LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: UPPER ELEMENTARY SCHOOL #6
167 SICKLERVILLE AVENUE
SICKLERVILLE, NJ 08081

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I. EXECUTIVE SUMMARY

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

Winslow Township BOE
Upper Elementary School #6
617 Sickler Ave
Berlin, NJ 08009

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	$ 104,759
Natural Gas	$ 58,045
Total	$ 162,804

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	Pump Replacement	$13,234	$253	52.3	-80.9%
ECM #2	DDC Control System	$446,720	$8,577	52.1	-71.2%
ECM #3	Chiller Replacement	$44,300	$1,966	22.5	-11.2%
ECM #4	Kitchen Exhaust Fan Replacement	$5,749	$54	106.5	-81.2%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar PV System - 132.48 KW	$1,192,320	$78,644	15.2	-1.1%

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	Pump Replacement	0.3	1,782.0	-
ECM #2	DDC Control System	-	22,554.0	3,866.4
ECM #3	Chiller Replacement	3.7	13,844.0	-
ECM #4	Kitchen Exhaust Fan Replacement	0.3	378.0	-

RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar PV System - 132.48 KW	132.5	159,847.0	-

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. This facility did not have any ECM's that have a 10 year or less payback. The typical ECM's that would be recommended are already in place or due to the life of the equipment are not ready for replacement.

Although ECM #1, 2 and 3 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 exceeded the ASHRAE expected useful service life and the ECMs will provide a notable reduction in electric consumption and demand:

- **ECM #1:** Pump Replacement
- **ECM #2:** DDC Control System
- **ECM #3:** Chiller Replacement

The kitchen hood exhaust is provided by a down blast fan and is a code violation. This fan is required to be an up blast fans as originally scheduled. The existing kitchen hood and dish wash hood exhaust fans are near the end of their ASHRAE expected useful service life. Due to the large construction cost and little energy savings these ECMs do not provide a payback It is recommended that a New Jersey registered Professional Engineer review the kitchen hoods before implementing the ECM. 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. After an engineering review, it is recommended to proceed with the installation of hood fan replacements unit as suggested in ECM #4 (or equal) since the existing fans are near the end of their expected lifespan and this will correct the kitchen hood fan code violation.

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 as follows: boiler burners, forty-four (44) classroom ventilators for heat and ventilation, entrance hot water cabinet unit heaters, hot water propeller unit heaters and an electric wall heater, general exhaust fans, and two (2) domestic hot water 1/6 hp circulator pumps.

The two (2) boilers are in very good condition, are approximately 80% efficient and have seventeen (17) years of service life remaining. There are more efficient condensing boilers on the market but replacing these boilers with about half of their useful life left will not have any economical benefit. Therefore, these boilers should be replaced at the end of its service life.

There is equipment nearing the end of its service life that is in fair to poor condition that should be replaced in about three (3) to five (5) years from now. The equipment that falls into this category is the two (2) Gymnasium, one (1) Cafeteria and one (1) Kitchen heating and ventilation units and the sixteen (16) air handling units serving first floor classroom, Library and faculty, three (3) instantaneous gas fired domestic water heaters and the three (3) domestic hot water circulator pumps.

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 111,680 square foot Upper Elementary School #6, which includes the following spaces: classrooms, gym, cafeteria, kitchen, restrooms, office, library, 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:

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

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

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

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

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

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

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	14.2¢ / kWh
Natural Gas	$1.39 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider:	Atlantic City Electric
Rate:	Annual General Service
Meter No:	6104280
Customer ID No:	0
Third Party Utility Provider:	
TPS Meter / Acct No:	

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-08	65,440	229.0	$8,922
Feb-08	72,640	204.0	$11,269
Mar-08	51,360	135.0	$8,238
Apr-08	70,080	224.0	$10,963
May-08	71,840	211.0	$9,826
Jun-08	57,520	197.0	$7,686
Jul-08	60,720	197.0	$8,323
Aug-08	52,720	170.0	$7,245
Sep-08	57,520	175.0	$7,832
Oct-08	56,960	181.0	$7,721
Nov-08	50,800	175.0	$7,184
Dec-08	72,090	198.0	$9,550
Totals	**739,690**	**229.0 Max**	**$104,759**

AVERAGE DEMAND **191.3 KW average**

AVERAGE RATE **$0.142** **$/kWh**

Figure 1
Electricity Usage Profile

Table 4
Natural Gas Billing Data

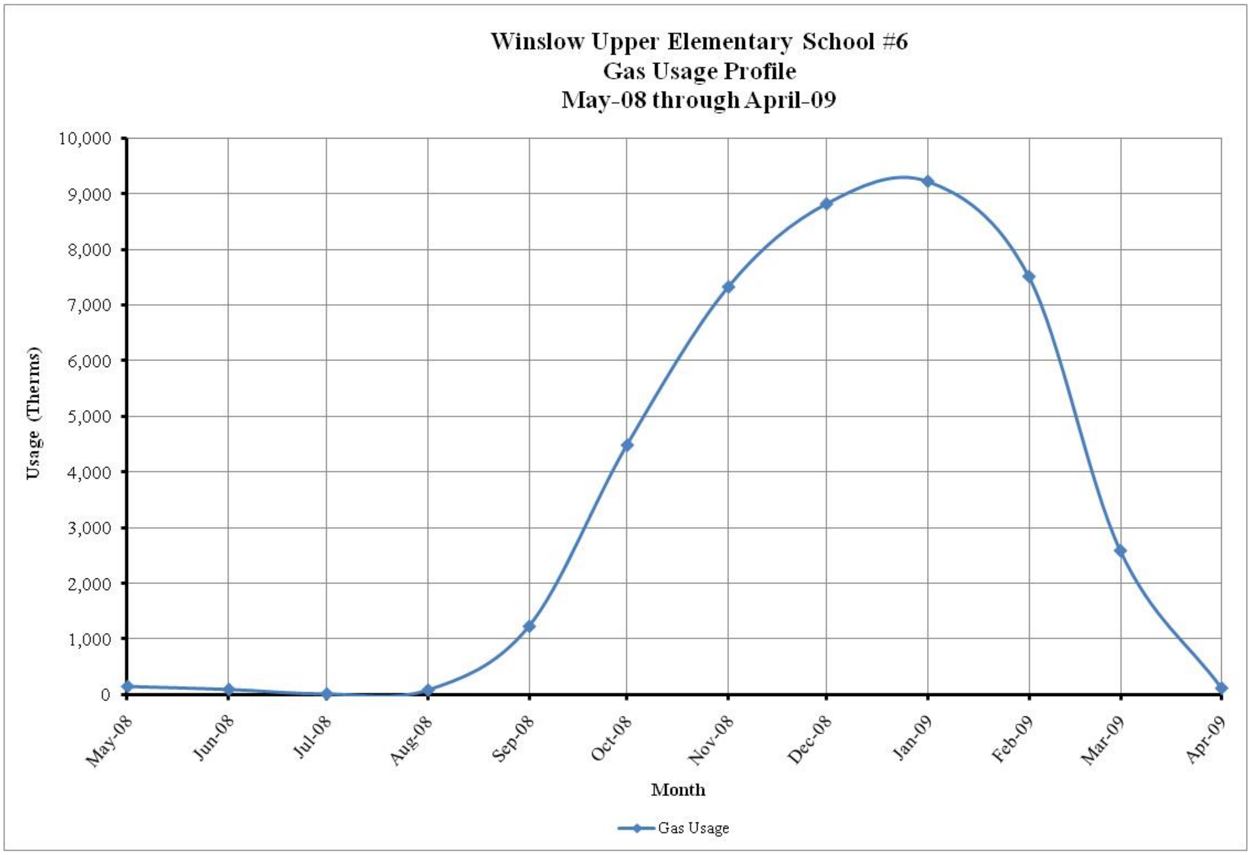
NATURAL GAS USAGE SUMMARY

Utility Provider: South Jersey Gas
Rate: Firm Transportation
Meter No: 351272
Point of Delivery ID: 0
Third Party Utility Provider:
TPS Meter No:

