ENERGY AUDIT – FINAL REPORT

MONMOUTH BEACH SCHOOL

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CEG PROJECT NO. 9C08141

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Table of Contents

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I. EXECUTIVE SUMMARY

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

Monmouth Beach Board of Education
Monmouth Beach School
7 Hastings Place
Monmouth Beach, NJ 07750

Municipal Contact Person: Linda Considine
Facility Contact Person: John Immersi

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	$ 59,686
Natural Gas	$ 37,040
Total	$ 96,726

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST[A]	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)
1	Lighting Upgrade – General	$9,295	$910	10.2
2	Lighting Controls	$3,520	$1,801	1.9
3	Lighting Upgrade – Multi-Purpose Room	$9,400	$790	11.9
4	Domestic HW Heater Replacement	$1,920	$465	4.1

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

The estimated demand and energy savings are shown below in Table 2. The information in this table corresponds to the ECM's in Table 1.

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	NAT GAS (THERMS)
1	Lighting Upgrade – General	2.52	5,690	-
2	Lighting Controls	-	4,554	-
3	Lighting Upgrade – Multi-Purpose Room	1.32	4,942	-
4	Domestic HW Heater Replacement	-	4,680	(182)

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 Monmouth Beach School:

- **ECM #2:** Lighting Controls
- **ECM #4:** Domestic Hot Water Replacement

In addition to the above recommendation, CEG also has a secondary suggestion to move forward with ECM#1: Lighting Upgrade – General and ECM #3: Lighting Upgrade – Multi-Purpose Room. Although the combined simple payback is 10.9 years, these two ECMs would complete the School's upgrade of the lighting systems within the facility. The Owner should review the implementation of ECM#1 and ECM#3 and consider the benefit to the function of the facility.

II. INTRODUCTION

This comprehensive energy audit covers the 61,882 square foot Monmouth Beach School facility that includes classrooms, a multi-purpose room, administrative offices, locker rooms, and a technology lab.

The first task was to collect and review one year's worth of utility energy data for electricity and natural gas. 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 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.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from June-07 to May-08. The Owner was able to gather the information for the above-reference period for our review and analysis. Jersey Central Power and Light (JCP&L) provides electricity to the facility under their General Service Secondary Three-Phase 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. Currently, as of April 2009, the Owner is taking advantage of the New Jersey Energy Choice program and is utilizing South Jersey Energy as their new electric generation supplier. JCP&L still provides the electric service distribution to the facility.

Table 4 and Figure 2 show the natural gas energy usage for the surveyed facility from May-07 to April-08. South Jersey Energy and New Jersey Natural Gas (NJNG) both supplied natural gas to the facility during the date range noted. South Jersey Energy provided gas service under the Basic General Service (BGS) rate. Currently, as of May 2009, the Owner is taking advantage of the New Jersey Energy Choice program and is utilizing Pepco Energy Services as their new natural gas supplier. NJNG still provides the transportation service to the facility under their General Service Large (GSL) – Transport Service rate.

Based on the utility data provide by the Owner, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	16.0¢ / kWh
Natural Gas	$1.56 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
6/07	17,920	110	$ 3,555
7/07	18,080	126	$ 3,688
8/07	21,280	121	$ 4,112
9/07	36,320	148	$ 5,484
10/07	25,120	90	$ 3,749
11/07	28,160	89	$ 4,154
12/07	48,640	146	$ 7,547
1/08	24,320	89	$ 3,889
2/08	38,720	102	$ 5,863
3/08	32,160	95	$ 4,736
4/08	41,280	114	$ 6,008
5/08	40,160	128	$ 6,901
Totals	**372,160**	**148 MAX**	**$59,686**

Figure 1
Electricity Usage Profile

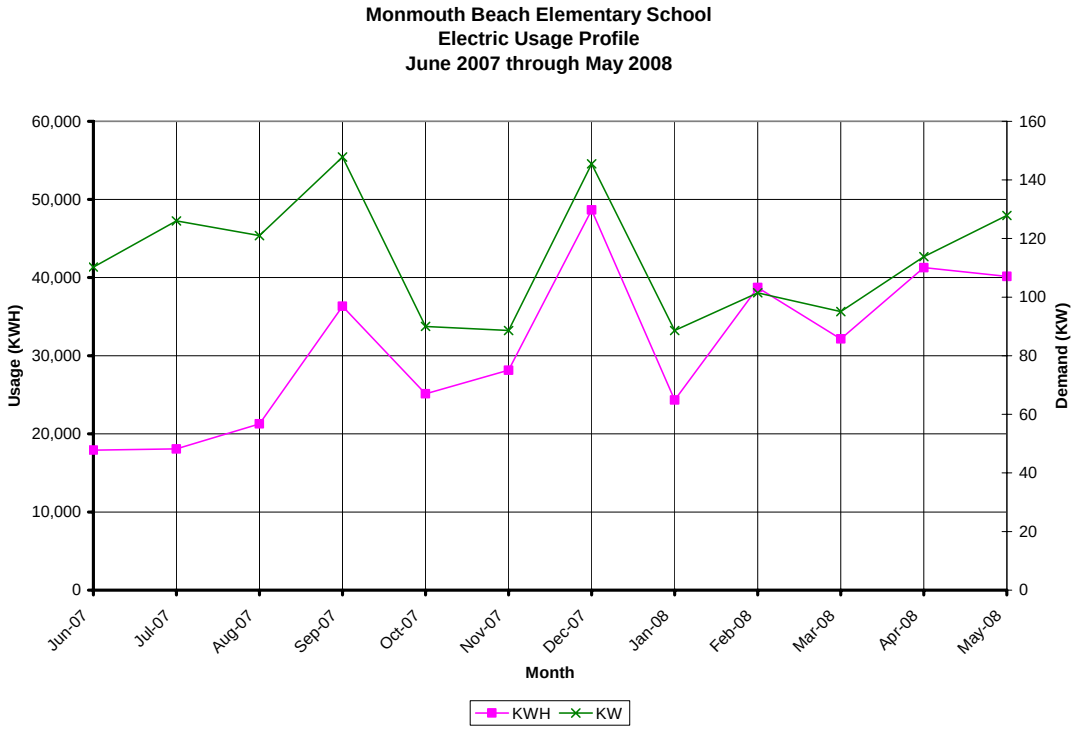
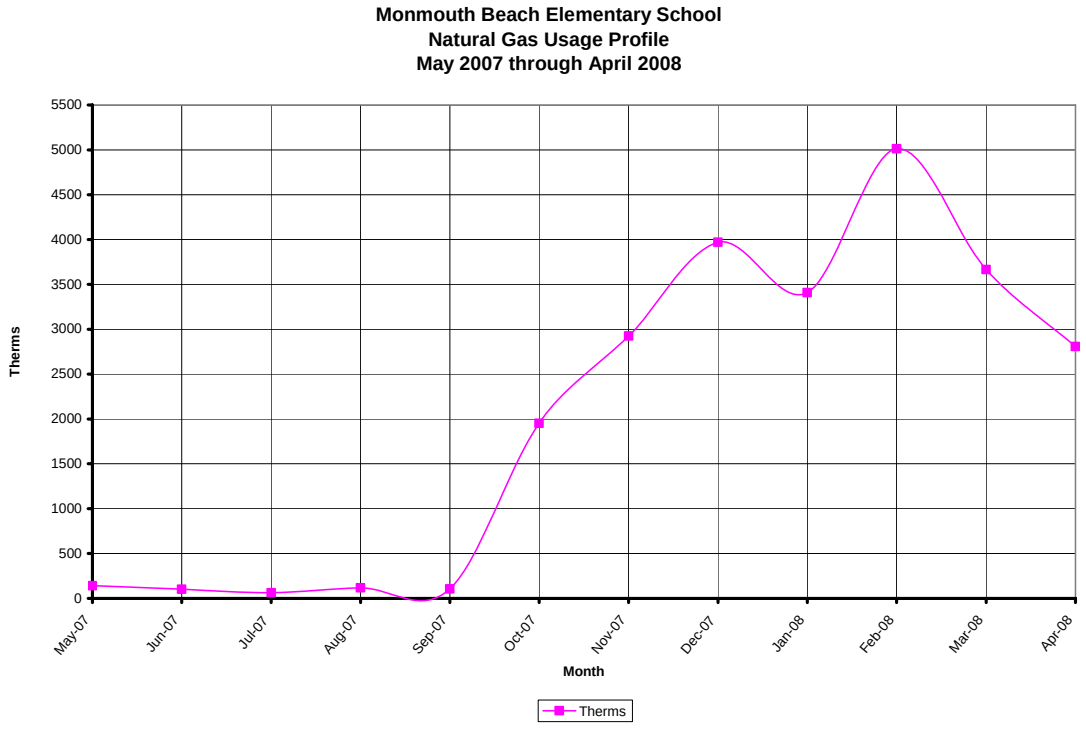


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
5/07	142.0	$781
6/07	102.5 [A]	$722 [A]
7/07	63.0	$663
8/07	118.0	$745
9/07	104.0	$725
10/07	4,877.0 [B]	$7,195 [B]
11/07		
12/07	3,971.0	$5,640
1/08	3,408.0	$4,921
2/08	5,013.0	$6,967
3/08	3,665.0	$5,249
4/08	2,808.0	$4,154
Totals	**25,089.0**	**$37,762**

Notes:
A. Utility information for 6/07 is estimated; utility bill was not provided by Owner for this month.
B. For 10/07 and 11/07, one billing period was reported by the utility company for these respective months.

