LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: **SALEM CITY BOARD OF EDUCATION**

JOHN FENWICK ELEMENTARY SCHOOL
183 SMITH STREET
SALEM, NJ 08079

ATTN: MR. WILL ROYSTER
DIRECTOR OF BUILDINGS AND GROUNDS

PREPARED BY: **CONCORD ENGINEERING GROUP**
520 S. BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CEG-INC.NET

CEG CONTACT: PATRICK MULLEN, P.E.
LEAD MECHANICAL ENGINEER
EMAIL: PMULLEN@CEG-INC.NET

REPORT ISSUANCE: **FINAL, JANUARY 12, 2011**

PROJECT NO: **9C10083**

TABLE OF CONTENTS

REPORT DISCLAIMER

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

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

I. EXECUTIVE SUMMARY

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

Salem City Board of Education
John Fenwick Elementary School Building
183 Smith Street
Salem, NJ 08079

Municipal Contact Person: Deborah A. Piccirillo, Business Administrator
Facility Contact Person: Will A. Royster, Director of Buildings and Grounds

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	$ 57,932
Natural Gas	$ 43,480
Total	$ 101,412

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	Premium Pump Motor Replacement	$3,190	$159	20.0	-10.2%
ECM #2	Window AC Replacement	$8,550	$292	29.3	-48.7%
ECM #3	Window AC Upgrade	$40,086	$1,262	31.8	-52.8%
ECM #4	UV Unit Upgrade W/ Energy Recovery	$1,319,500	$14,812	89.1	-83.2%
ECM #5	Underfloor Plenum Insulation	$161,750	$25,505	6.3	136.5%
ECM #6	General Lighting Upgrade	$14,366	$3,807	3.8	297.5%
ECM #7	Lighting Controls	$9,915	$1,790	5.5	170.8%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar PV 137.31 KWDC system	$1,235,790	$80,834	15.3	63.5%

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	Premium Pump Motor Replacement	0.4	1,113.0	0.0
ECM #2	Window AC Replacement	2.3	2,043.3	0.0
ECM #3	Window AC Upgrade	4.9	8,828.4	0.0
ECM #4	UV Unit Upgrade W/ Energy Recovery	14.8	(12,113.8)	11,332.0
ECM #5	Underfloor Plenum Insulation	0.0	91,897.2	8,468.4
ECM #6	General Lighting Upgrade	10.0	26,622.0	0.0
ECM #7	Lighting Controls	0.0	12,517.0	0.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar PV 137.31 KWDC system	111.2	163,962.0	0.0

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

- **ECM #5:** Under floor Plenum Insulation
- **ECM #6:** Lighting Upgrade
- **ECM #7:** Lighting Controls

Although ECM #1 does not provide a payback less than 10 years, it is recommended to proceed with the installation of premium efficient motors as suggested in ECM #1 (or equal) since the existing pump motors are past their expected lifespan. Also when window AC units come to the end of their life span, it is highly recommended to install energy star rated equipment as the replacement unit as noted in ECM #2.

It should be noted that currently, the classrooms are getting little to no ventilation air. The pneumatic controls were disabled when the air compressor and control panel were removed from the system. The outside air damper has a spring return to close the damper when the pneumatic control is absent. ECM#4 does not account for the outside ventilation air that should be conditioned but is not. The net effect to the cost of conditioning the outside air is an increase since no air is conditioned at this time. If the system were bringing in the proper ventilation, current costs would be more and the savings would increase from what is calculated. This would reduce the payback time and show this ECM as more favorable. The school Board should still consider this ECM because of the net improvement to the facility.

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.
5. Turn off or put to "sleep" all computers and ancillary desk plug in loads when not in use. Do not allow computers to sit idle in screen saver mode when not in use as this does not save energy.

Renewable Energy Measures (REMs) were also reviewed for implementation at the John Fenwick Elementary School. CEG utilized a ground mounted solar array to house a substantial PV system. The recommended 137.31 kW DC PV system will produce approximately 163,962 kWh of electricity annually and will reduce the schools electrical consumption from the grid by 40.37%. The system's calculated simple payback of 15.3 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options before deciding to not implement this renewable energy measure.

Other Recommendations:

The NJ Clean Energy Program provides assistance to public entities with incentive programs to help fund energy conservation measures. Salem BOE should utilize all applicable programs as outlined in the Funding Options section of this report. In addition, NJ law provides financing options for public entity's to utilize when implementing energy efficiency projects. The Energy Savings Improvement Program (ESIP) provides a flexible method for public entities to finance energy efficiency projects where the savings pays for the project costs over a 15 year period. This provides a great way to fund much needed capital improvements within a facility. Since the savings funds the project, there is no added debt to the BOE and typically the financing is cash flow positive on day one. Salem should strongly consider this route along with the other NJ Clean Energy Programs to facilitate the implementation of the energy efficiency recommendations.

Overall, the John Fenwick Elementary School appears to be operating at a lower efficiency level compared to other schools in the region. With the implementation of the above recommended measures the Salem City BOE will realize further energy savings at the John Fenwick Elementary School.

II. INTRODUCTION

The comprehensive energy audit covers the 56,913 square foot John Fenwick Elementary School Building, which includes the following spaces: classrooms, restrooms, administration offices, library, work rooms, multi-purpose room, stage stock room, kitchen, teacher's lounge, nurse office, boiler room and conference room.

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

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

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

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

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

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs

provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

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

The electric usage profile represents the actual electrical usage for the facility. The facility receives electric distribution service through Atlantic City Electric on rate schedule Annual General Service rate structure. The Middle School has contracted South Jersey Energy, a **Third Party Supplier** (TPS), to provide electric commodity supply (generation) service. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Gas provides natural gas to the facility under the Basic Gas Service Supply, BGSS-Firm Transportation rate structure. The Middle School has contracted Woodruff Energy, a **Third Party Supplier** (TPS), to provide gas commodity supply (generation) service. 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	14.3¢ / kWh
Natural Gas	$1.46 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Annual General Service
Meter No: 35592463
Customer ID No: 0071 7679 9992
Third Party Utility S.J. Energy Co.
TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION	DEMAND	TOTAL BILL
Jun-09	23,520	121.6	$3,591
Jul-09	23,040	99.2	$3,543
Aug-09	25,520	122.4	$3,821
Sep-09	32,560	144.0	$4,776
Oct-09	31,040	105.6	$4,460
Nov-09	37,600	115.2	$5,223
Dec-09	43,920	126.4	$6,115
Jan-10	45,920	118.4	$6,215
Feb-10	42,639	126.4	$5,813
Mar-10	34,320	115.2	$4,836
Apr-10	33,040	128.0	$4,770
May-10	33,040	128.0	$4,770
Totals	**406,159**	**144.0 Max**	**$57,932**

