ENERGY AUDIT – FINAL REPORT

METUCHEN BOARD OF EDUCATION
HIGH SCHOOL
400 GROVE AVENUE
METUCHEN, NJ 08840
ATTN: MR. MICHAEL HARVIER

CEG PROPOSAL NO. 9C08133

CONCORD ENGINEERING GROUP

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

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

Table of Contents

REPORT DISCLAIMER

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

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

I. EXECUTIVE SUMMARY

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

Metuchen Board of Education
Metuchen High School
400 Grove Avenue
Metuchen, NJ 08840

Municipal Contact Person: Michael Harvier
Facility Contact Person: Lenny / Carlos

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	$ 153,204
Natural Gas	$ 91,164
Total	$ 244,368

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

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST[A]	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Lighting Upgrade - General	$500	$241	2.1	50.3%
2	Lighting Controls	$2,640	$455	5.8	17.2%
3	Parking Lot Lighting Upgrade	$23,580	$3,813	6.1	16.2%
4	De-stratification Fans to Improve Air Circulation in Classrooms	$750/unit	$121	6.2	16.1%
5	Walk-in Cooler Upgrade	$1,480	$616	2.4	43.6%

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	2.7	1,620	-
2	Lighting Controls	-	3,058	-
3	Parking Lot Lighting Upgrade	-	25,596	-
4	De-stratification Fans to Improve Air Circulation in Classrooms	-	-	84.3
5	Walk-in Cooler Upgrade	-	4,080	-

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 the Metuchen High School:

- **ECM #1:** Lighting Upgrade – General
- **ECM #2:** Lighting Controls
- **ECM #3:** Parking Lot Lighting Upgrade
- **ECM #4:** De-stratification Fans to Improve Air Circulation in Classrooms
- **ECM #5:** Walk-in Cooler Upgrade

II. INTRODUCTION

This comprehensive energy audit covers the 105,000 square foot Metuchen High School facility that includes classrooms, a gymnasium, fitness center, library, auditorium, cafeteria/kitchen, music rooms, administrative offices, locker rooms, computer labs, etc. The original structure was built in 1956 with a major renovation in 2007-2008 that upgraded all existing major HVAC equipment to more energy-efficient units.

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. These costs do not include engineering, permits, measurement & verification costs or commissioning services. The NJ SmartStart Building® program incentives (refer to Appendix C) are calculated for the appropriate ECM's and subtracted from the installed cost prior to calculation of the simple payback. In addition, where applicable, maintenance cost savings are estimated and applied to the net savings. Simple return on investment is calculated

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. The Owner was able to gather the information for the above-reference period for our review and analysis. The Public Service Electric and Gas Company (PSE&G) provides electricity to the facility under their Large Power and Lighting Secondary Service (LPLS) Rate. This particular rate encompasses general purposes at secondary distribution voltages where the customer's demand exceeds 150 Kilowatts in any one month. 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. PSE&G 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 January-08 to December-08. Metuchen High School receives natural gas via two means. Hess Corporation is a Third Party Supplier (TPS) that the owner has contracted with to provide the commodity side of the natural gas supply. Elizabethtown Gas, under their basic general delivery rate, provides delivery of the natural gas supply to the facility.

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

Description	Average
Electricity	14.9¢ / kWh
Natural Gas	$1.51 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	85,680	242	$ 10,504
2/08	87,780 [A]	244 [A]	$ 10,996 [A]
3/08	87,780 [A]	244 [A]	$ 10,996 [A]
4/08	84,600	287	$ 10,555
5/08	93,360	284	$ 11,656
6/08	97,440	318	$ 16,896
7/08	78,000	262	$ 14,820
8/08	62,280	240	$ 12,854
9/08	81,360	296	$ 15,907
10/08	91,440	289	$ 13,359
11/08	92,160	274	$ 12,657
12/08	87,480	275	$ 12,004
Totals	**1,029,360**	**MAX 318**	**$ 153,204**

Notes: A. A combined utility bill for February and March was provided. This combined bill was divided in half to obtain the average monthly value.

Figure 1
Electricity Usage Profile

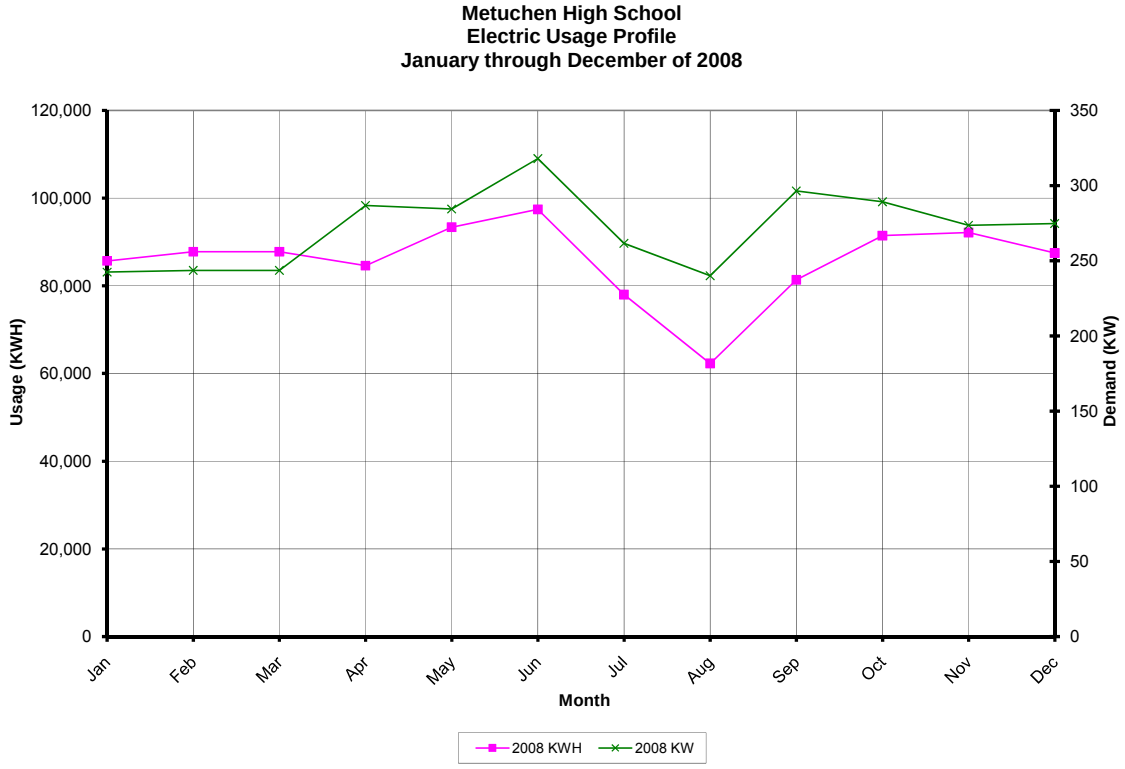
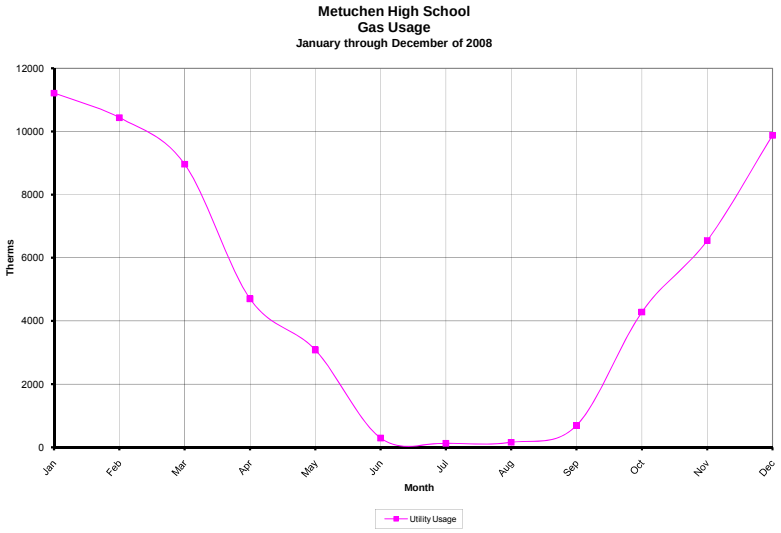