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance amongst building of similar type. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. Their website allows the user to determine how well the client's building energy use intensity (EUI) compares with similar facilities throughout the U.S. and in your specific region or state. Figure 3 below depicts a national EUI grading for elementary schools. The EUI for this facility is calculated as follows:

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

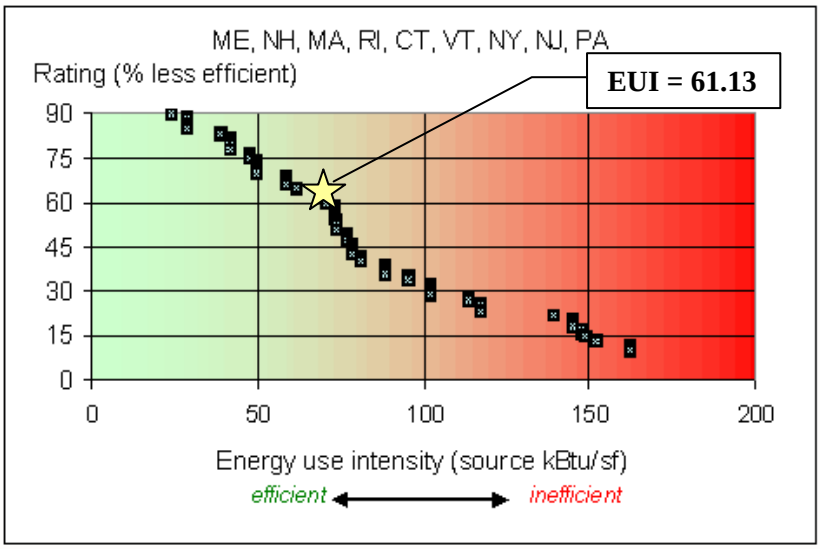
Electric = ((372,160 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 1,270,554 kBtu/h

Gas = ((25,089 therms) * (100,000 Btu/h / 1 W)) / (1000 Btu/h / 1 kBtu/h) = 2,508,900 kBtu/h

$$Building\ \ EUI = \frac{(1{,}270{,}554\ kBtu/h + 2{,}508{,}900\ kBtu/h)}{61{,}882\ SF} = \frac{3{,}779{,}454\ kBtu/h}{61{,}822\ SF}$$

Monmouth Beach School EUI = 61.13 kBtu/SF

Figure 3
Energy Use Intensity Distributions: Schools



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 Start account for the municipal in order to allow the municipal access to monitoring their yearly energy usage as it compares to facilities of similar type. The following is the user name and password for this account:

User Name: monmouthbeaches

Password: lgeaceg2009

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
Monmouth Beach School	57	50

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

V. FACILITY DESCRIPTION

The 61,882 SF Monmouth Beach School is comprised of classrooms, a large multi-purpose room with an adjacent stage, administrative offices, a faculty room, and specialized media and technology rooms. The typical hours of operation for this facility are between 7:00 am and 3:30 pm for the classrooms, and 6:30 am and 4:00 pm for the aforementioned offices. The building contains typical construction throughout. Exterior walls are brick/block construction with minimum insulation typical of their time period and provide a decent barrier against infiltration. The amount of insulation within the wall is an unknown quantity. The windows throughout the facility are in good shape and appear to be maintained by the owner. Typical windows throughout the facility are double pane, ¼" thermal panels with aluminum frames and integral blinds. The integral blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof assembly is approximately nineteen (19) years old and is constructed of a built-up roof with light color stone covering. The amount of insulation below the roofing is unknown. Originally built in 1953, the school has undergone two renovations. The first was completed in 1974, and significantly increased the square footage of the school by adding classrooms, offices, the multi-purpose room, and the boiler room. The second renovation occurred in 2001, and consisted of the addition of six new classrooms on the north side of the building.

Heating Plant

The facility is heated via a boiler plant located in the first floor boiler room. The boiler plant consists of four (4) gas-fired, Fulton Pulse-Pak boilers that were installed in 2004 by Miller-Chitty Co. One (1) boiler is a Fulton PHW1400 with an input of 1,400 Btu/h and an output of 1,204 Btu/h. The remaining three (3) boilers are Fulton PHW 2000 with an input of 2,000 Btu/h and output of 1,680 Btu/h, respectively. One (1) set of inline pumps provides flow to the new additions of the school consisting of 3 HP motors having an efficiency of 82%, while one (1) set of end suction pumps is used to provide heating hot water to the existing part of the building. The end-suction pumps contain 3 HP motors having an estimated efficiency of 87.5%.

Classrooms

Classrooms are heated, cooled and ventilated by means of unit ventilators located within each room; the make and model of unit ventilator varies throughout the building. A majority of the classrooms added in 1974 are fitted with AAF/Herman–Nelson unit ventilators equipped with one (1) row hot water coils and DX coils with remote condensing units located on the roof. However, three classrooms along the east side have not been retro-fitted, and are currently using Nesbitt Vintage unit ventilators that contain heating coils only. The Classrooms added in 2001 are all equipped with Airedale Classmate units that contain hot water heating coils, DX cooling coils with remote condensing units located on the roof. The Airedale units serving these classrooms are ducted above each space into an overhead air distribution system.

The Music Room is heated, cooled and ventilated via forced air from a rooftop unit that is ducted to the room. Zone level heating coils are provided within the duct distribution system to meet the heating needs of the individual zones.

Offices

The Offices of the facility, added in 1974, are all heated, cooled and ventilated via overhead air distribution fed from rooftop air-handling units containing a cooling section only. Zone level heating coils are provided within the duct distribution system to meet the heating needs of the individual zones.

Multi-Purpose Room

The Multi-Purpose Room receives heating and ventilation via indoor, air-handling units suspended at the ceiling within the space that contain hot water coils. This room is not mechanically cooled.

Toilets, Corridors and Locker Rooms

Toilets, Corridors, and Locker Rooms are heated via cabinet heaters containing hot water coils.

Exhaust System

Exhaust air for this facility is exhausted from each space via rooftop exhaust fans of various sizes. Exhaust fans are operated based on the facility occupancy schedule.

Domestic Hot Water

Domestic hot water for the restrooms/showers is provided by an A. O. Smith gas-fired hot water heater, 100-gallon capacity and 199,000 Btu/h input.

HVAC Control System

The original control system for the facility consisted of a pneumatic air control system pressurized by an air compressor. However, in recent years the Owner has began to retro-fit the entire control system throughout the building to direct digital control (DDC). The majority of the building is controlled via the DDC system and is operated on a facility occupancy schedule as set by the Owner. The Owner has control of the DDC system via a computer front-end located in the Maintenance Office.

Lighting

A lighting retro-fit has been conducted throughout most of the school in accordance with the renovations. Typical lighting within the Classrooms and Offices are provided by 2’x4’ lay-in type fixtures with T8 lamps. It was noted that each classroom, has a T12 strip-light located above each chalk-board that had not been retro-fitted as part of other projects.

The Multi-Purpose Room is lit via metal-halide light fixtures located at approximately 24’-0” above the finished floor. Each fixture contains 250W, twist-lock lamps.

The Media Center has pendant-hung, direct/indirect T8 fixtures that provide the lighting for the space.