AVERAGE DEMAND **120.9 KW average**

AVERAGE RATE **$0.143 $/kWh**

March 2010 and May 2010 estimated

Figure 1
Electricity Usage Profile

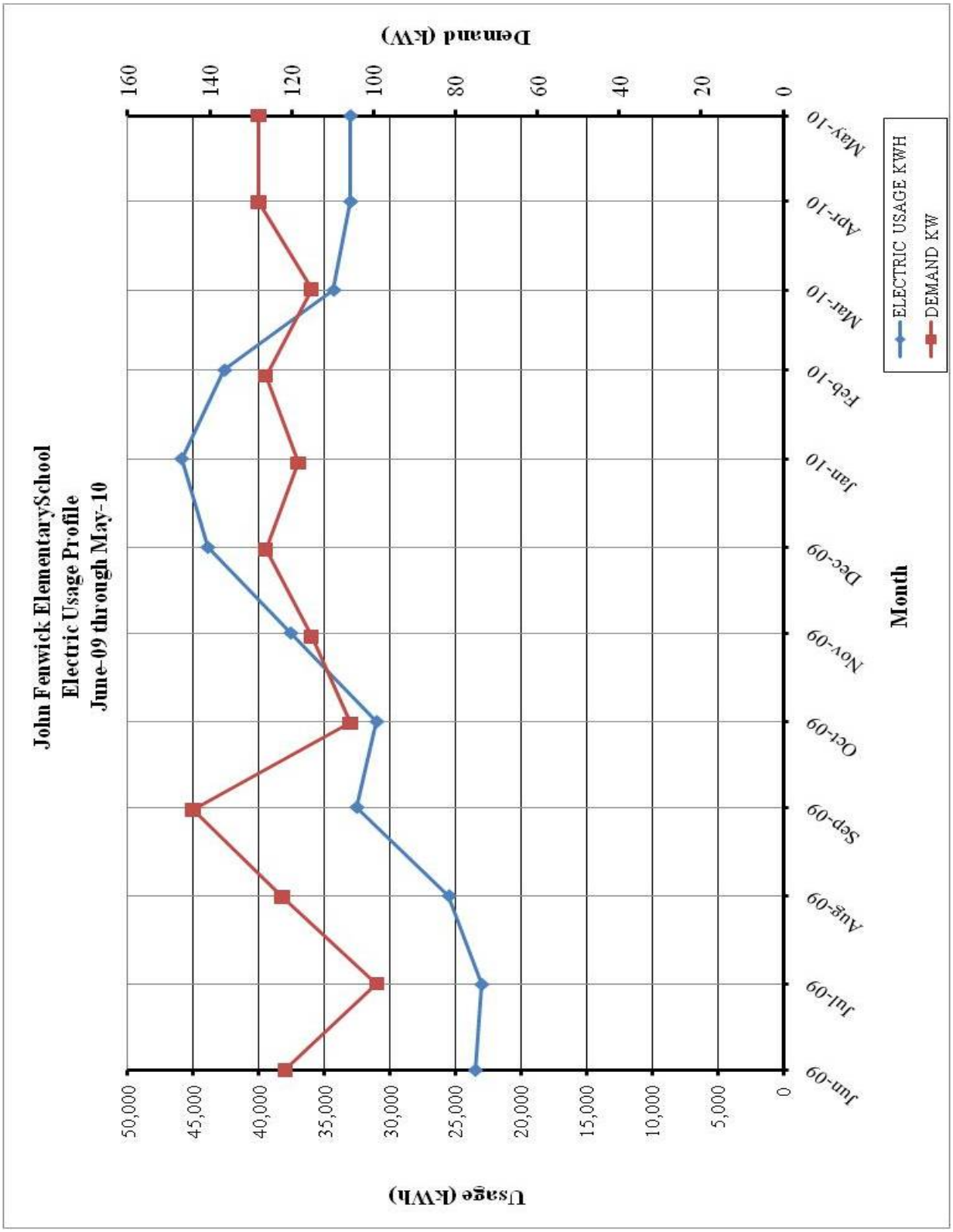
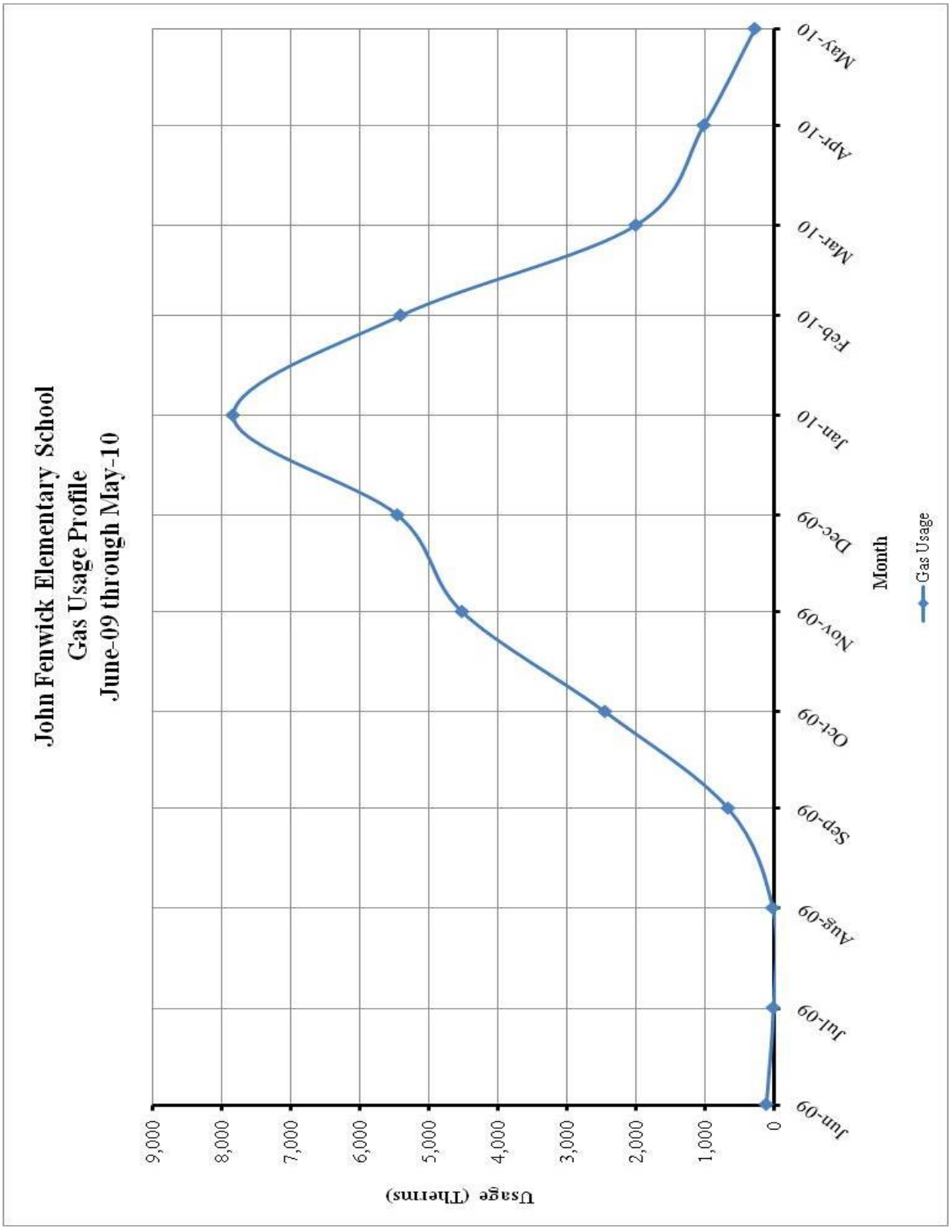


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	South Jersey Gas	
Rate:	BCS Firm Transportation	
Meter No:	0484810	
Point of Delivery ID:	2 13 32 2014 0 5	
Third Party Utility Provider:	Woodruff Energy	
TPS Meter No:		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Jun-09	113.85	$206.47
Jul-09	10.32	$36.32
Aug-09	20.50	$52.47
Sep-09	665.60	$1,120.97
Oct-09	2,449.75	$4,057.12
Nov-09	4,518.80	$7,472.10
Dec-09	5,453.37	$7,535.82
Jan-10	7,835.60	$10,871.75
Feb-10	5,407.02	$7,506.44
Mar-10	2,000.70	$2,789.57
Apr-10	1,017.00	$1,427.46
May-10	277.56	$403.15
TOTALS	**29,770.07**	**$43,479.64**
AVERAGE RATE:	**$1.46**	**$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

