LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: ELEMENTARY SCHOOL #4
541 KALI ROAD
SICKLERVILLE, NJ 08081

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I. EXECUTIVE SUMMARY

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

Winslow Township Board of Education
Elementary School #4
541 Kali Road
Sicklerville, NJ 08081

Municipal and Facility Contact Person: Robert W. Austin

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	$ 48,710
Natural Gas	$ 48,323
Total	$ 97,033

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's 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	Lighting Upgrade	$140	$276	0.5	1477.8%
ECM #2	NEMA Premium Efficnecy Motor Replacement	$5,650	$222	25.5	-41.1%
ECM #3	Rooftop Unit Replacement	$29,125	$1,189	24.5	-38.8%
ECM #4	Split System Replacement	$9,464	$641	14.8	1.6%
ECM #5	Convert Pnuematic Control to DDC	$276,000	$12,331	22.4	-33.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	242.19 KW PV System	$2,179,710	$144,178	15.1	65.4%

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	Lighting Upgrade	0.7	1,369	0.0
ECM #2	NEMA Premium Efficnecy Motor Replacement	0.6	1,487	0.0
ECM #3	Rooftop Unit Replacement	10.0	7,977	0.0
ECM #4	Split System Replacement	3.8	3,046	0.0
ECM #5	Convert Pnuematic Control to DDC	0.0	31,312	3,174
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	242.19 KW PV System	0.0	290,096	0.0

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 #1:** Lighting Upgrade

Although ECM #2, 3, 4 and 5 do not provide a payback less than 10 years, it is recommended to proceed with the following ECMs for the school since the existing equipment is past its expected lifespan and the ECMs will provide a notable reduction in electric consumption and demand:

- **ECM #2:** NEMA Premium Efficiency Motor Replacement
- **ECM #3:** Rooftop Unit Replacement
- **ECM #4:** Split System Replacement
- **ECM #5:** Convert Pneumatic Control to DDC

There is newer equipment that is in the beginning or middle of its ASHRAE expected useful service life that is in very good to fair condition. The boilers, boiler pumps, domestic water heaters, Faculty Room air handling unit, three (3) split system air conditioning units and six (6) window air conditioners fall into this category. The four (4) boilers are in very good condition, are approximately 85% efficient and have twenty-nine (29) years of service life remaining. There are more efficient (1%-2%) condensing boilers on the market but they are still very efficient and cannot be improved upon without great cost and would not be beneficial to install at this time. The four (4) boiler pumps are in good condition and have eight (8) years of service life remaining. The domestic water heaters are in fair condition and have two (2) years of expected service life remaining. The Faculty Room air handling unit is in good to fair condition and has four (4) years of expected service life remaining. The three (3) split system air conditioning units are in fair condition and have one (1) to two (2) years of expected service life remaining. The six (6) window air conditioners are in good to fair condition and have five (5), six (6) or thirteen (13) years of expected service life remaining.

There is equipment that has exceeded the ASHRAE expected useful service life that is in fair to poor condition that should be maintained or replaced as needed as a maintenance project. There would not be an energy advantage in replacing this equipment. Equipment that falls into this category is: two (2) electric heaters, four (4) window air conditioning units, air compressor, thirty-four (34) unit ventilators, two (2) Multi-purpose room heating and ventilating units, eighteen (18) PTAC units, ten (10) fractional horse power exhaust fans, two (2) exhaust fans with 1 horse power and larger motor with less than 2000 hours of annual usage. It is recommended that a New Jersey registered Professional Engineer review the kitchen hoods before replacing the kitchen hood exhaust fans. Due to code changes made since this installation, the hood would be required to meet the newer code requirements with respect to capture velocities if any work is done to this system.

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.

II. INTRODUCTION

The comprehensive energy audit covers the 69,075 square foot School #4, which includes the following spaces: classrooms, multipurpose room, restrooms, office, resource room, storage and boiler room.

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 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 Firm Transportation rate structure. Hess Corporation is believed to be the third party supplier because they were the third party supplier in the year prior to the time period of this report. 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	14.9¢ / kWh
Natural Gas	$1.47 / Therm *

*Note: Due to the absence of Gas bills for Elementary School #4, energy savings are calculated using the gas bills from Elementary School #3 due to similarity in size.

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atalntic City Electric
Rate: Annual General Service
Meter No: 57131805
Customer ID No: 0
Third Party Utility
TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
May-08	32,720	132.0	$5,251
Jun-08	23,200	49.0	$4,135
Jul-08	23,040	70.0	$4,017
Aug-08	33,680	136.0	$5,508
Sep-08	31,440	121.0	$4,567
Oct-08	26,080	94.0	$3,655
Nov-08	25,840	109.0	$3,793
Dec-08	26,240	109.0	$3,749
Jan-09	29,440	109.0	$4,137
Feb-09	28,560	98.0	$4,010
Mar-09	24,640	109.0	$3,663
Apr-09	21,200	105.0	$2,225
Totals	**326,080**	**136.0 Max**	**$48,710**