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	11,210	$ 17,551
2/08	10,432.5	$ 16,334
3/08	8,959.4	$ 14,029
4/08	4,698.9	$ 7,369
5/08	3,081.3	$ 4,828
6/08	290.6 [A]	$ 442 [A]
7/08	125.6	$ 253
8/08	157.1	$ 250
9/08	690.4	$ 1,004
10/08	4,280	$ 5,976
11/08	6,542	$ 9,220
12/08	9,873	$ 13,906
Totals	**60,341**	**$ 91,164**

Notes: A. Utility information for 6/08 is estimated; utility bill was not provided by Owner for this month.

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:

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

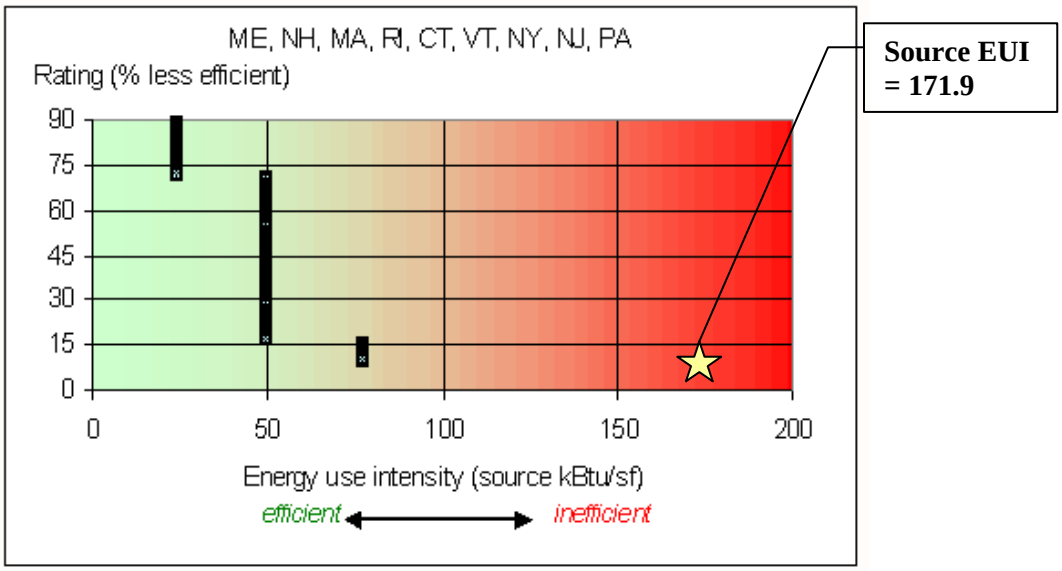
Electric = ((1,029,360 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 3,514,235 kBtu/h

Gas = ((60,341 therms) * (100,000 Btu/h / 1 W)) / (1000 Btu/h / 1 kBtu/h) = 6,034,100 kBtu/h

$$Building\ \ EUI = \frac{(3{,}514{,}235\ kBtu/h + 6{,}034{,}100\ kBtu/h)}{105{,}000\ SF} = \frac{9{,}548{,}335\ kBtu/h}{105{,}000\ SF}$$

Metuchen High School EUI = 90.9 kBtu/SF (Site Energy); 171.9 kBtu/SF (Source Energy)

Figure 3
Energy Use Intensity Distributions: High School



C. EPA Energy Benchmarking System

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

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

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the 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:	metuchentwp
Password:	Lgeaceg2009
Security Question:	What is your birth city? metuchen

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
Metuchen High School	34	50

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

V. FACILITY DESCRIPTION

The 105,000 SF Metuchen High School is comprised of classrooms, a large auditorium with an adjacent stage, administrative offices, a faculty room, laboratory classrooms 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 5:00 pm for the aforementioned offices. There are also numerous after school activities and community functions in the evenings and weekends. Originally built in 1956, the school has undergone one renovation in 2008. Typical wall construction is masonry with brick veneer. Floor deck construction is steel structure with steel decking and poured concrete. All roofs are flat built-up type with approximately 2" rigid insulation, waterproof membrane, and not ballasted. The original roof assembly is constructed of a built-up roof with light color stone ballast. 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 a 3/8" air space housed in aluminum frames.

Heating Plant

The facility is heated via a boiler plant located in the first floor boiler room. The boiler plant consists of five (5) gas-fired, HydroTherm KN-series boilers that were installed in 2007. All five (5) boilers are HydroTherm KN-20 with an input of 1,900 MBH and an output of 1,760 MBH (89% efficient at full load). Five (5) end suction pumps provide hot water flow to the school. This array of pumps is powered by Baldor Super-E efficient motors that consists of one (1) 10 HP motor, one (1) 7.5 HP motor, two (2) 5 HP motors, and one (1) 3 HP motor. The efficiency of the10 HP, 7.5 HP, 5 HP, and 3 HP motors are approximated 91.7%, 91.2%, 90.2%, and 89.8% respectively. The pumps are also controlled by variable speed drives.

Cooling System

Cooling in the administration wing, library, music rooms, and the core areas is provided by rooftop units with DX cooling. These units feature premium efficiency motors along with variable speed drives on the fans. Several of the units also include heat recovery wheels. The phone/data rooms along with other special rooms are cooled by split units with the evaporator section in the room and the condenser/compressor on the roof.