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

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

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

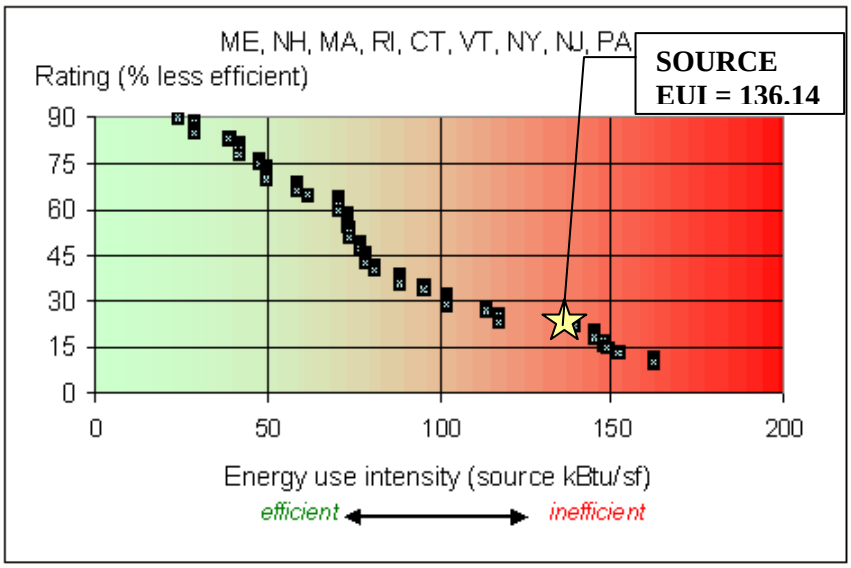
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	**BUILDING USE**			**SITE ENERGY**	**SITE-SOURCE RATIO**	**SOURCE ENERGY**
	kWh	**Therms**	**Gallons**	**kBtu**		**kBtu**
ELECTRIC	406,159.0			1,386,627	3.340	4,631,334
NATURAL GAS		29,770.1		2,977,007	1.047	3,116,926
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				4,363,634		7,748,260
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		56,913	SQUARE FEET			
BUILDING SITE EUI		*76.67*	kBtu/SF/YR			
BUILDING SOURCE EUI		*136.14*	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: salemboe
Password: lgeaceg2010

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

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**
John Fenwick Elementary School	37	50

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

V. FACILITY DESCRIPTION

The 56,913 SF John Fenwick Elementary School Building is a one story facility comprised of classrooms, restrooms, administration offices, library, work rooms, multi-purpose room, stage stock room, kitchen, teacher's lounge, nurse office, boiler room and conference room.

The building is open Monday through Friday from 6:30 am to 10:00 pm and is occupied by the maintenance staff. The typical hours of full occupancy and operation for this facility are Monday through Friday between 8:00 am and 3:00 pm. The school is occupied with 469 school children grades 3 through 8, 42 faculty and 4 maintenance staff. Occupancy drops to approximately 40% of faculty and children from 3:30 pm to 5:30 pm with after school activity.

Exterior walls are block with face brick construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good to fair condition and appear to be maintained. The typical windows are double pane, ¼" clear glass with aluminum frames with internal. 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 built-up roof. The amount of insulation below the roofing is unknown. The building was built in 1955 with an addition in 1974.

HVAC Systems

The building is heated by two (2) H.B Smith model 28A-18 cast Iron water boilers. They each have a natural gas input capacity of 5,862,000 BTU/Hr and are 79% thermal efficient. The boilers are capable of burning natural gas or fuel oil #2. Fuel oil is not used although still connected to the burners. The boiler burners are Power Flame model C4-GO-25 with a maximum input capacity of 6,300,000 BTU/Hr or 45.0 GPH #2 Oil. The boilers and burners are five years old and in good condition.

There are zone hot water pumps that distribute hot water throughout the building to unit ventilators and perimeter fin tube radiation. The forty-seven (47) unit ventilators have fractional horsepower motors, heating capacity ranging from 18.5 MBH to 67.2 MBH, and should be maintained or replaced as needed. Zone pumps 1, 2, 3, 7 and 8 are fractional horsepower, in-line pumps. These pumps are past their expected useful service life and should be maintained or replaced as needed. Replacing these pump motors would not provide a significant energy savings and would not have an economical payback.

There are domestic hot water pumps that circulate hot water throughout the building. Circulator pumps 9 and 10 are fractional horsepower, in-line pumps. These pumps are past their expected useful service life and should be maintained or replaced as needed. Replacing these pump motors would not provide a significant energy savings and would not have an economical payback.

Heating zone pumps #4, 5 and 6 each have a 3 horsepower, 84% efficient motor and have one (1) year of ASHRAE expected useful service life remaining.

There are two (2) heat & ventilation units serving the cafeteria and are located adjacent to the stage. The units are fractional horsepower and have a hot water heating coil. The units are fifty-five (55) years old and are in fair condition. Replacing these fan motors would be no significant energy savings due to the low motor horsepower. These units should be maintained/replaced as needed. Entrance doorways are heated via hot water cabinet heaters which are in fair condition.

The building is cooled by forty-six (46) window air conditioners. The units range from 0.5 Tons to 1.5 Ton nominal cooling capacity. They are in good to fair condition.

Exhaust System

There are four fan rooms. Each of the four fan rooms is located at the end of each classroom wing. The room houses the exhaust fan that is used to ventilate the classroom wing crawl space. The fans are manually turned on and off. The individual toilet rooms within each classroom have an operable window for ventilation.

HVAC System Controls

There was a temperature control upgrade in 2007 that upgraded from pneumatic control to electronic control. The boilers are controlled on a Johnson Controls Metasys system. The hot water supply temperature is controlled on a temperature reset program. When the outside temperature is 60°F or higher, the water temperature is maintained at 140°F. As the outside temperature drops from 60°F to 20°F, the water temperature will rise from 140°F to 180°F. When outside temperature is 20°F or less the water temperature is maintained at 180°F.

Domestic Hot Water

The domestic hot water is produced by an H.B Smith 19 Series 4 cast Iron water boiler. The boiler has a natural gas input capacity of 520,000 BTU/Hr and is 79.4% thermal efficient. The boiler is capable of burning natural gas or fuel oil #2. Fuel oil is not used although still connected to the burner. The boiler burner is a Power Flame model CR1-GO-10 with a maximum input capacity of 800,000BTU/hr or 6.0 GPH #2 Oil. The boilers and burners are nineteen (19) years old and in fair condition. The boilers are connected to a large domestic hot water tank for storage. The domestic hot water is circulated throughout the building by a fractional horsepower hot water re-circulation pump (P-9 and P-10). The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in fair condition.

Domestic hot water for the laundry is provided by a 6 gallon State Industries electric water heater with 1650 watts input capacity. It is two (2) years old and is in good condition.

Domestic hot water for the kitchen is provided by a 50 gallon State Industries electric water heater with 4,500 watts input capacity. It is five (5) years old and in good condition.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. The building exterior is lit with high pressure sodium lamps.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

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

VII. ENERGY CONSERVATION MEASURES

ECM #1: Install NEMA Premium® Efficiency Motors

Description:

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 continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

Some of the existing electric motors driving the primary hot water pumps and the supply air fans in some of the air handling units are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing electric motors over 1 HP or more with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	**FUNCTION**	**MOTOR HP**	**HOURS OF OPERATION**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**
P-4	Zone #3 Hot Water Pump	3	2,190	85.5%	89.5%
P-5	Zone #4 Hot Water Pump	3	2,190	85.5%	89.5%
P-6	Zone #4 Hot Water Pump - Stand-by	3	4,380	84.0%	89.5%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate} \left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
P-4	3	90%	85.5%	89.5%	0.11	232	$33
P-5	3	90%	85.5%	89.5%	0.11	232	$33
P-6	3	90%	84.0%	89.5%	0.15	649	$93
TOTAL					**0.4**	**1,113**	**$159**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
P-4	3	$1,063	$60	$1,003	$33	30.3
P-5	3	$1,063	$60	$1,003	$33	30.3
P-6	3	$1,063	$60	$1,003	$93	10.8
TOTAL	**Totals:**	**$3,190**	**$180**	**$3,010**	**$159**	**18.9**

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,190
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$3,190
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$159
Total Yearly Savings ($/Yr):	$159
Estimated ECM Lifetime (Yr):	18
Simple Payback	20.0
Simple Lifetime ROI	-10.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,864
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	($1,001.70)

ECM #2: Window A/C Unit Replacement

Description:

Air-conditioning is provided to the building via residential-style window air-conditioning units. The existing window air-conditioning units are inefficient with an estimated energy efficiency ratio of 8.8 EER to 9.7 EER. The existing window air-conditioning units appear to be approximately 15-plus year old, and are past their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a window air-conditioning unit is 10 years.