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
May-08	157.00	$266.00
Jun-08	103.00	$203.00
Jul-08	23.00	$60.00
Aug-08	90.00	$155.00
Sep-08	1,234.00	$1,789.00
Oct-08	4,486.00	$5,806.00
Nov-08	7,324.00	$10,117.00
Dec-08	8,815.00	$12,662.00
Jan-09	9,220.00	$12,429.00
Feb-09	7,512.00	$10,667.00
Mar-09	2,593.00	$3,697.00
Apr-09	126.00	$194.00
TOTALS	**41,683.00**	**$58,045.00**

AVERAGE RATE: **$1.39** **$/THERM**

Figure 2
Natural Gas Usage Profile



C. 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:

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

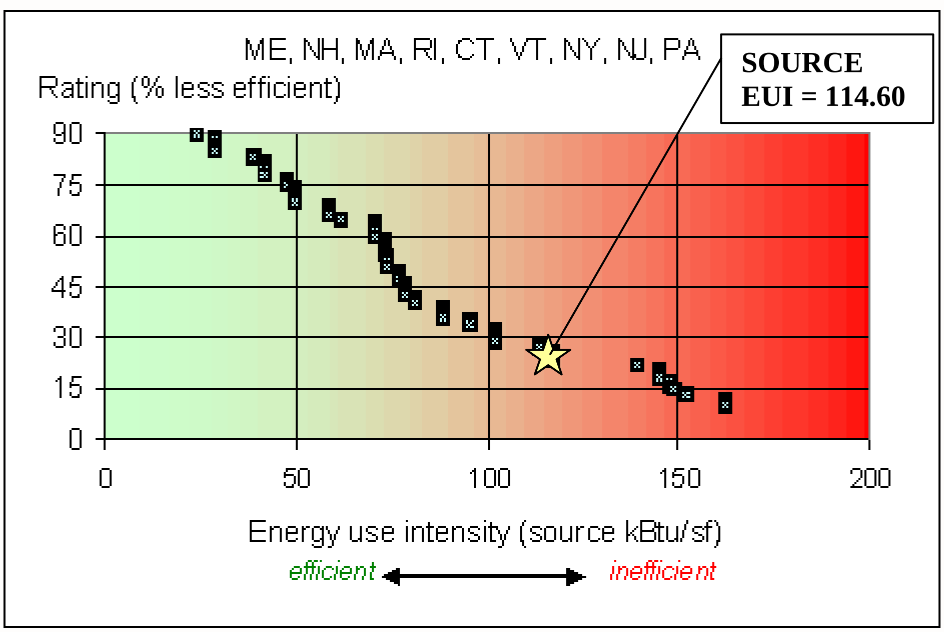
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY kBtu	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons			
ELECTRIC	739,690.0			2,525,302	3.340	8,434,508
NATURAL GAS		41,683.0		4,168,300	1.047	4,364,210
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				6,693,602		12,798,718
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		111,680	SQUARE FEET			
BUILDING SITE EUI		*59.94*	kBtu/SF/YR			
BUILDING SOURCE EUI		*114.60*	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**
Upper Elementary School #6	51	50

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

V. FACILITY DESCRIPTION

The 111,680 SF Upper Elementary School is a two story facility comprised of a classrooms, gym, restrooms, office, library, storage and boiler room. The typical hours of operation for this facility are between 8:00 am and 5:00 pm. Exterior walls are block 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. Blinds inside the building 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 black rubber roof over insulation board on corrugated steel decking. The amount of insulation below the roofing is unknown. The building was built in 1992 with no additions since the original construction.

<u>HVAC Systems</u>

The building is heated by two (2) Weil-McLain No. 94 cast iron water boiler model 1094 series number 3 with 3247 MBH natural gas input or 22.5 GPH for heavy oil input. The boilers have a 2,612,000 BTUH gross output, 2,271,000 BTUH net output with a thermal efficiency of 80%. They were installed in 1992 and are in very good condition. The boilers have seventeen (17) years of useful ASHRAE expected useful service life remaining. The boiler burners are at the end of their useful ASHRAE service life.

There are two (2) in-line boiler pumps. The pump nameplate could not be read. These pumps are assumed to be Armstrong model 3/3/5 4330 BF, 1 hp, rated at 170 GPM at 10 feet of head based on the pumps at Winslow school #5. The pumps approximately 18 years old and are in fair condition. There are two (2) hot water in-line loop pumps. The pump nameplate could not be read. The pumps are assumed to be Armstrong model number 3/3/8 4380 BF, 5 hp motor rated at 220 GPM at 50 feet of head based on the Winslow school #5. The loop pumps are approximately 18 years old and appear to be in fair condition. Based on the assumed age of the pumps, they are eight (8) years past their ASHRAE expected useful service life. The system piping appears to be original to the building and in good to fair condition.

The Gymnasium has two (2) heat and ventilation units. One (1) is located in the Gym Store room and one (1) unit is located in the mechanical mezzanine. Both units are a Trane M series Climate Changer size 17 with 307.8 MBH heating capacity. These units are seventeen (17) years old and are in good to fair condition and have 3 years of ASHRAE expected useful service life remaining.

The Cafeteria has one (1) heat and ventilation unit located in the mechanical mezzanine. The unit is a Trane indoor M series Climate Changer model MCCA03 with 578.8 MBH heating capacity. This unit is seventeen (17) years old and is in good to fair condition. The unit has 3 years of ASHRAE expected useful service life remaining.

There is one (1) heat and ventilation unit serving the Kitchen and is located in the kitchen storage room. The unit is a Trane indoor M series Climate Changer model MCCA10 with 291.0 MBH heating capacity. This unit is seventeen (17) years old and is in good to fair condition. The unit has 3 years of ASHRAE expected useful service life remaining.

There are sixteen (16) air handling units serving first floor classrooms, Art rooms, Music rooms Library, computer room and the faculty dining area and the second floor Faculty Work room that are located above the ceiling adjacent to the area served. The units are USA Coil according to existing drawings with chilled water cooling coils and fractional horse power fan motors. The cooling capacity ranges from 15.8 MBH to 64.8 MBH where the chiller unit is located nearby on the roof. These units utilize unit mounted hot water heating coils with capacities from 29.0 MBH to 115.8 MBH. These units are seventeen (17) years old, are in fair condition and have three (3) years of ASHRAE expected useful service life remaining.

There are two (2) Trane air cooled chillers located on the roof. One (1) unit is model CGADC40 and is 40 Tons nominal cooling capacity. One (1) unit is model CGA120 and is 10 Tons nominal cooling capacity. The chilled water loop is 35% Glycol. These units are eighteen (18) years old, are in fair condition and have three (2) years of ASHRAE expected useful service life remaining.

