | \$1,530 | \$1,363 | \$1,214 | \$724 | \$618 | \$951 | \$1,176 | \$1,161 | \$908 | \$812 | \$954 | \$1,440 | \$12,850 |
| Supply \$/kwh | \$0.092 | \$0.092 | \$0.093 | \$0.097 | \$0.098 | \$0.128 | \$0.143 | \$0.141 | \$0.140 | \$0.121 | \$0.114 | \$0.113 | \$0.114 |
| Total Cost, \$ | \$2,430 | \$2,155 | \$1,922 | \$1,149 | \$985 | \$1,307 | \$1,568 | \$1,534 | \$1,199 | \$1,099 | \$1,302 | \$1,949 | \$18,597 |
| \$/KWH | \$0.1460 | \$0.1448 | \$0.1474 | \$0.1544 | \$0.1559 | \$0.1756 | \$0.1902 | \$0.1862 | \$0.1850 | \$0.1635 | \$0.1550 | \$0.1523 | \$0.1594 |

MARTIN LUTHER KING CENTER

| CONSTRUCTION COST AND REBATES | | | | | |
|--|-------------------|----------------------------|---------------------------|------------------------|------------------------|
| <u>ECM # 1 - UPGRADE FLUORESCENT LIGHTING</u> | <u>Qty</u> | <u>Unit Cost \$</u> | <u>Material \$</u> | <u>Labor \$</u> | <u>Total \$</u> |
| New T-8 Linear Fluorescent Lamps & Ballasts | 1 | \$4,190 | \$4,190 | \$6,480 | \$10,670 |
| Total Cost | | | | | \$10,670 |
| Annual Maintenance Savings | | | | | <u>\$3,125</u> |
| Total Net Cost | | | | | \$7,545 |
| | | | | | |
| | | | | | |
| <u>ECM # 2 - INSTALL CFL LIGHTING</u> | <u>Qty</u> | <u>Unit Cost \$</u> | <u>Material \$</u> | <u>Labor \$</u> | <u>Total \$</u> |
| 15 Watt Compact Fluorescent | 1 | \$80 | \$80 | \$75 | \$155 |
| Total Cost | | | | | \$155 |
| Annual Maintenance Savings | | | | | <u>\$158</u> |
| Total Net Cost | | | | | -\$3 |
| | | | | | |
| | | | | | |
| <u>ECM # 3 - INSTALL LIGHTING CONTROLS</u> | <u>Qty</u> | <u>Unit Cost \$</u> | <u>Material \$</u> | <u>Labor \$</u> | <u>Total \$</u> |
| Occupancy Sensors | 15 | \$75 | \$1,125 | \$0 | \$1,125 |
| Total Cost | | | | | \$1,125 |
| Utility Incentive | | | | | <u>\$300</u> |
| Total Net Cost | | | | | \$825 |
| | | | | | |
| | | | | | |
| <u>ECM # 4 - HVAC - BARD UNIT UPGRADE</u> | <u>Qty</u> | <u>Unit Cost \$</u> | <u>Material \$</u> | <u>Labor \$</u> | <u>Total \$</u> |
| Bard Unit | 10 | \$5,000 | \$50,000 | \$50,000 | \$100,000 |
| Total Cost | | | | | \$100,000 |
| Utility Incentive | | | | | <u>\$0</u> |
| Total Net Cost | | | | | \$100,000 |
| | | | | | |
| | | | | | |
| <u>ECM # 5 - PV SOLAR</u> | <u>Qty</u> | <u>Unit Cost \$</u> | <u>Material \$</u> | <u>Labor \$</u> | <u>Total \$</u> |
| PV Solar | 175 | \$2,070 | \$362,250 | Included | \$362,250 |
| Total | | | | | \$362,250 |

Concord Engineering Group, Inc.