This energy conservation measure would replace the window-air conditioning units past their service life. There are nine (9) units serving the first floor that are past their service life. This ECM includes replacement of the existing units with high energy efficient, window air-conditioning units with cooling capacities equal to the existing units. The EER of the new equipment will be 10.8 EER Basis of Design: 1.5 Ton model SM18L30A or equivalent.

Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}} \right) \times FullLoadCoolingHrs.$$

Existing Air Conditioning Units

Rated Capacity = 6 units at 1.5 Cooling Tons = 9.0 Cooling Tons at 9.7 EER
Rated Capacity = 3 units at 1.5 Cooling Tons = 4.5 Cooling Tons at 8.8 EER

Full Load Cooling Hrs. of Operation = 900 hrs/yr.

Average Cost of Electricity = $0.143 / kWh

Proposed High-Efficiency Air Conditioning Units

Rated Capacity = 9.0 Cooling Tons at 10.8 EER

$$EnergySavings = \frac{[9.0\,tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{9.7} - \frac{1}{10.8} \right) \times 900\,hrs = 1{,}020.6\,kWh/yr$$

Rated Capacity = 4.5 Cooling Tons at 10.8 EER

$$EnergySavings = \frac{[4.5\,tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{8.8} - \frac{1}{10.8} \right) \times 900\,hrs = 1{,}022.7\,kWh/yr$$

Energy Cost Savings = (1,020.6 + 1,022.7) kWh * $0.143 / kWh = $292 per year

Estimated Demand Savings = kWh Saved / Hrs of Operation = 2,043.3 kWh / 900 hrs = 2.27 kW

There are currently no applicable equipment incentives for equipment of this capacity. Furthermore, maintenance savings could not be calculated due to the fact that there are no adequate data to baseline the existing expenditures.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$8,550
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$8,550
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$292
Total Yearly Savings ($/Yr):	$292
Estimated ECM Lifetime (Yr):	15
Simple Payback	29.3
Simple Lifetime ROI	-48.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$4,383
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	($5,061.85)

ECM #3: Window A/C Upgrade

Description:

Air-conditioning is provided to the building via residential-style window air-conditioning units. The existing window air-conditioning units are inefficient with an estimated energy efficiency ratio of 8.8 EER (10.8 SEER est.) and 9.7 EER (11.7 SEER est.). The existing window air-conditioning units appears to be approximately 15-plus years of age and is past their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a window air-conditioning unit is 10 years.

This energy conservation measure would replace the window-air conditioning units past their service life. There are nine (9) units serving the first floor that are past their service life. The existing units will be replaced with high energy efficient, ductless mini split system units with cooling capacities typical of the existing units; approximately 18,000 Btu/h. The SEER of the new 1.5 Ton equipment will be 20 SEER Basis of Design: 1.5 Ton LG model LS181HSV or equivalent.

Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{SEER_{OLD}} - \frac{1}{SEER_{NEW}} \right) \times Avg.LoadFactor \times Hrs.ofCooling$$

Existing Air Conditioning Units

Rated Capacity = 6 units at 1.5 Cooling Tons = 9.0 Cooling Tons at 11.7 SEER
Rated Capacity = 3 units at 1.5 Cooling Tons = 4.5 Cooling Tons at 10.8 SEER

Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity = $0.143 / kWh

Proposed High-Efficiency Air Conditioning Units

Rated Capacity = 9.0 Cooling Tons at 20 SEER

$$EnergySavings = \frac{[9.0\ tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{11.7} - \frac{1}{20} \right) \times 0.80 \times 1800\ hrs = 5{,}516.3\ kWh/yr$$

Rated Capacity = 4.5 Cooling Tons at 20 SEER

$$EnergySavings = \frac{[4.5\ tons \times 12{,}000\,Btu/ton]}{[1000W/kW]} \times \left(\frac{1}{10.8} - \frac{1}{20} \right) \times 0.80 \times 1800\ hrs = 3{,}312\ kWh/yr$$

Energy Cost Savings = (5,516.3 + 3,312) kWh * $0.143 / kWh = $1,262.4 per year

Estimated Demand Savings = kWh Saved / Hrs of Operation = 8,828.3 kWh / 1,800 hrs = 4.9 kW

There are currently no applicable equipment incentives for equipment of this capacity. Furthermore, maintenance savings could not be calculated due to the fact that there are no adequate data to baseline the existing expenditures.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$41,328
NJ Smart Start Equipment Incentive ($):	$1,242
Net Installation Cost ($):	$40,086
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,262
Total Yearly Savings ($/Yr):	$1,262
Estimated ECM Lifetime (Yr):	15
Simple Payback	31.8
Simple Lifetime ROI	-52.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$18,936
Internal Rate of Return (IRR)	-8%
Net Present Value (NPV)	($25,015.55)

ECM #4: Classroom Unit Ventilator Upgrade

The unit ventilators in the building are in poor condition and are heating only units. The units have an outside air damper that has a pneumatic actuator. The pneumatic controls have been removed and are no longer viable. The air compressor and controls have been removed. Under this condition, the proper ventilation is not being provided. There are window air conditioning units that are inefficient and are either past or near the end of their expected service life. The typical window air conditioning unit is 1.5 tons cooling nominal and average 9.9 EER. Due to age, outdated parts and controls, the system is inefficient compared to today's high efficiency standards. The unit ventilators in the 1974 addition are excluded from this ECM due to the availability of parts. The window air conditioners are already high efficiency (10.7 EER) or can be replaced with a 10.7 EER from another area when replaced by the units in this ECM.

This ECM includes installation of new classroom unit ventilator with a hot water heating coil, direct expansion cooling coil, energy recovery wheel and the remote air conditioning condensing unit. The units will provide the required ventilation with the benefit of more efficient cooling and energy recovery. The installation includes demolition, preparation for new work, setting the units, miscellaneous piping, insulation, new wall box, grille and dampers, local controller electrical wiring and start-up. The electrical wiring is assumed to be local to the unit and adequate for the new unit ventilator. The basis of design for this ECM is Trane unit ventilator series VUVE with energy recovery model ERSA050 and remote condensing unit series 4TTB30 or similar. Each unit shall be equipped with an energy recovery wheel, air side economizer, premium efficiency motors, high efficiency scroll compressors with R410a refrigerant, hot water coil, LON based controller with factory mounted controller and a Rawal valve hot gas bypass on the remote condensing unit. Owner should retain a professional engineer to confirm heating and cooling loads prior to pursuing with this ECM.