Classroom unit ventilators provide heat and ventilation to forty-four (44) classrooms. These units have fractional horsepower fan motors. The units are seventeen (18) years old and are in fair condition and are seven (3) year past the ASHRAE expected useful service life.

Entrance doorways are heated via hot water cabinet unit heaters. The cabinet unit heaters have fractional horsepower fan motors and a heating capacity ranging from 13.4 MBH to 20.2 MBH. These units are eighteen (18) years old and are in fair condition and have two (2) years of ASHRAE expected useful service life remaining.

There are four (4) hot water unit heaters with propeller fans. The unit serving the mezzanine and the unit serving the kitchen storage have a capacity of 15.0 MBH each and the unit serving the storage room and the unit serving the boiler room are each is 4.2 MBH. These units are eighteen (18) years old and are in fair condition and have two (2) years of ASHRAE expected useful service life remaining.

There is one (1) electric wall mounted unit heater serving the Electric Room. The heater is 2 KW, is eighteen (18) years old, in fair condition and has two (2) years of ASHRAE expected useful service life remaining.

<u>Exhaust System</u>

Air is exhausted from the toilet rooms, gym and cafeteria through the roof exhaust fans. Ventilation air pressurizes the building and is transferred into the ceiling plenum in classrooms, offices, music rooms, Library and Art room. From the ceiling plenum the air is relieved from the building through roof mounted exhaust fans with fractional horsepower fan motors and through gravity relief vents. The exhaust fans are operated based on the facility occupancy schedule, interlocked with an air handling unit or by manual switching. The existing drawings have the kitchen hood exhaust fan scheduled as a Penn model FMX-24B, 3 horsepower, 460 volt, 3 phase motor that is manually operated according to existing drawings. The existing drawings have the dish wash hood exhaust fan scheduled as a Penn model FMX-18B, 1 horsepower fan, 460 volt, 3 phase motor that is manually operated according to existing drawings. The equipment tags could not be read. It is believed the Greenheck equivalent is actually installed for the dish wash exhaust fan. The kitchen exhaust is a down blast fan is a code violation as this is required to be an up blast fans as originally scheduled. These fans are eighteen (18) years old and are in fair to poor condition and have two (2) years of ASHRAE expected useful service life.

HVAC System Controls

The HVAC systems within the facility are controlled via pneumatic controls. The controls are eighteen (18) years old and are in fair to poor condition and have two (2) years of ASHRAE useful service life remaining. The air compressor is a Curtis Climate Control 5 horsepower unit and is located in the boiler room. The tank is 120 gallon and was built in 1992. The air compressor is in good condition and has two (2) years of ASHRAE expected useful service life remaining.

Domestic Hot Water

Domestic hot water for the restrooms, kitchen and office lounge is provided by three (3) instantaneous gas fired water heaters from Bosch. Three heaters each have an input rating of 175 MBH with 3.96 gallon per minute (237.6 gph) recovery. The water heaters are seven (7) years old, are in good to fair condition and have five (5) years of ASHRAE expected useful service life remaining.

There are three (3) domestic hot water circulator pumps manufactured by Grundfos, model UP 26-96BF. The circulation pumps are controlled by an aqua stat to maintain temperature in a large tank. The circulator pumps are seven (7) years old, are in good to fair conditions and have three (3) years of ASHRAE expected useful service life remaining.

There are two (2) domestic hot water circulator pumps that are 1/6 hp that appear to be eighteen (18) years old and in fair condition and are ten (10) years past their ASHRAE expected useful service life. The domestic hot water piping insulation appeared to be in fair condition.

Lighting

The lighting in Winslow Township School #6 is primarily made up of fluorescent fixtures with T-8 lamps and electronic ballasts. All incandescent lamps have all been already been replaced with compact fluorescent lamps. There is no lighting ECMs for this building.

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 expected useful 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: 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 = 5,109
1 HP = 0.746 Watt
Load Factor = 75%
Cost of electricity = $0.142 / 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
1	78.0%	85.5%	0.06	321	$46
5	82.0%	89.5%	0.29	1,461	$207
			0.3	**1,782**	**$253**

NEMA Premium® Efficiency Motor = $3,936 minus the The SmartStart Building® incentive for replacing with a NEMA Premium® Efficiency 1 horsepower motor is $45/motor.

SmartStart Building® incentive = 2 (1hp motors) x $45/motor = $90

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**
1	2	ODP	4-Pole	$3,891	$7,782	$91.30	85.2
5	2	ODP	4-Pole	$2,825	$5,650	$414.81	13.6
				Totals:	*$13,432*	*$506*	*26.5*

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$13,432
NJ Smart Start Equipment Incentive ($):	$198
Net Installation Cost ($):	$13,234
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$253
Total Yearly Savings ($/Yr):	$253
Estimated ECM Lifetime (Yr):	10
Simple Payback	52.3
Simple Lifetime ROI	-80.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,530
Internal Rate of Return (IRR)	-22%
Net Present Value (NPV)	($11,075.86)

This ECM shows that a fractional horsepower motor with little use does not have substantial savings. In this case, the owner can replace this pump with a standard efficiency motor at or near failure because there is no payback and should be replaced when necessary.

ECM #2: DDC System

Description:

The current HVAC systems within the Upper Elementary School #6 are controlled via pneumatic thermostats in the original building. The Honeywell pneumatic Temperature control system panel is located in the boiler room. The functions of this panel include fourteen (14) zone occupancy switches (occupied/unoccupied/auto), two (2) chiller switches (on/auto), thirty (30) equipment status lights, two (2) pump status lights, hot water pump failure, a lead pump selector switch (pump 1/off/pump 2), and a lead pump alarm switch (normal/silence).

During initial discussions with the Owner it was noted that the hours of operation of the facility are generally 45 hours per week. Occasionally, there is additional after-hours usage during weeknights and thermostat adjustments are made by the person currently occupying the space instead on one general setpoint. This is a means for a cycling amongst different HVAC systems attempting to meet various setpoints throughout the year, independent of heating or cooling season. Therefore, a DDC system providing the Owner with full control over the HVAC equipment within the building appears to be an energy saving opportunity.

This ECM includes installing a Building Automation system with Direct Digital Controls (DDC) wired through an Ethernet backbone and front end controller within the Elementary School only. The system will include new thermostat controllers for all indoor air-handling systems and the rooftop units, in addition to each piece of equipment being wired back to a front end controller and computer interface. With the communication between the devices and the front end computer interface, the Owner will be able to take advantage of equipment scheduling for occupied and unoccupied periods based on the actual occupancy of the facility. Due to the fact that the Elementary School has diverse hours of occupancy, including evening hours, having supervisory control over all of the equipment makes sense. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

The new DDC system has the potential to provide 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 referenced 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 <u>10%</u> of the total energy cost for the facility.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately $4.00 per SF in accordance with recent Contractor pricing for systems of this magnitude. Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Cost of complete DDC System = ($4.00/SF x 111,680 SF) = <u>$446,720</u>

Heating Season Heating Degree Days	= 5,109 HDD
Average Cost of Gas	= $1.39 / Therm
Cooling Season Full Load Cooling Hrs.	= 3,759 hrs / yr
Average Cost of Electricity	= $0.142 / kWh

Note: Degree Days referenced from dereedays.com, weather station KNJSICK1 at Wilton's Corner in Sicklerville, NJ.