VI. MAJOR EQUIPMENT LIST

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

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade – General

Description:

During CEG's site survey it was noted that a major lighting replacement has already begun throughout the facility. The majority of classrooms, office spaces and similar areas contain lighting fixtures with T8 lamps and electronic ballasts. There were a few classrooms and storage rooms that have not received lighting fixture upgrades. These rooms contain lighting fixtures with T12 lamps and magnetic ballasts. The majority of the remaining T12 fixtures were located within the classrooms as lighting for the chalk-boards.

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 portion of the facility, approximately 2,260 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.

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

$$\text{Smart Start®}\ Incentive = (75 \times\ \$\ 25) + (36 \times\ \$\ 30) = \underline{\$2{,}955}$$

Maintenance Savings are calculated as follows:

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

$$Maintenance\ Savings = (256 \times 33\%\ reduction \times \$\ 2.00) + (\$20 \times 85) = \underline{\$1{,}870}$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$14,120
NJ Smart Start Equipment Incentive ($):	($2,955)
Maintenance Savings ($):	($1,870)
Net Installation Cost ($):	*$9,295*
Total Energy Savings ($ / yr):	*$910*
Simple Payback (yrs):	*10.2*

ECM #2: Lighting Controls

Description:

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

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

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

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large classrooms, office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper or equivalent. There are approximately sixty-four (64) sensors required for this project.

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the existing classrooms, offices, locker rooms, storage rooms, equipment rooms, etc. to be 0.8 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

$$Energy\ Savings = \left(10\% \times\ Watts/SF \times Building\ SF \times Operating\ Hours \times \$/kWh\right)$$

$$Energy\ Savings = \left(10\% \times\ 0.8\,Watts/SF \times 56{,}925\ SF \times 2{,}472 \times \$0.16/kWh\right) = \underline{\$\,1{,}801\ per\ year}$$

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

$$Installation\ Cost = \left(\#\ of\ \ sensors \times\ \$\ per\ sensor\right) = (64 \times \$75) = \underline{\$\ 4{,}800}$$

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the incentive for installing a lighting control is $20 per controller.

$$\text{Smart Start® } Incentive = (\#\ of\ \ controller \times\ \$\ 20) = (64 \times \$\ 20) = \underline{\$\,1{,}280}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,800
NJ Smart Start Equipment Incentive ($):	$1,280
Maintenance Savings ($):	$0
Net Installation Cost ($):	*$3,520*
Total Energy Savings ($ / yr):	*$1,801*
Simple Payback (yrs):	*1.9*

ECM #3: Lighting Upgrade – Multi-Purpose Room

Description:

The Multi-Purpose Room is currently lit via twenty (20) HID, 250 W Metal Halide fixtures that are mounted approximately 20'-0" above the finished floor. The lighting system is antiquated and the space would be better served with a more efficient, fluorescent lighting system. Studies have shown that metal halide lighting systems have a steep lumen depreciation rate (rate at which light is produced from fixture) which equates to approximately a 26% to 35% reduction in lighting output at 40% of the rated lamp life. In addition, the new fluorescent system will provide a better quality of light and save the Owner many dollars on replacement of the highly expensive metal halide lamps.

CEG recommends upgrading the lighting within the Multi-Purpose Room to an energy-efficient T-5 lighting system that includes new lighting fixtures with high efficiency, electronic ballasts and T-5 high output (HO) lamps. The T-5 HO lamps are rated for 20,000 hours versus the 10,000 hours for the 250W Metal Halide lamps so there would be a savings in replacement cost and labor. In addition to the standard lighting features of the T-5 fixtures; a day-lighting option could be selected for the outside rows of light to take advantage of the natural daylight that provides light to the room during the day via the clerestory.

This measure replaces all the HID, 250 W Metal Halide fixtures in the Multi-Purpose Room with a well-designed T-5 lighting system. Approximately twenty (20), 4-lamp THO high bay fixtures with reflectors and high-efficiency, electronic ballasts will be required in order to meet the mandated 50 foot-candle average within the Multi-Purpose Room.

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 250 W HID fixture to a T-5 or T-8 fixture warrants the following incentive: $50 per fixture.

$$\text{Smart Start®}\ \textit{Incentive} = (\#\ \textit{of}\ \ \textit{fixtures} \times\ \$50) = (20 \times \$50) = \underline{\$1{,}000}$$

Maintenance savings are calculated based on the facility operational hours as indicated by the Owner. For the Multi-Purpose Room the estimated operational hours are 3,744 hours per year. Based on the lamp life comparison, there will be two (2) complete lamp replacements required for the metal halide system at the time when one (1) complete lamp replacement would be required for the fluorescent lighting system. Based on industry pricing, the lamp cost for a 250W metal halide lamp is approximately ±$25 per lamp and a T-5 54HO fluorescent lamp is approximately ±$5 per lamp. Therefore, the maintenance savings are calculated as follows:

$$Maintenance\ Savings = (\#\ of\ \ MH\ \ lamps \times\ \ \$25\ \ per\ \ lamp) - (\#\ of\ \ T5HO\ lamps \times \$5\ \ per\ \ lamp)$$

$$Maintenance\ Savings = (40\ lamps \times\ \ \$25\ \ per\ \ lamp) - (80\ lamps \times \$5\ \ per\ \ lamp) = \underline{\$600}$$

It is pertinent to note, that installation labor was not included in the maintenance savings.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,000
NJ Smart Start Equipment Incentive ($):	($1,000)
Maintenance Savings ($):	($600)
Net Installation Cost ($):	*$9,400*
Total Energy Savings ($ / yr):	*$790*
Simple Payback (yrs):	*11.9*

ECM #4: Domestic Hot Water Heater Replacement

Description:

The locker rooms receive domestic hot water from an electric domestic hot water heater located in a storage room adjacent to Locker Room #34. The electric domestic hot water heater is an AO Smith, Model EES with an approximate age of ten (10) years. This heater is now at the end of its service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook; the estimated service life for a domestic hot water heater is ten (10) years.

This energy conservation measure will replace the existing electric, 4,500 Watt, 50-gallon capacity domestic hot water heater with one (1) gas-fired, tankless water heater; basis of design: Rheem GT Series or equivalent. Tankless water heaters heat water directly without the use of a storage tank. Therefore, they avoid the standby heat losses associated with storage water heaters. In a gas-fired tankless water heater, a gas burner heats the water and provides a constant supply of hot water. You do not need to wait for the storage tank to fill up with enough hot water.

Energy Savings Calculations:

Existing Electric DHW Heater Characteristics

No. of Units:	1
Rated Capacity:	4,500 Watts
Energy Factor (EF):	0.90
Storage Capacity:	50 gal

Operating Data for Existing Electric DHW Heater

Electricity Cost:	$0.16/kWh
Operating Hours:	1,040 hrs
Usage (gal/day):	64

$$Electric\ Usage = \frac{(Operatings\ Hours \times Electric\ Input)}{1000\ \frac{Watts}{kW}} = \frac{(1040\ hrs \times 4{,}500\ W)}{1000\ \frac{Watts}{kW}} = \underline{4{,}680\ kWh}$$

Electric Cost = Electric Usage x Electricity Cost = 4,680 kWh x $0.16/kWh = $748.80 per year

Proposed High-Efficiency Gas-Fired Tankless Water Heater Characteristics

No. of Units:	1
Rated Capacity:	199 MBH in
Energy Factor (EF):	0.82
Storage Capacity:	N/A

Operating Data for Proposed High-Efficiency Gas-Fired Tankless Water Heater

Natural Gas Cost:	$1.56/therm
Operating Hours:	1,040 hrs
Usage (gal/day):	64

Annual Natural Gas Usage for one (1) 4.1 GPM, 199 MBH input tankless gas-fired unit is estimated at approximately 182 therms.