Energy Savings Calculations:

$$\text{EnergyUsage} = \frac{\text{Cooling(Tons)} \times 12{,}000 \left(\frac{\text{Btu}}{\text{Ton hr}} \right) \times \text{Full Load Cooling Hrs.}}{1000 \left(\frac{\text{Wh}}{\text{kWh}} \right) \times \text{EER} \left(\frac{\text{Btu}}{\text{Wh}} \right)}$$

$$\text{Demand} = \frac{\text{Cooling Capacity (Tons)} \times \left(\frac{12{,}000 \text{ BTU/Hr}}{1 \text{ Ton}} \right)}{\text{Cooling Efficiency (EER)} \times \left(\frac{1{,}000 \text{ Wh}}{\text{kWh}} \right)}$$

$$\text{Cooling Cost} = \text{Energy Usage(kWh)} \times \text{Ave Electric Cost} \left(\frac{\$}{\text{kWh}} \right)$$

Gas Fired Boiler :

$$\text{Heating Energy (Therms)} = \frac{\text{Heating Capacity}\left(\frac{\text{Btu}}{\text{Hr.}}\right) \times \text{HDD(Day °F)} \times 24\left(\frac{\text{Hr.}}{\text{Day}}\right) \times (0.60)}{65(°\text{F}) \times \text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{Therms}}\right) \times \text{Heating Efficiency (\%)}}$$

$$\text{Heating Cost} = \text{Heating Energy(Therms)} \times \text{Ave Fuel Cost}\left(\frac{\$}{\text{Therms}}\right)$$

Calculations

UNIT VENTILATOR REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Unit Ventilator	New Unit Ventilator	-
Number of Units	37	37	-
Total Cooling Capacity, Tons	55.5	55.5	-
Efficiency (EER) Average	9.9	12.7	-
Annual Full Load Cooling Hours	800	800	-
Total Cooling Capacity Recovered, BTU/Hr	0	424,390	424,390
Energy Recovery Unit Power Consumption, kW	0	24.38	-24.38
Annual Energy Recovery Power Consumption, kWh	0	50,712.79	-50,712.79
Total Heating Capacity, BTU/Hr	2,173,800	2,173,800	-
Total Heating Capacity Recovered, BTU/Hr	0	851,960	851,960
Heating Efficiency (Gas)	79%	79%	-
Heating Degree Days (65°F)	4,743	4,743	-
Elec Cost ($/kWh)	$0.143	$0.143	-
Natural Gas Cost ($/Therm)	$1.46	$1.46	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Cooling Compressor Energy Consmption, kWh	53,818	15,220	38,599
Cooling Demand, kW	67	52.4	14.8
Heating Energy (Therms)	28,913	17,581	11,332
Electric Energy Cost ($)	$7,696	$9,428	($1,732)
Total Gas Cost ($)	$42,213	$25,669	$16,544
Total Cost ($)	$49,909	$35,097	$14,812
COMMENTS:	HDD and CDD estimated based on Wilmington,DE.		

Estimated installed cost for the 37 new units is $1,319,500.

From the NJ Smart Start® Program appendix, the split system falls under the category "Unitary HVAC Systems" and warrants an incentive based on efficiency (SEER) at or above 14 for units with capacity below 5.4 Tons. The incentives are as follows:

$$\text{SmartStart® Incentive} = (\text{AC Unit Tonnage} \times \$92/\text{Ton}) = (55.5 \times \$92) = \$5{,}106$$

SUMMARY OF COST AND SAVINGS						
EQPT ID	**EXISTING**	**PROPOSED**	**TOTAL COST**	**INCENTIVES**	**NET COST**	**SAVINGS**
UV	Unit Ventillator and Window Air Conditioning	Unit Ventilator and High Efficient Split System with Energy Recovery	$222,000	$4,385	$217,616	$14,812
TOTAL			**$222,000**	**$4,385**	**$217,616**	**$14,812**

SUMMARY OF COST AND SAVINGS				
EQPT ID	**EXISTING**	**TOTAL ENERGY SAVINGS, kWh**	**TOTAL POWER SAVINGS, kW**	**TOTAL GAS SAVINGS, THERMS**
UV	Unit Ventillator and Window Air Conditioning	(12,114)	(10)	11,332
TOTAL		-12114	-9.5	11332

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,319,500
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$1,319,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$14,812
Total Yearly Savings ($/Yr):	$14,812
Estimated ECM Lifetime (Yr):	15
Simple Payback	89.1
Simple Lifetime ROI	-83.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$222,180
Internal Rate of Return (IRR)	-17%
Net Present Value (NPV)	($1,142,675.31)

ECM #5: Building Envelope Improvement – Under floor Insulation

Description:

The classrooms were originally built to have the outside air ventilation come into the classroom through the unit ventilator. Classroom air was relieved through a transfer duct to a below floor crawl space plenum. The transfer duct has been removed from all classrooms. Today outside air is drawn directly into the crawl space to provide ventilation and water vapor removal. School staff states that the floor is not insulated. The un-insulated floor is very energy inefficient in both heating and cooling. This ECM includes installation of under floor insulation of an R-30 insulation value.

Building envelope improvements may require a significant investment. Typically, the investment is recovered through energy savings however; the payback is generally quite protracted. For example, in a drafty building, adding insulation or upgrading the windows would improve comfort. Human comfort impacts productivity as uncomfortable or unhappy occupants will have a higher absentee rate and/or will require additional time from maintenance personnel as they search for stopgap solutions to the comfort problem.

Energy Savings Calculations:

For the following energy savings calculations, we obtained heating and cooling degree days from the Wilmington Delaware weather data (www.degreedays.net (using temperature data from www.wunderground.com)) and the floor areas from measurements and photographs of this facility.

Heating Load, BTU/Hr = Average U-Value x Floor Area x Temp Difference

Cooling Load, BTU/Hr = Average U-Value x Floor Area x Temp Difference

Cooling Electricity, kW = Cooling Load / 3413 BTU/Hr / kW

Annual Cooling Electricity Used, kWh = Cooling Electricity x Full Load Cooling Hours

Cooling Cost = Annual electric used x Cost of electricity

Gas Used, Therm = Heating Load*90 days x 24 hrs/day /100,000 Btu/Therm

Heating Cost = Gas used (Therms) x Ave Cost of gas ($/Therm)

Refer to the calculation summary below.

Calculation Summary:

Building Envelope Improvement - Floor Insulation		
Full Load Cooling Hours =	800	Hours
HDD65 =	4743	°F - day/year
CDD65 =	1703	°F - day/year
Total Existing Floor Area =	32,350	Square Feet
New Insulation Area =	32,350	Square Feet
Natural Gas Cost =	1.46	$/Therm
Electric Cost =	0.143	$/kWh
Existing AC EER =	8.8	EER
Existing Heating Efficiency =	79	% Efficency
Indoor Temp	70	°F
Winter Plenum Temperature	45	°F
Summer Plenum Temperature	95	°F

Description	Existing	Proposed	Saved
Average U value	0.518	0.033	-
Floor Area, sq. ft.	32,350.0	32350	-
Heating Load, BTU/Hr	418,932.5	26,876.3	392,056.2
Cooling Load, BTU/Hr	418,932.5	26,876.3	392,056.2
Cooling Electricity Used, kW	122.7	7.9	114.9
Annual Cooling Electricity Used, kWh	98,196.9	6,299.7	91,897.2
Cooling Savings, $	-	-	$13,141.3
Gas Used, Therms	9048.9	580.5	8,468.4
Annual Heating Saved $	-	-	$12,364
Total Savings			**$25,505**

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$161,750
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$161,750
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$25,505
Total Yearly Savings ($/Yr):	$25,505
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.3
Simple Lifetime ROI	136.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$382,575
Internal Rate of Return (IRR)	13%

ECM #6: Lighting Upgrade

Description:

The majority of the lighting at the Elementary school is 32 watt T-8 bulbs with electronic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. The lunch room utilizes 250 watt low bay pendant mounted metal halide (MH) fixtures.

This ECM includes switching out all existing 32 watt T-8 lamps with "SuperSaver" 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of the existing MH fixtures within the Lunch room to high output T-5 fixtures with electronic ballasts. High bay T-5 fixtures provide several advantages over the existing MH fixtures including; low lumen output loss, fast warm-up, and no color shifting with age. Since the lumen output remains constant over the life of the bulb, the T-5 fixtures can be designed with less input wattage than the existing metal halide fixtures further improving the overall efficiency of the light.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the hours of operation, proposed retrofits, costs, savings, and payback periods for each set of fixtures in the each building.