Energy Savings Calculations:

<u>10% Savings on Heating Calculations</u>

$$Heat\ Load = \frac{Heat\ Loss\left(\frac{Btu}{Hr\ SF}\right)\times Area\ (SF)}{1000\left(\frac{Btu}{kBtu}\right)}$$

$$Heat\ Load = \frac{50\left(\frac{Btu}{Hr\ SF}\right)\times 110{,}680\ (SF)}{1000\left(\frac{Btu}{kBtu}\right)} = 5{,}534\left(\frac{kBtu}{Hr}\right)$$

$$Est\ Heat\ Cons. = \frac{Heat\ Load\left(\frac{kBtu}{Hr}\right)\times Heat\ Deg\ Days\times 24\ Hrs\times Correction\ Factor}{Design\ Temp\ Difference\,(^\circ F)\times Efficiency\,(\%)\times Fuel\ Heat\ Value\left(\frac{kBtu}{Therm}\right)}$$

$$Est\ Heat\ Cons. = \frac{5{,}534\left(\frac{kBtu}{Hr}\right)\times 5{,}109\ (HDD)\times 24\ Hrs\times 0.3}{65\ (^\circ F)\times 81\%\times 100\left(\frac{kBtu}{Therm}\right)} = 38{,}664(Therms)$$

$$Savings. = Heat\ Cons.(Therms) \times 10\%\ Savings \times Ave\ Gas\ Cost\left(\frac{\$}{Therm}\right)$$

$$Savings. = 38{,}664\ (Therms) \times 10\% \times 1.39\left(\frac{\$}{Therm}\right) = \underline{\$5{,}374}$$

<u>10% Savings on Cooling Calculations</u>**:**

$$Est\ Cool\ Cons. = \frac{Cool\ Load\ (Tons) \times 12{,}000\left(\frac{Btu}{Ton\ Hr}\right) \times Full\ Load\ Cooling\ Hrs.}{Ave\ Energy\ Efficiency\ Ratio\left(\frac{Btu}{Wh}\right) \times 1000\left(\frac{Wh}{kWh}\right)}$$

$$Est\ Cool\ Cons. = \frac{50\ (Tons) \times 12{,}000\left(\frac{Btu}{Ton\ Hr}\right) \times 3{,}759\ Hrs.}{10.0\left(\frac{Btu}{Wh}\right) \times 1000\left(\frac{Wh}{kWh}\right)} = 225{,}540(kWh)$$

$$Savings. = Cool\ Cons.(kWh) \times 10\%\ Savings \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

$$Savings. = 225{,}540\ (kWh) \times 10\% \times 0.142\left(\frac{\$}{kWh}\right) = \underline{\$3{,}203}$$

Total Annual Energy Savings = \$5,374 + \$3,203 = <u>\$8,577</u> per year

It is pertinent to note that electric demand savings were unable to be estimated. Also, incentives for the installation of the DDC system are not currently available and maintenance savings could not be adequately calculated because information was not available to baseline the savings.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$446,720
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$446,720
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$8,577
Total Yearly Savings ($/Yr):	$8,577
Estimated ECM Lifetime (Yr):	15
Simple Payback	52.1
Simple Lifetime ROI	-71.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$128,655
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	($344,328.33)

ECM #3: Chiller Replacement

Description:

One (1) of the existing chillers is a Trane model CGADC404AFA1FGT , forty (40) nominal Tons, roof mounted air cooled chiller. The unit had a 9.7 EER when new and now is about 9.2 EER. There is one (1) existing chiller that is a Trane model CGA120B400AA, ten (10) nominal Tons, roof mounted air cooled chiller. The chillers serve the sixteen (16) USA Coil air handling units. The chiller units on the roof are approximately 18 years old, in fair to poor condition and two years from the end of their ASHRAE useful service life.

This ECM would replace the existing rooftop chillers with a new Trane Model CGAF-C40 and a Trane model CGA 120 or equivalent.

Energy Savings Calculations:

Cooling Assumptions:

Total Cooling Capacity	= 40 Tons
Existing Unit Efficiency	= 9.2 EER
New Unit Efficiency	= 9.55 EER, 1.2 KW/Ton
Average Cost of Electricity	= $0.142/kWh
Average Annual Hours @ Full Load	= 3,759 Hours

<u>Cooling Savings Calculation (40 Ton):</u>

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

$$EnergySavings = \frac{40\ (Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{9.2\left(\frac{Btu}{W}\right)} - \frac{1}{9.55\left(\frac{Btu}{W}\right)}\right) \times 3{,}759\ hours$$

$= \underline{7{,}188\ kWh}$

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

$$Demand\ Savings = \frac{7{,}188(kWh)}{3{,}759\ Hrs.} = \underline{1.91\ kW}$$

Total Annual Energy Cost Savings = 7,188 kWh x $0.142/kWh = <u>$1,021 per year</u>

$$\text{Smart Start® } Incentive = (Number\ of\ Tons \times \ \$14/Ton) = (50 \times \$14) = \$700$$

The total installed cost of a 40-Ton air cooled chiller unit each with an ambient kit is $36,000.

<u>Cooling Savings Calculation (10 Ton):</u>

Total Cooling Capacity	= 10 Tons
Existing Unit Efficiency	= 8.6 EER
New Unit Efficiency	= 9.85 EER, 1.2 KW/Ton
Average Cost of Electricity	= $0.142/kWh
Average Annual Hours @ Full Load	= 3,759 Hours

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

$$EnergySavings = \frac{10\ (Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{8.6\left(\frac{Btu}{W}\right)} - \frac{1}{9.85\left(\frac{Btu}{W}\right)}\right) \times 3{,}759\ hours$$

$$= \underline{6{,}656\ kWh}$$

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

$$Demand\ Savings = \frac{6{,}656(kWh)}{3{,}759\ Hrs.} = \underline{1.77\ kW}$$

Total Annual Energy Cost Savings = 6,656 kWh x $0.142/kWh = <u>$945 per year</u>

$$\text{Smart Start® } Incentive = (Number\ of\ Tons \times \ \$14/Ton) = (10 \times \$14) = \$140$$

The total installed cost of a 10-Ton air cooled chiller unit each with an ambient kit is $9,000.

Total for both units:

Energy Savings = 7,188 +6,656 = 13,844 *kWh*

Demand Savings = 1.91+ 1.77 = 3.68 *kW*

Installed cost = $36,000 + $9,000 = $45,000

Total Smart Start® *Incentive* = $560 +$140 = $700

Total Annual Energy Cost Savings = 1,021 +$945 = $1,966

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$45,000
NJ Smart Start Equipment Incentive ($):	$700
Net Installation Cost ($):	$44,300
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,966
Total Yearly Savings ($/Yr):	$1,966
Estimated ECM Lifetime (Yr):	20
Simple Payback	22.5
Simple Lifetime ROI	-11.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$39,320
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	($15,050.88)

ECM #4: Exhaust Fan Replacement - NEMA Premium Efficient Motor

Description:

Replacing the old exhaust fans with new exhaust fans with 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 25-35 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 = 1,500
1 HP = 0.746 Watt
Load Factor = 75%
Cost of electricity = $0.142 / 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**
1	78.0%	85.5%	0.06	94	$13
3	78.0%	85.5%	0.19	283	$40
			0.3	**378**	**$54**

The 1 hp NEMA Premium® Efficiency Fan and Motor installed cost is $2,495. The 3 hp NEMA Premium® Efficiency Fan and Motor installed cost is $3,254. There is no SmartStart Building® incentive for replacing with a NEMA Premium® Efficiency 1 horsepower or greater and less than 2000 hours annually.

