Logan Township School District
A TERRIFIC PLACE TO LEARN

ENERGY AUDIT – FINAL REPORT

LOGAN TOWNSHIP BOARD OF EDUCATION
LOGAN ELEMENTARY SCHOOL

110 SCHOOL LANE
LOGAN, NJ 08085
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CEG PROJECT NO. 9C09103

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Table of Contents

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I. EXECUTIVE SUMMARY

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

Logan Township Board of Education
Logan Elementary School
110 School Lane
Logan, NJ 08085

School District Contact Person: Frederick A. Berg
Facility Contact Person: John Mangino

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, 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	$ 192,773
Natural Gas	$ 43,596
Total	$ 236,369

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM' are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Boiler Replacement - High Efficiency	$112,360	$8,954	12.5	178.9%
ECM #2	Lighting Controls	$9,720	$10,805	0.9	1567.4%
ECM #3	Install DDC Controls	$480,000	$38,455	12.5	20.2%
ECM #4	Energy Recovery Unit Installation	$122,850	$8,114	15.1	32.1%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	63.71 KW PV System	$573,390	$36,299	15.8	58.3%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Boiler Replacement - High Efficiency	0	0	5,394
ECM #2	Lighting Controls	0	68,384	0
ECM #3	Install DDC Controls	0	112,199	10,679
ECM #4	Energy Recovery Unit Installation	0	24,436	2,548
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	63.71 KW PV System	64	71,453	0

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #2:** Lighting Controls

Although ECM #3 does not provide a payback less than 10 years, it is recommended to proceed with the installation of a direct digital controls (DDC) system as suggested in ECM #3 (or equal) for the school because with the installation of a DDC system, the building will operate much more efficient due to tighter temperature and scheduling control.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

Renewable Energy Measures (REMs) were also reviewed for implementation at the Logan Township – Elementary School. CEG utilized a roof-mounted strategy for the solar array as there was enough room on the roof structure to house the PV system. The recommended 63.71 kW PV system will produce approximately 71,453 kWh of electricity annually and will reduce the facility electrical consumption from the grid by 5.9%. The system's calculated simple payback of 15.8 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options before deciding to not implement this renewable energy measure.

Overall, after reviewing the utility information, existing documentation and conditions there are some valuable energy conservation measures available to the Logan Township – Elementary School. The owner has consulted CEG about a concern with the cooling tower where it has been inefficient due to corrosion of the open cooling tower. The immediate response to an old cooling tower is a replacement, but the problem with replacing the cooling tower is that the implementation of a new cooling tower system would add more consumption charges to the school's current bill. To get a better understanding of the current setup, the cooling tower, also known as an ejector tower, produces the chilled water for the system but within the tower itself , there are no moving parts, therefore any replacement with a modern efficient cooling tower with fans would add an electric load to the facility. This cooling tower also exceeds the ASHRAE

recommended service life as outlined in the 2007 ASHRAE Applications Handbook. CEG recommends the Owner review the implementation of a cooling tower replacement. An ECM was not recommended by CEG due to the fact that this is not an energy savings opportunity. Additionally, review of the renewable energy measure recommendation should be completed as well as continuing current maintenance practices and following CEG's recommended maintenance and operation measure references noted above.

There are also several issues which CEG suggests that the owner further investigate such matters to save small amounts of energy. The hot water loop for the heat pumps is controlled by a vintage Variable Frequency Drive (VFD). In conjunction with the VFD, there is a temperature control valve located on the return of each of the heat pumps. From in field observation, CEG has determined that these valves allow approximately 50% of the flow or more to be going through the heat pumps at all times. When the heat pump is not calling for any conditioning, the coil is shut off but the water is still flowing through the unit. CEG recommends that a new VFD be installed on the pumps serving the heat pump loop in conjunction with a two-way valve and circuit setter at the heat pump to replace the existing temperature control valve. This will allow the unit to have on/off capabilities and as a result the pumps will be able to modulate flow to approximately 25%. An ECM recommendation was not included because although there are energy savings, they are difficult to calculate without measurement data of the existing pump operation. Therefore, a simple payback cannot be calculated at this time.

II. INTRODUCTION

The comprehensive energy audit covers the 136,230 square foot Logan Elementary School, which includes the following spaces: Classrooms, offices, cafeteria, and gymnasium.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

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

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

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

$$Internal\ Rate\ of\ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + IRR)^n} \right)$$

$$Net\ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + DR)^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric provides electricity to the facility under their Annual General Service (AGS) rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. 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 historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Gas provides natural gas to the facility under the Basic Gas Supply Service (BGSS) rate structure. Woodruff Energy is the third party supplier. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	15.8¢ / kWh
Natural Gas	$1.67 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Annual Gas Service
Meter No: -
Customer ID No: -
Third Party Utility -
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jul-08	165,300	549.0	$26,120
Aug-08	99,000	501.0	$16,571
Sep-08	34,200	549.0	$20,496
Oct-08	111,900	426.0	$16,531
Nov-08	89,400	426.0	$12,730
Dec-08	106,200	426.0	$14,794
Jan-09	113,700	426.0	$16,081
Feb-09	119,400	426.0	$16,476
Mar-09	124,500	426.0	$17,149
Apr-09	96,900	426.0	$13,983
May-09	45,000	426.0	$6,227
Jun-09	115,200	441.0	$15,613
Totals	**1,220,700**	**549.0 Max**	**$192,773**