AVERAGE DEMAND **103.4 KW average**
AVERAGE RATE **$0.149** **$/kWh**

Figure 1
Electricity Usage Profile

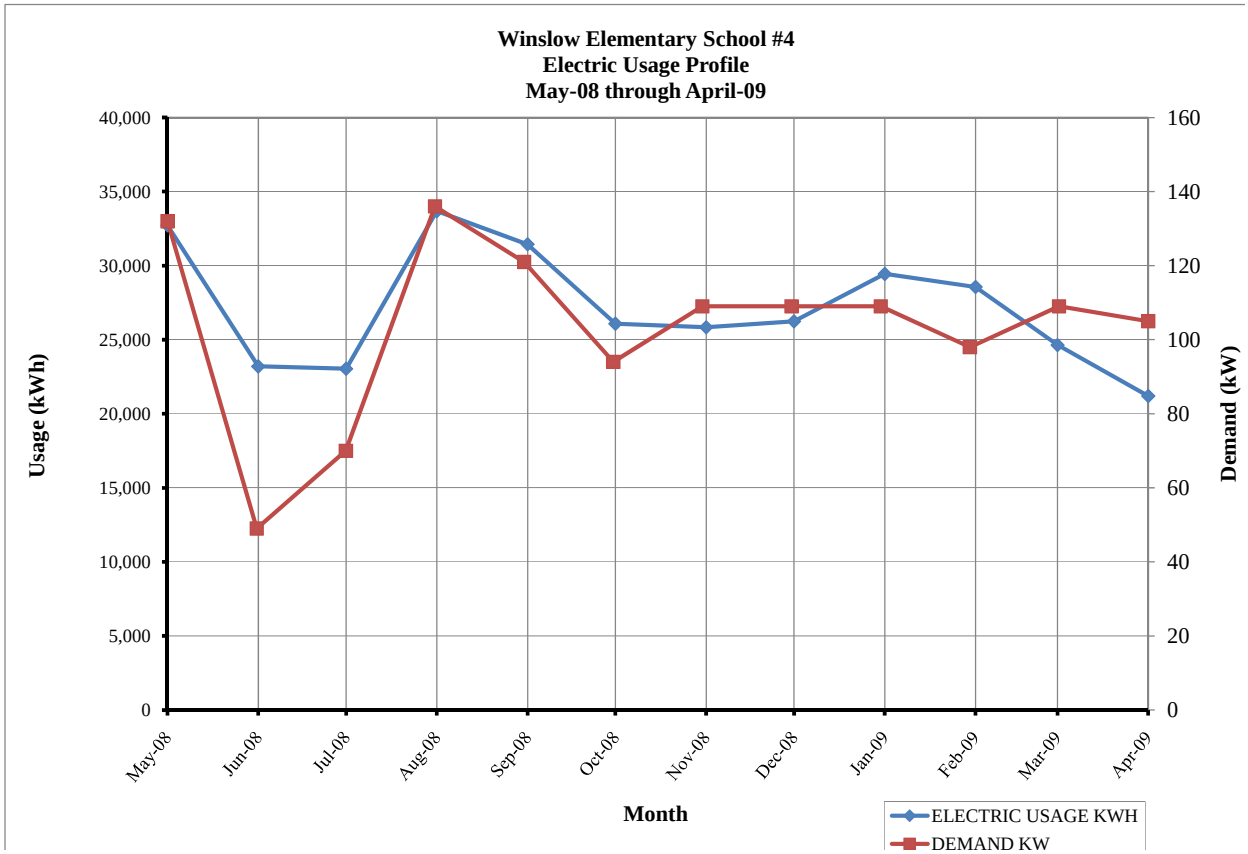
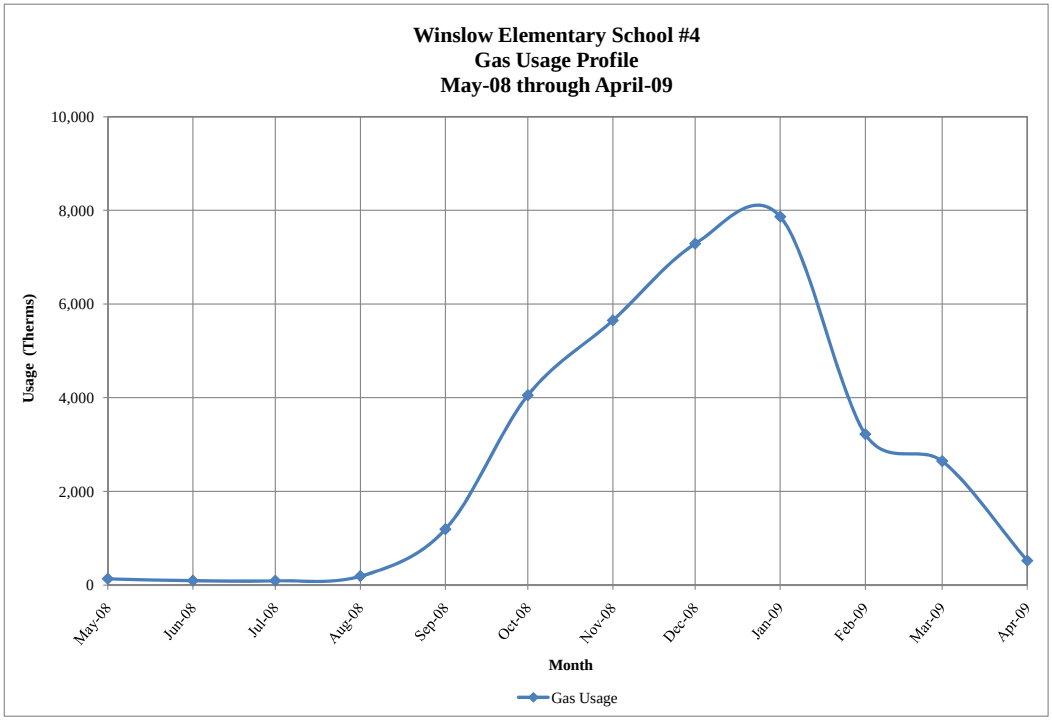


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	South Jersey Gas	
Rate:	Data not available	
Meter No:	Assumed ES #3 Data	
Point of Delivery ID:	0	
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
May-08	134.00	$358.00
Jun-08	94.00	$186.00
Jul-08	93.00	$192.00
Aug-08	191.00	$306.00
Sep-08	1,192.00	$1,724.00
Oct-08	4,052.00	$5,289.00
Nov-08	5,652.00	$7,812.00
Dec-08	7,289.00	$10,157.00
Jan-09	7,866.00	$10,930.00
Feb-09	3,221.00	$6,006.00
Mar-09	2,647.00	$3,776.00
Apr-09	521.00	$1,587.00
TOTALS	**32,952.00**	**$48,323.00**
AVERAGE RATE:	**$1.466**	**$/THERM**

Gas utility Data from School #3 is used as the gas utility Data for School #4 has not yet been made available.

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:

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

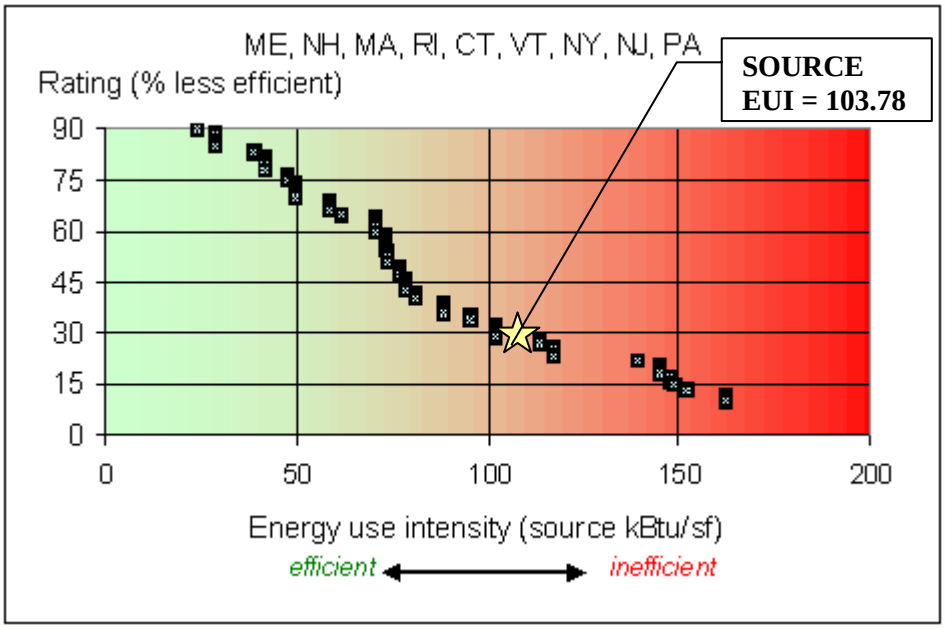
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

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	326080.0			1,113,237	3.340	3,718,212
NATURAL GAS		32952.0		3,295,200	1.047	3,450,074
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				4,408,437		7,168,286
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007. *Note: Due to the absence of Gas bills for Elementary School #4, calculations are based the gas bills fro						
BUILDING AREA		69,075	SQUARE FEET			
BUILDING SITE EUI		*63.82*	kBtu/SF/YR			
BUILDING SOURCE EUI		*103.78*	kBtu/SF/YR			

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

Figure 3
Source Energy Use Intensity Distributions: Elementary School Buildings



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 government municipalities 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 government municipalities 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 municipality 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: winslowboe
Password: lgeaceg2009

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

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**
Elementary School #4	64	50

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

V. FACILITY DESCRIPTION

The building is a one story facility comprised of a classrooms, multipurpose room, restrooms, office, resource room, storage and boiler room. The typical hours of operation for this facility are between 8:00 am and 5:00 pm. Exterior walls are brick construction with minimum insulation typical of the 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 metal frames. Some classrooms have a mirror finish on the classroom side were the windows face other classrooms. Blinds between the glass panes are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a concrete plank with approximately 3" of rigid insulation on top and built up roof. The amount of insulation below the roofing is unknown. The building was built in 1976 with no additions since the original construction.

There is a modular one story building comprised of six (6) classrooms. The typical hours of operation for this facility are between 8:00 am and 5:00 pm. Exterior walls are 2x6 stud, ply wood sheathing with vinyl siding and constructed with R-19, 5 ½ " fiberglass according to original design drawings. 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 metal frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is an asphalt roll roof with light color. The amount of insulation below the roofing is R-28, 9 inches fiberglass according to original design drawings. The building was built in 1988 with no additions since the original construction.