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**
1	1	ODP	4-Pole	$2,495	$2,495	$13.40	186.2
3	1	ODP	4-Pole	$3,254	$3,254	$40.21	80.9
				Totals:	*$5,749*	*$54*	*107.2*

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,749
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,749
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$54
Total Yearly Savings ($/Yr):	$54
Estimated ECM Lifetime (Yr):	20
Simple Payback	106.5
Simple Lifetime ROI	-81.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$1,080
Internal Rate of Return (IRR)	-12%
Net Present Value (NPV)	($4,945.62)

This ECM shows that a fan motor with little use does not have substantial savings. In this case, the owner can replace the existing fan with a new fan with a standard efficiency motor because there is no payback and should be replaced when necessary.

The kitchen exhaust is a down blast fan and is a code violation. This fan is required to be an up blast fans as originally scheduled. It is recommended that the kitchen cooking hood exhaust fan be replaced to correct the code violation.

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 9,400 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 132.48 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 159,847 KWh annually, reducing the overall utility bill by approximately 21.6% 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	15.2 Years	6.6%	4.8%

*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 spring operation for this facility is something that should be analyzed further. The demand and consumption throughout the spring months (April through May) is highest instance over the entire school year. This is most likely due to the fact that the chiller is put into operation typically in late March or early April to prepare for the cooling months. The instance that cannot be accounted for with standard rationality is the decrease in demand and consumption seen in March. Typically, an occurrence like this would be seen in the summer operation of a non-air conditioned facility with minimal summer usage not a facility like this.

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 with average demand loads above 200 KW. 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 Upper Elementary School #6

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 ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	Pump Replacement	$13,432	$0	$198	$13,234	$253	$0	$253	10	$2,530	$0	-80.9%	52.3	-22.48%	($11,075.86)
ECM #2	DDC Control System	$446,720	$0	$0	$446,720	$8,577	$0	$8,577	15	$128,655	$0	-71.2%	52.1	-12.63%	($344,328.33)
ECM #3	Chiller Replacement	$45,000	$0	$700	$44,300	$1,966	$0	$1,966	20	$39,320	$0	-11.2%	22.5	-1.11%	($15,050.88)
ECM #4	Kitchen Exhaust Fan Replacement	$5,749	$0	$0	$5,749	$54	$0	$54	20	$1,080	$0	-81.2%	106.5	-12.44%	($4,945.62)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar PV System - 132.48 KW	$1,192,320	$0	$0	$1,192,320	$22,698	$55,946	$78,644	15	$1,179,660	$839,190	-1.1%	15.2	-0.13%	($253,473.03)

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 $\geq$ 16 \$600 per ton, EER $\geq$ 18 \$750 per ton, EER $\geq$ 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%

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
School #6

Building ID: 2052895
For 12-month Period Ending: April 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: February 13, 2010

Facility
School #6
617 Sickler Ave
Berlin, NJ 08009

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: 1992
Gross Floor Area (ft²): 111,680

Energy Performance Rating[2] (1-100) 51

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,523,822
Natural Gas (kBtu)[4]	4,168,300
Total Energy (kBtu)	6,692,122

Energy Intensity[5]	
Site (kBtu/ft²/yr)	60
Source (kBtu/ft²/yr)	115

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	606

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison	
National Average Site EUI	61
National Average Source EUI	116
% Difference from National Average Source EUI	-1%
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 #6	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	617 Sickler Ave, Berlin, NJ 08009	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 #6 (K-12 School)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	111,680 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	195 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	60 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	80 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: #6 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	72,090.00
03/01/2009	03/31/2009	50,800.00
02/01/2009	02/28/2009	56,960.00
01/01/2009	01/31/2009	57,520.00
12/01/2008	12/31/2008	52,720.00
11/01/2008	11/30/2008	60,720.00
10/01/2008	10/31/2008	57,520.00
09/01/2008	09/30/2008	71,840.00
08/01/2008	08/31/2008	70,080.00
07/01/2008	07/31/2008	51,360.00
06/01/2008	06/30/2008	72,640.00
05/01/2008	05/31/2008	65,440.00
#6 Electric Consumption (kWh (thousand Watt-hours))		**739,690.00**
#6 Electric Consumption (kBtu (thousand Btu))		**2,523,822.28**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,523,822.28**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: #6 Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
04/01/2009	04/30/2009	126.00
03/01/2009	03/31/2009	2,593.00
02/01/2009	02/28/2009	7,512.00
01/01/2009	01/31/2009	9,220.00
12/01/2008	12/31/2008	8,815.00
11/01/2008	11/30/2008	7,324.00
10/01/2008	10/31/2008	4,486.00
09/01/2008	09/30/2008	1,234.00
08/01/2008	08/31/2008	90.00
07/01/2008	07/31/2008	23.00

06/01/2008	06/30/2008	103.00
05/01/2008	05/31/2008	157.00
#6 Gas Consumption (therms)		**41,683.00**
#6 Gas Consumption (kBtu (thousand Btu))		**4,168,300.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**4,168,300.00**
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 #6
617 Sickler Ave
Berlin, NJ 08009

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 #6	
Gross Floor Area Excluding Parking: (ft^2)	111,680
Year Built	1992
For 12-month Evaluation Period Ending Date:	April 30, 2009

Facility Space Use Summary

School #6	
Space Type	K-12 School
Gross Floor Area(ft^2)	111,680
Open Weekends?	No
Number of PCs[d]	195
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	60
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	51	51	75	N/A	50
Energy Intensity					
Site (kBtu/ft2)	60	60	48	N/A	61
Source (kBtu/ft2)	115	115	91	N/A	116
Energy Cost					
$/year	$ 162,804.00	$ 162,804.00	$ 129,194.43	N/A	$ 165,194.98
$/ft2/year	$ 1.46	$ 1.46	$ 1.16	N/A	$ 1.48
Greenhouse Gas Emissions					
$MtCO_2e$/year	606	606	481	N/A	615
$kgCO_2e/ft^2$/year	5	5	4	N/A	5

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

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

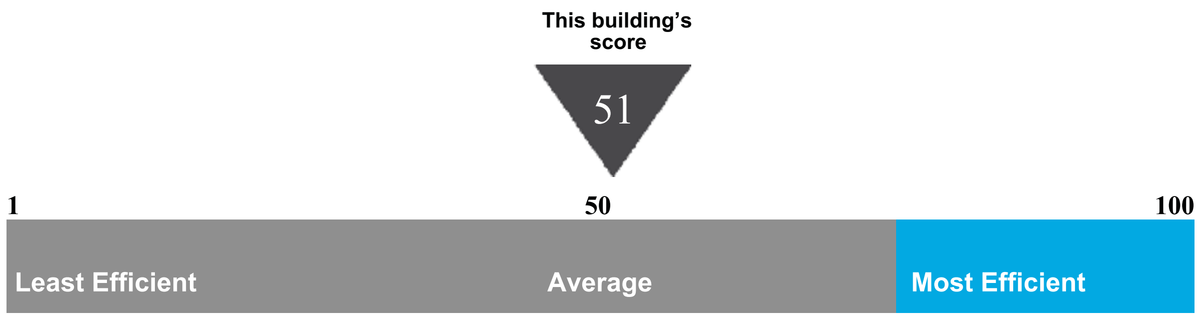
Statement of Energy Performance

2009

School #6
617 Sickler Ave
Berlin, NJ 08009

Portfolio Manager Building ID: 2052895

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 115 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