AVERAGE DEMAND **454.0 KW average**

AVERAGE RATE **$0.158 $/kWh**

Figure 1
Electricity Usage Profile

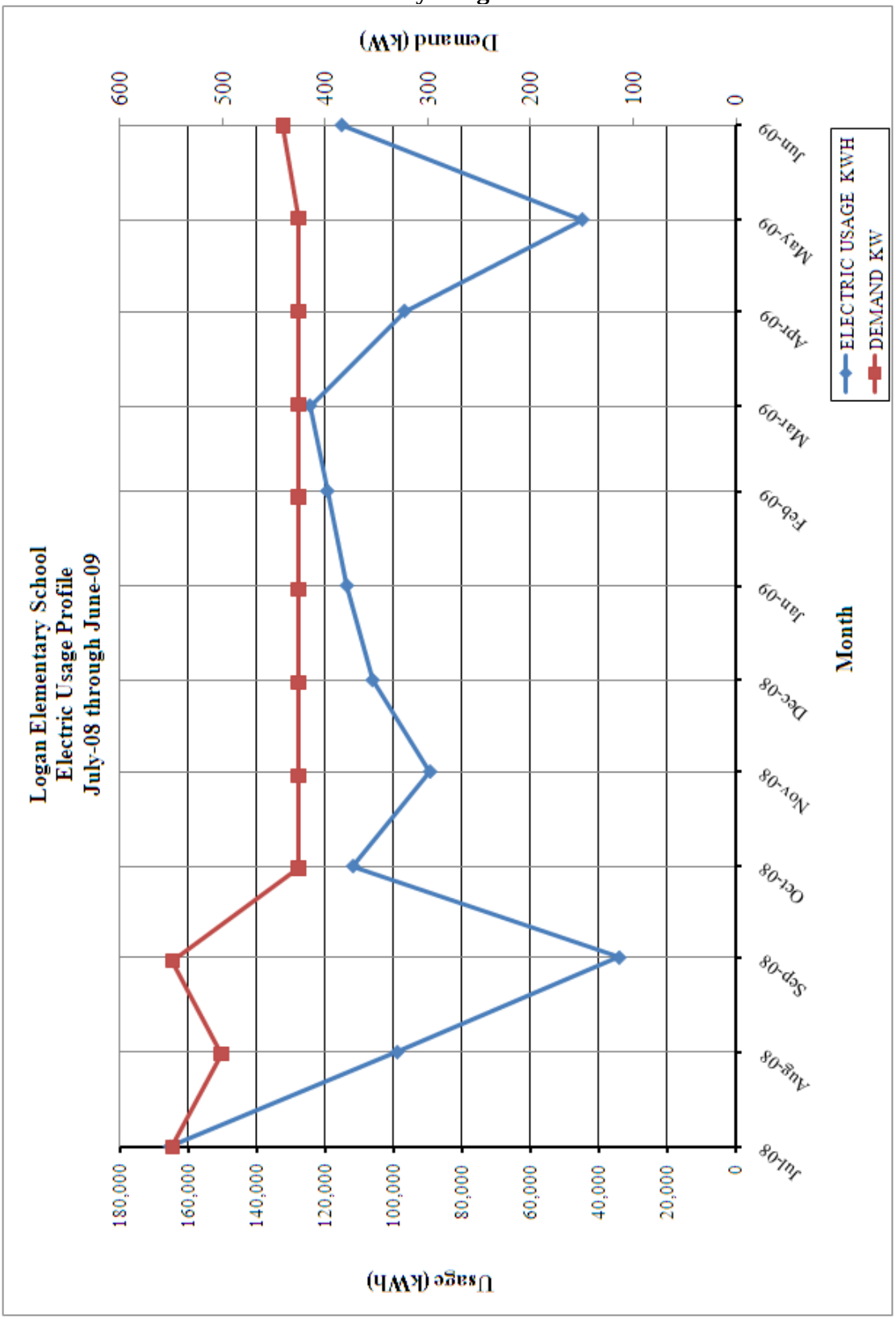
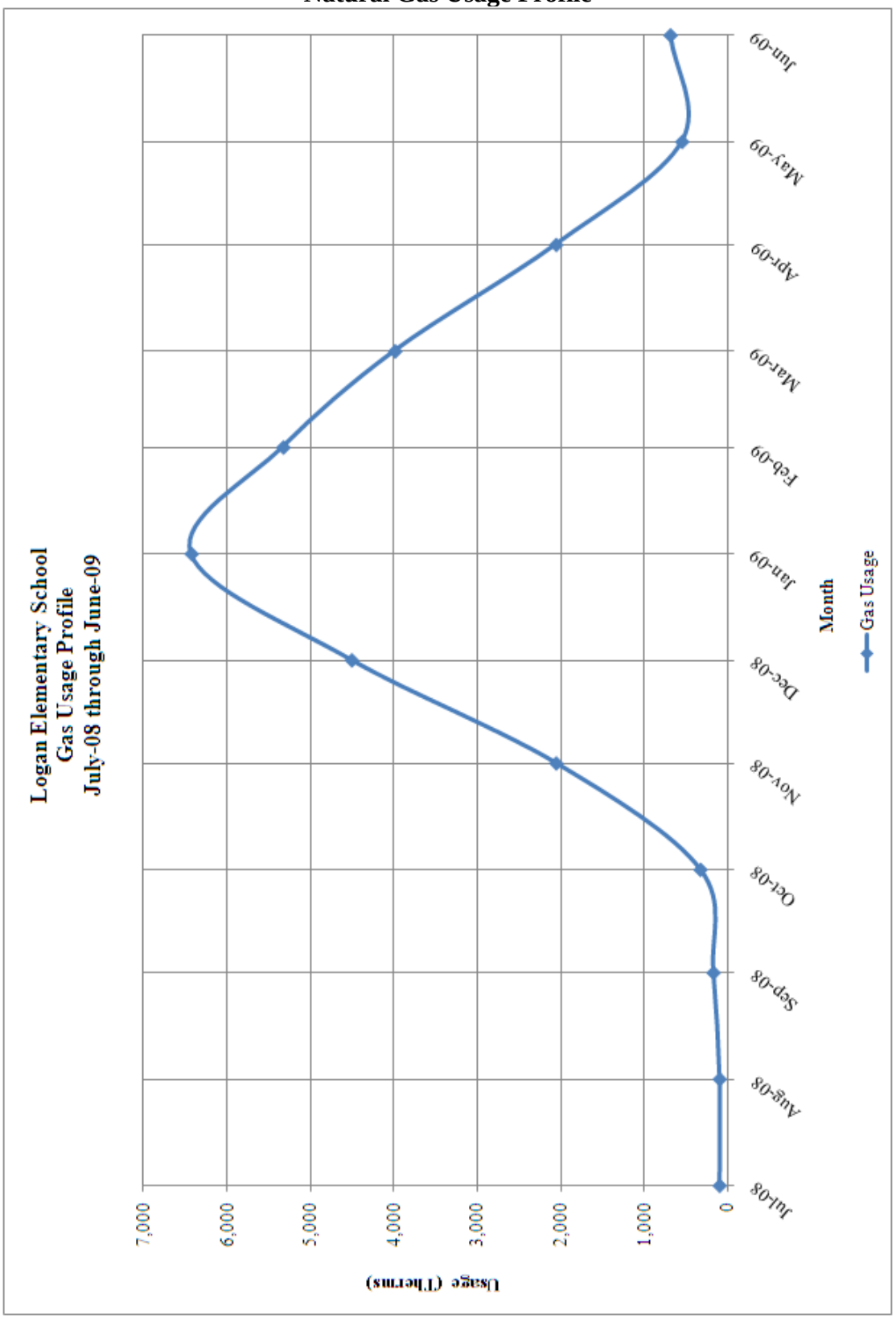


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	South Jersey Gas	
Rate:	Basic Gas Supply Service (BGSS)	
Meter No:		
Point of Delivery ID:	-	
Third Party Utility Provider:	Woodruff Energy	
TPS Meter No:	-	

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jul-08	100.00	$234.80
Aug-08	100.00	$252.82
Sep-08	175.00	$288.58
Oct-08	330.00	$512.80
Nov-08	2,060.00	$2,856.55
Dec-08	4,510.00	$7,486.60
Jan-09	6,430.00	$10,755.42
Feb-09	5,330.00	$8,955.47
Mar-09	3,990.00	$6,684.40
Apr-09	2,060.00	$3,455.21
May-09	550.00	$930.47
Jun-09	690.00	$1,182.45
TOTALS	**26,325.00**	**$43,595.57**
AVERAGE RATE:	**$1.656**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for 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 for similar building types. 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. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