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. The science lab hoods are exhausted by special units on the roof.

Domestic Hot Water

Domestic hot water for the restrooms/showers is provided by two (2) PVI gas-fired hot water heaters, each 250-gallon capacity and 565,000 Btu/h input. Domestic hot water is circulated by a Bell & Gossett 1/6 HP pump.

HVAC Control System

The school district has upgraded all controls to an Andover system. 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

Typical lighting throughout most of the classrooms is provided by 1'x 4' pendant-hung, direct/indirect fixtures with T8 lamps and electronic ballasts. Corridors, mechanical rooms, janitor closets, storage rooms, file rooms and the multi-purpose room are lit by 1'x 4', 2'x 2', and 2'x 4' T8 lighting fixtures.

The Gymnasium is lit via twenty-four T-5 light fixtures located at approximately 30'-0" above the finished floor. Each fixture contains 54-Watt High Output lamps.

All exit signs are of the latest LED lamp design.

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 numerous incandescent lamps are still being used in the kitchen and stage areas.

CEG recommends a replacement of the remaining incandescent lamps with energy-efficient lamps. Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: an 18-Watt CFL for a 60-Watt incandescent lamp, a 21-Watt CFL for a 75-Watt incandescent lamp, a 23-Watt CFL for a 100-Watt incandescent lamp and a 42-Watt CFL for a 150-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures.

This ECM involves replacing the remaining incandescent lamps in the facility with energy efficient compact fluorescent lamps.

Energy Savings Calculations:

There are twenty-five (25) 150-Watt incandescent lamps in the kitchen and stage that can be upgraded to 42-Watt CFL units. The average operating hours for all of these lamps is estimated to be 600 hours per year.

Energy cost savings:

[25 units * (150W – 42W)] * 600 hours * 1 kW/1,000 W * $0.149/kWh] = $241/yr

The cost of twenty-five (25) 42-Watt Compact Fluorescent Lamps (@ $20) is $500

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$500
NJ Smart Start Equipment Incentive ($):	-
Maintenance Savings ($):	-
Net Installation Cost ($):	*$500*
Total Energy Savings ($ / yr):	*$241*
Simple Payback (yrs):	*2.1*
Simple Return on Investment:	*50.3%*

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, faculty room, storage rooms, locker rooms, file rooms, etc.

CEG would recommend wall switches for individual rooms, ceiling mount sensors for larger rooms, office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper or equivalent. There are approximately 48 sensors required for this project (12,000 SF of space).

Energy Savings Calculations:

From Appendix F of this report, we calculated the lighting power density (Watts/ft^2) of the existing offices, conferences rooms, file rooms, copy rooms, storage rooms, equipment rooms, etc. to be 0.91 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

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

$$Energy\ Savings = (10\% \times\ 0.91\,Watts/SF \times 12{,}000\ SF \times 2{,}800 hrs/yr \times \$0.149/kWh) = \underline{\$\ 455\ per\ year}$$

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

$$Installation\ Cost = (\#\ of\ \ sensors \times\ \$\ \ per\ sensor) = (48 \times \$75) = \$\,3{,}600$$

NJ Smart Start® Program Incentives are calculated as follows:

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

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ controller \times\ \$\ 20) = (48 \times \$\ 20) = \underline{\$}960$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,600
NJ Smart Start Equipment Incentive ($):	($960)
Maintenance Savings ($):	-
Net Installation Cost ($):	*$2,640*
Total Energy Savings ($ / yr):	*$455*
Simple Payback (yrs):	*5.8*
Simple Return on Investment:	*17.2%*

ECM #3: Parking Lot Lighting Upgrade

Description:

The parking lot lighting uses the old 400-Watt metal halide technology that consumes a total of 460 Watts per fixture. New pulse start systems use only 350 Watts for the same intensity of light. Pulse-start lamps cannot replace existing probe-start lamps without changing out the ballast to compatible pulse-start ballast, meaning the ballast also must be changed out in a retrofit. On the other hand, this can be viewed as an opportunity to specify a dimming electronic ballast and maximize energy savings and shorten the payback through scheduled dimming.

Energy Savings Calculations:

There are thirty-six parking lot fixtures that would be good candidates for this new technology. Assume that each fixture is on for an average of 5 hours per night at 100% illumination and 5 hours per night at 50% illumination all year round (1,800 hrs at 100% and 1,800 hrs at 50% illumination).

Energy cost savings = 36 units x {[1,800 hr/yr x (460-350) watts] + [1,800 hr/yr x (460-175) watts]} x $0.149 = $3,813

The cost of a pulse start retrofit including labor and high reach is $680 per parking lot fixture.

36 units x $680/unit = $24,480

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the replacement of a 400-Watt conventional metal halide fixture to a pulse start metal halide fixture warrants the following incentive: $25 per fixture.

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ fixtures \times\ \$25) = (36 \times \$25) = \$900$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$24,480
NJ Smart Start Equipment Incentive ($):	($900)
Maintenance Savings ($):	-
Net Installation Cost ($):	*$23,580*
Total Energy Savings ($ / yr):	*$3,865*
Simple Payback (yrs):	*6.1*
Simple Return on Investment:	*16.2%*

ECM #4: De-stratification Fans to Improve Air Circulation in Classrooms

Description:

In the individual classrooms, due to temperature gradients, the temperature during the winter at the floor level near the student desks is often 5ºF lower than that at the ceiling. The hot air generated by the buildings heating system steadily rises to the ceiling. There are constant complaints of "cold or hot spots" at floor level and "hot upstairs and cold downstairs".

This ECM would install extremely efficient Airius Thermal Equalizers air turbines suspended just below ceiling height. Unlike most ceiling fans, the air is directed in a downward direction and not simply swirled around. Each unit is capable of equalizing somewhere between 1,000 and 1,500 square feet of open area.