520 BURNT MILL ROAD
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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 |

MARTIN LUTHER KING CENTER

| TAG | MAKE | MODEL | TYPE | CAPACITY | EFFICIENCY | SERVES | LOCATION | REMAINING USEFUL LIFE | NOTES |
|-------|-------|-----------------|------------------------------------|-------------------------------------|------------|----------------------------|------------------------------|-----------------------|---|
| AC-1 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-2 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-3 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-4 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-5 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-6 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-7 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-8 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-9 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| AC-10 | BARD | WA484-A10B | PACKAGED OUTDOOR WALL MTD | 4 TONS COOLING, 10 KW ELECTRIC HEAT | N/A | 12 FT. X 60 FT. OFFICE BAY | OUTSIDE MTD @ END OF TRAILOR | 10 YEARS | PACKAGED, TRAILER UNIT, ELECTRIC COOLING AND HEATING. |
| DHW | STATE | CD-5-40-2DR5973 | HOT WATER HEATER WITH STORAGE TANK | 4,500 WATTS, 40 GAL. | 100% | RESTROOM & KITCHEN | UTILITY ROOM | 10 YEARS | ELECTRIC HOT WATER HEATER |

INVESTMENT GRADE LIGHTING AUDIT
CONCORD ENERGY SERVICES

CEG Project #: B090403
Project Name : Bona Vista Township Energy Audit - Community Center
Address : 1000 Bona Vista Township Community Center
City : Strickland, NJ 08346
Building SF: 10,000