Natural Gas Cost = NG Usage x NG Cost = 182 therms x $1.56/therm = $283.92 per year

$$\textit{Annual Energy Savings} = \textit{Electric Cost} - \textit{Natural Gas Cost} = \$748.80 - \$283.92 = \$465 \textit{ per year}$$

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the installation of a gas-fired domestic hot water heater with a storage capacity less than 50 gallons and an EF >0.62 warrants the following incentive: $50 per unit.

$$\text{Smart Start®}\ \textit{Incentive} = (\#\ \textit{of units} \times\ \$50) = (1 \times \$50) = \$50$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,385
NJ Smart Start Equipment Incentive ($):	($50)
Maintenance Savings ($):	($0)
Net Installation Cost ($):	*$1,920*
Total Energy Savings ($ / yr):	*$465*
Simple Payback (yrs):	*4.1*

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 and wind 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 6,220 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in Appendix G. Using this square footage it was determined that a system size of 97.52 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 152,184 KWh annually, reducing the overall utility bill by approximately 40% 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 via one of the methods noted in Section X, Installation Funding Options. 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%

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

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the Monmouth Beach School. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for Monmouth Beach School it was determined that the average wind speed of approximately seven (7) mile per hour is adequate, however the kilowatt demand for the building is below the threshold (200 kW typically) for purchase of a commercial wind turbine. Therefore, CEG has determined that wind energy is not a viable option for the Owner to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

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

Electricity:

Section IV, Figure 1 demonstrates a base load profile as it pertains to electric usage. The electric consumption curve appears to be relatively consistent throughout the study period. There is on inconsistency that appears in December of 2007. This could have occurred due to excess use of the facility outside of the normal occupied hours. The electric demand curve follows the consumption profile but is higher than the consumption during the cooling season. This is because the air-conditioning equipment represents substantial kilowatt demand, however it is not operated for many hours because of summer schedule; therefore, the consumption is low.

Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load profile with major consumption occurring October 2007 through April 2008. This is occurrence is characteristic of a school operating schedule as the most consumption is occurring during the heating season when the facility has its highest occupancy.

Tariff Analysis:

Electricity:

Monmouth Beach School receives electrical service through Jersey Central Power and Light Company (JCP&L) on a General Service Secondary Three-Phase 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 and other standard charges. Currently, as of April 2009, the Owner is taking advantage of the New Jersey Energy Choice program and is utilizing South Jersey Energy as their new electric generation supplier. JCP&L still provides the electric service distribution to the facility.

Natural Gas:

Monmouth Beach School received natural gas service through South Jersey Energy and New Jersey Natural Gas (NJNG) during the study period. South Jersey Energy provided gas service under their Basic General Service (BGS) rate. Currently, as of May 2009, the Owner is taking advantage of the New Jersey Energy Choice program and is utilizing Pepco Energy Services as

their new natural gas supplier. NJNG still provides the transportation service to the facility under their General Service Large (GSL) – Transport Service rate. The GSL utility tariff is for delivery service for general purposes only. It is pertinent to note, since Monmouth Beach School has elected to utilize a Third Party Supplier (TPS), if the TPS should not deliver, the customer may receive service from NJNG under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

Recommendations:

CEG's recommendation is limited due to the fact that Monmouth Beach School has already contracted through the New Jersey Energy Choice program for electricity and natural gas utilizing third party suppliers for their commodity purchasing. CEG recommends that Monmouth Beach School's representatives keep abreast of the ever-changing utility purchasing climate and review their current contracts so that when the contracts are void, the School will be more educated in their decision making. Fore reference, Monmouth Beach School 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, Monmouth Beach School should also ask their 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.

B. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

C. Maintain all weather stripping on windows and doors.

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

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

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

G. Recalibrate existing temperature sensors serving the HVAC control system.

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

I. Clean all light fixtures to maximize light output.

J. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling.

In addition to the recommendations above, CEG would also like to suggest Retro-Commissioning. Retro-Commissioning is a means to verify your current equipment is operating at its designed capacity, airflow, etc. Commissioning Agents, after defining what the original system design parameters are, would recommend revisions to the current system operating characteristics and utilize an independent testing and balancing company to perform air and water balancing on the existing systems.

Electric Cost Summary

Jersey Central Power & Light

General Service Secondary 3 Phase

Monmouth Beach Elementary School **2008**

Account # 10 00 14 3382 1 2

Meter # 21 057 364

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	24,320	38,720	32,160	41,280	40,160	17,920	18,080	21,280	36,320	25,120	28,160	48,640	372,160	
KW	89	102	95	114	128	110	126	121	148	90	89	146	148	Max
Monthly Load Factor	37%	57%	45%	50%	42%	23%	19%	24%	34%	38%	44%	45%	38%	
Electric Delivery, $	$ 869	$ 1,097	$ 990	$ 1,203	$ 1,347	$ 1,018	$ 1,129	$ 1,129	$ 1,405	$ 909	$ 933	$ 1,520	$13,550	
Delivery $/kwh	$0.036	$0.028	$0.031	$0.029	$0.034	$0.057	$0.062	$0.053	$0.039	$0.036	$0.033	$0.031	$0.036	
Electric Supply, $	$ 2,710	$ 4,315	$ 3,584	$ 4,600	$ 5,348	$ 2,355	$ 2,376	$ 2,797	$ 4,047	$ 2,799	$ 3,138	$ 5,420	$43,489	
Supply $/kwh	$0.111	$0.111	$0.111	$0.111	$0.133	$0.131	$0.131	$0.131	$0.111	$0.111	$0.111	$0.111	$0.117	
Miscelanious Charges	$309	$451	$162	$205	$206	$182	$183	$186	$32	$41	$83	$607	$2,647	
Total Cost, $	$3,889	$5,863	$4,736	$6,008	$6,901	$3,555	$3,688	$4,112	$5,484	$3,749	$4,154	$7,547	$59,686	
$/KWH	$0.160	$0.151	$0.147	$0.146	$0.172	$0.198	$0.204	$0.193	$0.151	$0.149	$0.148	$0.155	**$0.160**	

Summary of Natural Gas Cost

South Jersey Energy, NJ Natural Gas

Monmouth Beach Elementary School **2008**

Account # 06 3227 4685 25

Meter # 642944

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	**Total**	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31		
Therms (Burner Tip)	3408.0	5013.0	3665.0	2808.0	142.0	102.5	63.0	118.0	104.0	1950.8	2926.2	3971.0	24271.5	
Total Distribution Cost	$1,417	$1,814	$1,481	$1,268	$598	590.0	$582	$593	$591	$872	$1,309	$1,557	12,673	Utility Charge
Cost per Therm	$0.416	$0.362	$0.404	$0.452	$4.211	$5.756	$9.238	$5.025	$5.686	$0.179	$0.268	$0.392	$0.522	
Total Commodity Cost	$3,503	$5,153	$3,768	$2,887	$183	132.0	$81	$152	$134	$2,005	$3,008	$4,082	25,089	Current Charge
Cost per Therm	$1.03	$1.03	$1.03	$1.03	$1.29	$1.29	$1.29	$1.29	$1.29	$0.41	$0.62	$1.03	$1.03	
Total Cost	$4,921	$6,967	$5,249	$4,154	$781	$722	$663	$745	$725	$2,878	$4,317	$5,640	$37,762	
Cost per Therm	$1.444	$1.390	$1.432	$1.480	$5.501	$7.044	$10.524	$6.314	$6.975	$0.590	$0.885	$1.420	**$1.556**	

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

=Utility Information for Oct 07 and Nov 07 was one bill. Engineer average bill (40% - Oct, 60% Nov) for graphing purposes.

CONSTRUCTION COST AND REBATES

CONCORD ENGINEERING GROUP

Monmouth Beach Elementary School

ECM 1 LIGHTING UPGRADE - GENERAL

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$14,120	$0	$0	$14,120
Total Cost			$0	$0	$14,120
Utility Incentive - NJ Smart Start					($2,955)
Total Cost Less Incentive					$11,165

ECM 2 LIGHTING CONTROLS - OFFICE/STORAGE AREAS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	64	$75	$4,800	$0	$4,800
Total Cost			$4,800	$0	$4,800
Utility Incentive - NJ Smart Start					($1,280)
Total Cost Less Incentive					$3,520

ECM 3 LIGHTING UPGRADE - MULTI-PURPOSE ROOM

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Fixture Replacement	LS	$11,000	$0	$0	$11,000
Total Cost			$0	$0	$11,000
Utility Incentive - NJ Smart Start					($1,000)
Total Cost Less Incentive					$10,000

ECM 4 DOMESTIC HOT WATER HEATER REPLACEMENT

	Qty	Unit Cost $	Material $	Labor $	Total $
New Tankless Hot Water Heater	1	$1,485	$990	$495	$1,485
Venting Kit	1	$400	$100	$300	$400
Gas Piping	1	$500	$200	$300	$500
Total Cost			$990	$495	$2,385
Utility Incentive - NJ Smart Start					($50)
Total Cost Less Incentive					$2,335

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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

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Monmouth Beach Elementary School"