Energy Savings Calculations:

The following assumptions are used in the savings analysis below:

- Typical classroom size is 20 feet by 80 feet with a 9'-6" ceiling height
- The heating season is approximately 2,800 hours per year
- The heating system efficiency is approximately 85% efficient in each classroom.
- The U-value of the ceiling tile system is 0.32 BTU/hr-ft^2 - ºF
- The temperature difference between the ceiling and floor is 5ºF

Method for Calculating Energy Savings:

$$\text{Annual energy savings} = \frac{U \times A \times DT \times HY}{\eta}$$

Where:

U = heat transmission value of the ceiling tile system
A = ceiling tile area
DT = anticipated temperature difference between ceiling and floor
HY = operating hours per year
η = heating system efficiency

Energy Savings = [0.32 BTU/hr-ft^2 - ºF x 1,600 SF x 5ºF x 2,800 hrs/year] ÷ 0.85 = 8,432,941 BTU

= 84.3 Therms

The energy used by the air turbine is 15 watts x 2,800 hrs = 42 kWh

Energy cost savings = (84.3 Therms x $1.51 / Therm) – (42 kWh x $0.149) = $127 - $6 = $121/unit

Cost of an air turbine installed including electrical feed = $750/unit

Energy Savings Summary:

ECM #4 – ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$750/unit
NJ Smart Start Equipment Incentive ($):	-
Maintenance Savings ($):	-
Net Installation Cost ($):	*$750/unit*
Total Energy Savings ($ / yr):	*$121/unit*
Simple Payback (yrs):	*6.2*
Simple Return on Investment:	*16.1%*

ECM #5: Walk-in Cooler Upgrades

Description:

The refrigerated walk-in cooler has a bank of evaporator fans that circulate the cold air over and under the food. These banks of evaporator fans (typically 1/3 HP motors) run continuously and give off heat that must be removed by the refrigeration.

This measure would install an evaporator fan controller that features two-speed operation of the evaporator fans – high speed during cooling, and low speed when not cooling. The estimated energy savings assumes that the cooler is not opened for 10 hours per day.

Energy Savings Calculations:

Installing a controller on the two (2) evaporator fan motors in the walk-in cooler would save approximately 340 kWh/month x 12 months = 4,080 kWh.

Annual Energy Cost Savings = 4,080 kWh x $0.149/kWh = $616 /walk-in cooler

The cost of an evaporator fan controller installed = $1,480/cooler

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,480
NJ Smart Start Equipment Incentive ($):	-
Maintenance Savings ($):	-
Net Installation Cost ($):	*$1,480*
Total Energy Savings ($ / yr):	*$616*
Simple Payback (yrs):	*2.4*
Simple Return on Investment:	*43.6%*

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 Metuchen School District, 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 8,410 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 131.6 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 205,305 KWh annually, reducing the overall utility bill by approximately 20% 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 20 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	11.56 Years	9.7%
Direct Purchase	11.56 Years	7.6%

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 Metuchen School District. 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 Metuchen Township it was determined that the average wind speed of approximately four (4) mile per hour is not adequate for wind energy production. 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 respective electricity and natural gas usage load profile for January through December 2008.

Electricity:

Section IV, Figure 1 demonstrates a very flat profile for the High School electric load. It is evident that there is a significant reduction in the On Peak Load from June through August 2008 (summer break) and a fairly steady consumption throughout the balance of the year. The winter load assumes air conditioning or electric hear the balance of the year. The flatter (steady base-load) shaping is important because a flat consumption profile will yield more competitive pricing.

Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load (November –March) profile for the Middle School. A noticeable drop-off occurs in the summer months with the non use of the hot water heating system.

Tariff Analysis:

Electricity:

This facility receives electrical service through Public Service Electric and Gas Company (PSE&G) on a LPLS (Large Power and Lighting Service) rate. This utility tariff is for delivery service for general purposes at secondary distribution voltages where the customer's measured peak demand exceeds 150 kilowatts in any month and also at primary distribution charges. The rate schedule has a Delivery Charge, Societal Benefits Charge, Non-utility Generation Charge, Securitization Charge, System Control Charge, Customer Account Services Charge, Standby Fee, Base Rate Distribution Adjustment Charge, Solar Pilot Recovery Charge and RGGI Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS).

While Metuchen may be on a typical rate structure with the local utility (LPL), some variations in price do cause some concern, and are worth investigating further. If Metuchen were to shop its electric load it would avoid the higher rates as demonstrated in August and September 2008.

Natural Gas:

The Metuchen High School receives natural gas service through Elizabethtown Gas Company on the General Delivery Service (GDS) when not receiving commodity by a Third Party Supplier. This utility tariff GDS where Gas Company's facilities are suitable and the quantity of gas is available for the service desired. Service is Continuous, but the customer may purchase supply from a Third Party Supplier of from the Company's Rider A, Basic Gas Supply Service (BGSS). This rate schedule has a; Service Charge, Demand Charge, per DCQ (Daily Contract Quantity), Distribution Charge, Balancing Charge and Commodity Charge. There are special provisions for determining DCQ and for Distributive Generation.

It is pertinent to note, should the TPS not deliver, Elizabethtown Gas Company may cease service or elect to put the customer on Standby Gas Service Sales Service. This rate is more than likely a penalty rate.

From review of the information provided, Metuchen is utilizing the services of a Third Party Supplier, Woodruff Energy for natural gas service. Based on review of the Third Party contract that Metuchen signed, it appears that at the time of the original contract signing Metuchen made a good decision and locked in what was the market pricing at that time. However, due to the low pricing in the current market, it appears that Metuchen is paying $4.63 / dth (unit of measure), or 37% above current market rates. It should also be noted that Metuchen used the service of another Third Party Supplier (TPS), Hess Corporation January through June 2008. During this term Metuchen paid $5.23 / dth or 40% above current market rates. The comparison against current market pricing is to be utilized as a benchmark for future energy procurement strategy by the School District.

In addition, it is pertinent to note that imbalances in billing may occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling. The Elizabethtown Gas Company tariff utilized for this facility will install daily and/or monthly imbalance charges for gas not delivered.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the Metuchen School District. CEG's primary observation is seen in the Natural Gas Commodity. The weighted average price per dth (decatherm) for all buildings is $11.26 (dth is the common unit of natural gas measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Metuchen could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption January through December 2008 and current natural gas rates, savings of over $65,000 per year are noticed. (Note: Savings were calculated using Metuchen's Average Annual Consumption of 19,668 dth's and a variance of $3.49 / dth and utilizing a fixed one-year commodity contract). CEG recommends aggregating the entire natural gas load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with Metuchen School District's electric costs. CEG recognized a segment of the electric cost is not competitive with current market prices. Based on the current market rates Metuchen School District is paying approximately $.008 / kWh per unit ($22,000 annually) above market. CEG recommends further advisement on these prices.