UPPER ELEMENTARY SCHOOL #6

Boiler

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
B-1	Boiler Room	Bldg. Heat	WEIL-McLAIN	1	1094	8986	3247	2612	80	GAS\OIL	1994	35	19	
B-2	Boiler Room	Bldg. Heat	WEIL-McLAIN	1	1094	8987	3247	2612	80	GAS\OIL	1994	35	19	

Boiler - Burner

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	BOILER RM	B-1	PREFERRED UTILITIES MFG. CORP	1	-	-	2347	80	NG / HVY OIL	1994	18	2	3 hp motor
-	BOILER RM	B-2	PREFERRED UTILITIES MFG. CORP	1	-	-	2347	80	NG / HVY OIL	1994	18	2	3 hp motor

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	BOILER LOOP	-	1	3/3/8 4380 BF	-	5	1750	220	50	-	-	1992	20	2	
-	BOILER RM	BOILER LOOP	-	1	3/3/8 4380 BF	-	5	1750	220	50	-	-	1992	20	2	
-	BOILER RM	BOILER CIRC	-	1	3/3/5 4330 BF	-	1	1750	170	10	-	-	2003	10	3	
-	BOILER RM	BOILER CIRC	-	1	3/3/5 4330 BF	-	1	1750	170	10	-	-	2003	10	3	

DHW - Pumps

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
DWP-1	BOILER RM	DOM WTR	GRUNDFOS	1	UP-29-96 BF	-	FRACTIONAL	115/1	1.7	2003	10	3	
DWP-2	BOILER RM	DOM WTR	GRUNDFOS	1	UP-29-96 BF	-	FRACTIONAL	115/1	-	2003	10	3	
DWP-3	BOILER RM	DOM WTR	GRUNDFOS	1	UP-29-96 BF	-	FRACTIONAL	115/1	-	2003	10	3	
-	BOILER RM	DOM WTR LOOP	-	1	E6312 LR37479	YQC48S17D1051J P	1/6	115/1	3.6	18	10	(-8)	
-	BOILER RM	DOM WTR LOOP	ARMSTRONG	1	-	-	-	115/1	-	18	10	(-8)	

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
AH-A-1	ABV. CLG.	A-121	US COIL&AIR	1	WHB-08	-	ChW	-	36.17	HOT WATER	-	52.02	-	-	120/1	-	18	20	2	
AH-A-2	ABV. CLG.	A-114	US COIL&AIR	1	WHD-04	-	ChW	-	15.83	HOT WATER	-	29.01	-	-	120/1	-	18	20	2	
AH-A-3	ABV. CLG.	A-133	US COIL&AIR	1	WHB-12	-	ChW	-	43.3	HOT WATER	-	73.5	-	-	120/1	-	18	20	2	
AH-A-4	ABV. CLG.	A-130, 131, 132	US COIL&AIR	1	WHB-12	-	ChW	-	36.2	HOT WATER	-	66.73	-	-	120/1	-	18	20	2	
AH-A-5	ABV. CLG.	A-134	US COIL&AIR	1	WHB-20	-	ChW	-	60.6	HOT WATER	-	83.07	-	-	480/3	-	18	20	2	
AH-A-6	ABV. CLG.	A-138	US COIL&AIR	1	WHB-08	-	ChW	-	26.35	HOT WATER	-	50.98	-	-	120/1	-	18	20	2	
AH-A-7	ABV. CLG.	Faculty	US COIL&AIR	1	WHB-16	-	ChW	-	43.22	HOT WATER	-	72.7	-	-	120/1	-	18	20	2	
AH-B-1	ABV. CLG.	B137 Vocal	US COIL&AIR	1	SWVB-15	921250419	ChW	-	54.01	HOT WATER	-	90.26	-	-	480/3	-	18	20	2	
AH-B-2	ABV. CLG.	B138 Instrumental	US COIL&AIR	1	SWVB-15	921250417	ChW	-	64.8	HOT WATER	-	115.78	-	-	480/3	-	18	20	2	
AH-B-3	ABV. CLG.	-	US COIL&AIR	1	WHB-12	-	ChW	-	39.21	HOT WATER	-	81.56	-	-	120/1	-	18	20	2	
AH-B-4	ABV. CLG.	-	US COIL&AIR	1	WHB-08	-	ChW	-	29.48	HOT WATER	-	45.44	-	-	120/1	-	18	20	2	
AH-B-5	Coor B119	B-125	US COIL&AIR	1	WHB-08	-	ChW	-	25.85	HOT WATER	-	45.13	-	-	120/1	-	18	20	2	
AH-B-6	Coor B116	-	US COIL&AIR	1	WHB-12	-	ChW	-	34.36	HOT WATER	-	66.4	-	-	120/1	-	18	20	2	
AH-B-7	Coor B101	B115	US COIL&AIR	1	WHB-08	-	ChW	-	21.59	HOT WATER	-	45.46	-	-	120/1	-	18	20	2	
AH-B-8	Coor B101	B-114	US COIL&AIR	1	WHB-08	-	ChW	-	27.48	HOT WATER	-	45.44	-	-	120/1	-	18	20	2	
AH-B-9	Coor B101	B113	US COIL&AIR	1	WHB-08	-	ChW	-	23.34	HOT WATER	-	41.9	-	-	120/1	-	18	20	2	

Window AC Units

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	EER	Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	A-106	A-106	LG	1	LWHD120FR	712TAVY13703	11.5	9.8	R-22	115 / 1	2003	15	8	
-	B-105	B-105	LG	1	LWHD1500ER	702TACX04171	15	10.8	R-22	115 / 1	2004	15	9	
-	A-108	A-108	LG	1	LWHD120FR	702TAKK10637	11.5	9.8	R-22	115 / 1	2002	15	7	
-	A-205	A-205	LG	1	LWHD120FR	705TAXT03226	11.5	9.8	R-22	115 / 1	2003	15	8	
-	B-215	B-215	LG	1	LWHD120FR	701TANS00887	11.5	9.8	R-22	115 / 1	2000	15	5	
-	A-209	A-209	ELECTROLUX	1	FAA087P7A	IK64533372	8	9.6	R-22	115 / 1	2006	15	11	
-	A-212	A-212	SUNBEAM	1	-	E0600223130000257	15	9.6	R-22	115 / 1	2006	15	11	
-	A-216	A-216	FRIEDRICH	1	CP12C10	LFBK01792 CP12C10	12	10.8	R-22	115 / 1	2006	15	11	
-	A-218	A-218	MAYTAG	1	M7Y15F2A-D	CS 167343 065Y	15	10.8	R-22	115 / 1	2006	15	11	
-	A-208	A-208	LG	1	LWHD1500ER	702TAHQ04025	15	10.8	R-22	115 / 1	2004	15	9	
-	B-213	B-213	LG	1	LWHD1500ER	612TASW02998	15	10.8	R-22	115 / 1	2002	15	7	
-	B-210	B-210	LG	1	LWHD1500ER	612TABN02989	15	10.8	R-22	115 / 1	2002	15	7	
-	B-207	B-207	FRIEDRICH	1	CP10C10	LFBK01413 CP10C10	10	10.8	R-22	115 / 1	2006	15	11	