HVAC Systems

The building is heated by four (4) Paterson-Kelley Thermific™ model N1500-MFD water boilers with 1,500 MBH natural gas input, 1,275 MBH output with a combustion efficiency of 85%. They were installed in 2008 and are in very good condition and have twenty eight (28) years of ASHRAE expected useful service life remaining. There is a Bell & Gossett model number EVN 48T17D173B P, ¾ hp, in-line boiler pump at each of the four (4) boilers. The pumps were manufactured in December 2008 and are in good condition and have eight (8) years of ASHRAE expected useful service life remaining. There are two (2) hot water loop pumps, Bell & Gossett model 1-1/2BB-9 ½ BF with a 5 hp motor. The loop pumps are rated at 125 GPM at 94 feet of head. Both loop pumps and motors are original to the building. The loop pumps, manufactured and installed in 1976, are fourteen (14) years past their ASHRAE expected useful service life and appear to be in poor condition. The newer loop pump motor is one (1) year past the ASHRAE expected service life. The system piping appears to be original to the building and in fair to poor condition.

The Multi Purpose room has two (2) heat and ventilation unit that appear to be original to the building. According to existing drawings, these units are model WS-9 with 235 MBH of heating

capacity. The units were manufactured in 1976 and are fourteen (14) years past their ASHRAE expected useful service life, and are in fair to poor condition.

The Administration area is conditioned by a packaged constant volume rooftop unit made by Heat controller, Inc. The unit is older and the equipment tag is not legible. The packaged rooftop unit has approximately 90 MBH DX Cooling and an EER of 9.0. The system includes duct mounted hot water reheat coils for office zoning. Local thermostats control each reheat coil and is activated in the heating season when heating is required. Conditioned air is distributed to the administration area through ductwork to ceiling diffusers.

The Faculty area is served by a packaged constant volume rooftop unit made by Rheem model RKKB-A120CL15E with a cooling capacity of 125 MBH and an EER of 9.0. The unit was manufactured and installed in 1999, has four (4) years left of its ASHRAE expected useful service life and is in fair to poor condition.

The Kitchen area is served by a packaged constant volume rooftop unit made by Rheem model RRCF-150CK with a cooling capacity of 172 MBH and an EER of 9.0. The unit was manufactured and installed in 1992, is past its ASHRAE expected useful service life and is in fair to poor condition.

The Resource room is served by a packaged constant volume rooftop unit made by Trane series XL1000. The unit tag is not legible but based on data collected for Winslow Elementary School #3, it is model TSX030A with 30 MBH nominal cooling capacity and an EER of 9.0. The unit was manufactured and installed in 1988, is past its ASHRAE expected useful service life and is in poor condition.

There are recessed ceiling mounted unit heaters at the corridor exits. There are two (2) unit heaters in the kitchen area. There is fin tube radiation throughout the building perimeter andis in fair condition. There is one (1) heating only unit ventilator in thirty four (34) Classrooms and two (2) in the Resource Room for a total of thirty-six (36) unit ventilators. The unit ventilators and the unit heaters are all fractional horsepower. The unit ventilators and unit heaters are original to the building, are fourteen (14) years past their ASHRAE expected useful service life and are in fair to poor condition. These units should be maintained or replaced as a maintenance project.

The Classroom 22 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 / KS1822 with 17 MBH nominal cooling capacity. The classroom unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is sixteen (16) years old, in fair to poor condition and is one (1) year past its ASHRAE expected useful service life.

The Resource office is conditioned by a cooling only ductless split system made by York model MC12SA with 12,000 BTUH cooling capacity and an EER of 9.0. The unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is thirty four (34) years old, is nineteen (19) year past its ASHRAE expected useful service life and in is in poor condition.

The Classroom 19 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 / KS1822 with 17 MBH nominal cooling capacity. The classroom unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is fourteen (14) years old, has one (1) year of ASHRAE expected useful service life remaining and is in fair to poor condition.

The Computer Classroom 11 is conditioned by a cooling only ductless split system made by Sanyo, model C2422 with 24 MBH cooling capacity and an EER of 9.7. The Computer Classroom unit runs 24/7 to cool and to maintain room setpoint. The unit is sixteen (16) years, is one (1) year past its ASHRAE expected useful service life and in is in fair to poor condition.

The Classroom 9 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 / KS1822 with 17 MBH nominal cooling capacity. The classroom unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is sixteen (16) years, is one (1) year past its ASHRAE expected useful service life and in is in fair to poor condition.

The Classroom 9 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 / KS1822 with 17 MBH nominal cooling capacity. The classroom unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is sixteen (16) years old, is one (1) year past its ASHRAE expected useful service life and in is in fair to poor condition.

The Conference room is conditioned by a cooling only ductless split system made by Sanyo, model C1822 with 18 MBH nominal cooling capacity and an EER of 9.0. The unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is thirteen (13) years old, has two (2) years of ASHRAE expected useful service life remaining and in is in fair to poor condition.

The Classroom 2 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 with 18 MBH nominal cooling capacity and an EER of 9.0. The unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is thirteen (13) years old, has two (2) years of ASHRAE expected useful service life remaining and in is in fair to poor condition.

The Classroom 8 is conditioned by a cooling only ductless split system made by Sanyo, model C1822 with 18 MBH nominal cooling capacity and an EER of 9.0. The unit controlled by occupants, when turned on, will cool to maintain room setpoint. The unit is eighteen (18) years old, is three (3) years past its ASHRAE expected useful service life and in is in fair to poor condition.

Exhaust System

Air is exhausted from the toilet rooms through the fractional horse power roof exhausters. The toilet room exhaust fan is operated based on the facility occupancy schedule. The roof exhausters appear to be original to the building, in fair to poor condition and are fourteen (14) years past their ASHRAE expected useful service life. The classroom unit ventilators introduce outside air and pressurize the classroom. The room pressure is relieved into the corridor ceiling plenum. There are gravity roof exhaust vents that relieve building pressurization from the corridor ceiling plenum.

HVAC System Controls

The HVAC systems within the facility are controlled via pneumatic controls. There is a HVAC Controls air compressor located in the boiler room serving the controls. The air compressor was manufactured in 1976 and is nineteen (19) years past it's ASHRAE useful service life and is in fair to poor condition.

Domestic Hot Water

Domestic hot water for the restrooms, office lounge and kitchen is provided by two water heaters. There is a 91 gallon Vanguard model 6E743A water heater, with capacity of 199,900 BTU/hr natural gas input and has a 181.9 gph recovery rate. It was manufactured in the year 2000 and is in fair condition and has two (2) years left of its ASHRAE useful service life.

Here is a 100 gallon A.O. Smith model BTR 200 104 water heater, capacity of 199,900 BTU/hr natural gas input, 193 gph recovery rate. It was manufactured in the year 2000 and is in fair condition and has two (2) years left of its ASHRAE useful service life.

The domestic hot water is circulated throughout the building by a fractional horsepower hot water re-circulation pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good to poor condition. Damaged insulation should be replaced with new insulation "in-kind".

Lighting

Typical lighting throughout building is fluorescent tube pendant and lay-in fixtures with T-8 lamps and electronic ballasts. Storage rooms and closets are lit with incandescent lamps. Restrooms are lit with wall mounted compact fluorescent lamps. The exterior is lit with high pressure sodium lamps and metal halide lamps.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of 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: Lighting Upgrades

Description:

The lighting in Winslow Township School #4 is primarily made up of fluorescent fixtures with T-8 lamps with electronic ballasts. There are a few restrooms with incandescent lighting.

This ECM includes replacement of all incandescent lamps to compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the proposed retrofits, costs, savings, and payback periods.