| Existing Lighting Fixture Type | Room Name | Existing Fixtures | | | Proposed Fixtures | | | Wattage Reduction | Average Ave kWh/Bkrs | Features Retrofit | | | Unit Installation Cost | | | Simple Probuck | | | | | | | |
|--------------------------------|------------------------------------|------------------------------|-------------------|-----------------|-------------------|------------------|--------------------|---|----------------------|-------------------|-----------------|-------------|------------------------|------------|------------|----------------|---------------------|--------------------|---------|-------------|------------|-----------------|------|
| | | Lighting Fixture Description | Lamps per Fixture | Qty of Fixtures | Total Watts | Existing/Replace | Description | | | Lamps per Fixture | Qty of Fixtures | Total Watts | Material Each | Labor Each | Total Each | | Energy Savings, kWh | Energy Savings, \$ | Qty | Total Labor | Total All | Rebate Estimate | |
| A | Reception Area | 4L-T8-32w-2'x4' | 4 | 108 | 21 | 2268 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO QHE-4X52TR/UNV ISL-SC | 4 | 84 | 21 | 1764 | 504 | 4176 | 30.16 | 2.105 | \$336.75 | 21 | \$38.80 | \$1,260.00 | \$2,074.80 | \$0.00 | 6.2 |
| E | | 1L-Incandescent Par | 1 | 65 | 5 | 325 | Relamp | Sylvania Lamp 15 Watt Compact Fluorescent Par Lamp | 1 | 17 | 5 | 85 | 240 | 4176 | 30.16 | 1.002 | \$160.36 | 5 | \$31.00 | \$80.00 | \$155.00 | \$0.00 | 1.0 |
| A | Program Coord. Office "B" | 4L-T8-32w-2'x4' | 4 | 108 | 2 | 216 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 2 | 168 | 48 | 1872 | 30.16 | 90 | \$14.38 | 2 | \$38.80 | \$77.60 | \$197.60 | \$0.00 | 13.7 |
| A | Electrical Room | 4L-T8-32w-2'x4' | 4 | 108 | 2 | 216 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 2 | 168 | 48 | 600 | 30.16 | 29 | \$4.61 | 2 | \$38.80 | \$77.60 | \$197.60 | \$0.00 | 42.9 |
| A | Office "A" | 4L-T8-32w-2'x4' | 4 | 108 | 2 | 216 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 2 | 168 | 48 | 1872 | 30.16 | 90 | \$14.38 | 2 | \$38.80 | \$77.60 | \$197.60 | \$0.00 | 13.7 |
| A | Closet - Office "A" | 4L-T8-32w-2'x4' | 4 | 108 | 1 | 108 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 1 | 84 | 24 | 600 | 30.16 | 14 | \$2.30 | 1 | \$38.80 | \$38.80 | \$98.80 | \$0.00 | 42.9 |
| A | Office "C" | 4L-T8-32w-2'x4' | 4 | 108 | 1 | 108 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 1 | 84 | 24 | 1872 | 30.16 | 45 | \$7.19 | 1 | \$38.80 | \$38.80 | \$98.80 | \$0.00 | 13.7 |
| A | Office "D" | 4L-T8-32w-2'x4' | 4 | 108 | 1 | 108 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 1 | 84 | 24 | 1872 | 30.16 | 45 | \$7.19 | 1 | \$38.80 | \$38.80 | \$98.80 | \$0.00 | 13.7 |
| A | Office "E" | 4L-T8-32w-2'x4' | 4 | 108 | 3 | 324 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO QHE-4X52TR/UNV ISL-SC | 4 | 84 | 3 | 252 | 72 | 1872 | 30.16 | 135 | \$21.57 | 3 | \$38.80 | \$116.40 | \$296.40 | \$0.00 | 13.7 |
| B | | 18" Linear Fluorescent | 1 | 33 | 3 | 99 | Existing to Remain | Existing to Remain | 1 | 33 | 3 | 99 | 0 | 1872 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| A | Office "F" | 4L-T8-32w-2'x4' | 4 | 108 | 2 | 216 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 2 | 168 | 48 | 1872 | 30.16 | 90 | \$14.38 | 2 | \$38.80 | \$77.60 | \$197.60 | \$0.00 | 13.7 |
| A | Men's Toilet Room | 4L-T8-32w-2'x4' | 4 | 108 | 3 | 324 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 3 | 252 | 72 | 1872 | 30.16 | 135 | \$21.57 | 3 | \$38.80 | \$116.40 | \$296.40 | \$0.00 | 13.7 |
| A | Women's Toilet Room | 4L-T8-32w-2'x4' | 4 | 108 | 3 | 324 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 3 | 252 | 72 | 1872 | 30.16 | 135 | \$21.57 | 3 | \$38.80 | \$116.40 | \$296.40 | \$0.00 | 13.7 |
| C | Maintenance Closet | 2' Linear Recessed 2'x2' | 4 | 52 | 1 | 52 | Existing to Remain | Existing to Remain | 1 | 52 | 1 | 52 | 0 | 600 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| A | Computer Lab | 4L-T8-32w-2'x4' | 4 | 108 | 8 | 864 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO QHE-4X52TR/UNV ISL-SC | 4 | 84 | 8 | 672 | 192 | 1872 | 30.16 | 359 | \$57.51 | 8 | \$38.80 | \$310.40 | \$790.40 | \$0.00 | 13.7 |
| F | | 1L-2 Linear Fluorescent-T8 | 1 | 17 | 2 | 34 | Existing to Remain | Existing to Remain | 1 | 17 | 2 | 34 | 0 | 1872 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| G | | 1L-3 Linear Fluorescent-T8 | 1 | 23 | 2 | 46 | Existing to Remain | Existing to Remain | 1 | 23 | 2 | 46 | 0 | 1872 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| H | | 2L-4 Linear Fluorescent-T8 | 1 | 55 | 2 | 66 | Existing to Remain | Existing to Remain | 2 | 55 | 2 | 66 | 0 | 1872 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| C | Closet - "B" | 2' Linear Recessed 2'x2' | 4 | 52 | 1 | 52 | Existing to Remain | Existing to Remain | 1 | 52 | 1 | 52 | 0 | 600 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| C | Closet "D" | 2' Linear Recessed 2'x2' | 4 | 52 | 1 | 52 | Existing to Remain | Existing to Remain | 1 | 52 | 1 | 52 | 0 | 600 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| C | Closet "E" | 2' Linear Recessed 2'x2' | 4 | 52 | 1 | 52 | Existing to Remain | Existing to Remain | 1 | 52 | 1 | 52 | 0 | 600 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| A | Kitchen | 4L-T8-32w-2'x4' | 4 | 108 | 4 | 432 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 4 | 336 | 96 | 1872 | 30.16 | 180 | \$287.75 | 4 | \$38.80 | \$155.20 | \$395.20 | \$0.00 | 13.7 |
| A | Community Room | 4L-T8-32w-2'x4' | 4 | 108 | 24 | 2592 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 24 | 2016 | 576 | 1872 | 30.16 | 1,078 | \$172.52 | 24 | \$38.80 | \$951.20 | \$2,371.20 | \$0.00 | 13.7 |
| A | Preschool Classroom | 4L-T8-32w-2'x4' | 4 | 108 | 17 | 1836 | Relamp, Reballast | Sylvania Lamps FO28-841XPSSSECO Sylvania Ballast | 4 | 84 | 17 | 1428 | 408 | 2640 | 30.16 | 1,077 | \$172.34 | 17 | \$38.80 | \$659.60 | \$1,679.60 | \$0.00 | 9.7 |
| D | Utility Room - Preschool Classroom | 2L-U Tube-T8 | 2 | 55 | 3 | 165 | Existing to Remain | Existing to Remain | 2 | 55 | 3 | 165 | 0 | 2640 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |
| D | | 2L-U Tube-T8 | 2 | 55 | 1 | 55 | Existing to Remain | Existing to Remain | 2 | 55 | 1 | 55 | 0 | 2640 | 30.16 | 0 | \$0.00 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | |