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

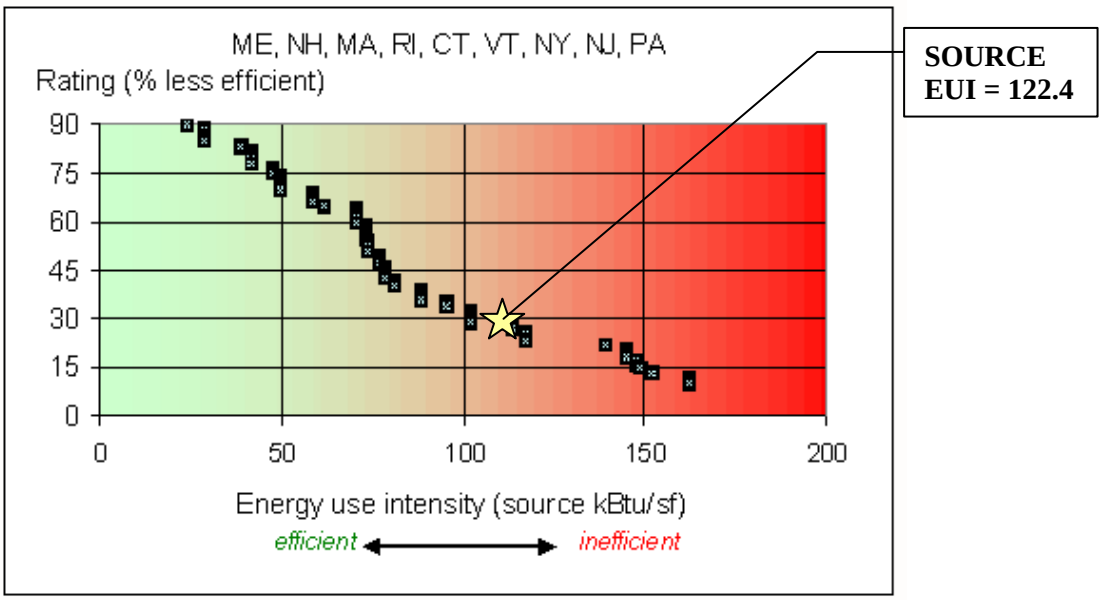
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	1220700.0			4,167,470	3.340	13,919,349
NATURAL GAS		26325.0		2,632,500	1.047	2,756,228
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				6,799,970		16,675,577
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		136,230	SQUARE FEET			
BUILDING SITE EUI		*49.92*	kBtu/SF/YR			
BUILDING SOURCE EUI		*122.41*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of *Elementary Schools*.

Figure 3
Source Energy Use Intensity Distributions: Elementary 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 tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local school districts is becoming more important as utility costs continue to increase and emphasis is being placed 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. It is vital that local school districts assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the school district to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login

User Name: loganboe
Password: lgeaceg2009

Security Question: What city were you born in?
Security Answer: "logan"

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Logan Elementary School	30	50

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 136,230 SF Logan Elementary School is a one story facility comprised of Classrooms, offices, cafeteria, and gymnasium. The typical hours of operation for this facility are between 7:00 am and 3:30 pm. On the weekends there are sometimes events which occupy the building from approximately 9:00 am until 1:00 pm. Exterior walls are brick construction with insulation typical of the current time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the facility are double pane, ¼" clear glass with vinyl frames. The majority of the roof is flat layered roof system with no stones. The amount of insulation below the roofing is unknown. The building was built in 1991 with one small addition in 2000.

HVAC Systems

The Logan Elementary School is conditioned by a conventional water-source heat pump system. The heat pumps are located within the ceiling and are manufactured by McQuay. The cooling tower is located outside on grade, manufactured by B.A.C. These heat pump units are original to the building and seem to be in good condition. The cooling tower is actually an ejector tower with no moving parts or electricity. It provides 755 gallons per minute to the system and has four (4) 60 volt heaters within the basin to keep it from freezing during the winter months. The tower has been suffering from maintenance issues which mainly include a corrosion problem in the basin of the tower. Furthermore, the cooling tower is approximately 19 years old and is very close to its ASHRAE service life. Unfortunately, since this unit has no moving parts and does not need any electricity to run other than to power the heaters and pumps within. A replacement of the cooling tower with a high efficiency tower would be a good consideration for the owner in the future.

Outside air is introduced into the heat pump system through rooftop supply air fans which duct into a mixing box attached to the heat pump and mix in with the return air from the room. These rooftop supply fans are manufactured by Penn Vent, along with a few other manufacturers which provide unconditioned air to the spaces.

The heat for the building is provided by a boiler plant located in the mechanical room. This plant consists of two (2) Lochinvar boilers which supply the hot water to the heat pumps and the cabinet unit heaters that are installed in the hallways ceilings near the exits. The boilers have an input heating capacity of 2,002,000 Btu/h. The boilers have a standard efficiency of 80%. These boilers are approximately eighteen (18) years old but due to insufficient controls that make use of turn down or set-backs, the boilers are constantly running which makes them very inefficient. A controls system to monitor these units would be a viable solution; otherwise a replacement with condensing boilers would also provide substantial savings but only in conjunction with a controls system.

A Greenheck makeup air unit is providing the kitchen area with extra outside air to compensate for all the kitchen equipment. Additionally, there is a Greenheck centrifugal fan exhausting the air from the space.

The gymnasium has two (2) McQuay heating only air handling units installed in the mezzanine. These units provide heating and ventilation as required by space occupancy. Unfortunately, these units are improperly controlled and since the outside air / return air dampers do not work they need to be opened and closed manually. Additionally, the coil for the water side on one of the units has been shut off. The gym suffers from overheating problems during the winter season and since there is a lack of control, the efficiency at which these units run is limited.

The server room is conditioned by a cooling only ductless split system made by Liebert. The server room unit runs 24/7 to cool the school servers. The unit is in good condition.

The 2000 addition has two (2) York split system units on the roof which supply two rooms within the addition. These units are in good condition.

Exhaust System

Air is exhausted from each of the building's wings through centrifugal exhaust fans.

HVAC System Controls

There is currently no central HVAC control system in this facility. The thermostats within the building are non-programmable, heating and cooling set point with auto change over. This type of system causes inefficient system operation and does not allow the owner to have supervisory/ master control. The energy efficiency of the HVAC system would be greatly increased if the implementation of a Direct Digital Control (DDC) system were applied.

Domestic Hot Water

Domestic hot water for the restrooms and kitchen areas is provided by an 80 gallon State gas-fired hot water heater, capacity of 500 MBH. During the time of the survey, there was a Bradford White gas-fired domestic hot water heater, capacity of 505 MBH being installed. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The domestic hot water piping insulation appeared to be in good condition.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and magnetic ballasts. The retrofit of T-8 lamps into magnetic ballasted fixtures is very inefficient and does not save any electrical energy, therefore new fixtures and electronic ballasts should be installed for optimum energy savings. Storage rooms and closets are lit with compact fluorescent lamps. The exterior lighting consists of high pressure sodium lamps.

VI. MAJOR EQUIPMENT LIST

The equipment list is considered major energy consuming equipment and through energy conservation measures could yield substantial energy savings. 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 in some cases 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 the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Boiler Plant Upgrade

Description:

There is one boiler plant providing hot water for the heat pump loop which conditions the building as well as cabinet unit heaters which are located in the ceilings in the hallway. The boiler plant consists of two (2) Lochinvar cast iron boilers, model N2000, 2,002 MBH input, natural gas, water boiler. The existing units are less efficient with an estimated combustion efficiency of 80% for heating, when new. The estimated service life for this type of gas fired boiler is thirty-five (35) years; these hot water boilers are 18 years old but have not exceeded their ASHRAE service life yet.

This energy conservation measure will replace the gas fired boilers serving the facility. Calculation is based on the following equipment: Aerco, Benchmark BMK-2.0GWB condensing boiler or equivalent replacing the hot water boiler. The existing units will be replaced with high energy efficient units with capacities typical of the existing units. The installation of the new boilers also includes the installation of an electronic (DDC) control panel and associated sequences.