All in all, CEG suggests the Metuchen School Distric schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the Metuchen will learn more about the competitive supply process. Metuchen 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, Metuchen should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier. Finally, if Metuchen frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

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

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

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

XI. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

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

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

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

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

G. Clean all light fixtures to maximize light output.

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

Electric Cost Summary

PSE&G - Electric (LPLS)

Metuchen High School

Account # 5157120028

Meter # 778017769

2008

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	85,680	87,780	87,780	84,600	93,360	97,440	78,000	62,280	81,360	91,440	92,160	87,480	1,029,360	
KW	242	244	244	287	284	318	262	240	296	289	274	275	318	Max
Monthly Load Factor	48%	54%	48%	41%	44%	43%	40%	35%	38%	42%	47%	43%	44%	
Electric Delivery, $	$2,799	$2,847	$2,847	$2,925	$3,086	$5,713	$4,724	$4,186	$5,168	$3,059	$3,079	$3,066	$43,498	
Delivery $/kwh	$0.033	$0.032	$0.032	$0.035	$0.033	$0.059	$0.061	$0.067	$0.064	$0.033	$0.033	$0.035	$0.042	
Electric Supply, $	$7,706	$8,149	$8,149	$7,630	$8,570	$11,183	$10,096	$8,668	$10,739	$10,301	$9,578	$8,938	$109,706	
Supply $/kwh	$0.090	$0.093	$0.093	$0.090	$0.092	$0.115	$0.129	$0.139	$0.132	$0.113	$0.104	$0.102	$0.107	
Total Cost, $	$10,504	$10,996	$10,996	$10,555	$11,656	$16,896	$14,820	$12,854	$15,907	$13,359	$12,657	$12,004	$153,204	
$/KWH	$0.1226	$0.1253	$0.1253	$0.1248	$0.1248	$0.1734	$0.1900	$0.2064	$0.1955	$0.1461	$0.1373	$0.1372	$0.1488	

**The combined bill for February and March has been divided by 2 to obtain these values

Summary of Natural Gas Cost

Elizabethtown Gas(General Delivery - ADDQ af - class 203)

2008

Metuchen High School													
Account#: 9455525880	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total
Third Party Supplier account #: 510271	31	28	31	30	31	30	31	31	30	31	30	31	
Meter#:09237531													
Therms (Burner Tip)	11210	10432.5	8959.4	4698.9	3081.3	290.6	125.6	157.1	690.4	4,280	6,542	9,873	60,341
Total Distribution Cost	$2,945	$2,742	$2,357	$1,244	$821	$92	$47	$57	$194	$1,150	$1,774	$2,669	16,093
Cost per Therm	$0.263	$0.263	$0.263	$0.265	$0.267	$0.317	$0.377	$0.360	$0.280	$0.269	$0.271	$0.270	$0.267
Total Commodity Cost	14605.9	13591.98	11672.16	6125.45	4006.68	350	$206	$194	$810	$4,826	$7,446	$11,237	75,071
Cost per Therm	$1.30	$1.30	$1.30	$1.30	$1.30	$1.20	$1.64	$1.23	$1.17	$1.13	$1.14	$1.14	$1.24
Total Cost	$17,551	$16,334	$14,029	$7,369	$4,828	$442	$253	$250	$1,004	$5,976	$9,220	$13,906	$91,164
Cost per Therm	$1.57	$1.57	$1.57	$1.57	$1.57	$1.52	$2.01	$1.59	$1.45	$1.40	$1.41	$1.41	$1.51
	Hess Corporation						Elizabethtown Gas		WoodruffEnergy				

ESTIMATED VALUE

DETAILED COST BREAKDOWN PER ECM

CONCORD ENGINEERING GROUP

Metuchen High School

ECM 1 Lighting Upgrade - General

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$500	$0	$0	$500
Total Cost			$0	$0	$500
Utility Incentive - N/A					$0
Total Cost Less Incentive					$500

ECM 2 Lighting Controls

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	48	$75	$1,440	$2,160	$3,600
Total Cost			$1,440	$2,160	$3,600
Utility Incentive - NJ Smart Start ($20 per Sensor)					($960)
Total Cost Less Incentive					$2,640

ECM 3 Parking Lot Lighting Upgrade

	Qty	Unit Cost $	Material $	Labor $	Total $
New Pulsestart Lamps and Ballast	36	$680	$0	$0	$24,480
Total Cost			$0	$0	$24,480
Utility Incentive - NJ Smart Start ($25 per Fixture)					($900)
Total Cost Less Incentive					$23,580

ECM 4 De-Stratification Fans to Improve Air Circulation in Classrooms

	Qty	Unit Cost $	Material $	Labor $	Total $
New Thermal Equalizer Air Turbine	Per unit	$750	$0	$0	$750
Total Cost			$0	$0	$750
Utility Incentive - N/A					$0
Total Cost Less Incentive					$750

ECM 5 Walk- Cooler Upgrade

	Qty	Unit Cost $	Material $	Labor $	Total $
Evaporator Fan Controller	1	$1,480	$0	$0	$1,480
Total Cost			$0	$0	$1,480
Utility Incentive - N/A					$0
Total Cost Less Incentive					$1,480

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

	$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

EXISTING EQUIPMENT LIST

Concord Engineering Group

"Metuchen High School"

Boiler

Location	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	HydroTherm	5	KN-20	-	1,900	1,760	87%	Nat. Gas	2	35	33

HW Pump/Motors

Location	Motor Manufacturer	Qty	Motor Model #	Motor Serial #	HP	RPM	GPM	Ft. Hd	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	Baldor	1	EM3313T	37F614T853	10	1770	210	75	230/460	3	2	20	18
Boiler Room	Baldor	1	EM3311T	37F614S186	7 1/2	1770	156	100	230/460	3	2	20	18
Boiler Room	Baldor	2	EM3218T	36G548T832	5	1750	110	75	230/460	3	2	20	18
Boiler Room	Baldor	1	EM3211T	36G548T862	3	1755	115	50	230/460	3	2	20	18

Domestic Hot Water Heater

Location	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	PVI	2	P250A-PV	-	565	800	250	94%	Nat. Gas	2	12	10

Domestic Hot Water Circulating Pumps

Location	Manufacturer	Qty	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Rm	Bell & Gossett	1	PL 45B	-	1/6	3300	30*	20*	115	1	2	10	8

Air Handling Units

Location	Manufacturer	Qty	Model #	Serial #	Cooling Capacity	Cooling Coil	Heating Capacity	Heating Coil	S/A Fan HP	E/A Fan HP	EER	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Roof	Circul-Aire	1	TMP90EWRE46BD2FH	-	-	-	-	-	-	-	-	-	-	2	15	13
Roof	Aaon	1	RK0820750	-	8 tons	DX R-22	188 MBH	Gas HTX	-	-	11	230/460	3	2	15	13
Roof	Circul-Aire	1	TMP-3500	E2006100031	-	-	-	-	3	1.5	-	460	3	3	15	12
Roof	Circul-Aire	2	TMP-2000	E2006100030	-	-	-	-	2	2	-	460	3	3	15	12
Roof	Circul-Aire	2	TMP90EWRE46BD2FH	E2007010060	-	-	-	-	15	7.5	-	460	3	2	15	12
Roof	Circul-Aire	1	M0DLR304HBD2460	-	-	-	-	-	5	-	-	-	-	2	15	13
Roof	Circul-Aire	1	TMP-1500	-	-	-	-	-	1	-	-	-	-	2	15	13
Roof	Addison Co.	1	TR5150BA3A00DH		158,400 BTUH	-	-	-	5	2	11	230/460	-	2	15	13
Roof	Thermal Zone	1	MS29A13115CA	-	9,000	-	N/A	N/A	-	-	13	115	-	2	15	13
Roof	Thermal Zone	1	10AJB36A05	6934 M0106 09422	-	-	-	-	-	-	-	-	-	2	15	13
Roof	Heat Craft	1	JH0200L6C	T97F-00472	-	Copper-Tube	-	-	-	-	-	208-230	3	2	15	13
Music Room	Trane	1	-	-	-	DX	-	HW	-	-	-	-	-	2	20	18