Liquid Chiller

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Nominal Tons	% Glycol	EWT	LWT	GPM	Efficiency	Volt / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
CH-1	Roof	AH units	TRANE	1	CGADC404AFA1FGT	J92K83755	40	35	53	43	99	9.7 EER	480/3	1992	20	2	
CH-2	Roof	AH units	TRANE	1	CGA120B400AA	G29198875	10	35	53	43	20	9.1 EER	480/3	1992	20	2	

Air Compressor

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Pressure	Capacity	Volts / Phase	FLA	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
COMP-1	BOILER RM	ATC	Curtis Climate Control	1			5	200 PSI	120 GAL	-	-	1992	20	2	

Heating and Ventilation 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
HV-A-1	Gym Storage	GYM	TRANE	1	MCCA17			307.8	5	596	480/3	-	1993	20	3	
HV-A-2	MEZZ	GYM	TRANE	1	MCCA17	K93A03221, 43, 44		307.8	5	709	480/3	-	1993	20	3	
HV-B-1	MEZZ	B-133 CAFÉ	TRANE	1	MCCA03	K93A01614, 15, 16		578.8	15	529	480/3	-	1993	20	3	
AMU-B-1	MEZZ	KITCHEN	TRANE	1	MCCA10			291	1.5	834	480/3	-	1993	20	3	

Instant Hot Water Heater

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (W)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
DWH-1	MER	DOM WTR	BOSCH	1	GWH 635 ESN	7703311001 837 FD 587 00608	GAS 175 MBH	3.96	-	80	-	-	2003	12	5	237.6 GPH recovery max
DWH-2	MER	DOM WTR	BOSCH	1	GWH 635 ESN	7703311001 FD 685 00273	GAS 175 MBH	3.96	-	80	-	-	2003	12	5	237.6 GPH recovery max
DWH-3	MER	DOM WTR	BOSCH	1	GWH 635 ESN	7703311001 FD 685 00421	GAS 175 MBH	3.96	-	80	-	-	2003	12	5	237.6 GPH recovery max

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
EF-B7	roof	Kitchen hood	PENN	1	FMX-24B	-	3	1228	480/3	-	1992	20	2	PER EXISTING DRAWINC

UNIT VENTILATORS

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - HW	Fan HP	Volts/Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
UV-1	CLASSRM.	CLASSRM.	TRANE	23	TUV-10	-	-	56	fractional	120/1	-	1992	20	2	
UV-2	CLASSRM.	CLASSRM.	TRANE	7	TUV-07	-	-	38	fractional	120/1	-	1992	20	2	
UV-3	CLASSRM.	CLASSRM.	TRANE	2	TUV-12	-	-	66	fractional	120/1	-	1992	20	2	
UV-4	CLASSRM.	CLASSRM.	TRANE	1	TUV-15	-	-	72	fractional	120/1	-	1992	20	2	

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

Investment Grade Lighting Audit

CEG Job #: 9C09026
Project: Winslow Township School #6
Address: 617 Sickler Ave.
Sicklerville, NJ 08081
Building SF: 111,680

"Winslow Upper Elementary School #6"

KWH COST: $0.142

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING											PROPOSED LIGHTING									SAVINGS			
CEG Type	Room 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	Yearly $ Savings	Yearly Simple Payback
1.34		Boiler Room	4600	7	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Pendant Mnt., No Lens	58	0.41	1,867.6	$265.20		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.34		Electrical Room	4600	4	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Pendant Mnt., No Lens	58	0.23	1,067.2	$151.54		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B123	Classroom	2080	14	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.81	1,689.0	$239.83		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B122	Closet	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B120	Classroom	2080	14	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.81	1,689.0	$239.83		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Girl's Restroom	3200	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	742.4	$105.42		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B146	Office	2200	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	510.4	$72.48		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Nurse	2200	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,531.2	$217.43		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Boy's Restroom	3200	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	742.4	$105.42		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B115	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B114	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B113	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B112	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B111	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21	B109	Classroom	2080	13	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.75	1,568.3	$222.70		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B107	Classroom	2080	6	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B106	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B105	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B104	Classroom	2080	6	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B103	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B102	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Storage	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.11		Stairway	3200	3	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21			3200	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B152	Office	2200	2	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	255.2	$36.24		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B151	Office	2200	2	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	255.2	$36.24		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
10		Lobby	3200	7	6	4x4, 6 Lamp. 32w T8, Elect. Ballast, Recessed, Prismatic Lens	174	1.22	3,897.6	$553.46		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.11		Stairway	3200	3	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Stairway	3200	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A105	Classroom	2080	9	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.52	1,085.8	$154.18		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A106	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21	A107	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A108	Classroom	3200	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	2,227.2	$316.26		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A109	Classroom	2080	6	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A110	Classroom	2080	13	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.75	1,568.3	$222.70		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A112	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A108	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A114	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.11		Stairway	3200	3	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21			3200	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	556.8	$79.07		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Custodial Closet	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Custodial Supply Closet	500	2	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	58.0	$8.24		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A121	Art Room	2080	16	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.93	1,930.2	$274.09		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6		Gym	2080	28	4	2x4 4 Lamp, 54w T5HO, Elect. Ballast, Pendant Mnt., No Lens	242	6.78	14,094.1	$2,001.36		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A133	Computer Lab	2080	16	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.93	1,930.2	$274.09		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.21		Men's Locker Room	2080	6	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.21		Women's Locker Room	2080	6	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Gym Office	2200	2	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	255.2	$36.24		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21		Gym Storage	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A132	Computer Lab	2080	24	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.39	2,895.4	$411.14		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Custodial Closet	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21	B138	Music Room	2080	15	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	1.68	3,494.4	$496.20		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21	B137	Music Room	2080	15	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	1.68	3,494.4	$496.20		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B139	Orchestra	2080	2	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	241.3	$34.26		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Custodial Closet	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
7		Cafetorium	2080	20	4	2x4 4 Lamp, 54w T5HO, Elect. Ballast, Recessed Mnt., No Lens	242	4.84	10,067.2	$1,429.54		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Employee Dining Room	3200	4	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.45	1,433.6	$203.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Men's Restroom	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Women's Restroom	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Kitchen	2080	17	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	1.90	3,960.3	$562.37		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Kitchen Storage	2080	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	482.6	$68.52		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
11		Library	2080	25	3	2x2, 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	1.20	2,496.0	$354.43		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1.21			2080	30	2	1x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.74	3,619.2	$513.93		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Library Office	2200	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	382.8	$54.36		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21		AV Storage	500	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	87.0	$12.35		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A205	Classroom	2080	9	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.52	1,085.8	$154.18		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A206	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A207	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A208	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A209	Classroom	2080	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	482.6	$68.52		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A210	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A212	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A213	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A214	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A215	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A216	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Storage	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Storage	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	A218	Art Room	2080	20	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.16	2,412.8	$342.62		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Men's Restroom	500	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	116.0	$16.47		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21		Custodial Closet	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Women's Restroom	500	4	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	116.0	$16.47		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B216	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B215	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B214	Classroom	2080	6	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B213	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B212	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B211	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B210	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B208	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B207	Classroom	2080	5	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.29	603.2	$85.65		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B206	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B205	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B204	Classroom	2080	6	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	723.8	$102.79		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B203	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	B202	Classroom	2080	12	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.70	1,447.7	$205.57		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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2.21		Storage	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Faculty Workroom	2200	11	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.64	1,403.6	$199.31		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Faculty Men's Restroom	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Faculty Women's Restroom	500	1	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	29.0	$4.12		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Main Office	2200	11	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	1.23	2,710.4	$384.88		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Breakroom	2200	2	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.22	492.8	$69.98		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Copy Room	2200	2	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.22	492.8	$69.98		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Main Office Hall	2200	3	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	382.8	$54.36		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Assistant Principal's Office	2200	2	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.22	492.8	$69.98		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Dr. Brown's Office	2200	2	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.22	492.8	$69.98		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4.21		Principal's Office	2200	4	4	2x4, 4 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	112	0.45	985.6	$139.96		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		2nd Fl. Corridor	3200	28	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.62	5,196.8	$737.95		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Corridor A & C	3200	35	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	2.03	6,496.0	$922.43		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Corridor B	3200	30	2	2x4, 2 lamp, 32w T8 Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.74	5,568.0	$790.66		0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
		Totals		1005	249			71.68	159,184.1	$22,604.15	0	0			0.00	0	$0.00		$0.00	0.00	0.0	$0.00	#DIV/0!