Energy Savings Calculations:

<u>Existing Gas Fired Hot Water Boilers, Typical for (2) Lochinvar:</u>

Rated Capacity = 2,002 MBh Input, 1,600 MBh Output (Natural Gas)

Combustion Efficiency = 80%
Age & Radiation Losses = 5%
Thermal Efficiency = 75%

<u>Replacement Gas Fired Boiler (Hot water) (2 Aerco Benchmark):</u>

High-Efficiency Gas Fired Boiler

Rated Capacity = 2,000 MBh Input, 1,860 MBh Output (Natural Gas)

Combustion Efficiency = 95%
Radiation Losses = 0.5%
Thermal Efficiency = 94.5%

Natural Gas Equipment List - Estimated Annual Usage per unit						
Concord Engineering Group						
Logan Elementary School						
Manufacturer	**Qty.**	**Model #**	**Serial #**	**Input (MBh)**	**% of Total Input**	**Estimated Annual Therms**
Lochinvar	**1**	**N2000**	**J908704**	**2002**	**39.97%**	**10,521.59**
Lochinvar	**1**	**N2000**	**J908705**	**2002**	**39.97%**	**10,521.59**
State	1	SBT80-500 NE7	-	500	9.98%	2,627.77
Bradford White	1	D80L5033NA	FH12341569	505	10.08%	2,654.05
			Total Input MBH	**5,009**	**1.00**	**26,325.00**
			Total Input Therms	50.1		
			Total Gas Consumption Therms / yr.	26325		

Operating Data:

Heating Season Fuel Consumption = 2 x 10,521.59 = 21,043 Therms

*Further energy savings will be realized by installing DDC controls for the boiler system. CEG estimates that this measure will provide approximately 5% natural gas usage reduction throughout the boiler operation.

DDC System Energy Savings = 21,043 x 5% = 1,052 Therms

$$Heating\ Energy\ Savings = Fuel\ Consumption \times \frac{(New\ Furnace\ Efficiency - Old\ Furnace\ Efficiency)}{New Furnace Efficiency}$$

Heating Energy Savings = 21,043 Therms x ((94.5% - 75%) / (94.5%)) = 4,342 Therms

Total Heating Energy Savings = 4,342 Therms + 1,052 Therms = 5,394 Therms

Total Heating Cost Savings

Heating Energy Cost Savings = Annual Energy Savings x $/Therm

Heating Energy Cost Savings = 5,394 Therms x $1.66/Therm = $8,954/ yr.

Installed cost of a new gas fired heating plant $119,360. Cost for asbestos abatement was not included in this estimate.

Equipment Incentives:

Heating Smart Start Equipment Incentive = $2.00/MBh for boilers < 300 MBh and $1.75/MBh for boilers ≥ 300 MBh.

Total Smart Start Equipment Incentive = ($1.75/MBh x 4,000 MBh)
Total Smart Start Equipment Incentive = $7,000

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$119,360
NJ Smart Start Equipment Incentive ($):	$7,000
Net Installation Cost ($):	$112,360
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$8,954
Total Yearly Savings ($/Yr):	$8,954
Estimated ECM Lifetime (Yr):	35
Simple Payback	12.5
Simple Lifetime ROI	178.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$313,390
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$80,036.57

ECM #2: Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. Photocell control senses light levels and turn off or reduce lights when there is adequate daylight. Photocells are mostly used outside, but are becoming more popular in energy-efficient interior lighting designs as well.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control - 10%.

Energy savings achieved for "Occupancy Sensors for Lighting Control" average 10%. Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors. The estimated savings is below the average listed above due to the continuous occupancy nature of college educational facilities. The majority of the savings is expected to be after school hours when rooms are left with lights on.

The ECM includes replacement of standard wall switches with sensors wall switches for individual all offices, class rooms, and bathrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. See the "Investment Grade Lighting Audit" appendix for details.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by 10% for all areas that include occupancy sensors.

Light Energy = 683,839 kWh/Yr. proposed lighting controlled energy

Hours of Operation:

Classrooms and Hallways:
6,760 Hrs per year.

Offices and administration area:
4,706 Hrs per year.

Closets and Storage Rooms:
(Approximately 25% of regular admin hours) – 1,200 to 1,800 Hrs per year.

Energy Savings Calculations:

$$Energy\ Savings = \left(10\% \times Occuapancy\ Sensored\ Light\ Energy\ \left(kWh/Yr\right)\right)$$

$$Energy\ Savings = \left(10\% \times 683{,}839\ \left(kWh\right)\right) = 68{,}384\ \left(kWh\right)$$

$$Savings. = Energy\ Savings\ \left(kWh\right) \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

$$Savings. = 68{,}384\ \left(kWh\right) \times 0.158\left(\frac{\$}{kWh}\right) = \$10{,}805$$

Installation cost per dual-technology sensor (Basis: Sensor switch or equivalent) is $110/unit including material and labor.

Installation Cost = $110 x 108 motion sensors = $11,880

From the NJ Smart Start appendix, the installation of a lighting control device warrants the following incentive: occupancy = $20 per fixture.

$$\text{Smart Start®}\ Incentive = \left(\#\ of\ \ wall\ mount\ devices \times\ \$\ 20\right) = \left(180 \times \$20\right) = \$2{,}160$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,880
NJ Smart Start Equipment Incentive ($):	$2,160
Net Installation Cost ($):	$9,720
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,805
Total Yearly Savings ($/Yr):	$10,805
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.9
Simple Lifetime ROI	1567.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$162,075
Internal Rate of Return (IRR)	111%
Net Present Value (NPV)	$119,269.39

ECM #3: Install DDC Controls

Description:

Throughout the older part of the building there are no controls for any of the HVAC units and heating units. The use of manual control of HVAC systems is inaccurate and can be neglected due to human error. The current setup with manual control does not allow for night time setback. In addition, the absence of controllers doesn't allow the building to maintain the temperature at set-point under changing load conditions.

The DDC system has the potential to realize substantial savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, etc. The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Energy Management and Control System Savings - 5%-15%.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 15% of the total energy cost for the facility.

Energy Savings Calculations:

Studies have shown that the installation of a full DDC system could save an estimated 10% of the total energy costs for this facility which is approximately $236,368.

Annual Savings = 15% x $236,368 = $35,455.

Assuming one-half of the total energy savings is natural gas and the other half is electric savings, this equates to 112,199 kWh and 10,679 Therms saved. We have also assumed a maintenance savings of $3,000 per year for the pneumatic devices.

The cost of a full DDC system with new field devices, thermostats, controllers, computer, software, engineering, etc. is approximately $4 per SF based on recent project cost data and a control contractor's budget pricing. For this facility, the estimated cost of a DDC system for the facility is approximately $480,000 (based on 120,000 SF).

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$480,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$480,000
Maintenance Savings ($/Yr):	$3,000
Energy Savings ($/Yr):	$35,455
Total Yearly Savings ($/Yr):	$38,455
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.5
Simple Lifetime ROI	20.2%
Simple Lifetime Maintenance Savings	$45,000
Simple Lifetime Savings	$576,825
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($20,926.71)

ECM #4: Energy Recovery Unit Installation

Description:

The Logan Elementary School utilizes supply and exhaust fans to bring in outside air for a heat pump system which conditions the entire school. With the current setup, the outside air being pulled in goes straight to the heat pump and is then treated to condition the space. The exhaust is a plenum return through the exhaust fans. On days where there are extreme climates, the heat pump is unable to fully meet the space requirements for temperature due to the large temperature change which it needs to overcome. The benefit of using an energy recovery unit to pre-condition the air before entering the heat pump greatly reduces the load and also allows for efficient conditioning to the spaces. Concord Engineering suggests that for each of the energy recovery units installed, the existing supply fan be removed and the new unit will be placed above the existing penetration. The exhaust that is running in conjunction with the supply fan will be removed and capped, while a new penetration through the roof will be placed underneath the return of the energy recovery unit.