AC Condensers

Location	Manufacturer	Qty	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Approx. Age	ASHRAE Service Life	Remaining Life
Roof	Carrier Condensing Unit	1	38AH-054-621BA	-	50Tons	-	R-22	460	3	2	20	18
Roof	Ccnctcl International Inc	2	11AC25UMXRX	66-1209C01101C	-	-	R-22	-	-	2	20	18
Roof	Fedders	7	HFC1012N7F-UL	ETS04803F	11,500	-	-	203/208	1	5	20	15
Roof	Fedders	3	HFC1009N2F-UL	-	-	-	-	-	-	5	20	15

STATEMENT OF ENERGY PERFORMANCE
Metuchen High School

Building ID: 1773698
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 18, 2009

Facility
Metuchen High School
400 Grove Ave
Metuchen, NJ 08840

Facility Owner
Metuchen Board of Education
16 Simpson Place
Metuchen, NJ 08840

Primary Contact for this Facility
Mike Harvier
16 Simpson Place
Metuchen, NJ 08840

Year Built: 1956
Gross Floor Area (ft²): 105,001

Energy Performance Rating[2] (1-100) 34

Site Energy Use Summary[3]

Electricity (kBtu)	3,512,176
Natural Gas (kBtu)[4]	6,034,080
Total Energy (kBtu)	9,546,256

Energy Intensity[5]

Site (kBtu/ft²/yr)	91
Source (kBtu/ft²/yr)	172

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	856

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

National Average Comparison

National Average Site EUI	79
National Average Source EUI	149
% Difference from National Average Source EUI	15%
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 South Burnt Mill Rd.
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Metuchen High 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	400 Grove Ave , Metuchen, NJ 08840	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		☐

High School (K-12 School)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	105,001 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?	Yes	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	134	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1	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	Yes	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	50 %	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	9 (Optional)	Is this school in operation for at least 8 months of the year?		☐
High School?	Yes	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: PSE&G - Public Service Elec & Gas Co

Fuel Type: Electricity		
Meter: Electric Cost (kWh) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	87,480.00
11/01/2008	11/30/2008	92,160.00
10/01/2008	10/31/2008	91,440.00
09/01/2008	09/30/2008	81,360.00
08/01/2008	08/31/2008	62,280.00
07/01/2008	07/31/2008	78,000.00
06/01/2008	06/30/2008	97,440.00
05/01/2008	05/31/2008	93,360.00
04/01/2008	04/30/2008	84,600.00
03/01/2008	03/31/2008	87,780.00
02/01/2008	02/29/2008	87,780.00
01/01/2008	01/31/2008	85,680.00
Electric Cost Consumption (kWh)		**1,029,360.00**
Electric Cost Consumption (kBtu)		**3,512,176.32**
Total Electricity Consumption (kBtu)		**3,512,176.32**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Natural Gas Cost (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/01/2008	12/31/2008	9,873.00
11/01/2008	11/30/2008	6,542.00
10/01/2008	10/31/2008	4,280.00
09/01/2008	09/30/2008	690.40
08/01/2008	08/31/2008	157.10
07/01/2008	07/31/2008	125.60
06/01/2008	06/30/2008	290.60
05/01/2008	05/31/2008	3,081.30
04/01/2008	04/30/2008	4,698.90

03/01/2008	03/31/2008	8,959.40
02/01/2008	02/29/2008	10,432.50
01/01/2008	01/31/2008	11,210.00
Natural Gas Cost Consumption (therms)		**60,340.80**
Natural Gas Cost Consumption (kBtu)		**6,034,080.00**
Total Natural Gas Consumption (kBtu)		**6,034,080.00**
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
Metuchen High School
400 Grove Ave
Metuchen, NJ 08840

Facility Owner
Metuchen Board of Education
16 Simpson Place
Metuchen, NJ 08840

Primary Contact for this Facility
Mike Harvier
16 Simpson Place
Metuchen, NJ 08840

General Information

Metuchen High School	
Gross Floor Area Excluding Parking: (ft^2)	105,001
Year Built	1956
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

High School	
Space Type	K-12 School
Gross Floor Area(ft^2)	105,001
Open Weekends?	Yes
Number of PCs	134
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	50
Percent Heated	100
Months[o]	9
High School?	Yes
School District[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	34	34	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	91	91	62	N/A	79
Source (kBtu/ft^2)	172	172	117	N/A	149
Energy Cost					
$/year	$ 244,366.00	$ 244,366.00	$ 165,616.29	N/A	$ 211,791.03
$/$ft^2$/year	$ 2.33	$ 2.33	$ 1.58	N/A	$ 2.02
Greenhouse Gas Emissions					
$MtCO_2e$/year	856	856	580	N/A	742
$kgCO_2e/ft^2$/year	8	8	5	N/A	7

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 LIGHTING AUDIT

CONCORD ENERGY SERVICES

CEG Job #: 9C08133
Project: Metuchen Board of Education Energy Audit : Metuchen High School
Address: 400 Grove Street
City: Metuchen, NJ
Building SF: 105,000

"Metuchen High School"

DATE: 06/02/2009
KWH COST: $0.149

EXISTING LIGHTING											PROPOSED LIGHTING							SAVINGS			
Line No.		Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Payback
1		General Office	8	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	91	0.73	1528.8	$227.49	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
2		Admin Office 1	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
3		Admin Office 2	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
4		Admin Office 3	1	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	0.06	121.8	$18.12	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
5		Admin Office 4	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
6		Admin Office 5	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
7		Admin Office 6	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
8		Admin Office 7	1	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	0.06	121.8	$18.12	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
9		Admin Office 8	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
10		Admin Hallway	6	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
11		Guidance Hallway	3	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.25	516.6	$76.87	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
12		Guidance Office 1	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
13		Guidance Office 2	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
14		Guidance Office 3	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
15		Room-09	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