From the **NJ Smart Start Incentive Appendix**, the replacement of a HID fixture to a T-5 or T-8 fixture warrants the following incentive: 250W HID to T-5, T-8 = $50 per fixture

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ fixtures \times\ \$\,50)$$

$$\text{Smart Start®}\ Incentive = (12\ \ fixtures \times\ \$\,50) = \$600$$

There is no Maintenance Savings for this ECM:

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$14,966
NJ Smart Start Equipment Incentive ($):	$600
Net Installation Cost ($):	$14,366
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,807
Total Yearly Savings ($/Yr):	$3,807
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.8
Simple Lifetime ROI	297.5%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$57,105
Internal Rate of Return (IRR)	26%
Net Present Value (NPV)	$31,081.72

ECM #7: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

- Occupancy Sensors for Lighting Control 20% - 28% energy savings.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors. The savings is estimated to be lower than the reference above because of the continuously occupied nature of a school setting.

This ECM includes replacement of standard wall switches with sensors wall switches for the offices, classrooms, cafeteria, etc. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

From the **NJ Smart Start® Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Occupancy Sensor Wall Mounted (existing facility only) = $20 per sensor.
Occupancy Sensor Remote Mounted (existing facility only) = $35 per sensor

$$\text{Smart Start®}\ Incentive = \left(\#\ of\ \ wall\ mount \times\ \$\ 20\right) + \left(\#of\ ceiling\ mount \times 35\right)$$
$$= \left(48 \times \$20\right) + \left(15 \times \$35\right) = \$1485$$

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,400
NJ Smart Start Equipment Incentive ($):	$1,485
Net Installation Cost ($):	$9,915
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,790
Total Yearly Savings ($/Yr):	$1,790
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.5
Simple Lifetime ROI	170.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$26,850
Internal Rate of Return (IRR)	16%
Net Present Value (NPV)	$11,453.90

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 Salem City BOE John Fenwick Elementary School 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 Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are 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). Parking lots and ground area can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park vehicles under the array and no parking lot area is lost. Due to the age of the building, it is assumed the roof would not support the PV installation and a ground mounted system will be assumed.

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 and site of Salem City BOE John Fenwick Elementary School for the purposes of determining a potential for a photovoltaic system. CEG believes a ground mounted parking lot canopy system and ground area system is best suited for this site. An area of 9,750 S.F. can be utilized for a PV system as depicted in the **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 137.31 kilowatts DC could be installed. A system of this size has an estimated kilowatt hour production of 163,962 KWh annually, reducing the overall utility bill by approximately 40.37% 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 parking lot and ground space at 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**	**INTERNAL RATE OF RETURN**
Direct Purchase	15.3 Years	4.7%

*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.

Wind Generation

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, proximity to residential neighborhoods, and limited site space make the Elementary School Building a poor candidate for wind energy production. Additionally, the kilowatt demand for the middle school 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 electricity usage profile demonstrates both a winter heating and summer cooling load profile. Historical usage is relatively steady throughout the year with higher consumption in the winter months. The average monthly usage is 34,263kWh with an annual capacity obligation of 75.94kW and a transmission obligation of 75.05kW. Largest consumption months were November – February.

The historical usage profile is very beneficial for competitive energy prices when shopping for alternative suppliers. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the Atlantic City Electric's BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. A base-load shaping (flat) will secure more competitive energy prices when procuring through an alternative energy source.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by similar summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer either a market based rate that is lower than South Jersey Gas's BGSS rate or a hybrid product structure that allows for a firm, fixed price during the winter months (Nov-Mar) and market based rate for the summer months (April-Oct) are recommended.

Tariff Analysis:

Electricity:

The school receives electric distribution service through Atlantic City Electric (AECO) on rate schedule's AGS (Annual General Service). The school is currently contracted with a Third Party Supplier (TPS) to provide electric commodity service. For electric supply (generation) service, the client has a choice to either use AECO's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The current BGS-FP average price to compare for AECO's AGS rate schedule is $0.1150/kWh. Based upon the current third party supplier electric rate with South Jersey Energy, June 2009 – April 2010, the school is currently experiencing savings over the BGS-FP default rate with Atlantic City Electric

The utility, AECO will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity from. AECO's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, Market Transition, Transition Bond Charge, Non Utility Generation Charge, Societal Benefits Charge (SBC), Infrastructure Investment Charge, System Control Charge, Regulatory Assets Recovery Charge, and Regional Greenhouse Gas Initiative Charge.

Natural Gas:

The school currently receives natural gas distribution service through South Jersey Gas (SJG) on rate schedule GSG (General Service Gas) and has contracted with Woodruff Energy, a Third Party Supplier (TPS) to provide firm natural gas commodity service. For natural gas supply service, the client has a choice to either use SJG's default service rate BGSS or contract with a Third Party Supplier (TPS) to supply natural gas.

.

SJG provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of monthly natural gas BGSS charges from SJG.
http://www.southjerseygas.com/108/tariff/bgssrates.pdf

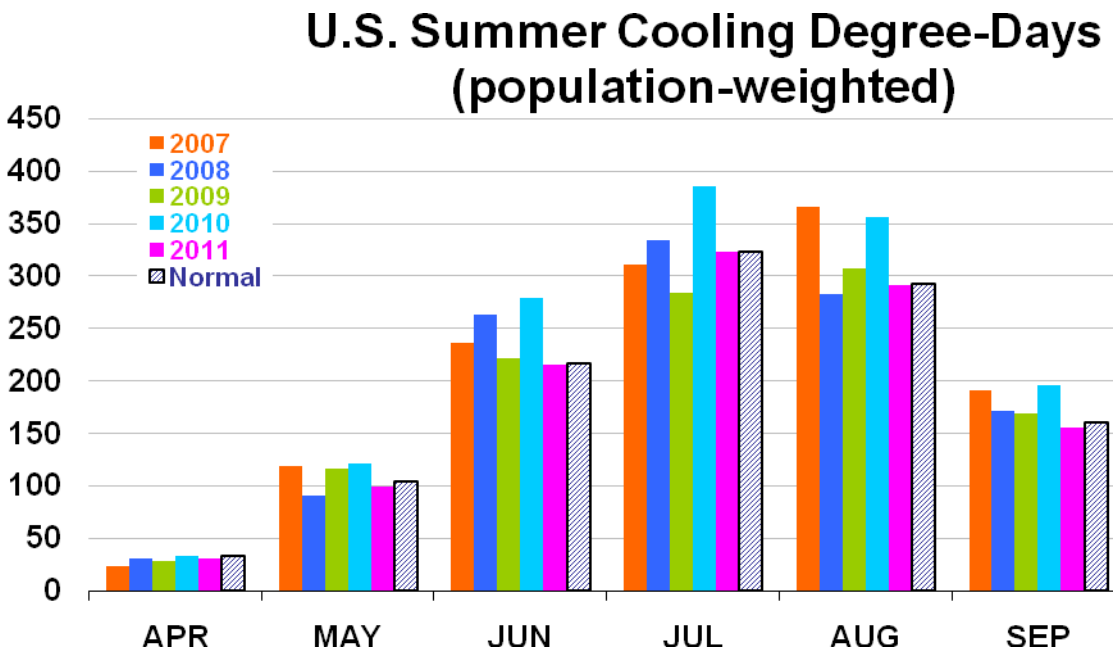
The BGSS average price to compare for the same time period of bills received and analyzed fluctuated between $0.4752/therm and $.7791/therm. Based upon the current third party supplier's natural gas rate billed ($1.205/therm & $0.928/therm) by TPS Woodruff Energy, the facility accounts did not experience a savings over the BGSS default rate with SJG.

The utility, SJG is responsible for maintaining the existing network of underground pipes that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their natural gas from. SJG's delivery service rates includes the following charges: Customer Service Charge, Delivery Charge, Line Loss, and Applicable Riders that include: Societal Benefits Charge (SBC), Balancing Service Clause, Temperature Adjustment Clause, Conservation Incentive Program and Energy Efficient Tracker.