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

Project Name: **LGEA Solar PV Project - Winslow Township BOE Upper Elementary School #6**
Location: **Sicklerville, NJ**
Description: **Photovoltaic System - Direct Purchase**

Simple Payback Analysis

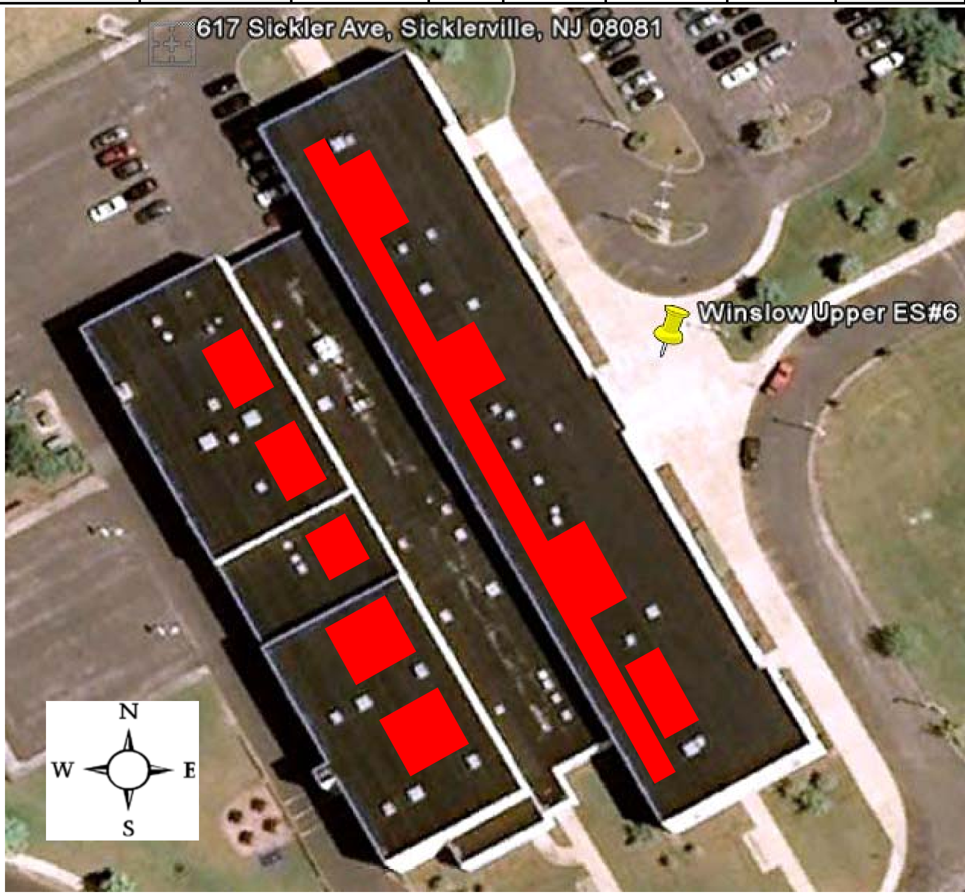
	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,192,320
Annual kWh Production	159,847
Annual Energy Cost Reduction	$22,698
Annual SREC Revenue	$55,946
First Cost Premium	**$1,192,320**
Simple Payback:	**15.16** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.142**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$1,192,320	0	0	0	$0	(1,192,320)	0
1	$0	159,847	$22,698	$0	$55,946	$78,645	($1,113,675)
2	$0	159,048	$23,379	$0	$55,667	$79,046	($1,034,629)
3	$0	158,253	$24,081	$0	$55,388	$79,469	($955,160)
4	$0	157,461	$24,803	$0	$55,111	$79,914	($875,246)
5	$0	156,674	$25,547	$1,614	$54,836	$78,769	($796,477)
6	$0	155,891	$26,314	$1,606	$54,562	$79,270	($717,207)
7	$0	155,111	$27,103	$1,598	$54,289	$79,794	($637,413)
8	$0	154,336	$27,916	$1,590	$54,017	$80,344	($557,069)
9	$0	153,564	$28,753	$1,582	$53,747	$80,919	($476,150)
10	$0	152,796	$29,616	$1,574	$53,479	$81,521	($394,629)
11	$0	152,032	$30,505	$1,566	$53,211	$82,150	($312,479)
12	$0	151,272	$31,420	$1,558	$52,945	$82,807	($229,672)
13	$0	150,516	$32,362	$1,550	$52,680	$83,492	($146,180)
14	$0	149,763	$33,333	$1,543	$52,417	$84,208	($61,972)
15	$0	149,014	$34,333	$1,535	$52,155	$84,953	$22,981
16	$0	148,269	$35,363	$1,527	$51,894	$85,730	$108,711
17	$0	147,528	$36,424	$1,520	$51,635	$86,539	$195,251
18	$0	146,790	$37,517	$1,512	$51,377	$87,381	$282,632
19	$0	146,056	$38,642	$1,504	$51,120	$88,258	$370,889
20	$0	145,326	$39,802	$1,497	$50,864	$89,169	$460,058
21	$1	144,599	$40,996	$1,489	$50,610	$90,116	$550,174
22	$2	143,876	$42,225	$1,482	$50,357	$91,100	$641,274
23	$3	143,157	$43,492	$1,475	$50,105	$92,123	$733,397
24	$4	142,441	$44,797	$1,467	$49,854	$93,184	$826,581
25	$5	141,729	$46,141	$1,460	$49,605	$94,286	$920,868
	Totals:	3,765,348	$827,562	$32,247	$1,317,872	$2,113,188	($3,195,142)
				Net Present Value (NPV)		**$920,893**	
				Internal Rate of Return (IRR)		**4.8%**	

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
Upper ES#6	9400	Sunpower SPR230	576	14.7	8,470	132.48	159,847	19,008	15.64



.= Proposed PV Layout

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

APPENDIX F
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PVWatts * * * 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:	132.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	107.3 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	210.0°
Energy Specifications	
Cost of Electricity:	0.1 ¢/kWh

Results

Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.50	8306	11.79
2	3.27	9967	14.15
3	4.25	13996	19.87
4	5.17	16096	22.86
5	5.85	18445	26.19
6	6.12	17928	25.46
7	6.05	18091	25.69
8	5.50	16552	23.50
9	4.79	14190	20.15
10	3.68	11430	16.23
11	2.58	7916	11.24
12	2.17	6929	9.84
Year	4.33	159847	226.98

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

RReDC Return to RReDC home page (*http://rredc.nrel.gov*)