16		Room-10	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
17		Room-11	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
18		Room-12	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
19		Break Room	7	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.57	1205.4	$179.36	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
20		Special Services Office 1	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
21		Special Services Office 2	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
22		Special Services Office 3	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
23		Special Services Lobby	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
24		ClassRm 117	6	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
25		ClassRm 118	7	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.57	1205.4	$179.36	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
26		ClassRm 119	8	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.66	1377.6	$204.99	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
27		ClassRm 120	9	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.74	1549.8	$230.61	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
28		ClassRm 121	10	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.82	1722	$256.23	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
29		General Science Lab 122	10	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.82	1722	$256.23	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
30		Stairwell 1	2	CFL	2100	46	0.09	193.2	$28.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
31		Chemistry Lab 123	27	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	2.21	4649.4	$691.83	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
32		Biology Lab 124	27	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	2.21	4649.4	$691.83	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
33		ClassRm 128	10	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.82	1722	$256.23	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
34		ClassRm 129	6	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
35		Office 130A	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

36		Office 130B	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
37		ClassRm 131	6	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
38		ClassRm 132	6	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
39		Dean of Discipline	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
40		Dean of Discipline	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
41		Corridor A	31	2'x2' T8 Electronic Ballast 3 Lamp U-Bend Prism Reflector	2100	47	1.46	3059.7	$455.28	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
42		Library	18	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	1.04	2192.4	$326.23	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
43		Library	42	High Hat Compact FL	2100	21	0.88	1852.2	$275.61	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
44		Library	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
45		Office 133	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
46		Office 134	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
47		Office 135	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
48		ESL ClassRm 136	4	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.33	688.8	$102.49	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
49		Room-137	2	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	0.12	243.6	$36.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
50		Room-138	3	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.25	516.6	$76.87	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
51		Food Class 140	18	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.48	3099.6	$461.22	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
52		Room-141	1	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.08	172.2	$25.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
53		Faculty Dining	8	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.66	1377.6	$204.99	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
54		Computer Lab 146	18	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.48	3099.6	$461.22	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
55		ClassRm 147	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
56		ClassRm 148	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
57		ClassRm 149	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
58		ClassRm 150	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

59		ClassRm 151	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
60		Biology Lab 152	22	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.80	3788.4	$563.71	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
61		Science ClassRm 153	19	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.56	3271.8	$486.84	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
62		Physics Lab 154	23	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.89	3960.6	$589.34	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
63		Gymnasium 159	24	2' x 4' 4-Lamp, T-5, I-beam	2100	229	5.50	11541.6	$1,717.39	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
64		Fitness Center 160	50	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	4.10	8610	$1,281.17	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
65		Corridor C	34	2'x2' T8 Electronic Ballast 3 Lamp U-Bend Prism Reflector	2100	47	1.60	3355.8	$499.34	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
66		Corridor E	8	High Hat Halogen High intensity Flood Incandescent	2100	100	0.80	1680	$249.98	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
67		Art Room 167	18	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.48	3099.6	$461.22	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
68		KILN RM	4	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100		0.00	0	$0.00	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
69		Storage 164	4	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.11	235.2	$35.00	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
70		Office 165	2	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.06	117.6	$17.50	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
71		Room-166	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
72		Woodworking Shop 168	16	4 LAMP 4' T8	2100	109	1.74	3662.4	$544.97	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
73		Woodworking Shop 168	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
74		Storage 169	1	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.03	58.8	$8.75	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
75		Storage 169	4	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.33	688.8	$102.49	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
76		Wrestling Practice Room	20	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	1.16	2436	$362.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
77		Mech DWG 171	16	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.31	2755.2	$409.97	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
78		ClassRm 172	6	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.49	1033.2	$153.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
79		Storage 173	12	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.34	705.6	$104.99	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
80		Room-174	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
81		Athletic Director	5	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.41	861	$128.12	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

82		Cafeteria	40	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	3.28	6888	$1,024.93	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
83		Kitchen	17	150 Watt Incandescent	600	150	2.55	1530	$227.66	17	42 W CFL	42	0.71	428.4	$63.75	$20.00	$340.00	1.84	1101.6	$163.92	2.07
84		Boiler Room	19	4' 2-Lamp T-8 Translucent Lens Electronic Ballast	2100	58	1.10	2314.2	$344.35	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
85		Boiler Room	4	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.11	235.2	$35.00	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
86		Boys Room 180	3	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.25	516.6	$76.87	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
87		Girls Room 181	3	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.25	516.6	$76.87	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
88		MDF Room		4', 2-Lamp, T8, Electronic Ballast	2100	58	0.00	0	$0.00	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
89		Teachers Work Room	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
90		Room-183	2	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	0.12	243.6	$36.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
91		ClassRm 187	6	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	0.35	730.8	$108.74	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
92		Hallway 184	4	4' 1-Lamp T-8 Translucent Lens Electronic Ballast	2100	28	0.11	235.2	$35.00	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
93		Music 188	45	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	2.61	5481	$815.57	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
94		Music 188A	4	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	0.23	487.2	$72.50	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
95		Music 189	20	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	1.16	2436	$362.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
96		Music 189A	5	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	0.29	609	$90.62	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
97		Music 189B	1	4' Indirect Lighting Electronic Ballast 2 Lamp T8	2100	58	0.06	121.8	$18.12	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
98		Auditorium Stage	8	150 W Incandescent	600	150	1.20	720	$107.14	8	42 W CFL	42	0.34	201.6	$30.00	$20.00	$160.00	0.86	518.4	$77.14	2.07
99		Auditorium	47	High Hat Halogen High intensity Flood Incandescent	2100	300	14.10	29610	$4,405.97	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
100		Corridor B	12	2'x2' T8 Electronic Ballast 3 Lamp U-Bend Prism Reflector	2100	47	0.56	1184.4	$176.24	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
101		Classroom 200	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
102		Classroom 201	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
103		Classroom 202	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
104		Classroom 203	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
105		Classroom 204	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00

106		Classroom 205	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
107		Classroom 206	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
108		Classroom 207	16	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.31	2755.2	$409.97	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
109		Computer room 208	16	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	1.31	2755.2	$409.97	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
110		Office 209	4	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.33	688.8	$102.49	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
111		Office 209A	2	2'x4' 3 Lamp T8 Electronic Ballast No Refelector	2100	82	0.16	344.4	$51.25	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
112		Classroom 215	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
113		Classroom 216	12	4' Indirect Lighting Electronic Ballast 3 Lamp T8	2100	82	0.98	2066.4	$307.48	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
114		2nd Floor Corridor A	12	2'x2' T8 Electronic Ballast 3 Lamp U-Bend Prism Reflector	2100	47	0.56	1184.4	$176.24	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
115		Boys Locker Room Area	21	1'x4', 32 W 2 -Lamp, T8, Electronic Ballast	2100	58	1.22	2557.8	$380.60	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
116		Gym Storage	4	26 W CFL	2100	26	0.10	218.4	$32.50	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
117		Gym Foyer	1	26 W CFL	2100	26	0.03	54.6	$8.12	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
118		Girls Locker Room Area	11	1'x4', 32 W 2 -Lamp, T8, Electronic Ballast	2100	58	0.64	1339.8	$199.36	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
119		Front Lobby 190	12	High Hat Compact FL	2100	100	1.20	2520	$374.98	0	No Change Required		0.00	0	$0.00		$0.00	0.00	0	$0.00	0.00
			1157				98.90	202071	$30,068.21	25			1.05	630	$93.74		$500.00	2.70	1620	$241.06	2.07