From the **Smart Start Incentive Appendix**, there is no incentive for replacing incandescent lamps with compact fluorescent lamps. The incentive is only available if the entire light fixture is replaced. In most cases, the existing fixtures can be re-lamped by the facility's staff to obtain the energy savings without the expense of a new fixture and the involvement of an electrician to install a new fixture.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$140
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$140
Maintenance Savings ($/Yr):	$37
Energy Savings ($/Yr):	$239
Total Yearly Savings ($/Yr):	$276
Estimated ECM Lifetime (Yr):	8
Simple Payback	0.5
Simple Lifetime ROI	1477.8%
Simple Lifetime Maintenance Savings	$300
Simple Lifetime Savings	$2,209
Internal Rate of Return (IRR)	197%
Net Present Value (NPV)	$1,798.21

ECM #2: Install NEMA Premium Efficient Pump Motor

Description:

Replacing the old pump motors with new efficient motors is a simple change that can provide substantial savings.

Existing electric motors equal to or greater than one horsepower ranged from 78 to 93% efficient. The improved efficiency of the NEMA premium efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace all motors with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

Energy Savings Calculations:

Given:

Annual Hours of Operations = 2,600 (Average)
1 HP = 0.746 Watt
Load Factor = 75%
Cost of electricity = $0.149 / kWh

The following table outlines the NEMA Premium® Efficiency Motor replacement energy savings for this facility:

NEMA PREMIUM EFFICIENT MOTOR REPLACEMENT					
MOTOR HP	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**	**KW SAVINGS**	**KWH SAVINGS**	**COST SAVINGS**
5	82.0%	89.5%	0.29	743	$111
5	82.0%	89.5%	0.29	743	$111
			0.6	**1,487**	**$222**

NEMA Premium® Efficiency Motor = $2,879 minus the The SmartStart Building® incentive for replacing with a NEMA Premium® Efficiency 5 horsepower motor is $54/motor.

SmartStart Building® incentive = 2 (5hp motors) x $54/motor = $108

The following table outlines the motor replacement plan for this facility:

MOTOR REPLACEMENT PLAN							
MOTOR HP	**QTY**	**ENCL. TYPE**	**NO. OF POLES**	**INSTALLED COST ****	**TOTAL COST**	**TOTAL SAVINGS**	**SIMPLE PAYBACK**
5	1	ODP	4-Pole	$2,825	$2,825	$110.75	25.5
5	1	ODP	4-Pole	$2,825	$2,825	$110.75	25.5
				Totals:	*$5,650*	*$222*	*25.5*

**** Net Cost after the SmartStart Buildings® incentive is applied.**

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,758
NJ Smart Start Equipment Incentive ($):	$108
Net Installation Cost ($):	$5,650
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$222
Total Yearly Savings ($/Yr):	$222
Estimated ECM Lifetime (Yr):	15
Simple Payback	25.5
Simple Lifetime ROI	-41.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,330
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($2,999.78)

ECM #3: Rooftop Unit Replacements

Description:

The Winslow Elementary School #4 is currently conditioned by three (3) packaged, cooling-only and one (1) packaged, cooling/gas heat rooftop air conditioning units (RTUs). The unit's cooling efficiencies are as shown below. Three out of the four existing units have surpassed their useful life. The units are in poor condition and in need of replacement. The efficiencies of the existing units are below today's standards for cooling efficiency. The proposed units are high efficiency one-for-one replacements of the existing units. The owner should have a professional engineer verify heating and cooling loads prior to moving forward with this ECM.

This ECM includes installation of three (3) high efficient cooling only rooftop units. The ECM calculations are based on Trane Packaged Rooftop Units or equivalent. Means Costworks software is used to estimate demolition and labor costs for a generic rooftop AC unit replacement.

Full Load Cooling Hrs = 800 hrs/yr.
Average Cost of Electricity = $0.149/kWh

TAG	COOLING CAPACITY (TONS)	CURRENT EER	NEW EER
RTU-1	15	8.5	11.5
RTU-2	7.5	8	11.5
RTU-3	2.5	8	11

Energy Savings Calculations:
Cooling Savings for 15 Ton Unit Replacement:

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000 \left(\frac{Btu}{Ton\ hr} \right)}{1000 \left(\frac{Wh}{kWh} \right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}} \right) \times Full\ Load\ Hrs.$$

$$EnergySavings = \frac{15\,(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{8.5\left(\frac{Btu}{W}\right)} - \frac{1}{11.5\left(\frac{Btu}{W}\right)}\right) \times 800\ hours$$

$$= 4{,}419\ kWh$$

$$Demand\ Savings = \frac{Energy\ Savings\,(kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{4{,}419\,(kWh)}{800\ Hrs.} = 5.52\ KW$$

$$Cooling\ Cost\ Savings = 4{,}419 kWh \times 0.149\left(\frac{\$}{kWh}\right) = \$658$$

The calculations are carried out for the rest of the units and the results are tabulated in the below table.

TAG	COOLING CAPACITY (TONS)	ENERGY SAVINGS (KWH)	DEMAND SAVINGS (KW)	COOLING COSTS SAVINGS	TOTAL COSTS
RTU-1	15	4419	5.5	$658	$18,225
RTU-2	7.5	2739	3.4	$408	$9,113
RTU-3	2.5	818	1.0	$122	$3,750
Total	25	7977	10.0	$1,189	$31,088

From the NJ Smart Start® Program appendix, the packaged unit replacement falls under the category “Electric Unitary HVAC” and warrants an incentive based on efficiency (EER) at or above 11.5. The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\ Tons \times\ \$/Ton\ Incentive)$$

Central DX AC Systems

<5.4 tons, minimum 14.0 SEER,	$92/ton
>5.4 tons to 11.25 tons, minimum 11.5 EER,	$73/ton
>11.25 tons to 20 tons, minimum 11.5 EER,	$79/ton

TAG	COOLING CAPACITY (TONS)	INCENTIVES
RTU-1	15	1185
RTU-2	7.5	547.5
RTU-3	2.5	230

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$31,088
NJ Smart Start Equipment Incentive ($):	$1,963
Net Installation Cost ($):	$29,125
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,189
Total Yearly Savings ($/Yr):	$1,189
Estimated ECM Lifetime (Yr):	15
Simple Payback	24.5
Simple Lifetime ROI	-38.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$17,835
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($14,930.80)

ECM #4: HVAC Split System Replacement

Description:

The Winslow Township School #4 is conditioned through eight (8) split systems. Three of the systems are in good condition. There are four (4) Sanyo and one (1) York split system units which serve various office spaces. These units are 1, 1.5 and 2 tons, respectively. These units have exceeded their ASHRAE service life expectancy of 15 years making them prime targets for replacement. These units hold an Energy Efficiency Rating (EER) of 9 and 9.7 respectively. Due to the age and wear, the estimated cooling efficiencies are 8.5 and 9.2 EER today.

This ECM includes the replacement of the 1, 1.5 and 2 ton split system condensing units and DX cooling coils. This ECM would replace the existing rooftop condenser with a high-efficiency Trane Model XL15i or equal with an efficiency of SEER=15.