This ECM installs an energy recovery unit for each of the four (4) supply fans serving the spaces, Semco of equivalent. During the heating season, this unit uses the exhaust air stream to pre-heat the incoming outdoor air, lowering the impact on the schools boiler and during the cooling season, pre-cool the outdoor air to limit cooling required by the heat pumps. Energy savings calculations were performed using Trane Trace® 700 comprehensive building analysis software. Usage shown below is for all four (4) units.

Assumptions:

Area Served	Required Outdoor Air (CFM)	Total Air to Space (CFM)
West Wing B	2520	16800
East Wing B	1895	13460
West Wing C	1645	10600
East Wing C	1485	9900

Total Existing Electric Usage = 382,728 kWh
Total Existing Natural Gas Usage = 9,172 Therms

Total New Electric Usage = 358,292 kWh
Total New Natural Usage = 6,624 Therms

Electric Cost Savings = (Existing – New) x $/kWh
Electric Cost Savings = (382,728 kWh – 358,292 kWh) x $0.16 = $3,910

Natural Gas Cost Savings = (Existing – New) x $/Therm
Natural Gas Cost Savings = (9,172 Therms – 6,624 Therms) x $1.65/Therm = $4,204

Total Cost Savings = Electric Savings + Natural Gas Savings
Total Cost Savings = $3,910 + $4,204 = $8,114*
*Note: There are limited cooling savings due to the limited usage of the facility during the summer months.

Currently no Smart Start incentives are available for an energy recovery system.

Total installation cost for the four (4) rooftop units is estimated at $122,850. The pricing for each piece of equipment is based on budgetary numbers received from the manufacturer's representative.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$122,850
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$122,850
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$8,114
Total Yearly Savings ($/Yr):	$8,114
Estimated ECM Lifetime (Yr):	20
Simple Payback	15.1
Simple Lifetime ROI	32.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$162,280
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	($2,134.17)

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 measures (REM) for the school district utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

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 4,525 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 63.71 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 71,453 KWh annually, reducing the overall utility bill by approximately 5.9% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory

PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

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

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**INTERNAL RATE OF RETURN**
Direct Purchase	15.8 Years	58.3%	4.5%

*The solar energy measure is shown for reference in the executive summary Renewable Energy Measure (REM) table

Given the large amount of capital required by the BOE to invest in a solar system through a Direct Purchase CEG does not recommend the BOE pursue this route. It would be more advantageous for the BOE to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the BOE at a reduced rate compared to their existing electric rate.

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

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

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

Electricity:

This facility is comprised of Classrooms, offices, cafeteria, and gymnasium. The typical hours of operation for this facility are between 7:00 am and 3:30 pm. The building was built in 1991 with one small addition in 2000.

The Electric Usage Profile demonstrates a very erratic load – profile. The profile is erratic as an extreme valley is demonstrated in September with an extreme jump in consumption the following month, which continues through March. Another large drop in consumption is demonstrated in May. The consumption jumps again June and July as is typical with the summer cooling (air conditioner) load. In this facility cooling is provided by a cooling tower and heat pump combination system. The server room is conditioned by a cooling only ductless split system made by Liebert. The server room unit runs 24/7 to cool the school servers. The constant operation adds to the winter consumption. The 2000 addition has two (2) York split system units on the roof which supply two rooms within the addition. This facility receives its electric Delivery and Commodity service via Atlantic City Electric (ACE) on an AGS rate schedule. A flat (base-load) shaping is important because it will yield more competitive pricing when shopping for alternative energy supply.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical heating load profile, with increasing consumption in the winter months (October – March) and a dramatic drop in consumption in the summer months (May – September). Heating is the obvious reason for the winter consumption and in this facility the primary source for heating is supplied via a boiler plant located in the mechanical room. This plant consists of two (2) Lochinvar boilers which supply the hot water to the heat pumps and the cabinet unit heaters that are installed in the hallways ceilings near the exits. Domestic hot water for the restrooms and kitchen areas is provided by an 80 gallon State natural gas-fired hot water heater, capacity of 500 MBH. Natural gas Delivery service in this facility is provided by South Jersey Gas Company on a GSG rate schedule. The natural gas Commodity service is provided by a Third Party Supplier (TPS) Woodruff Energy. A flat load profile will always allow for the most competitive price available when shopping for alternative energy supplies.

Tariff Analysis:

Electricity:

This facility receives electrical Delivery Service from Atlantic City Electric on an AGS Secondary (Annual General Service) utility rate. The AGS rate is available at any point of Company's system where facilities of adequate character and capacity exist for the entire electric service requirements of any customer contracting for annual service delivered at one point and metered at or compensated to the voltage of delivery. This delivery service includes the following charges: Delivery Service Charges, Distribution Demand Charges, Reactive Demand Charges, Distribution Rates, Non-Utility Generation Charges, Societal Benefits Charges, Regulatory Assets Recovery Charges, Transition Bond Charges, Market Transition Charge Tax, Transmission Demand Charge, Regional Greenhouse Gas Initiative Recovery Charge, and Infrastructure Investment Surcharge.

Currently the BOE is procuring its electric requirements from the utility Atlantic City Electric Company. CEG will make recommendations (please see below), that are contrary to this.

Natural Gas:

This facility is serviced by South Jersey Gas Company (SJG) on its Firm Delivery rate (GSG) General Service Gas from the utility and BGSS (Basic Generation Supply Service) when not being served by a Third Party Supplier (TPS). Currently The BOE is procuring natural gas Commodity service from a Third Party Supplier (TPS), Woodrfuff Energy. The Delivery Rate has the following charges: Customer Charge, Delivery Charge, BSC Volume Charge and Commodity Charge under this rate structure. The BGSS Supply rates are designed to recover SJG's cost of gas applicable to customers who purchase gas from SJG. The company earns no profit from BGSS. BGSS consists of (2) two pricing mechanisms: Residential and Commercial customers that use less than 5,000 therms annually and Commercial and Industrial customers that consume at least 5,000 therms annually.

Imbalances occur when Third Party Suppliers (TPS) are used to supply natural gas and full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. Note: It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used otherwise, imbalances can occur, jeopardizing economics and scheduling. If the supplier does not deliver they can be placed on a very costly rate. A customer can automatically be put on an alternative supply rate by the utility.

A "firm account" refers to the type of interstate pipeline service that the utility has subscribed for and delivered on behalf of the customer. Much like the telecom industry, the pipeline space (capacity) has been deregulated. The pipeline capacity is broken down into reliability of service. "Firm service" is the highest level of reliability and is the last, in pecking order, for interruption. Please see CEG recommendations below.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the scope. Therefore CEG recommends aggregating all energy loads. CEG's observations are seen in both the electric and natural gas costs. The average "price to compare" per kWh (kilowatt hour) for all buildings is $.1249/ kWh (kWh is the common unit of electric measure). The average "price to compare" per decatherm for natural gas is $11.893 /Dth (decatherm is the common unit of measure). These Weighted Average Prices for electricity were supplied by Logan and is served via the utility, Atlantic City Electric Company. The average price for natural gas is supplied via a Third Party Supplier (TPS) Woodruff Energy. The price noted was supplied by the Logan BOE. The "price-to-compare" in electricity is the price netting out the utility transmission and distribution (wire) charges. For natural gas, it is the price netting utility transportation charges. This price is said to be the City-Gate price.

Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The BOE 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 (July 2008 – June 2009) and current electric rates, the BOE could see an improvement of up to 23 % or over $60,000 in its electric costs, annually. (Note: Savings were calculated using an Average Annual Consumption of 1,818,900 kWh and an Average fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG recommends that the BOE seek an energy advisor to maximize energy savings and to apply a "managed approach" to procuring energy.