Gas-Fired Hot Water Boilers

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
B-1	Boiler Room	Fulton Pulse	1	PHW-1400	-	1400	1204	86%	Nat. Gas	5	35	30
B-2	Boiler Room	Fulton Pulse	1	PHW-2000	-	2000	1680	84%	Nat. Gas	5	35	30
B-3	Boiler Room	Fulton Pulse	1	PHW-2000	-	2000	1680	84%	Nat. Gas	5	35	30
B-4	Boiler Room	Fulton Pulse	1	PHW-2000	-	2000	1680	84%	Nat. Gas	5	35	30

Boiler - Pumps

Tag	Location	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life	
-	Boiler Room	Taco - Inline	2	GV2004AE	-	5	1725	-	75	208	3	6	10	4	
-	Boiler Room	B&G - End Suct	2	1510	-	3	1775	45	75	208	3	8	20	12	* Wattsaver Motor

Domestic Hot Water Heaters

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
-	Boiler Room	AO Smith	1	BTR-200A	LD02-1657456-110	199	193	100	83%	Nat. Gas	5	10	5
-	Storage Rm (#34)	AO Smith	1	EES52917	GE01-6638824-917	4.5 kW	-	50	-	Elect	10	10	0

Rooftop Air Handling Units

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Cooling Type	Cooling Capacity	EER	Heating Type	Heating Capacity	Eff	Fan HP	Motor RPM	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
RTU-1	Roof	Trane	1	THC036	208101605L	DX R-22	38 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-2	Roof	Trane	1	THC048	208101618L	DX R-22	49.8 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-3	Roof	Trane	1	TCD074	Z08101543D	DX R-22	74 MBh	10.3	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-4	Roof	Trane	1	TCD091	R39103570D	DX R-22	91 MBh	10.4	Cooling Only; No Heating			3	1750	208	3	7	15	8
RTU-5	Roof	Trane	1	THC102	209100004L	DX R-22	98 MBh	11.5	Cooling Only; No Heating			2	1750	208	3	7	15	8
RTU-6	Roof	Trane	1	THC036	208101788L	DX R-22	38 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-7	Roof	Trane	1	THC036	208101739L	DX R-22	38 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-8	Roof	Trane	1	THC060	208101638L	DX R-22	62.4 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
RTU-9	Roof	Trane	1	THC060	208101752L	DX R-22	62.4 MBh	13	Cooling Only; No Heating			1	1750	208	3	7	15	8
MUA-1	Roof	Trane	1	GRCA15PD	L02A01242	N/A	N/A	N/A	NG	150 MBh	80%	3/4	1750	208	3	7	15	8

Air-Cooled Condensing Units

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
_	Roof	Trane	1	2TTA042	20211XA3F	3.5 ton	10 SEER	R-22	208	3	7	20	13
_	Roof	Armstrong	1	4SC414LE136	1608A11455	3 ton	14 SEER	R-22	208	3	7	20	13
_	Roof	Armstrong	1	4SC414LE136	-	3 ton	14 SEER	R-22	208	3	7	20	13
_	Roof	Lennox	1	TSA036	5807E17877	3 ton	13 SEER	R-22	208	3	7	20	13
_	Roof	Trane	1	2TTA2042	3281UYR3F	3.5 ton	12 SEER	R-22	208	3	7	20	13
_	Roof	Trane	1	2TTA036	3111LDM3F	3 ton	12 SEER	R-22	208	3	6	20	14
_	Roof	Trane	1	2TTA036	311K8D3F	3.5 ton	12 SEER	R-22	208	3	6	20	14
_	Roof	Lennox	1	TSA036	5806J25042	3 ton	1 3SEER	R-22	208	3	7	20	13
_	Roof	Lennox	1	TSA036	5807E17864	3 ton	13 SEER	R-22	208	3	7	20	13
_	Roof	Lennox	1	TSA036	5807E17863	3 ton	13 SEER	R-22	208	3	7	20	13
_	Roof	York	1	HABAT036	W0N5575373	3 ton	10 SEER	R-22	208	3	7	20	13
_	Roof	York	1	HABAT036	W0F6422114	3 ton	10 SEER	R-22	208	3	7	20	13
_	Roof	York	1	HABAT036	W0N5575370	3 ton	10 SEER	R-22	208	3	7	20	13

Unit Ventilators

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Supply CFM	Cooling Type	Cooling Capacity	Heating Type	Heating Capacity	Fan HP	Motor RPM	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
_	Classrooms No. 1-6, 11, 12	AAF-Herman Nelson	8	AVS13	-	1250	DX R-22	41.1 MBh	HW	57.0 MBh	1/4	1750	120	1	7	20	13
_	Classroom No. 30	Trane	2	VUV105	-	1500	DX R-22	50.7 MBh	HW	77.7 MBh	2 - 1/10	1750	120	1	6	20	14
_	Classrooms No. 7,8,9	Trane	3	VUV105	-	1500	DX R-22	50.7 MBh	HW	77.7 MBh	2 - 1/10	1750	120	1	7	20	13
_	Faculty Rm 17	Trane	1	VUV105	-	1500	DX R-22	50.7 MBh	HW	77.7 MBh	2 - 1/10	1750	120	1	7	20	13
_	Classrooms No. 13,14,15	Nesbitt	3	-	-	1250	-	-	HW	57.0 MBh	1/4	1750	120	1	34	20	(14)
_	Art Room No. 16	Trane	1	VUV105	-	1500	-	-	HW	77.7 MBh	2 - 1/10	1750	120	1	34	20	(14)

Self-Contained Air Handling Units

Tag	Location	Manufacturer	Qty.	Model #	Serial #	Supply CFM	Cooling Type	Cooling Capacity	EER	Heating Type	Heating Capacity	Fan HP	Motor RPM	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
_	Classrooms No. 18-23	Airedale Classmate	6	CMH	-	1500	DX R-22	45.3 MBh	9	Heat Pump	30.6 MBh	1/2	1750	208	3	7	15	8

Note: Unit access key was unavailable.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Monmouth Beach School

Building ID: 1765824
For 12-month Period Ending: April 30, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 05, 2009

Facility
Monmouth Beach School
7 Hastings Place
Monmouth Beach, NJ 07750

Facility Owner
Monmouth Beach School
7 Hastings Place
Monmouth Beach, NJ 07750

Primary Contact for this Facility
Linda Considine
7 Hastings Place
Monmouth Beach, NJ 07750

Year Built: 1953
Gross Floor Area (ft²): 61,822

Energy Performance Rating[2] (1-100) 57

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	2,427,150
Electricity (kBtu)	1,132,784
Total Energy (kBtu)	3,559,934

Energy Intensity[5]

Site (kBtu/ft²/yr)	59
Source (kBtu/ft²/yr)	108

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	329

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	63
National Average Source EUI	115
% Difference from National Average Source EUI	-7%
Building Type	K-12 School

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 S. Burnt Mill Rd
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Monmouth Beach School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	7 Hastings Place, Monmouth Beach, NJ 07750	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		☐

Monmouth Beach School (K-12 School)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	61,822 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.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	129	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	No	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	70 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

Months	10 (Optional)	Is this school in operation for at least 8 months of the year?		
High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: Electric Meter - Acct 10 00 14 3382 1 2 (kWh)
Space(s): Entire Facility

Start Date	End Date	Energy Use (kWh)
04/01/2008	04/30/2008	41,280.00
03/01/2008	03/31/2008	32,160.00
02/01/2008	02/29/2008	38,720.00
01/01/2008	01/31/2008	24,320.00
12/01/2007	12/31/2007	48,640.00
11/01/2007	11/30/2007	28,160.00
10/01/2007	10/31/2007	25,120.00
09/01/2007	09/30/2007	36,320.00
08/01/2007	08/31/2007	21,280.00
07/01/2007	07/31/2007	18,080.00
06/01/2007	06/30/2007	17,920.00
Electric Meter - Acct 10 00 14 3382 1 2 Consumption (kWh)		**332,000.00**
Electric Meter - Acct 10 00 14 3382 1 2 Consumption (kBtu)		**1,132,784.00**
Total Electricity Consumption (kBtu)		**1,132,784.00**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Natural Gas - Acct # 06 3227 4685 25 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
04/01/2008	04/30/2008	2,808.00
03/01/2008	03/31/2008	3,665.00
02/01/2008	02/29/2008	5,013.00
01/01/2008	01/31/2008	3,408.00
12/01/2007	12/31/2007	3,971.00
11/01/2007	11/30/2007	4,877.00
10/01/2007	10/31/2007	0.00
09/01/2007	09/30/2007	104.00
08/01/2007	08/31/2007	118.00
07/01/2007	07/31/2007	63.00