Cooling Season Full Load Cooling Hrs. = 800 hrs/yr.
Average Cost of Electricity = $0.149/kWh

Total Rated Cooling Capacity = 1 Tons
Existing System Efficiency = 8.5 EER
Proposed System Efficiency = 15 EER

Total Rated Cooling Capacity = 1.5 Tons
Existing System Efficiency = 8.5 EER
Proposed System Efficiency = 15 EER

Total Rated Cooling Capacity = 2 Tons
Existing System Efficiency = 9.2 SEER
Proposed System Efficiency = 15 SEER

Energy Savings Calculations:

Cooling Savings Calculation:

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{SEER_{OLD}} - \frac{1}{SEER_{NEW}}\right) \times Full\ Load\ Hrs.$$

$$EnergySavings = \frac{2\,(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)}\times\left(\frac{1}{9.2\left(\frac{Btu}{W}\right)}-\frac{1}{15\left(\frac{Btu}{W}\right)}\right)\times 800\ hours$$

$= 807\ kWh$

$$EnergySavings = \frac{1.5\,(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)}\times\left(\frac{1}{8.5\left(\frac{Btu}{W}\right)}-\frac{1}{15\left(\frac{Btu}{W}\right)}\right)\times 800\ hours$$

$= 734\ kWh$

$$EnergySavings = \frac{1.0\,(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)}\times\left(\frac{1}{8.5\left(\frac{Btu}{W}\right)}-\frac{1}{15\left(\frac{Btu}{W}\right)}\right)\times 800\ hours$$

$= 489\ kWh$

Total Energy Savings = (# of units x Energy Savings)

Total Energy Savings =
[1 (2 Ton) x 807 kWh] + [3 (1.5 Ton) x 734 kWh] + [1 (1 Ton) x 489 kWh] = 4,305 kWh

$$Demand\ Savings = \frac{Energy\ Savings\,(kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{4{,}305\,(kWh)}{800\ Hrs.} = 5.38\ KW$$

$$Cooling\ Cost\ Savings = 4{,}305\,(kWh)\times 0.149\left(\frac{\$}{kWh}\right) = \$641$$

Installation cost for the four (4) 1.5 ton and one (1) 2 Ton split systems is estimated at $10,200. Note that this estimate includes the demolition of the existing units. Also, the lowest tonnage Trane replacement in the XL15i unit is 1.5 tons; therefore the 1 ton unit will be replaced with a 1.5 ton.

From the **NJ Smart Start® Program Appendix**, the rooftop unit replacement falls under the category "Central DX AC Systems" and warrants an incentive based on efficiency (EER) at a certain cooling tonnage. The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\ Tons \times\ \$/Ton\ Incentive)$$
$$= (8 Tons \times \$92/Ton) = \$736$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$10,200
NJ Smart Start Equipment Incentive ($):	$736
Net Installation Cost ($):	$9,464
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$641
Total Yearly Savings ($/Yr):	$641
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.8
Simple Lifetime ROI	1.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$9,615
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($1,811.78)

ECM #5: Install DDC Controls

Description:

Winslow Elementary School #3 is controlled by outdated ATC pneumatic controls for all of their HVAC equipment. 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 15% of the total energy costs for this facility which is approximately $236,368.

Annual Savings = 15% x $62,206 = $9,331.

Assuming one-half of the total energy savings is natural gas and the other half is electric savings, this equates to 31,312 kWh and 3,174 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 $276,000 (based on approximately 70,000 SF).

*Note: Due to the absence of Gas bills for Elementary School #4, energy savings are calculated using the gas bills from Elementary School #3 due to similarity in size.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$276,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$276,000
Maintenance Savings ($/Yr):	$3,000
Energy Savings ($/Yr):	$9,331
Total Yearly Savings ($/Yr):	$12,331
Estimated ECM Lifetime (Yr):	15
Simple Payback	22.4
Simple Lifetime ROI	-33.0%
Simple Lifetime Maintenance Savings	$45,000
Simple Lifetime Savings	$184,965
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($128,793.32)

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 municipality 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 17,200 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 242.19 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 290,096 KWh annually, reducing the overall utility bill by approximately 88.9% 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.

Direct purchase involves the school paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**INTERNAL RATE OF RETURN**
Direct Purchase	11.2 Years	8.9%	8.1%

*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 school to invest in a solar system through a Direct Purchase CEG does not recommend the school pursue this route. It would be more advantageous for the school 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 school 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:

The Electric Usage Profile is fairly consistent throughout the year dependent on season. Through the months where heating is the priority (Oct through Apr) the demand is very consistent as well as the consumption month-to-month. The summer operation for this facility is not consistent whatsoever. The demand in June and July drops while the consumption stays consistent with the basic operation of the school throughout the year. The month of August proves to have the highest demand and consumption over the entire school year. This could be associated with use of the air conditioning equipment in the rooms that have air conditioning during the preparation for the upcoming school year. However, having this peak in load is something that the BOE should look to avoid.

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). The main central heating equipment and domestic hot water equipment for this facility consists entirely of gas-fired equipment hence the noted profile.

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.

Natural Gas:

This facility has natural gas serviced by South Jersey Gas Company (SJG) on its firm delivery rate, General Service Gas (GSG) from the utility and BGSS (Basic Generation Supply Service) commodity when not being served by a Third Party Supplier (TPS). Currently the Township is procuring natural gas from a Third Party Supplier (TPS), Woodruff Energy. This 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 two (2) 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.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the scope of this project. 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 $.145/ kWh (kWh is the common unit of electric measure). The average "price to compare" per deca-therm for natural gas is $14.80 /dth (dth is the common unit of measure). These Weighted Average Prices are as supplied via current BOE utility suppliers.

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 the study period's historical consumption (May 2008 to April 2009) and current electric rates, the BOE could see an improvement of up to 15 % or up to $135,000 in its electric costs annually. (Note: Savings were calculated using an Average Annual Consumption of 6,217,580 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 20% or up to $156,000 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.

CEG also recommends that the BOE review their current energy supply contracts with their current suppliers in order to gain a better idea of the options. The BOE has procured natural gas commodity via Hess Corporation and has knowledge of the general procedures. However, CEG highly recommends the BOE utilize a consultant to ensure "best practice" is utilized when joining into a fixed term pricing contract for commodity. 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, the BOE 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, 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 buildings that were audited as part of the NJ Clean Energy's 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%.

v. *Direct Install Program* – The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 80% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.

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.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Winslow Township Board of Education Elementary School #4

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	Lighting Upgrade	$140	$0	$0	$140	$239	$37	$276	8	$2,209	$300	1477.8%	0.5	197.19%	$1,798.21
ECM #2	NEMA Premium Efficnecy Motor Replacement	$5,758	$0	$108	$5,650	$222	$0	$222	15	$3,330	$0	-41.1%	25.5	-5.98%	($2,999.78)
ECM #3	Rooftop Unit Replacement	$31,088	$0	$1,963	$29,125	$1,189	$0	$1,189	15	$17,835	$0	-38.8%	24.5	-5.59%	($14,930.80)
ECM #4	Split System Replacement	$10,200	$0	$736	$9,464	$641	$0	$641	15	$9,615	$0	1.6%	14.8	0.20%	($1,811.78)
ECM #5	Convert Pnuematic Control to DDC	$276,000	$0	$0	$276,000	$9,331	$3,000	$12,331	15	$184,965	$45,000	-33.0%	22.4	-4.63%	($128,793.32)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	242.19 KW PV System	$2,179,710	$0	$0	$2,179,710	$42,644	$101,534	$144,178	25	$3,604,450	$2,538,350	65.4%	15.1	4.31%	$330,882.81

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 February, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

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
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	$450 per ton, EER ≥ 16 $600 per ton, EER ≥ 18 $750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

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, AFUE ≥ 92%

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
Gas Fired Tankless Water Heaters	$300 per unit

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$15 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
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
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

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
Daylight Dimming - office	$50 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
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

STATEMENT OF ENERGY PERFORMANCE
School #4

Building ID: 2052879
For 12-month Period Ending: April 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: February 13, 2010

Facility
School #4
541 Kali Road
Sicklerville, NJ 08081

Facility Owner
Winslow Board Of Education
20 Coopers Folly Road
Atco, NJ 08004

Primary Contact for this Facility
Robert Austin
20 Coopers Folly Road
Atco, NJ 08004

Year Built: 1976
Gross Floor Area (ft²): 69,075

Energy Performance Rating[2] (1-100) 64

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,112,585
Natural Gas (kBtu)[4]	3,295,200
Total Energy (kBtu)	4,407,785

Energy Intensity[5]