CEG's secondary recommendation coincides with the BOE's natural gas costs. Based on the current market, (which is very competitive), the BOE could see a savings of over 26% or over $10,000 annually in its natural gas expenditures. Again CEG recommends the use of any *energy advisor* to review alternative energy sourcing strategies and to install a "managed approach" to energy procurement that will be based on the energy budget.

CEG also recommends that The BOE not renew its energy supply contract with the Third Party Supplier and its fixed price contract. The fixed priced contract does not accomplish the needs of the BOE. The BOE needs budget protection and CEG has shown that these energy prices are not competitive to the market. The analysis has demonstrated that the price is above market and the BOE has no way of adjusting the price should the market fall.

CEG further recommends that The BOE create an energy program through a "managed approach". The "managed approach" will take into account creating an "energy budget" that is in line with The BOE's budget year and risk tolerance. Risk tolerance is the appetite that a customer has for risk. Based on the reduced state and local government budgets and the general aversion for risk, the local government is required to manage this risk.

CEG recommends the BOE 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), they will learn more about the

competitive supply process. They can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu, and should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, they should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

Finally, if the BOE frequently changes its supplier for energy (natural gas), CEG recommends it closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility 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.

iv. *Pay For Performance* – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all participants in the local government energy audit program. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project

Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)

2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.

3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and $0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.

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. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Logan Township BOE - Logan Elementary School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Boiler Replacement - High Efficiency	$119,360	$0	$7,000	$112,360	$8,954	$0	$8,954	35	$313,390	$0	178.9%	12.5	7.29%	$80,036.57
ECM #2	Lighting Controls	$11,880	$0	$2,160	$9,720	$10,805	$0	$10,805	15	$162,075	$0	1567.4%	0.9	111.16%	$119,269.39
ECM #3	Install DDC Controls	$480,000	$0	$0	$480,000	$35,455	$3,000	$38,455	15	$576,825	$45,000	20.2%	12.5	2.39%	($20,926.71)
ECM #4	Energy Recovery Unit Installation	$122,850	$0	$0	$122,850	$8,114	$0	$8,114	20	$162,280	$0	32.1%	15.1	2.81%	($2,134.17)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	63.71 KW PV System	$573,390	$0	$0	$573,390	$11,290	$25,009	$36,299	25	$907,475	$625,225	58.3%	15.8	3.90%	$58,689.85

Notes: 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Other Equipment Incentives

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

STATEMENT OF ENERGY PERFORMANCE
Logan Elementary School

Building ID: 1949694
For 12-month Period Ending: June 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: January 26, 2010

Facility
Logan Elementary School
110 School Lane
Logan, NJ 08085

Facility Owner
Logan Township BOE
110 School Lane
Swedesboro, NJ 08085

Primary Contact for this Facility
Frederick Berg
110 School Road
Swedesboro, NJ 08085

Year Built: 1991
Gross Floor Area (ft²): 136,230

Energy Performance Rating[2] (1-100) 30

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	4,165,028
Natural Gas (kBtu)[4]	2,632,500
Total Energy (kBtu)	6,797,528

Energy Intensity[5]

Site (kBtu/ft²/yr)	50
Source (kBtu/ft²/yr)	122

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	774

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	42
National Average Source EUI	102
% Difference from National Average Source EUI	20%
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
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Logan Elementary 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	110 School Lane, Logan, NJ 08085	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		☐
Logan Elementary School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	136,230 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	238 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	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	60 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	80 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10 (Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity

Meter: Electric Meter (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
06/01/2009	06/30/2009	115,200.00
05/01/2009	05/31/2009	45,000.00
04/01/2009	04/30/2009	96,900.00
03/01/2009	03/31/2009	124,500.00
02/01/2009	02/28/2009	119,400.00
01/01/2009	01/31/2009	113,700.00
12/01/2008	12/31/2008	106,200.00
11/01/2008	11/30/2008	89,400.00
10/01/2008	10/31/2008	111,900.00
09/01/2008	09/30/2008	34,200.00
08/01/2008	08/31/2008	99,000.00
07/01/2008	07/31/2008	165,300.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**1,220,700.00**
Electric Meter Consumption (kBtu (thousand Btu))		**4,165,028.40**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**4,165,028.40**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Gas Meter (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
06/01/2009	06/30/2009	690.00
05/01/2009	05/31/2009	550.00
04/01/2009	04/30/2009	2,060.00
03/01/2009	03/31/2009	3,990.00
02/01/2009	02/28/2009	5,330.00
01/01/2009	01/31/2009	6,430.00
12/01/2008	12/31/2008	4,510.00
11/01/2008	11/30/2008	2,060.00
10/01/2008	10/31/2008	330.00
09/01/2008	09/30/2008	175.00

08/01/2008	08/31/2008	100.00
07/01/2008	07/31/2008	100.00
Gas Meter Consumption (therms)		**26,325.00**
Gas Meter Consumption (kBtu (thousand Btu))		**2,632,500.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,632,500.00**
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.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the 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
Logan Elementary School
110 School Lane
Logan, NJ 08085

Facility Owner
Logan Township BOE
110 School Lane
Swedesboro, NJ 08085

Primary Contact for this Facility
Frederick Berg
110 School Road
Swedesboro, NJ 08085

General Information

Logan Elementary School	
Gross Floor Area Excluding Parking: (ft^2)	136,230
Year Built	1991
For 12-month Evaluation Period Ending Date:	June 30, 2009

Facility Space Use Summary

Logan Elementary School	
Space Type	K-12 School
Gross Floor Area(ft^2)	136,230
Open Weekends?	No
Number of PCs[d]	238
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	Yes
Percent Cooled	60
Percent Heated	80
Months[o]	10
High School?	No
School District[o]	Logan

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2009)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	30	30	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	50	50	33	N/A	42
Source (kBtu/ft^2)	122	122	80	N/A	102
Energy Cost					
$/year	$ 236,366.57	$ 236,366.57	$ 154,230.37	N/A	$ 197,240.56
$/$ft^2$/year	$ 1.74	$ 1.74	$ 1.14	N/A	$ 1.45
Greenhouse Gas Emissions					
$MtCO_2e$/year	774	774	505	N/A	646
$kgCO_2e/ft^2$/year	6	6	4	N/A	5

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

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

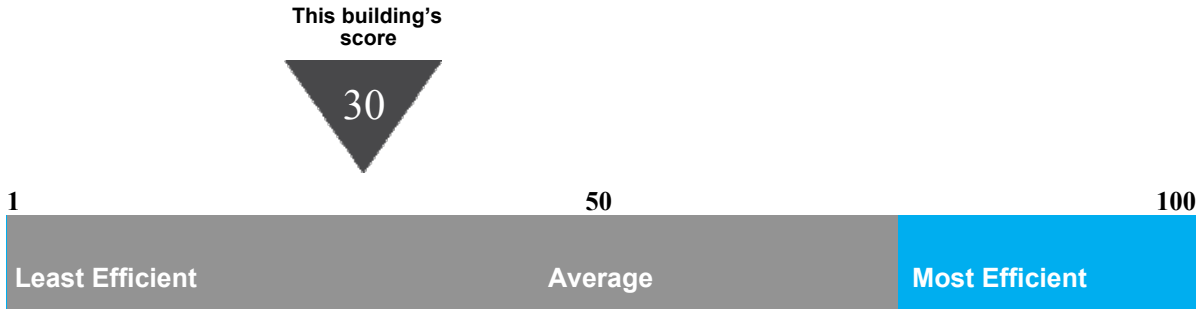
Statement of Energy Performance

2009

Logan Elementary School
110 School Lane
Logan, NJ 08085

Portfolio Manager Building ID: 1949694

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 122 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending June 2009