06/01/2007	06/30/2007	102.50
05/01/2007	05/31/2007	142.00
Natural Gas - Acct # 06 3227 4685 25 Consumption (therms)		**24,271.50**
Natural Gas - Acct # 06 3227 4685 25 Consumption (kBtu)		**2,427,150.00**
Total Natural Gas Consumption (kBtu)		**2,427,150.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Monmouth Beach School
7 Hastings Place
Monmouth Beach, NJ 07750

Facility Owner
Monmouth Beach School
7 Hastings Place
Monmouth Beach, NJ 07750

Primary Contact for this Facility
Linda Considine
7 Hastings Place
Monmouth Beach, NJ 07750

General Information

Monmouth Beach School	
Gross Floor Area Excluding Parking: (ft^2)	61,822
Year Built	1953
For 12-month Evaluation Period Ending Date:	April 30, 2008

Facility Space Use Summary

Monmouth Beach School	
Space Type	K-12 School
Gross Floor Area(ft^2)	61,822
Open Weekends?	No
Number of PCs	129
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	70
Percent Heated	100
Months[o]	10
High School?	No
School District[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2008)	**Baseline** (Ending Date 04/30/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	57	57	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	59	59	50	N/A	63
Source ($kBtu/ft^2$)	108	108	90	N/A	115
Energy Cost					
$/year	$ 90,457.00	$ 90,457.00	$ 75,732.15	N/A	$ 96,841.84
$/$ft^2$/year	$ 1.46	$ 1.46	$ 1.22	N/A	$ 1.56
Greenhouse Gas Emissions					
$MtCO_2e$/year	329	329	275	N/A	352
$kgCO_2e/ft^2$/year	5	5	4	N/A	5

More than 50% of your building is defined as K-12 School. 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.

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C08141
Project: Monmouth Beach ES Energy Audit
Address: 7 Hastings Place
Monmouth Beach, NJ 07750
Building SF: 61882

"Monmouth Beach Elementary School"

DATE: 06/01/2009
KWH COST: $0.160

ECM #1: Lighting Upgrade - General

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	Classroom -1	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
2	B	Classroom -2	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
3	B	Classroom -3	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
4	B	Classroom -4	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
5	B	Classroom -5	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
6	B	Classroom -6	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38

7	B	Classroom - 7	15	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.22	2745.9	$439.34	15	No Change Required.	81	1.22	2745.9	$439.34	$0.00	$0.00	0.00	0	$0.00	0.00
8	B	Classroom - 8	15	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.22	2745.9	$439.34	15	No Change Required.	81	1.22	2745.9	$439.34	$0.00	$0.00	0.00	0	$0.00	0.00
9	B	Classroom - 9	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
10	A	Boiler Rm - 10	8	1'X4' 1-Lamp T-12 Industrial Strip Magnetic Ballast	2260	50	0.40	904	$144.64	8	1'X4' 1-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF	28	0.22	506.24	$81.00	$80.00	$640.00	0.18	397.76	$63.64	10.06
11	B	Classroom -11	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
12	B	Classroom -12	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
13	E	Classroom -13	16	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	1.28	2892.8	$462.85	12	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	81	0.97	2196.72	$351.48	$140.00	$1,680.00	0.31	696.08	$111.37	15.08
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
14	E	Classroom -14	16	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	1.28	2892.8	$462.85	12	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	81	0.97	2196.72	$351.48	$140.00	$1,680.00	0.31	696.08	$111.37	15.08
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
15	E	Resource Rm -15	16	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	1.28	2892.8	$462.85	12	2'X4' 3-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N 2GC8	81	0.97	2196.72	$351.48	$140.00	$1,680.00	0.31	696.08	$111.37	15.08
	D		4	1'X4' 2-Lamp T-12 Prismatic Lens Magnetic Ballast	2260	80	0.32	723.2	$115.71	4	4' 2-Lamp 32W T-8 Surface Mtd / Elect Ballast; Metalux M/N BA w/ Baffle	61	0.24	551.44	$88.23	$140.00	$560.00	0.08	171.76	$27.48	20.38
16	C	Art Rm - 16	15	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.92	2067.9	$330.86	15	No Change Required.	61	0.92	2067.9	$330.86	$0.00	$0.00	0.00	0	$0.00	0.00
17	B	Faculty Rm - 17	15	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.22	2745.9	$439.34	15	No Change Required.	81	1.22	2745.9	$439.34	$0.00	$0.00	0.00	0	$0.00	0.00
18	B	Classroom - 18	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00

19	B	Classroom - 19	8	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.65	1464.48	$234.32	8	No Change Required.	81	0.65	1464.48	$234.32	$0.00	$0.00	0.00	0	$0.00	0.00
20	B	Classroom - 20	15	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.22	2745.9	$439.34	15	No Change Required.	81	1.22	2745.9	$439.34	$0.00	$0.00	0.00	0	$0.00	0.00
21	B	Classroom - 21	15	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.22	2745.9	$439.34	15	No Change Required.	81	1.22	2745.9	$439.34	$0.00	$0.00	0.00	0	$0.00	0.00
22	B	Classroom - 22	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
23	B	Classroom - 23	8	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.65	1464.48	$234.32	8	No Change Required.	81	0.65	1464.48	$234.32	$0.00	$0.00	0.00	0	$0.00	0.00
24	B	Prep Room	12	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.97	2196.72	$351.48	12	No Change Required.	81	0.97	2196.72	$351.48	$0.00	$0.00	0.00	0	$0.00	0.00
25	E	Storage	8	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.64	1446.4	$231.42	8	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.44	994.4	$159.10	$100.00	$800.00	0.20	452	$72.32	11.06
26	A	Elec Service Rm	1	1'X4' 1-Lamp T-12 Industrial Strip Magnetic Ballast	2260	50	0.05	113	$18.08	1	1'X4' 1-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF	28	0.03	63.28	$10.12	$80.00	$80.00	0.02	49.72	$7.96	10.06
27	B	Nurse's Office-24	6	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.49	1098.36	$175.74	6	No Change Required.	81	0.49	1098.36	$175.74	$0.00	$0.00	0.00	0	$0.00	0.00
28	G	Toilet	1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
29	G	Toilet	1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
30	E	Storage	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
31	F	Conference Rm - 25	4	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2684	109	0.44	1170.224	$187.24	4	No Change Required.	109	0.44	1170.224	$187.24	$0.00	$0.00	0.00	0	$0.00	0.00
32	B	Superint Office-26	4	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2684	81	0.32	869.616	$139.14	4	No Change Required.	81	0.32	869.616	$139.14	$0.00	$0.00	0.00	0	$0.00	0.00

33	B	Main Office-27	6	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2684	81	0.49	1304.424	$208.71	6	No Change Required.	81	0.49	1304.424	$208.71	$0.00	$0.00	0.00	0	$0.00	0.00
34	H	Media Center -29	46	1'X4' 3-Lamp T-8 Direct/ Indirect Electronic Ballast	2260	81	3.73	8420.76	$1,347.32	46	No Change Required.	81	3.73	8420.76	$1,347.32	$0.00	$0.00	0.00	0	$0.00	0.00
	H		4	1'X4' 3-Lamp T-8 Direct/ Indirect Electronic Ballast	2260	81	0.32	732.24	$117.16	4	No Change Required.	81	0.32	732.24	$117.16	$0.00	$0.00	0.00	0	$0.00	0.00
	I		20	2-Lamp CFL Recessed Can Fixture	2260	25	0.50	1130	$180.80	20	No Change Required.	25	0.50	1130	$180.80	$0.00	$0.00	0.00	0	$0.00	0.00
	B		1	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.08	183.06	$29.29	1	No Change Required.	81	0.08	183.06	$29.29	$0.00	$0.00	0.00	0	$0.00	0.00
35	B	Tech Lab - 30	22	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.78	4027.32	$644.37	22	No Change Required.	81	1.78	4027.32	$644.37	$0.00	$0.00	0.00	0	$0.00	0.00
36	C	Boys Toilet	2	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.12	275.72	$44.12	2	No Change Required.	61	0.12	275.72	$44.12	$0.00	$0.00	0.00	0	$0.00	0.00
	G		1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
37	C	Girls Toilet	2	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.12	275.72	$44.12	2	No Change Required.	61	0.12	275.72	$44.12	$0.00	$0.00	0.00	0	$0.00	0.00
	G		1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
38	E	Cust Office - 31	2	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.16	361.6	$57.86	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	248.6	$39.78	$100.00	$200.00	0.05	113	$18.08	11.06
39	B	Men's Toil	6	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.49	1098.36	$175.74	6	No Change Required.	81	0.49	1098.36	$175.74	$0.00	$0.00	0.00	0	$0.00	0.00
40	G	Women's Toil	1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
41	F	Prep Kitch -32	1	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.11	246.34	$39.41	1	No Change Required.	109	0.11	246.34	$39.41	$0.00	$0.00	0.00	0	$0.00	0.00