Electric and Natural Gas Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2010, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technicals and trader sentiment. This market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.



Short Term Energy Outlook - US Energy Information Administration (12/07/2010):

U.S. Natural Gas Prices *The Henry Hub spot price averaged $3.71 per million Btu (MMBtu) during November, an increase of about 28 cents from October's price of $3.43 per MMBtu). Over the winter heating season, the projected monthly average spot price peaks at $4.29 per MMBtu in January 2011, before dropping back down to close to $4.00 per MMBtu in June 2011. This month's Outlook slightly raises the average 2011 Henry Hub spot price to $4.33 per MMBtu from last month's forecast of $4.31 per MMBtu.*

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for February 2011 delivery (for the 5-day period ending December 2) averaged $4.29 per MMBtu, and the average implied volatility over the same period was 45 percent. This produced lower and upper bounds for the 95-percent confidence interval for February 2011 contracts of $3.06 per MMBtu and $6.03 per MMBtu, respectively. At this time last year, the natural gas February 2010 futures contract averaged $4.84 per MMBtu and implied volatility averaged 57 percent. The corresponding lower and upper limits of the 95-percent confidence interval were $3.20 per MMBtu and $7.34 per MMBtu

U.S. Electricity Consumption. *EIA expects U.S. electricity consumption will rise slightly by 4.7 percent in 2010. Retail sales of electricity to the industrial sector from January through September 2010 were up by nearly 7 percent compared with the same period last year, about the same as the increase in the U.S. manufacturing production index. EIA's assumption of 3.6*

percent growth in manufacturing output during 2011 translates to an expected growth in electricity sales to the industrial sector of about 1.7 percent. Improved economic conditions should also spur growth of 1.1 percent in retail electricity sales to the commercial sector. However, EIA expects residential electricity sales to fall by 2.1 percent next year as summer temperatures return to normal levels after the hot summer of 2010. Overall, growth in total U.S. consumption of electricity remains nearly flat during 2011.

***U.S. Electricity Retail Prices**. The average U.S. retail price for electricity distributed to the residential sector during the first three quarters of 2010 was about the same as the retail price during the same period last year. However, residential electricity prices during the fourth quarter 2010 are expected to be 1.2 percent higher than last year. EIA expects the U.S. residential price to continue growing by 0.9 percent during 2011 as utilities pass through the higher fuel costs they incurred this past year to their retail customers.*

Recommendations:

1. CEG recommends an aggregated approach for 3rd party commodity supply procurement strategies for both electric and natural gas supply service. By aggregating the Fenwick School's facility with other schools in the County, the Fenwick School would continue to see a reduction in energy supply costs. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Current market pricing is extremely low. Contracts due to expire in the near term would yield more favorable pricing than previously realized. It is important to aggregate usage where available and take advantage of these current market prices quickly, before energy increases.
   The below recommendations presented by CEG are based on current information provided by the county for its utility usage, any savings presented with these recommendations are estimates only based on that information. It is recommended that further analysis and review of more recent utility data and any current 3rd party supply contracts be performed prior to performing any of the presented recommendations.

   Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the Fenwick School, in conjunction with the High School and Middle School utilize the advisement of 3rd party unbiased Energy Consulting Firm experienced in the aggregation of facilities and procurement of retail electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

   - Budgets that reflect sound market intelligence
   - An understanding of historical prices and trends
   - Awareness of seasonal opportunities (e.g. shoulder months)
   - Negotiation of fair contractual terms
   - An aggressive, market based price

2. CEG recommends that the Fenwick School consider utilizing a third party utility billing-auditing service to further analyze historical utility invoices such as water, sewer, natural gas and electric for incorrect billings and rate tariff optimization services. This service could provide refunds on potential incorrect billings that may have been passed through by the utilities and paid by the school.

X. INSTALLATION FUNDING OPTIONS

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

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

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

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

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

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

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

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

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

v. *Direct Install Program* – The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 100 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 60% 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. Moreover, the program currently has a 100 kW maximum demand limit for applicability. This demand limit is capable of being waived if the School District is able to receive a portion of their respective Township Local Government's American Recovery and Reinvestment Act (ARRA) funding towards energy efficiency improvements. Therefore, for facilities over the 100 kW maximum demand limit, such as Salem Elementary School, the School

District will need to coordinate Direct Install efforts with the Township's Local Government.

vi. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to $50,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - http://njcleanenergy.com/commercial-industrial/programs/eecbg-eligible-entities. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

This incentive is provided in addition to the other NJ Clean Energy program funding. This program's incentive is considered the entity's capital and therefore can be applied to the LGEA program's requirements to implement the recommended energy conservation measures totaling at least 25% of the energy audit cost. Additional requirements of this program are as follows:

1. The entity must utilize additional funding through one or more of the NJ Clean Energy programs such as Smart Start, Direct Install, and Pay for Performance.

2. The EECBG funding in combination with other NJ Clean Energy programs may not exceed the total cost of the energy conservation measures being implemented.

3. Envelope measures are applicable only if recommended by the LGEA energy audit and if the energy audit was completed within the past 12 months.

4. New construction and previously installed measures are not eligible for the EECBG rebate.

5. Energy conservation measures eligible for the EECBG must fall within the list of approved energy conservation measures. The complete list of eligible measures and other program requirements are included in the "EECBG Complete Application Package." The application package is available on the NJ Clean Energy website - http://njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants.

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

XI. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

E. Turn off or put to “sleep” all computers and ancillary desk plug in loads when not in use. Do not allow computers to sit idle in screen saver mode when not in use as this does not save energy.

XII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

A. Cost Estimates noted within this report are based on industry accepted costing data such as RS Means™ Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
    a. operating hours
    b. equipment type
    c. control strategies
    d. scheduling
D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

John Fenwick Elementary School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Premium Pump Motor Replacement	$2,121	$1,069	$0	$3,190	$159	$0	$159	18	$2,864	$0	-10.2%	20.0	-1.11%	($1,001.70)
ECM #2	Window AC Replacement	$8,550	$0	$0	$8,550	$292	$0	$292	15	$4,383	$0	-48.7%	29.3	-7.39%	($5,061.85)
ECM #3	Window AC Upgrade	$25,200	$16,128	$1,242	$40,086	$1,262	$0	$1,262	15	$18,936	$0	-52.8%	31.8	-8.18%	($25,015.55)
ECM #4	UV Unit Upgrade W/ Energy Recovery	$777,000	$542,500	$0	$1,319,500	$14,812	$0	$14,812	15	$222,180	$0	-83.2%	89.1	-16.89%	($1,142,675.31)
ECM #5	Underfloor Plenum Insulation	$97,050	$64,700	$0	$161,750	$25,505	$0	$25,505	15	$382,575	$0	136.5%	6.3	13.37%	$142,727.03
ECM #6	General Lighting Upgrade	$14,966	$0	$600	$14,366	$3,807	$0	$3,807	15	$57,105	$0	297.5%	3.8	25.64%	$31,081.72
ECM #7	Lighting Controls	$11,400	$0	$1,485	$9,915	$1,790	$0	$1,790	15	$26,850	$0	170.8%	5.5	16.14%	$11,453.90
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar PV 137.31 KWDC system	$1,235,790	$0	$0	$1,235,790	$23,447	$57,387	$80,834	25	$2,020,850	$1,434,675	63.5%	15.3	4.21%	$171,784.38

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

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Variable Frequency Drives

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

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters > 50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH
Gas Fired Tankless Water Heaters	$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$25 per fixture (1-2 lamps) $30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	$7 per bulb
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

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

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

STATEMENT OF ENERGY PERFORMANCE
John Fenwick Elementary School

Building ID: 2521009
For 12-month Period Ending: May 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 09, 2010