| Existing Lighting Fixture Type | Room Name | Existing Fixtures | | | Proposed Fixtures | | | Fixtures Reratedified | | | Unit Installation Cost | | | Rebate Estimate | Simple Payback | | | | | | | | | | | |
|--------------------------------|------------------------------|------------------------------|-------------------|-------|-------------------|-------------|--------------------|---|-------------------|-------|------------------------|-------------|-------------------|-----------------|----------------|--------------------|--------------|---------------------|-------------------|-------------------|---------------|----------------|----------------|-----------------|-------------|------------|
| | | Lighting Fixture Description | Lampe per Fixture | Watts | Qty of Fixtures | Total Watts | Existing/Replace | Description | Lampe per Fixture | Watts | Qty of Fixtures | Total Watts | Waftage Reduction | | | Average Rate Hours | Ave \$/kwh | Energy Savings, kWh | Energy Savings \$ | Qty | Material Each | Labor Each | Total Each | Total Materials | Total Labor | Total All |
| D | Office - Preschool Classroom | 2-L-U-Tube-T8 | 2 | 55 | 4 | 220 | Existing to Remain | Existing to Remain | 2 | 55 | 4 | 220 | 0 | 2640 | \$0.16 | 0 | \$0.00 | 0 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | 9.7 |
| A | | 4L-T8-32w-2x4' | 4 | 108 | 2 | 216 | Relamp, Reballast | Sylvania Lamps FO28-841XP/SS/ECCO | 4 | 84 | 2 | 168 | 48 | 2640 | \$0.16 | 127 | \$20.28 | 2 | 38.8 | 60 | \$38.80 | \$77.60 | \$120.00 | \$197.60 | \$0.00 | 9.7 |
| A | Room 2 - Preschool Classroom | 4L-T8-32w-2x4' | 4 | 108 | 12 | 1296 | Relamp, Reballast | Sylvania Lamps FO28-841XP/SS/ECCO | 4 | 84 | 12 | 1008 | 288 | 2640 | \$0.16 | 760 | \$121.65 | 12 | 38.8 | 60 | \$38.80 | \$465.60 | \$720.00 | \$1,185.60 | \$0.00 | 9.7 |
| D | Boys Toilet Room - "A" | 2-L-U-Tube-T8 | 2 | 55 | 2 | 110 | Existing to Remain | Sylvania Ballast QHE-4K32TR/UNV ISL-SC | 2 | 55 | 2 | 110 | 0 | 2640 | \$0.16 | 0 | \$0.00 | 0 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | |
| D | Boys Toilet Room - "B" | 2-L-U-Tube-T8 | 2 | 55 | 1 | 55 | Existing to Remain | Existing to Remain | 2 | 55 | 1 | 55 | 0 | 2640 | \$0.16 | 0 | \$0.00 | 0 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | |
| D | Girls Toilet Room - "A" | 2-L-U-Tube-T8 | 2 | 55 | 1 | 55 | Existing to Remain | Existing to Remain | 2 | 55 | 1 | 55 | 0 | 2640 | \$0.16 | 0 | \$0.00 | 0 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | |
| D | Girls Toilet Room - "B" | 2-L-U-Tube-T8 | 2 | 55 | 1 | 55 | Existing to Remain | Existing to Remain | 2 | 55 | 1 | 55 | 0 | 2640 | \$0.16 | 0 | \$0.00 | 0 | 0 | 0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | |
| First Floor Summary | | | | | | | | | | | | | | 142 | 13319 | 142 | 10487 | 2832 | 7,495 | \$1,999.28 | 113 | \$4,270 | \$6,555 | \$10,825 | \$0 | 9.0 |