Site (kBtu/ft²/yr)	64
Source (kBtu/ft²/yr)	104

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	345

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	73
National Average Source EUI	119
% Difference from National Average Source EUI	-13%
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	School #4	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	541 Kali Road, Sicklerville, NJ 08081	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		☐
School #4 (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	69,075 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	121 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	50 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	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: #4 Electric (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
04/01/2009	04/30/2009	21,200.00
03/01/2009	03/31/2009	24,640.00
02/01/2009	02/28/2009	28,560.00
01/01/2009	01/31/2009	29,440.00
12/01/2008	12/31/2008	26,240.00
11/01/2008	11/30/2008	25,840.00
10/01/2008	10/31/2008	26,080.00
09/01/2008	09/30/2008	31,440.00
08/01/2008	08/31/2008	33,680.00
07/01/2008	07/31/2008	23,040.00
06/01/2008	06/30/2008	23,200.00
05/01/2008	05/31/2008	32,720.00
#4 Electric Consumption (kWh (thousand Watt-hours))		**326,080.00**
#4 Electric Consumption (kBtu (thousand Btu))		**1,112,584.96**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,112,584.96**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: #4 Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
04/01/2009	04/30/2009	521.00
03/01/2009	03/31/2009	2,647.00
02/01/2009	02/28/2009	3,221.00
01/01/2009	01/31/2009	7,866.00
12/01/2008	12/31/2008	7,289.00
11/01/2008	11/30/2008	5,652.00
10/01/2008	10/31/2008	4,052.00
09/01/2008	09/30/2008	1,192.00
08/01/2008	08/31/2008	191.00
07/01/2008	07/31/2008	93.00

06/01/2008	06/30/2008	94.00
05/01/2008	05/31/2008	134.00
#4 Gas Consumption (therms)		**32,952.00**
#4 Gas Consumption (kBtu (thousand Btu))		**3,295,200.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**3,295,200.00**
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
School #4
541 Kali Road
Sicklerville, NJ 08081

Facility Owner
Winslow Board Of Education
20 Coopers Folly Road
Atco, NJ 08004

Primary Contact for this Facility
Robert Austin
20 Coopers Folly Road
Atco, NJ 08004

General Information

School #4	
Gross Floor Area Excluding Parking: (ft^2)	69,075
Year Built	1976
For 12-month Evaluation Period Ending Date:	April 30, 2009

Facility Space Use Summary

School #4	
Space Type	K-12 School
Gross Floor Area(ft^2)	69,075
Open Weekends?	No
Number of PCs[d]	121
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	50
Percent Heated	80
Months[o]	10
High School?	No
School District[o]	Winslow

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2009)	**Baseline** (Ending Date 04/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	64	64	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	64	64	57	N/A	73
Source ($kBtu/ft^2$)	104	104	93	N/A	119
Energy Cost					
$/year	$ 97,033.00	$ 97,033.00	$ 86,935.85	N/A	$ 111,159.89
$/$ft^2$/year	$ 1.40	$ 1.40	$ 1.25	N/A	$ 1.60
Greenhouse Gas Emissions					
$MtCO_2e$/year	345	345	309	N/A	395
$kgCO_2e/ft^2$/year	5	5	4	N/A	6

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.

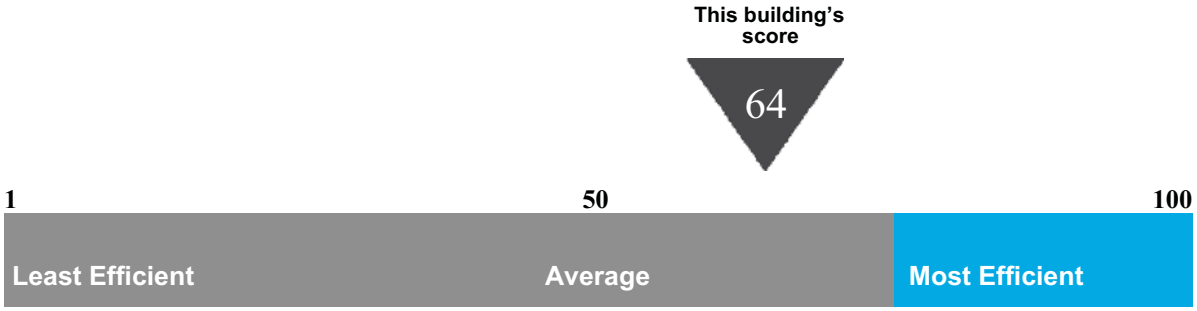
Statement of Energy Performance

2009

School #4
541 Kali Road
Sicklerville, NJ 08081

Portfolio Manager Building ID: 2052879

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 104 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending April 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: 02/13/2010

MAJOR EQUIPMENT LIST

Concord Engineering Group

WINSLOW TOWNSHIP BOE SCHOOL #4

Boiler

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
#20	Boiler Room	Building heat	Paterson-Kelley	1	N1500-MFD	FY 27-08-32600 CODE -XE	1500	1275	85	NATURAL GAS	2008	30	28	2060 LBS/HR MIN. RELIEF VALVE
#21	Boiler Room	Building heat	Paterson-Kelley	1	N1500-MFD	FY 27-08-32598 CODE -XE	1500	1275	85	NATURAL GAS	2008	30	28	2060 LBS/HR MIN. RELIEF VALVE
#22	Boiler Room	Building heat	Paterson-Kelley	1	N1500-MFD	FY 27-08-32595 CODE -XE	1500	1275	85	NATURAL GAS	2008	30	28	2060 LBS/HR MIN. RELIEF VALVE
#23	Boiler Room	Building heat	Paterson-Kelley	1	N1500-MFD	FY 27-08-32596 CODE -XE	1500	1275	85	NATURAL GAS	2008	30	28	2060 LBS/HR MIN. RELIEF VALVE

Boiler - Pumps

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Frame Size	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Boiler Rm.	LOOP PUMP	Bell & Gossett	1	1 -1 /2 BB-9 1/2 - BF	746256	5	1750	125	94	-	208/230-3	34	20	(-14)	
-	Boiler Rm.	LOOP PUMP	Bell & Gossett	1	1 -1 /2 BB-9 1/2 - BF	746257	5	1750	125	94	-	208/230-3	34	20	(-14)	
-	Boiler Rm.	BOILER #20, 21, 22, 23	Bell & Gossett	4	ENV-48T17D173B P	P/N: 903583	3/4	1725	-	-	-	208-230/460	2	10	8	

Domestic Hot Water Heater

Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
	BOILER RM	Domestic water	VANGUARD COMMERCIAL	1	6E743A	VGNG 0400GO 1230	199.9	181.9	91	80	NG	2000	12	2	
	BOILER RM	Domestic water	AO SMITH		MASTER FIT BTR 200 104	MA000900445	199	193	100	80	NG	2000	12	2	

Air Handling Units

Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Heating Type	Input (MBh)	Output (MBh)	Heating Eff. (%)	Fuel	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	ROOF	-	Rheem	1	RRCF-150CK	B4458BTCPC G2792 -0429	DX R-22	8.5	172,000	-	-	-	-	-	208/230	-	18	15	(-3)	
-	ROOF	Resource Room	TRANE	1	UNKNOWN	UNKNOWN	DX R-22	8	90,000	-	-	-	-	-	-	-	18	15	(-3)	
-	ROOF	MAIN OFFICE	HEAT CONTROLLER, INC.	1	UNKNOWN	UNKNOWN	DX R-22	8	30,000	-	-	-	-	-	-	-	18	15	(-3)	
-	ROOF	FACULTY	Rheem	1	RKKB-A120CL15E	2A6335ADAAF179916266	DX R-22	9	125,000	NG	75/150	60.75/121.5	81%	NG	208/230-3	-	1999	15	4	

Unit Heaters and Cabinet Unit Heaters

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Heating Type	Heating Capacity (MBH)	CFM	RPM / HP	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	MOD	HALLWAY	FASCO	4	-	-	ELECTRIC	-	-	-	1988	15	(-7)	