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 01/26/2010

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Logan Elementary School"

Boiler

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Mech Room	Building	Lochinvar	2	N2000	J908704	2002	1601.6	80	NG	18	35	17	

Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Frame Size	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	
Mech Room	Full Temp Loop	Dayton	2	3KW31A	-	-	1415	-	-	-	208/230/3	18	10	-8	
Mech Room	Cooling Tower	Marathon	2	WH326TTDR4026APW	-	40	-	-	-	-	230/240/3	18	10	-8	
Mech Room	Heat Pump Loop	Marathon	2	WC324TTDR4026APW	-	40	1760	-	-	-	230/240/3	18	10	-8	

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Mech Room	Building	State	1	SBT80-500 NE7	-	500	563	80	-	NG	18	12	-6	
Mech Room	Building	Bradford White	1	D80L5033NA	FH12341569	505	545	80	-	NG	0	12	12	

AC Condensers

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Roof	Addition	York	2	H1R076S46A	WGJM004925	73.5 MBH	10	R-22	460/3	18	15	-4	

Heat Pumps

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	EER Heating Capacity	COP	Refrigerant	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Horizontal in Ceilings	Building	McQuay	8	CCW	-	9000	10.3	3.6	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	8	CCW	-	12000	10.7	3.8	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	6	CCH	-	15000	11.7	3.9	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	4	CCH	-	19000	11.1	3.8	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	12	CCH	-	24000	10.4	3.6	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	3	CCH	-	30000	10.5	3.6	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	28	CCH	-	36000	10.7	3.7	R-22	265/1	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	6	CCH	-	42000	10.6	3.7	R-22	460/3	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	18	CCH	-	48000	10.7	3.5	R-22	460/3	-	19	20	1	
Horizontal in Ceilings	Building	McQuay	5	CCH	-	60000	10.4	3.5	R-22	460/3	-	19	20	1	
Vertical Floor Mounted	Building	McQuay	1	-	-	-	-	-	R-22	-	-	19	20	1	
Vertical Floor Mounted	Building	McQuay	2	LHP	-	15 Ton	-	-	R-22	-	-	19	20	1	
Vertical Floor Mounted	Building	McQuay	1	LHP	-	20 Ton	-	-	R-22	-	-	19	20	1	
Vertical Floor Mounted	Building	McQuay	2	LHD	-		-	-	R-22	-	-	19	20	1	
Vertical Floor Mounted	Building	McQuay	1	LHD	-		-	-	R-22	-	-	19	20	1	

Heating and Ventilation Units

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Heating Coil	Capacity (Btu/h)	Fan HP	Fan RPM	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Mezzanine	Gym	McQuay	2	1HD111CV	3WA00014-06	HTX	11 Square Feet of Coil	-	-	460/3	50	19	15	-4	

Kitchen Hood

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Fan HP	Fan RPM	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Roof	Kitchen	Greenheck	1	CUBE-300-30G	91E02012	3	765	208/1	-	19	25	6	
Roof	Kitchen	Greenheck	1	KSU-112-D-2-30	91E02011	2	884	208/1	-	19	25	6	

Cooling Tower

Location	Area Served	Manufacturer	Qty.	Model #	Serial #	# of Cells	Flow (GPM)	Fan HP	Volts / Phase	Sump Heaters (kW)	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
On Grade	Building	BAC	1	J0909B34R	90101189	1	755	-	-	4 (60 volt)	19	20	1	

CEG Job #: 9C09103
Project: Logan Twp. Elem. School
Address: 110 School Lane
Logan Twp., NJ 08085
Building SF: 136,230

"Logan Elementary School"

KWH COST: $0.164

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
421	BOE Men's Restroom	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	BOE Women's Restroom	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
900	240 Tech. Room	6760	16	1	175w MH Pendant Mnt., Prismatic Lens	208	3.33	22,497.3	$3,689.55	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	240 Finishing	6760	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	1,473.7	$241.68	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	240 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	240 Office	4706	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	1,025.9	$168.25	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	239 Life Skills	6760	21	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.22	8,233.7	$1,350.32	21	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	239 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	238 Art Room	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	238 Art Storage	1800	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	588.6	$96.53	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	237 Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	236 Gifted & Talented	6760	12	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.70	4,705.0	$771.61	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	Elec. Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	234 Computer Lab	6760	12	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.70	4,705.0	$771.61	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Comp. Lab Office	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	260 Science Lab	6760	16	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	1.31	8,869.1	$1,454.54	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
321	260 Storage	1800	1	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.08	147.6	$24.21	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

322	261/262	6760	24	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	1.97	13,303.7	$2,181.80	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
321	261/262 Storage	1800	4	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.33	590.4	$96.83	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
321	Storage	1800	2	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.16	295.2	$48.41	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	233 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	232 Custodial Closet/ Elec. Room	1800	4	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.23	417.6	$68.49	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Boy's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	231 Science	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	231 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	230	6760	12	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.98	6,651.8	$1,090.90	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	224 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	225 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	226 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	227 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	228 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	223 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	216 Classroom	6760	19	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.10	7,449.5	$1,221.72	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821		6760	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	229.8	$37.69	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Women's Restroom	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Men's Restroom	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	222 Storage	1800	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	588.6	$96.53	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	215 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

821	215 Storage	1800	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	61.2	$10.04	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	214 Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	213 Electrical Room	4706	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	272.9	$44.76	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	212 Custodial Closet	1800	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	196.2	$32.18	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Boy's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	211 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	210 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	209 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	208 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	207 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	206 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	205 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	204 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	203 Classroom	6760	16		6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	202 Guidance	4706	11	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.90	4,244.8	$696.15	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421		4706	4	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.44	2,051.8	$336.50	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	200/100 Main Office	4706	28	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	2.30	10,805.0	$1,772.02	28	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	Main Office Restroom	4706	2	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.07	320.0	$52.48	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	102 Elec. Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	103 Storage	1800	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	588.6	$96.53	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	104 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	104 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	104 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	105 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	105 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	105 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

1000	106 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	106 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	106 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	107 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	107 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	107 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	109 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	109 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	109 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	108 Computer Lab	6760	16	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	1.31	8,869.1	$1,454.54	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	110 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	110 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	110 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	111 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	111 Bathroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	111 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	112 Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	113 Copy Room	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	114 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	115 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		6760	1	2	Down Light, (2) 26w CFL	56	0.06	378.6	$62.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Boy's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	120 Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	121 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	121 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	122 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	122 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	123 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	123 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	124 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	124 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	125 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	125 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	126 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	126 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	127 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

700	127 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	128 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	128 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	129 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	129 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	130 Classroom	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	130 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	131 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	132 Music	6760	16	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.93	6,273.3	$1,028.82	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	132 Storage	1800	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	196.2	$32.18	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	133 Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	134 Classroom	6760	17	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.99	6,665.4	$1,093.12	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	134 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	135 Classroom	6760	17	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.99	6,665.4	$1,093.12	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	135 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	136 Classroom	6760	17	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.99	6,665.4	$1,093.12	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	136 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	137 Classroom	6760	17	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.99	6,665.4	$1,093.12	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	137 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	Women's Restroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821	Men's Restroom	4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	138 Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	139 Office	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700		4706	1	2	Down Light, (2) 26w CFL	56	0.06	263.5	$43.22	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Boy's Lav.	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Storage	1800	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	392.4	$64.35	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Shop	6760	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	2,210.5	$362.53	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	Faculty	4706	8	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.66	3,087.1	$506.29	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821		4706	4	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.14	640.0	$104.96	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	Mech./ Elec. Room	1800	17	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.99	1,774.8	$291.07	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	Receiving	4706	8	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.46	2,183.6	$358.11	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Lockers/ Bathroom	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821		4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Bldg. & Grnds Office	4706	1	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.11	513.0	$84.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