| | | | | | | | | | | | | | | | |
|---|-----------------------------------|--|----------------------------|-------------------------------|---------------------|-----------------------|-----------------------------|------------------------------|----------|---------------------|----------|--------------------|------------------|-----------------|--------------------|
| <p>Project Name: Buena Vista Community Center Location: Buena Vista, NJ Description: Photovoltaic System - Direct Purchase</p> | | | | | | | | | | | | | | | |
| <p>Simple Payback Analysis</p> <table border="1"> <tr> <td colspan="2" style="text-align: center;">Photovoltaic System - Direct Purchase</td> </tr> <tr> <td>Total Construction Cost</td> <td style="text-align: right;">\$362,250</td> </tr> <tr> <td>Annual kWh Production</td> <td style="text-align: right;">62,812</td> </tr> <tr> <td>Annual Energy Cost Reduction</td> <td style="text-align: right;">\$10,050</td> </tr> <tr> <td>Annual SREC Revenue</td> <td style="text-align: right;">\$21,984</td> </tr> <tr> <td>First Cost Premium</td> <td style="text-align: right;">\$362,250</td> </tr> <tr> <td>Simple Payback:</td> <td style="text-align: right;">11.31 Years</td> </tr> </table> | | Photovoltaic System - Direct Purchase | | Total Construction Cost | \$362,250 | Annual kWh Production | 62,812 | Annual Energy Cost Reduction | \$10,050 | Annual SREC Revenue | \$21,984 | First Cost Premium | \$362,250 | Simple Payback: | 11.31 Years |
| Photovoltaic System - Direct Purchase | | | | | | | | | | | | | | | |
| Total Construction Cost | \$362,250 | | | | | | | | | | | | | | |
| Annual kWh Production | 62,812 | | | | | | | | | | | | | | |
| Annual Energy Cost Reduction | \$10,050 | | | | | | | | | | | | | | |
| Annual SREC Revenue | \$21,984 | | | | | | | | | | | | | | |
| First Cost Premium | \$362,250 | | | | | | | | | | | | | | |
| Simple Payback: | 11.31 Years | | | | | | | | | | | | | | |
| <p>Life Cycle Cost Analysis</p> <p>Analysis Period (years): 25 Financing Term (mths): 0 Average Energy Cost (\$/kWh): \$0.160 Financing Rate: 0.00%</p> | | | | | | | | | | | | | | | |
| | Financing %: 0% | | | | | | | | | | | | | | |
| | 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 | Net Cash Flow | Cumulative Cash Flow | | | | | | | | |
| 0 | \$362,250 | 0 | 0 | 0 | \$0 | (\$362,250) | 0 | | | | | | | | |
| 1 | \$0 | 62,812 | \$10,050 | \$0 | \$21,984 | \$32,034 | (\$330,216) | | | | | | | | |
| 2 | \$0 | 62,498 | \$10,351 | \$0 | \$21,874 | \$32,226 | (\$297,990) | | | | | | | | |
| 3 | \$0 | 62,185 | \$10,662 | \$0 | \$21,765 | \$32,427 | (\$265,563) | | | | | | | | |
| 4 | \$0 | 61,874 | \$10,982 | \$0 | \$21,656 | \$32,638 | (\$232,925) | | | | | | | | |
| 5 | \$0 | 61,565 | \$11,311 | \$634 | \$21,548 | \$32,225 | (\$200,701) | | | | | | | | |
| 6 | \$0 | 61,257 | \$11,651 | \$631 | \$21,440 | \$32,460 | (\$168,241) | | | | | | | | |
| 7 | \$0 | 60,951 | \$12,000 | \$628 | \$21,333 | \$32,705 | (\$135,536) | | | | | | | | |
| 8 | \$0 | 60,646 | \$12,360 | \$625 | \$21,226 | \$32,962 | (\$102,574) | | | | | | | | |
| 9 | \$0 | 60,343 | \$12,731 | \$622 | \$21,120 | \$33,229 | (\$69,344) | | | | | | | | |
| 10 | \$0 | 60,041 | \$13,113 | \$618 | \$21,014 | \$33,509 | (\$35,836) | | | | | | | | |
| 11 | \$0 | 59,741 | \$13,506 | \$615 | \$20,909 | \$33,800 | (\$2,035) | | | | | | | | |
| 12 | \$0 | 59,442 | \$13,911 | \$612 | \$20,805 | \$34,104 | \$32,069 | | | | | | | | |
| 13 | \$0 | 59,145 | \$14,329 | \$609 | \$20,701 | \$34,420 | \$66,489 | | | | | | | | |
| 14 | \$0 | 58,849 | \$14,759 | \$606 | \$20,597 | \$34,750 | \$101,239 | | | | | | | | |
| 15 | \$0 | 58,555 | \$15,201 | \$603 | \$20,494 | \$35,093 | \$136,332 | | | | | | | | |
| 16 | \$0 | 58,262 | \$15,657 | \$600 | \$20,392 | \$35,449 | \$171,781 | | | | | | | | |
| 17 | \$0 | 57,971 | \$16,127 | \$597 | \$20,290 | \$35,820 | \$207,601 | | | | | | | | |
| 18 | \$0 | 57,681 | \$16,611 | \$594 | \$20,188 | \$36,205 | \$243,806 | | | | | | | | |
| 19 | \$0 | 57,393 | \$17,109 | \$591 | \$20,088 | \$36,606 | \$280,412 | | | | | | | | |
| 20 | \$0 | 57,106 | \$17,623 | \$588 | \$19,987 | \$37,021 | \$317,433 | | | | | | | | |
| 21 | \$1 | 56,820 | \$18,151 | \$585 | \$19,887 | \$37,453 | \$354,886 | | | | | | | | |
| 22 | \$2 | 56,536 | \$18,696 | \$582 | \$19,788 | \$37,901 | \$392,787 | | | | | | | | |
| 23 | \$3 | 56,254 | \$19,257 | \$579 | \$19,689 | \$38,366 | \$431,153 | | | | | | | | |
| 24 | \$4 | 55,972 | \$19,834 | \$577 | \$19,590 | \$38,848 | \$470,002 | | | | | | | | |
| 25 | \$5 | 55,692 | \$20,429 | \$574 | \$19,492 | \$39,348 | \$509,350 | | | | | | | | |
| Totals: | | | | | | | \$871,600 | \$679,683 | | | | | | | |
| | | | | | | | \$509,375 | | | | | | | | |
| | | | | | | | | 7.9% | | | | | | | |