42	E	Storage	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
43	E	Storage	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
44	E	Girls Locker Room - 33	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
	G		3	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.22	494.94	$79.19	3	No Change Required.	73	0.22	494.94	$79.19	$0.00	$0.00	0.00	0	$0.00	0.00
	F		2	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.22	492.68	$78.83	2	No Change Required.	109	0.22	492.68	$78.83	$0.00	$0.00	0.00	0	$0.00	0.00
45	F	Girls Toilet	2	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.22	492.68	$78.83	2	No Change Required.	109	0.22	492.68	$78.83	$0.00	$0.00	0.00	0	$0.00	0.00
	G		1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
46	E	Storage	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
47	F	Boys Toilet	2	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.22	492.68	$78.83	2	No Change Required.	109	0.22	492.68	$78.83	$0.00	$0.00	0.00	0	$0.00	0.00
	G		1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
48	E	Boys Locker Room - 34	1	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.08	180.8	$28.93	1	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.06	124.3	$19.89	$100.00	$100.00	0.03	56.5	$9.04	11.06
	G		3	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.22	494.94	$79.19	3	No Change Required.	73	0.22	494.94	$79.19	$0.00	$0.00	0.00	0	$0.00	0.00
	F		2	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.22	492.68	$78.83	2	No Change Required.	109	0.22	492.68	$78.83	$0.00	$0.00	0.00	0	$0.00	0.00
49	E	PhysEd Rm - 35	2	1'X4' 2-Lamp T-12 Prismatic w/ Refl. Magnetic Ballast	2260	80	0.16	361.6	$57.86	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.11	248.6	$39.78	$100.00	$200.00	0.05	113	$18.08	11.06
50	B	CST Office - 36	8	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.65	1464.48	$234.32	8	No Change Required.	81	0.65	1464.48	$234.32	$0.00	$0.00	0.00	0	$0.00	0.00

51	B	Copy Rm - 37	4	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.32	732.24	$117.16	4	No Change Required.	81	0.32	732.24	$117.16	$0.00	$0.00	0.00	0	$0.00	0.00
52	B	Copy Rm - 38	5	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	0.41	915.3	$146.45	5	No Change Required.	81	0.41	915.3	$146.45	$0.00	$0.00	0.00	0	$0.00	0.00
53	B	Music Rm - 39	16	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	81	1.30	2928.96	$468.63	16	No Change Required.	81	1.30	2928.96	$468.63	$0.00	$0.00	0.00	0	$0.00	0.00
54	C	Stage	10	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	3744	61	0.61	2283.84	$365.41	10	No Change Required.	61	0.61	2283.84	$365.41	$0.00	$0.00	0.00	0	$0.00	0.00
55	F	Music Storage	2	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2260	109	0.22	492.68	$78.83	2	No Change Required.	109	0.22	492.68	$78.83	$0.00	$0.00	0.00	0	$0.00	0.00
56	F	Princ Office -40	3	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2684	109	0.33	877.668	$140.43	3	No Change Required.	109	0.33	877.668	$140.43	$0.00	$0.00	0.00	0	$0.00	0.00
57	F	BOE Offices - 41	4	2'X4' 4-Lamp T-8 Prismatic Lens Electronic Ballast	2684	109	0.44	1170.224	$187.24	4	No Change Required.	109	0.44	1170.224	$187.24	$0.00	$0.00	0.00	0	$0.00	0.00
58	G	Front Vestibule	6	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.44	989.88	$158.38	6	No Change Required.	73	0.44	989.88	$158.38	$0.00	$0.00	0.00	0	$0.00	0.00
59	C	Corridor A	20	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	1.22	2757.2	$441.15	20	No Change Required.	61	1.22	2757.2	$441.15	$0.00	$0.00	0.00	0	$0.00	0.00
60	C	Corridor B	7	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.43	965.02	$154.40	7	No Change Required.	61	0.43	965.02	$154.40	$0.00	$0.00	0.00	0	$0.00	0.00
61	C	Corridor C	10	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.61	1378.6	$220.58	10	No Change Required.	61	0.61	1378.6	$220.58	$0.00	$0.00	0.00	0	$0.00	0.00
62	C	Corridor D	20	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	1.22	2757.2	$441.15	20	No Change Required.	61	1.22	2757.2	$441.15	$0.00	$0.00	0.00	0	$0.00	0.00
63	C	Corridor E	7	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.43	965.02	$154.40	7	No Change Required.	61	0.43	965.02	$154.40	$0.00	$0.00	0.00	0	$0.00	0.00
64	A	Corridor F	5	2'X4' 3-Lamp T-8 Prism Lens Electronic Ballast	2260	50	0.25	565	$90.40	5	1'X4' 1-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF	28	0.14	316.4	$50.62	$80.00	$400.00	0.11	248.6	$39.78	10.06
	C		4	2'X4' 2-Lamp T-8 Prism Lens Electronic Ballast	2260	61	0.24	551.44	$88.23	4	No Change Required.	61	0.24	551.44	$88.23	$0.00	$0.00	0.00	0	$0.00	0.00
	G		1	2'X2' U-Bulb T-8 Lamp Prism Lens Electronic Ballast	2260	73	0.07	164.98	$26.40	1	No Change Required.	73	0.07	164.98	$26.40	$0.00	$0.00	0.00	0	$0.00	0.00
		Totals	646				49.18	112899.34	18063.89	634			46.66	107208.66	17153.38		$14,120.00	2.52	5,690.68	$910.51	15.51

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Hours of Operation based on information from Owner - Classroom: 2260 hours, Office: 2684 hours.

INVESTMENT GRADE LIGHTNG AUDIT

CONCORD ENGINEERING GROUP

CEG Job #: 9C08141
Project: Monmouth Beach ES Energy Audit
Address: 7 Hastings Place
Monmouth Beach, NJ 07750
Building SF: 61882

"Monmouth Beach Elementary School"

DATE: 06/01/2009
KWH COST: $0.160

ECM #3: Lighting Upgrade - Multi-Purpose Room

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
34	MH	Multipurpose Rm - 28	20	HID 250 W Metal Halide	3744	295	5.90	22089.6	$3,534.34	20	2'X4' 4-Lamp 54W T-5HO Reflector/Elect Ballast; Metalux M/N F-BAY	229	4.58	17147.52	$2,743.60	$550.00	$11,000.00	1.32	4942.08	$790.73	13.91
		Totals	20				5.90	22089.60	3534.34	20			4.58	17147.52	2743.60		$11,000.00	1.32	4,942.08	$790.73	13.91

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Hours of Operation based on information from Owner - Multi-Purpose Room : 3744 hours.