Split Systems and AC Condensers

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity (MBH)	SEER	Refrigerant	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	ROOF / CR-22	CR-22	SANYO	1	C1822 / KS1822	57342 / 0062942	17	10.2	R-22	230/208 - 1		1994	15	(-1)	
-	ROOF / CR	CR	YORK	1	MC12 SA/MCB 12-5	EM 105536	12	10.2	R-22	208/230-1		1976	15	(-19)	90 KW ELECTRIC HEAT
-	ROOF / CR 19	CR 19	SANYO	1	C1822 / KS1822	123964 /0148364	17	10.2	R-22	230/208 - 1		1996	15	1	
-	ROOF / CR 11	CR 11	SANYO	1	C2422 / KS2422	34942 / 0032842	22.8	10.0	R-22	230/208 - 1		1994	15	(-1)	
-	ROOF / CR 9	CR 9	SANYO	1	C1822 / KS1822	100524 / 55151	17	10.2	R-22	230/208 - 1		1992	15	(-3)	
-	ROOF / NURSE	NURSE	SANYO	1	C1822 / KS1822	22271 / 0075972	17	10.2	R-22	230/208 - 1		1997	15	2	
-	ROOF / CR 3	CR 3	SANYO	1	C1822 / KS1822	28771 / 0055581	17	10.2	R-22	230/208 - 1		1997	15	2	
-	ROOF / CR 8	CR 8	SANYO	1	C1822 / KS1822	4322 / 0018122	17	10.2	R-22	230/208 - 1		1992	15	(-3)	

Window AC Conditioners

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity (MBH)	EER		Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	CR 34	CR 34	HAMPTON BAY	1	HBLG120	006XA00652	12	9.8	10.89	R-22	115 / 1	9	10	1	
-	CR 31	CR 31	MAYTAG	1	M7Y15F2B-A	MS 235324 348Y	14.5	10.7	11.89	R-22	115 / 1	14	10	-4	
-	CR 27	CR 27	HAMPTON BAY	1	HBLG120	006KAD0860	12	9.8	10.89	R-22	115 / 1	9	10	1	
-	CR 26	CR 26	MAYTAG	1	M7Y15F2B-A	AT 138639 013Y	14.5	10.7	11.89	R-22	115 / 1	14	10	-4	
-	CR 25	CR 25	WHIRLPOOL	1	ACQ122XK1	QP2594908	11.6	9.8	10.89	R-22	115 / 1	1	10	9	
-	CR 24	CR 24	ELECTROLUX	1	FAC107P1A	-	10	10.8	12.00	R-22	115 / 1	9	10	1	
-	CR 20	CR 20	MAYTAG	1	M7Y15F2B-A	MS 235869 384Y	14.5	10.7	11.89	R-22	115 / 1	14	10	-4	
-	CR 15	CR 15	MAYTAG	1	M6T12F2A REV-B	CP952467	14.5	10.7	11.89	R-22	115 / 1	14	10	-4	
-	CR 2	CR 2	FEDDERS	1	A6X08F2A REV-B	EP 319170 142Y	-	9.8	10.89	R-22	115 / 1	8	10	2	
-	CR 4	CR 4	SHARP	1	AF-R	1608374	12	10	11.11	R-22	115 / 1	1	10	9	

Air Compressor

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Pressure	Capacity	Volts / Phase	FLA	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	BOILER ROOM	HVAC CONTROLS	-	-	-	-	-	-	-	-	-	1976	15	(-19)	Rebate for 1hp and greater

HEAT AND VENTILATOR UNITS

Tag	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
-	CLASSROOMS	CLASSROOMS	NESBITT	34	TP-1250	-	HW	61700	FRACTIONAL	-	208/3	-	ORIGINAL 1976	15	(-19)	
-	MULTIPORPOUSE RM	MULTIPORPOUSE RM	UNKNOWN	2	LPH-55	-	HW	235	1.5	-	208/3	-	ORIGINAL	20	(-14)	

Kitchen Hood

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Fan HP	Fan RPM	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	KITCHEN	KITCHEN COOKING	-	1	HB-242	-	1.5	745	208/3	-	1976	15	(-19)	5410 cfm, 0.375" ESP

PTAC - Units

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - ELECTRIC (KW)	Fan HP	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	MOD	MOD CR 1	GENERAL ELECTRIC	3	AZC115DBV1	GZ835560	14.2	3.55	-	230/208-1	-	1988	10	(-12)	
-	MOD	MOD CR 2	GENERAL ELECTRIC	3	AZC115DBV1	-	14.2	3.55	-	230/208-1	-	1988	10	(-12)	
-	MOD	MOD CR 3	GENERAL ELECTRIC	3	AZC115DBV1	-	14.2	3.55	-	230/208-1	-	1988	10	(-12)	
-	MOD	MOD CR 4	GENERAL ELECTRIC	3	AZC115DBV1	-	14.2	3.55	-	230/208-1	-	1988	10	(-12)	
-	MOD	MOD CR 5	GENERAL ELECTRIC	3	AZC115DBV1	-	14.2	3.55	-	230/208-1	-	1988	10	(-12)	
-	MOD	MOD CR 6	GENERAL ELECTRIC	3	AZC115DBV1	-	14.2	3.55	-	230/208-1	-	1988	10	(-12)	

NOTE: IF AN ITEM IS LEFT BLANK, THE INFORMATION IS EITHER NOT AVAILABLE OR NOT APPLICABLE FOR THIS PIECE OF EQUIPMENT.

CEG Job #: **9C09026**
Project: Winslow Township School #4
Address: 541 Kali Road
Sicklerville, NJ 08081
Building SF: 69,075

"Winslow Township School #4"

KWH COST: $0.147

ECM #1: Lighting Upgrade - General

EXISTING LIGHTINC											PROPOSED LIGHTING									SAVINGS				
CEG Type	Rm. No.	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	Maintenance Savings	Yearly $ Savings	Yearly Simple Payback
1.31	1	Classroom	1880	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,744.6	$256.46	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	1	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
1.31	2	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
14	2	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 13w CFL	26	0.03	54.1	$7.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	3	Classroom	2080	22	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	1.28	2,654.1	$390.15	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	3	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
1.31	4	Classroom	2080	22	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	1.28	2,654.1	$390.15	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	4	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
1.31	5	Classroom	2080	22	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	1.28	2,654.1	$390.15	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
14	5	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 13w CFL	26	0.03	54.1	$7.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	6	Classroom	2080	22	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	1.28	2,654.1	$390.15	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
14	6	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 13w CFL	26	0.03	54.1	$7.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	7	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	7	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
1.31	8	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	8	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
10		Storage	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
4.11		Nurse	1880	6	4	2x4 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	109	0.65	1,229.5	$180.74	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
14		Nurse's Restroom	500	1	2	Wall Mnt. Vanity Light, (2) 13w CFL	26	0.03	13.0	$1.91	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Counselor	1880	8	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.46	872.3	$128.23	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00

4.11		Main Office	2200	6	4	2x4 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	109	0.65	1,438.8	$211.50	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
4.11		Copy Room	2200	2	4	2x4 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	109	0.22	479.6	$70.50	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
8		Main Office Hall	2200	4	2	2x2 2 Lamp, 32w T8 Utube, Elect. Ballast, Recessed, Prismatic	58	0.23	510.4	$75.03	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
4.11		Principal's Office	2200	3	4	2x4 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	109	0.33	719.4	$105.75	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
10		Compactor Room	1880	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	173.0	$25.43	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	9	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13	9	Bathroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
10		Storage	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	10	Art	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	11	Computer Lab	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	12	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	13	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	14	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	15	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	16	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	17	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	18	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	19	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.21		Girl's Restroom	2080	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
10		Custodial Closet	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.21		Boy's Restroom	2080	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.21		Conference Room	1600	3	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.17	278.4	$40.92	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00

2.21		Library	2080	26	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.51	3,136.6	$461.09	26	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Library Office	2080	2	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Library Office	2080	2	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
4.11		AV Storage	500	4	4	2x4 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	109	0.44	218.0	$32.05	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.21		Boy's Restroom	2080	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
10		Custodial Closet	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.21		Girl's Restroom	2080	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	241.3	$35.47	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	20	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	21	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	22	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	23	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	24	Classroom	2080	12	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.70	1,447.7	$212.81	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	25	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	26	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	27	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	28	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	29	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	30	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	31	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	32	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.31	33	Resource Room	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00