| Building | Usable Roof Area (sq ft) | Panel | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|----------------|--------------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Community Ctr. | 10000 | Sunpower SPR230 | 175 | 14.7 | 2,573 | 40.25 | 62,812 | 5,775 | 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.



STATEMENT OF ENERGY PERFORMANCE

Martin Luther King Center

Building ID: 1790006

For 12-month Period Ending: November 30, 2008¹

Date SEP becomes ineligible: N/A

Date SEP Generated: July 09, 2009

| | | |
|---|------------------------------|---|
| Facility Martin Luther King Center 661 Jackson Road Newtonville, NJ 08346 | Facility Owner N/A | Primary Contact for this Facility N/A |
|---|------------------------------|---|

Year Built: 1992

Gross Floor Area (ft²): 10,000Energy Performance Rating² (1-100) 54**Site Energy Use Summary³**

| | |
|---------------------------------|---------|
| Electricity (kBtu) | 368,860 |
| Natural Gas (kBtu) ⁴ | 0 |
| Total Energy (kBtu) | 368,860 |

Energy Intensity⁵

| | |
|-----------------------------------|-----|
| Site (kBtu/ft ² /yr) | 39 |
| Source (kBtu/ft ² /yr) | 130 |

Emissions (based on site energy use)

| | |
|---|----|
| Greenhouse Gas Emissions (MtCO ₂ e/year) | 56 |
|---|----|

Electric Distribution Utility

Atlantic City Electric Co

National Average Comparison

| | |
|---|--------|
| National Average Site EUI | 41 |
| National Average Source EUI | 136 |
| % Difference from National Average Source EUI | -4% |
| Building Type | Office |