Project Name: LGEA Solar PV Project - Metuchen High School
Location: Metuchen, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$1,184,040
Annual kWh Production	205,305
Annual Energy Cost Reduction	$30,591
Annual SREC Revenue	$71,857
First Cost Premium	**$1,184,040**
Simple Payback:	**11.56** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	240	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.149**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$59,202	0	0	0	$0	0	0	(59,202)	0
1	$0	205,305	$30,591	$0	$71,857	$77,891	$26,759	($2,203)	($61,405)
2	$0	204,279	$31,508	$0	$71,498	$75,957	$28,694	($1,644)	($63,049)
3	$0	203,258	$32,453	$0	$71,140	$73,882	$30,768	($1,057)	($64,106)
4	$0	202,241	$33,427	$0	$70,784	$71,658	$32,992	($439)	($64,545)
5	$0	201,230	$34,430	$2,073	$70,431	$69,273	$35,377	($1,863)	($66,407)
6	$0	200,224	$35,463	$2,062	$70,078	$66,716	$37,935	($1,171)	($67,579)
7	$0	199,223	$36,527	$2,052	$69,728	$63,973	$40,677	($448)	($68,026)
8	$0	198,227	$37,622	$2,042	$69,379	$61,033	$43,618	$310	($67,717)
9	$0	197,236	$38,751	$2,032	$69,032	$57,880	$46,771	$1,102	($66,615)
10	$0	196,249	$39,914	$2,021	$68,687	$54,499	$50,152	$1,929	($64,686)
11	$0	195,268	$41,111	$2,011	$68,344	$50,873	$53,777	$2,793	($61,892)
12	$0	194,292	$42,344	$2,001	$68,002	$46,986	$57,665	$3,695	($58,197)
13	$0	193,320	$43,615	$1,991	$67,662	$42,817	$61,833	$4,635	($53,562)
14	$0	192,354	$44,923	$1,981	$67,324	$38,347	$66,303	$5,615	($47,946)
15	$0	191,392	$46,271	$1,971	$66,987	$33,554	$71,096	$6,636	($41,310)
16	$0	190,435	$47,659	$1,961	$66,652	$28,414	$76,236	$7,699	($33,610)
17	$0	189,483	$49,089	$1,952	$66,319	$22,903	$81,747	$8,806	($24,805)
18	$0	188,535	$50,561	$1,942	$65,987	$16,994	$87,657	$9,957	($14,848)
19	$0	187,593	$52,078	$1,932	$65,657	$10,657	$93,993	$11,153	($3,695)
20	$0	186,655	$53,641	$1,923	$65,329	$3,862	$100,788	$12,397	$8,702
21	$0	185,721	$55,250	$1,913	$65,003	$3,274	$92,655	$22,410	$31,112
22	$0	184,793	$56,907	$1,903	$64,677	$2,241	$76,247	$41,194	$72,306
23	$0	183,869	$58,615	$1,894	$64,354	$0	$0	$121,075	$193,381
24	$0	182,950	$60,373	$1,884	$64,032	$0	$0	$122,521	$315,902
25	$0	182,035	$62,184	$1,875	$63,712	$0	$0	$124,021	$439,923
	Totals:	3,916,797	$821,978	$31,948	$1,370,879	$968,168	$1,124,838	$1,293,740	$67,325
					Net Present Value (NPV)			**$40,934**	
					Internal Rate of Return (IRR)			**9.7%**	

Project Name: **LGEA Solar PV Project - Metuchen High School**
Location: **Metuchen, NJ**
Description: **Photovoltaic System - Direct Purchase**

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,184,040
Annual kWh Production	205,305
Annual Energy Cost Reduction	$30,591
Annual SREC Revenue	$71,857
First Cost Premium	**$1,184,040**
Simple Payback:	**11.56** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.149**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$1,184,040	0	0	0	$0	(1,184,040)	0
1	$0	205,305	$30,591	$0	$71,857	$102,447	($1,081,593)
2	$0	204,279	$31,508	$0	$71,498	$103,006	($978,587)
3	$0	203,258	$32,453	$0	$71,140	$103,594	($874,993)
4	$0	202,241	$33,427	$0	$70,784	$104,212	($770,782)
5	$0	201,230	$34,430	$2,073	$70,431	$102,788	($667,994)
6	$0	200,224	$35,463	$2,062	$70,078	$103,479	($564,515)
7	$0	199,223	$36,527	$2,052	$69,728	$104,203	($460,312)
8	$0	198,227	$37,622	$2,042	$69,379	$104,960	($355,352)
9	$0	197,236	$38,751	$2,032	$69,032	$105,752	($249,600)
10	$0	196,249	$39,914	$2,021	$68,687	$106,580	($143,021)
11	$0	195,268	$41,111	$2,011	$68,344	$107,444	($35,577)
12	$0	194,292	$42,344	$2,001	$68,002	$108,345	$72,768
13	$0	193,320	$43,615	$1,991	$67,662	$109,286	$182,054
14	$0	192,354	$44,923	$1,981	$67,324	$110,266	$292,320
15	$0	191,392	$46,271	$1,971	$66,987	$111,287	$403,606
16	$0	190,435	$47,659	$1,961	$66,652	$112,350	$515,956
17	$0	189,483	$49,089	$1,952	$66,319	$113,456	$629,412
18	$0	188,535	$50,561	$1,942	$65,987	$114,607	$744,019
19	$0	187,593	$52,078	$1,932	$65,657	$115,804	$859,823
20	$0	186,655	$53,641	$1,923	$65,329	$117,047	$976,870
21	$1	185,721	$55,250	$1,913	$65,003	$118,339	$1,095,209
22	$2	184,793	$56,907	$1,903	$64,677	$119,681	$1,214,891
23	$3	183,869	$58,615	$1,894	$64,354	$121,075	$1,335,966
24	$4	182,950	$60,373	$1,884	$64,032	$122,521	$1,458,487
25	$5	182,035	$62,184	$1,875	$63,712	$124,021	$1,582,508
	Totals:	3,916,797	$821,978	$31,948	$1,370,879	$2,766,548	$2,160,910
				Net Present Value (NPV)			**$1,582,533**
				Internal Rate of Return (IRR)			**7.6%**

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
Metuchen High School	8410	Sunpower SPR230	572	14.7	8,411	131.56	205,305	18,876	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.