1.31	34	Classroom	2080	16	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	58	0.93	1,930.2	$283.75	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
10		Storage	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
17		Gym	2080	21	3	2x4 HiBay, 3 Lamp 54w T5HO Elect. Ballast, Pendant Mnt., No Lens	182	3.82	7,949.8	$1,168.61	21	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
2.25		Faculty Room	2080	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, White Diffuser	58	0.52	1,085.8	$159.61	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
13		Women's Restroom	2080	1	2	Wall Mnt. Vanity Light, (2) 60w A19	120	0.12	249.6	$36.69	1	2	13w CFL	26	0.03	54.08	$7.95	$20.00	$20.00	0.09	195.52	$5.35	$34.09	0.59
14		Men's Restroom	2080	1	2	Wall Mnt. Vanity Light, (2) 13w CFL	26	0.03	54.1	$7.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Gym Office	2200	3	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.17	382.8	$56.27	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
10		Gym Storage	500	2	1	Industrial Pendant, (1) 46w CFL	46	0.09	46.0	$6.76	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Kitchen Storage	500	2	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.12	58.0	$8.53	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.11		Kitchen	2080	17	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.99	2,050.9	$301.48	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
1.14		Boiler Room	4200	9	2	1x4 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	58	0.52	2,192.4	$322.28	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	$0.00	0.00
		Totals		725	152			45.83	94,331	$13,866.69	725	14			0.18	379	$55.65		$140.00	0.66	1369	$37.46	$238.65	0.59

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 - Winslow Township BOE Elementary School #4
Location: Sicklerville, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

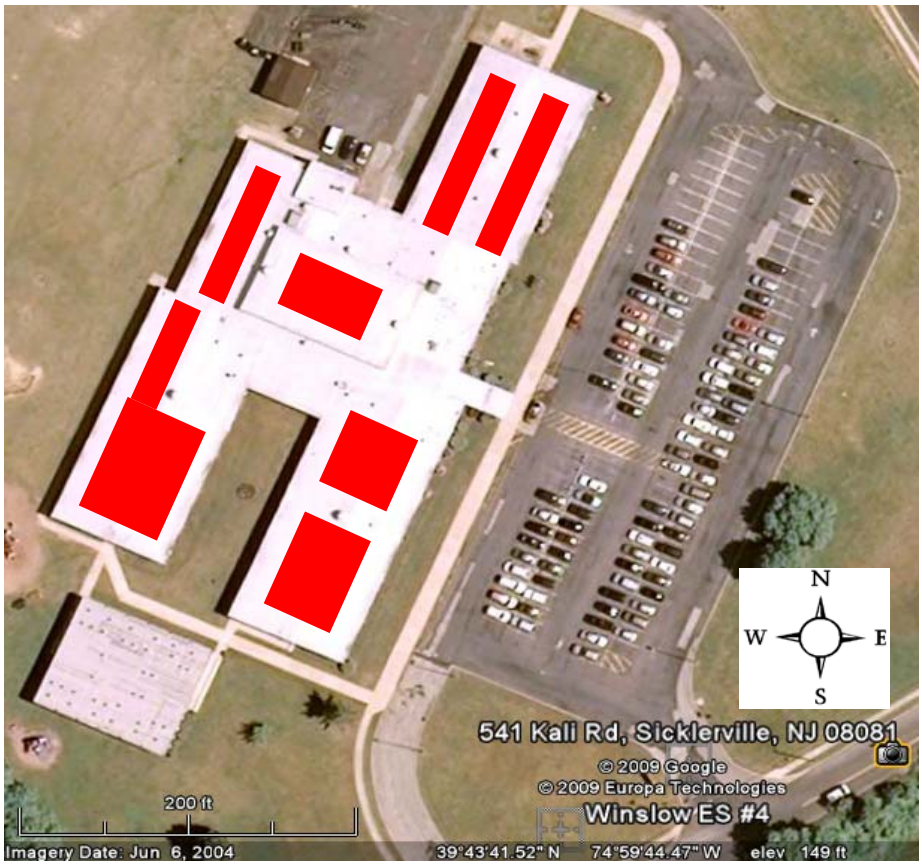
	Photovoltaic System - Direct Purchase
Total Construction Cost	$2,179,710
Annual kWh Production	290,096
Annual Energy Cost Reduction	$42,644
Annual SREC Revenue	$101,534
First Cost Premium	**$2,179,710**
Simple Payback:	**15.12** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.147**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$2,179,710	0	0	0	$0	(2,179,710)	0
1	$0	290,096	$42,644	$0	$101,534	$144,178	($2,035,532)
2	$0	288,646	$43,923	$0	$101,026	$144,949	($1,890,583)
3	$0	287,202	$45,241	$0	$100,521	$145,762	($1,744,821)
4	$0	285,766	$46,598	$0	$100,018	$146,617	($1,598,204)
5	$0	284,337	$47,996	$2,929	$99,518	$144,586	($1,453,619)
6	$0	282,916	$49,436	$2,914	$99,021	$145,543	($1,308,076)
7	$0	281,501	$50,919	$2,899	$98,525	$146,545	($1,161,531)
8	$0	280,094	$52,447	$2,885	$98,033	$147,595	($1,013,936)
9	$0	278,693	$54,020	$2,871	$97,543	$148,692	($865,244)
10	$0	277,300	$55,641	$2,856	$97,055	$149,840	($715,404)
11	$0	275,913	$57,310	$2,842	$96,570	$151,038	($564,366)
12	$0	274,534	$59,029	$2,828	$96,087	$152,289	($412,078)
13	$0	273,161	$60,800	$2,814	$95,606	$153,593	($258,485)
14	$0	271,795	$62,624	$2,799	$95,128	$154,953	($103,531)
15	$0	270,436	$64,503	$2,785	$94,653	$156,370	$52,839
16	$0	269,084	$66,438	$2,772	$94,179	$157,846	$210,685
17	$0	267,739	$68,431	$2,758	$93,709	$159,382	$370,067
18	$0	266,400	$70,484	$2,744	$93,240	$160,980	$531,047
19	$0	265,068	$72,599	$2,730	$92,774	$162,642	$693,690
20	$0	263,743	$74,777	$2,717	$92,310	$164,370	$858,060
21	$1	262,424	$77,020	$2,703	$91,848	$166,165	$1,024,225
22	$2	261,112	$79,331	$2,689	$91,389	$168,030	$1,192,255
23	$3	259,806	$81,711	$2,676	$90,932	$169,967	$1,362,222
24	$4	258,507	$84,162	$2,663	$90,478	$171,977	$1,534,199
25	$5	257,215	$86,687	$2,649	$90,025	$174,063	$1,708,261
	Totals:	6,833,487	$1,554,773	$58,522	$2,391,721	$3,887,971	$3,887,971
				Net Present Value (NPV)			**$1,708,286**
				Internal Rate of Return (IRR)			**4.9%**

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
School #4	17200	Sunpower SPR230	1053	14.7	15,483	242.19	290,096	34,749	15.64



.= Proposed PV Layout

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

AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	242.2 kW
DC to AC Derate Factor:	0.810
AC Rating:	196.2 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	218.0°
Energy Specifications	
Cost of Electricity:	0.1 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	2.46	14840	22.11
2	3.23	18001	26.82
3	4.22	25392	37.83
4	5.15	29315	43.68
5	5.84	33658	50.15
6	6.12	32745	48.79
7	6.04	33007	49.18
8	5.48	30153	44.93
9	4.76	25784	38.42
10	3.63	20603	30.70
11	2.54	14218	21.18
12	2.13	12379	18.44
Year	4.31	290096	432.24

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data — Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

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