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

N/A

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 | <input checked="" type="checkbox"/> |
|-------------------------------|--|--|-------|-------------------------------------|
| Building Name | Martin Luther King Center | Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings? | | <input type="checkbox"/> |
| Type | Office | Is this an accurate description of the space in question? | | <input type="checkbox"/> |
| Location | 661 Jackson Road, Newtonville, NJ 08346 | Is this address accurate and complete? Correct weather normalization requires an accurate zip code. | | <input type="checkbox"/> |
| 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 | | <input type="checkbox"/> |
| Office Area (Office) | | | | |
| CRITERION | VALUE AS ENTERED IN PORTFOLIO MANAGER | VERIFICATION QUESTIONS | NOTES | <input checked="" type="checkbox"/> |
| Gross Floor Area | 10,000 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. | | <input type="checkbox"/> |
| Weekly operating hours | 55 Hours | Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed. | | <input type="checkbox"/> |
| Workers on Main Shift | 10 | Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters) | | <input type="checkbox"/> |
| Number of PCs | 6 | Is this the number of personal computers in the Office? | | <input type="checkbox"/> |
| Percent Cooled | 50% or more | Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment? | | <input type="checkbox"/> |
| Percent Heated | 50% or more | Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment? | | <input type="checkbox"/> |

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co

| Fuel Type: Electricity | | |
|---|------------|--------------------------|
| Meter: Electric (kWh) Space(s): Entire Facility | | |
| Start Date | End Date | Energy Use (kWh) |
| 10/21/2008 | 11/20/2008 | 8,400.00 |
| 09/21/2008 | 10/20/2008 | 6,720.00 |
| 08/21/2008 | 09/20/2008 | 6,480.00 |
| 07/21/2008 | 08/20/2008 | 8,240.00 |
| 06/21/2008 | 07/20/2008 | 8,240.00 |
| 05/21/2008 | 06/20/2008 | 7,440.00 |
| 04/21/2008 | 05/20/2008 | 6,320.00 |
| 03/21/2008 | 04/20/2008 | 7,440.00 |
| 02/21/2008 | 03/20/2008 | 13,040.00 |
| 01/21/2008 | 02/20/2008 | 14,880.00 |
| 12/21/2007 | 01/20/2008 | 16,640.00 |
| Electric Consumption (kWh) | | 103,840.00 |
| Electric Consumption (kBtu) | | 354,302.08 |
| Total Electricity Consumption (kBtu) | | 354,302.08 |
| Is this the total Electricity consumption at this building including all Electricity meters? | | <input type="checkbox"/> |

| 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. | <input type="checkbox"/> |

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
Martin Luther King Center
661 Jackson Road
Newtonville, NJ 08346

Facility Owner
N/A

Primary Contact for this Facility
N/A

APPENDIX G

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General Information

| Martin Luther King Center | |
|--|-------------------|
| Gross Floor Area Excluding Parking: (ft ²) | 10,000 |
| Year Built | 1992 |
| For 12-month Evaluation Period Ending Date: | November 30, 2008 |

Facility Space Use Summary

| Office Area | |
|------------------------------------|-------------|
| Space Type | Office |
| Gross Floor Area(ft ²) | 10,000 |
| Weekly operating hours | 55 |
| Workers on Main Shift | 10 |
| Number of PCs | 6 |
| Percent Cooled | 50% or more |
| Percent Heated | 50% or more |

Energy Performance Comparison

| Performance Metrics | Evaluation Periods | | Comparisons | | |
|---|-------------------------------------|--------------------------------------|--------------|--------|------------------|
| | Current (Ending Date 11/30/2008) | Baseline (Ending Date 11/30/2008) | Rating of 75 | Target | National Average |
| Energy Performance Rating | 54 | 54 | 75 | N/A | 50 |
| Energy Intensity | | | | | |
| Site (kBtu/ft ²) | 39 | 39 | 30 | N/A | 41 |
| Source (kBtu/ft ²) | 130 | 130 | 101 | N/A | 136 |
| Energy Cost | | | | | |
| \$/year | \$ 17,299.67 | \$ 17,299.67 | \$ 13,382.68 | N/A | \$ 18,091.07 |
| \$/ft ² /year | \$ 1.73 | \$ 1.73 | \$ 1.34 | N/A | \$ 1.81 |
| Greenhouse Gas Emissions | | | | | |
| MtCO ₂ e/year | 56 | 56 | 43 | N/A | 59 |
| kgCO ₂ e/ft ² /year | 6 | 6 | 5 | N/A | 6 |

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:

o - This attribute is optional.

d - A default value has been supplied by Portfolio Manager.