421	Kitchen	6760	30	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	3.27	22,105.2	$3,625.25	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	Kitchen Custodial Closet	1800	1	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.06	104.4	$17.12	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	Café. Managers Office	4706	2	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.16	771.8	$126.57	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
900	Cafetorium	6760	24	1	175w MH Pendant Mnt., Prismatic Lens	208	4.99	33,745.9	$5,534.33	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	Stage Storage Areas	1800	6	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.35	626.4	$102.73	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	Stage	6760	12	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.70	4,705.0	$771.61	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Storage	1800	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	588.6	$96.53	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221	Stage Entrance	6760	2	2	2x4 2 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	58	0.12	784.2	$128.60	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	Music	6760	20	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	1.16	7,841.6	$1,286.02	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Music Storage Rooms	1800	7	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.76	1,373.4	$225.24	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	Speech	6760	6	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.49	3,325.9	$545.45	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's Lav.	4706	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	1,025.9	$168.25	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821		4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Boy's Lav.	4706	2	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.22	1,025.9	$168.25	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
821		4706	1	2	2x2 17w T8, Recessed, Prismatic Lens	34	0.03	160.0	$26.24	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
600	Gym	6760	30	1	175w MH Hi-Bay	208	6.24	42,182.4	$6,917.91	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	243 Boy's Locker Room & Storage	1800	9	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.98	1,765.8	$289.59	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	PE Ofiice	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Gym Storage	1800	6	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.65	1,177.2	$193.06	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	Girl's Locker Room & Storage	1800	9	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.98	1,765.8	$289.59	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	PE Ofiice	4706	3	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.33	1,538.9	$252.37	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	220 Classroom	6760	9	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.52	3,528.7	$578.71	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	220 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	221 Classroom	6760	9	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.52	3,528.7	$578.71	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	221 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	119 Speech	6760	7	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.41	2,744.6	$450.11	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

700	119 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	118 Computer Lab	6760	9	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.52	3,528.7	$578.71	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	118 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	117 Classroom	6760	9	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.52	3,528.7	$578.71	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
700	117 Storage	1800	1	2	Down Light, (2) 26w CFL	56	0.06	100.8	$16.53	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	116 Classroom	6760	7	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	0.41	2,744.6	$450.11	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1000	Library	6760	66	2	6"x4, 2 Lamp 32w T8, Pendant Mnt., Direct/Indirect	58	3.83	25,877.3	$4,243.87	66	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
		6760	18	1	Down Light, 175w MH	208	3.74	25,309.4	$4,150.75	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	Library Office	4706	4	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	0.33	1,543.6	$253.15	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	101 Nurse	4706	9	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.98	4,616.6	$757.12	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
421	201 Nurse	4706	6	4	2x4 4 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	109	0.65	3,077.7	$504.75	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
322	BOE Offices	4706	47	3	2x4 3 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	82	3.85	18,136.9	$2,974.46	47	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221	Corridors	6760	184	2	2x4 2 Lamp 32w T8, Magnetic Ballast, Recessed, Prismatic	58	10.67	72,142.7	$11,831.41	184	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1100	Mech. Room	1800	5	2	4"x4, 2 Lamp 32w T8, Surface Mnt., White Diffuser	58	0.29	522.0	$85.61	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
A1	Exterior	5096	27	1	70w HPS Wallpack	90	2.43	12,383.3	$2,030.86	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
A2		5096	13	1	70w HPS Down Light	90	1.17	5,962.3	$977.82	13	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
A3		5096	30	1	150w HPS "Shoebox", Pole Mntd.	188	5.64	28,741.4	$4,713.60	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
A4		5096	24	1	70w HPS Well Light	90	2.16	11,007.4	$1,805.21	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		1717	490			130.98	776,759	$127,388.46	1717	0			0.00	0	$0.00		$0.00	0.00	0	$0.00	#DIV/0!

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacment calculations

Project Name: LGEA Solar PV Project - Logan Township BOE
Location: Logan, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$573,390
Annual kWh Production	71,453
Annual Energy Cost Reduction	$11,290
Annual SREC Revenue	$25,009
First Cost Premium	**$573,390**
Simple Payback:	**15.80** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.158**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$573,390	0	0	0	$0	(573,390)	0
1	$0	71,453	$11,290	$0	$25,009	$36,298	($537,092)
2	$0	71,096	$11,628	$0	$24,884	$36,512	($500,580)
3	$0	70,740	$11,977	$0	$24,759	$36,736	($463,844)
4	$0	70,387	$12,336	$0	$24,635	$36,972	($426,872)
5	$0	70,035	$12,707	$721	$24,512	$36,497	($390,375)
6	$0	69,684	$13,088	$718	$24,390	$36,760	($353,615)
7	$0	69,336	$13,480	$714	$24,268	$37,034	($316,582)
8	$0	68,989	$13,885	$711	$24,146	$37,320	($279,261)
9	$0	68,644	$14,301	$707	$24,026	$37,620	($241,641)
10	$0	68,301	$14,730	$704	$23,905	$37,932	($203,709)
11	$0	67,960	$15,172	$700	$23,786	$38,258	($165,451)
12	$0	67,620	$15,627	$696	$23,667	$38,598	($126,853)
13	$0	67,282	$16,096	$693	$23,549	$38,952	($87,901)
14	$0	66,945	$16,579	$690	$23,431	$39,320	($48,581)
15	$0	66,611	$17,076	$686	$23,314	$39,704	($8,877)
16	$0	66,278	$17,589	$683	$23,197	$40,103	$31,227
17	$0	65,946	$18,116	$679	$23,081	$40,518	$71,745
18	$0	65,616	$18,660	$676	$22,966	$40,950	$112,695
19	$0	65,288	$19,220	$672	$22,851	$41,398	$154,093
20	$0	64,962	$19,796	$669	$22,737	$41,864	$195,957
21	$1	64,637	$20,390	$666	$22,623	$42,347	$238,304
22	$2	64,314	$21,002	$662	$22,510	$42,849	$281,154
23	$3	63,992	$21,632	$659	$22,397	$43,370	$324,524
24	$4	63,672	$22,281	$656	$22,285	$43,910	$368,434
25	$5	63,354	$22,949	$653	$22,174	$44,471	$412,905
	Totals:	1,363,173	$303,355	$11,119	$477,111	$986,295	$769,347
				Net Present Value (NPV)		**$412,930**	
				Internal Rate of Return (IRR)		**4.5%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Logan ES	4525	Sunpower SPR230	277	14.7	4,073	63.71	71,453	9,141	15.64

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	63.7 kW
DC to AC Derate Factor:	0.810
AC Rating:	51.6 kW
Array Type:	Fixed Tilt
Array Tilt:	0.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	0.2 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.09	3178	5.02
2	2.87	4099	6.48
3	3.95	6228	9.84
4	4.95	7411	11.71
5	5.73	8706	13.76
6	6.09	8594	13.58
7	5.97	8607	13.60
8	5.32	7731	12.21
9	4.48	6367	10.06
10	3.28	4833	7.64
11	2.20	3116	4.92
12	1.80	2580	4.08
Year	4.07	71453	112.90

.= Proposed PV Layout

Notes:

1. Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.