Project Name: LGEA Solar PV Project - Monmouth Beach ES
Location: Monmouth Beach, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$877,680
Annual kWh Production	152,184
Annual Energy Cost Reduction	$24,350
Annual SREC Revenue	$53,265
First Cost Premium	**$877,680**
Simple Payback:	**11.31** Years

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.160**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/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	$43,884	0	0	0	$0	0	0	(43,884)	0
1	$0	152,184	$24,350	$0	$53,265	$57,737	$19,836	$41	($43,843)
2	$0	151,424	$25,080	$0	$52,998	$56,303	$21,270	$505	($43,338)
3	$0	150,666	$25,832	$0	$52,733	$54,766	$22,807	$993	($42,345)
4	$0	149,913	$26,607	$0	$52,470	$53,117	$24,456	$1,504	($40,841)
5	$0	149,164	$27,406	$1,536	$52,207	$51,349	$26,224	$503	($40,337)
6	$0	148,418	$28,228	$1,529	$51,946	$49,454	$28,119	$1,072	($39,265)
7	$0	147,676	$29,075	$1,521	$51,686	$47,421	$30,152	$1,667	($37,598)
8	$0	146,937	$29,947	$1,513	$51,428	$45,241	$32,332	$2,288	($35,310)
9	$0	146,203	$30,845	$1,506	$51,171	$42,904	$34,669	$2,937	($32,372)
10	$0	145,472	$31,771	$1,498	$50,915	$40,398	$37,175	$3,614	($28,758)
11	$0	144,744	$32,724	$1,491	$50,660	$37,710	$39,863	$4,320	($24,438)
12	$0	144,020	$33,705	$1,483	$50,407	$34,828	$42,745	$5,056	($19,381)
13	$0	143,300	$34,717	$1,476	$50,155	$31,738	$45,835	$5,823	($13,559)
14	$0	142,584	$35,758	$1,469	$49,904	$28,425	$49,148	$6,621	($6,938)
15	$0	141,871	$36,831	$1,461	$49,655	$24,872	$52,701	$7,451	$514
16	$0	141,162	$37,936	$1,454	$49,407	$21,062	$56,511	$8,315	$8,829
17	$0	140,456	$39,074	$1,447	$49,160	$16,977	$60,596	$9,214	$18,043
18	$0	139,753	$40,246	$1,439	$48,914	$12,597	$64,976	$10,147	$28,190
19	$0	139,055	$41,453	$1,432	$48,669	$7,900	$69,673	$11,117	$39,308
20	$0	138,359	$42,697	$1,425	$48,426	$2,863	$74,710	$12,125	$51,432
21	$0	137,668	$43,978	$1,418	$48,184	$2,427	$68,681	$19,635	$71,067
22	$0	136,979	$45,297	$1,411	$47,943	$1,661	$56,518	$33,649	$104,717
23	$0	136,294	$46,656	$1,404	$47,703	$0	$0	$92,955	$197,672
24	$0	135,613	$48,056	$1,397	$47,465	$0	$0	$94,124	$291,796
25	$0	134,935	$49,498	$1,390	$47,227	$0	$0	$95,335	$387,131
	Totals:	2,903,360	$654,280	$23,681	$1,016,176	$717,663	$833,796	$958,996	$750,377
				Net Present Value (NPV)			**$52,801**		
				Internal Rate of Return (IRR)			**11.9%**		

Project Name: LGEA Solar PV Project - Monmouth Beach ES
Location: Monmouth Beach, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

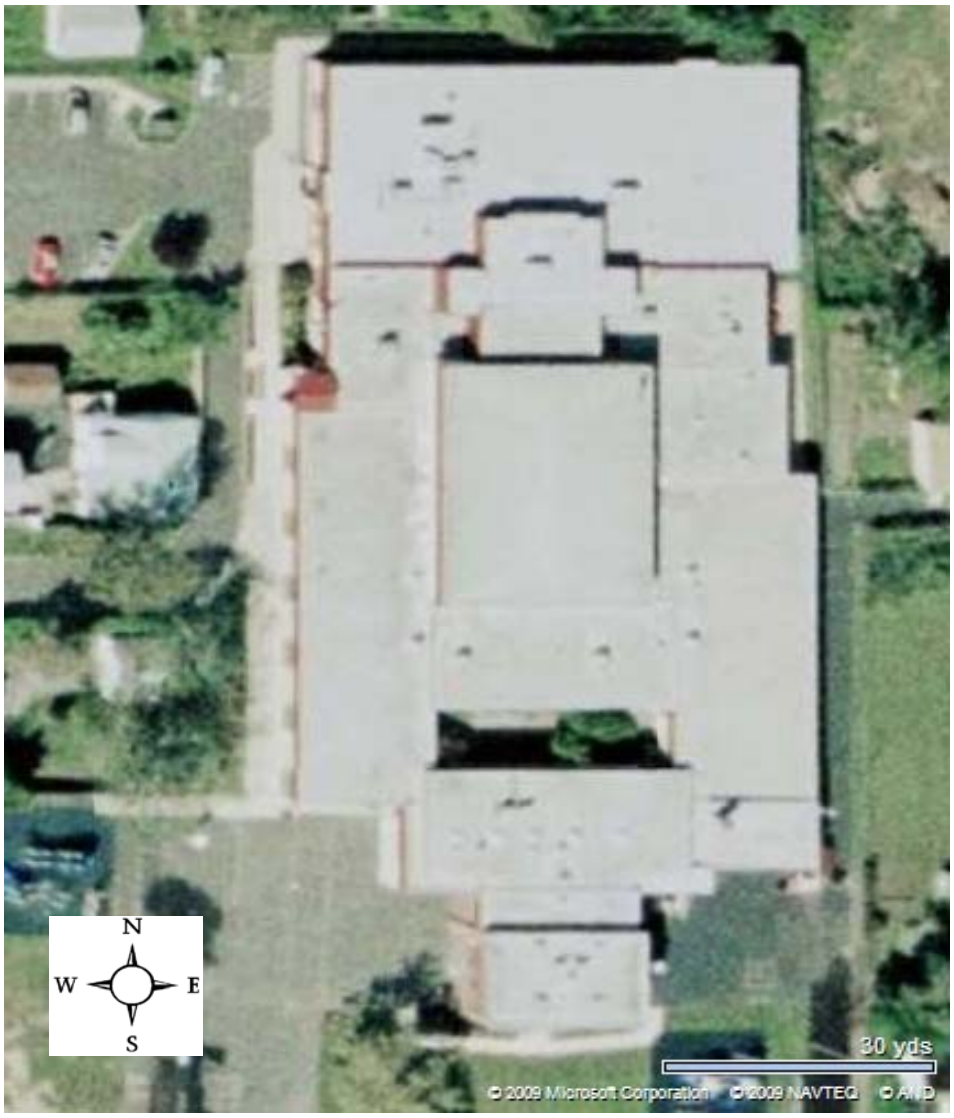
	Photovoltaic System - Direct Purchase
Total Construction Cost	$877,680
Annual kWh Production	152,184
Annual Energy Cost Reduction	$24,350
Annual SREC Revenue	$53,265
First Cost Premium	**$877,680**
Simple Payback:	**11.31** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.160**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$877,680	0	0	0	$0	(877,680)	0
1	$0	152,184	$24,350	$0	$53,265	$77,614	($800,066)
2	$0	151,424	$25,080	$0	$52,998	$78,078	($721,988)
3	$0	150,666	$25,832	$0	$52,733	$78,566	($643,422)
4	$0	149,913	$26,607	$0	$52,470	$79,077	($564,345)
5	$0	149,164	$27,406	$1,536	$52,207	$78,076	($486,269)
6	$0	148,418	$28,228	$1,529	$51,946	$78,645	($407,623)
7	$0	147,676	$29,075	$1,521	$51,686	$79,240	($328,383)
8	$0	146,937	$29,947	$1,513	$51,428	$79,861	($248,522)
9	$0	146,203	$30,845	$1,506	$51,171	$80,510	($168,012)
10	$0	145,472	$31,771	$1,498	$50,915	$81,187	($86,825)
11	$0	144,744	$32,724	$1,491	$50,660	$81,893	($4,931)
12	$0	144,020	$33,705	$1,483	$50,407	$82,629	$77,698
13	$0	143,300	$34,717	$1,476	$50,155	$83,396	$161,094
14	$0	142,584	$35,758	$1,469	$49,904	$84,194	$245,287
15	$0	141,871	$36,831	$1,461	$49,655	$85,024	$330,312
16	$0	141,162	$37,936	$1,454	$49,407	$85,888	$416,200
17	$0	140,456	$39,074	$1,447	$49,160	$86,787	$502,987
18	$0	139,753	$40,246	$1,439	$48,914	$87,720	$590,707
19	$0	139,055	$41,453	$1,432	$48,669	$88,690	$679,397
20	$0	138,359	$42,697	$1,425	$48,426	$89,698	$769,095
21	$1	137,668	$43,978	$1,418	$48,184	$90,744	$859,839
22	$2	136,979	$45,297	$1,411	$47,943	$91,829	$951,668
23	$3	136,294	$46,656	$1,404	$47,703	$92,955	$1,044,623
24	$4	135,613	$48,056	$1,397	$47,465	$94,124	$1,138,747
25	$5	134,935	$49,498	$1,390	$47,227	$95,335	$1,234,082
Totals:		2,903,360	$654,280	$23,681	$1,016,176	$2,111,762	$1,646,775
				Net Present Value (NPV)		**$1,234,107**	
				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
Monmouth Beach ES	6220	Sunpower SPR230	424	14.7	6,235	97.52	152,184	13,992	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.