Facility
John Fenwick Elementary School
183 Smith Street
Salem, NJ 08079

Facility Owner
Salem Board of Education
205 Walnut Street
Salem, NJ 08079

Primary Contact for this Facility
Will Royster
205 Walnut Street
Salem, NJ 08079

Year Built: 1955
Gross Floor Area (ft²): 56,913

Energy Performance Rating[2] (1-100) 37

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,385,815
Natural Gas (kBtu)[4]	2,977,007
Total Energy (kBtu)	4,362,822

Energy Intensity[5]

Site (kBtu/ft²/yr)	77
Source (kBtu/ft²/yr)	136

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	369

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	69
National Average Source EUI	122
% Difference from National Average Source EUI	12%
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 S. Burnt Mill Rd.
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) 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 or RA 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	John Fenwick Elementary School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	183 Smith Street, Salem, NJ 08079	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		☐
John Fenwick Elementary School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	56,913 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	100 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	No	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: Electric (kWh (thousand Watt-hours))
Space(s): John Fenwick Elementary School
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
05/01/2010	05/31/2010	33,040.00
04/01/2010	04/30/2010	33,040.00
03/01/2010	03/31/2010	34,320.00
02/01/2010	02/28/2010	42,639.00
01/01/2010	01/31/2010	45,920.00
12/01/2009	12/31/2009	43,920.00
11/01/2009	11/30/2009	37,600.00
10/01/2009	10/31/2009	31,040.00
09/01/2009	09/30/2009	32,560.00
08/01/2009	08/31/2009	25,520.00
07/01/2009	07/31/2009	23,040.00
06/01/2009	06/30/2009	23,520.00
Electric Consumption (kWh (thousand Watt-hours))		**406,159.00**
Electric Consumption (kBtu (thousand Btu))		**1,385,814.51**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,385,814.51**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Natural Gas (therms)
Space(s): John Fenwick Elementary School

Start Date	End Date	Energy Use (therms)
05/01/2010	05/31/2010	277.56
04/01/2010	04/30/2010	1,017.00
03/01/2010	03/31/2010	2,000.70
02/01/2010	02/28/2010	5,407.02
01/01/2010	01/31/2010	7,835.60
12/01/2009	12/31/2009	5,453.37
11/01/2009	11/30/2009	4,518.80
10/01/2009	10/31/2009	2,449.75
09/01/2009	09/30/2009	665.60
08/01/2009	08/31/2009	20.50

07/01/2009	07/31/2009	10.32
06/01/2009	06/30/2009	113.85
Natural Gas Consumption (therms)		**29,770.07**
Natural Gas Consumption (kBtu (thousand Btu))		**2,977,007.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,977,007.00**
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 PE or RA 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
John Fenwick Elementary School
183 Smith Street
Salem, NJ 08079

Facility Owner
Salem Board of Education
205 Walnut Street
Salem, NJ 08079

Primary Contact for this Facility
Will Royster
205 Walnut Street
Salem, NJ 08079

General Information

John Fenwick Elementary School	
Gross Floor Area Excluding Parking: (ft^2)	56,913
Year Built	1955
For 12-month Evaluation Period Ending Date:	May 31, 2010

Facility Space Use Summary

John Fenwick Elementary School	
Space Type	K-12 School
Gross Floor Area(ft^2)	56,913
Open Weekends?	No
Number of PCs[d]	100
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	90
Percent Heated	100
Months[o]	10
High School?	No
School District[o]	Salem City

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2010)	**Baseline** (Ending Date 05/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	37	37	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	77	77	54	N/A	69
Source (kBtu/ft^2)	136	136	95	N/A	122
Energy Cost					
$/year	$ 101,412.64	$ 101,412.64	$ 71,118.49	N/A	$ 90,948.59
$/$ft^2$/year	$ 1.78	$ 1.78	$ 1.25	N/A	$ 1.60
Greenhouse Gas Emissions					
$MtCO_2e$/year	369	369	259	N/A	331
$kgCO_2e/ft^2$/year	6	6	4	N/A	5

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

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

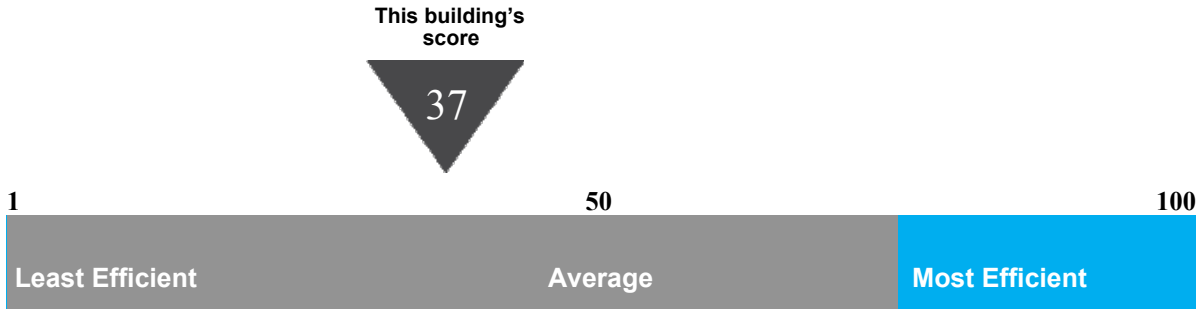
Statement of Energy Performance

2010

John Fenwick Elementary School
183 Smith Street
Salem, NJ 08079

Portfolio Manager Building ID: 2521009

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 136 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending May 2010

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: 12/09/2010

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - John Fenwick Elementary School

Rooftop / AC Units

Tag	UV	UV	-
Unit Type	Classroom Ventilator	Classroom Ventilator	-
Qty	13	37	-
Location	1974 Addition	THROUGHOUT	-
Area Served	Classrooms	Classrooms	-
Manufacturer	N/A	N/A	-
Model #	TWX750, YWP1250, TXWH2000	N/A	-
Serial #	N/A	N/A	-
Cooling Type	N/A	N/A	-
Cooling Capacity (Tons)	N/A	N/A	-
Cooling Efficiency (SEER/EER)	N/A	N/A	-
Heating Type	HW	HW	-
Heating Input (MBH)	Ranges 18.5 to 67.2	N/A	-
Efficiency	N/A	N/A	-
Fuel	N/A	N/A	-
Approx Age	37	55	-
ASHRAE Service Life	15	15	-
Remaining Life	(22)	(40)	-
Comments	Fractional HP fan motor; Perimeter radiation 480 to 640 MBH/LF	Fractional HP fan motor; Perimeter radiation	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM 164	CLASSROOM 165	CLASSROOM 166
Area Served	CLASSROOM 164	CLASSROOM 165	CLASSROOM 166
Manufacturer	General Electric	General Electric	General Electric
Model #	ASM18DKS1	ASV18DLS1	AGV18DDG1
Serial #	HM341345	AR417204	AD017942
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	9.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	3	2	8
ASHRAE Service Life	15	15	15
Remaining Life	12	13	7
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	1974 Addition	1974 Addition	1974 Addition
Area Served	CLASSROOM 170	CLASSROOM 171	WORKROOM 172
Manufacturer	General Electric	Whirlpool Corp	Ammana
Model #	ASV18DLS1	ACQ184XGO	N/A
Serial #	GR290999	N/A	N/A
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	2	15 +	15 +
ASHRAE Service Life	15	15	15
Remaining Life	13	-	-
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	1974 Addition	1974 Addition	1974 Addition
Area Served	CLASSROOM 173	CLASSROOM 174	CLASSROOM 175
Manufacturer	General Electric	Friedrich	General Electric
Model #	AGW18DJG1	CP18N30	AGW18DJG1
Serial #	ZH308750	-	ZH309424
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	-	14340	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	1974 Addition	1974 Addition	1974 Addition
Area Served	CLASSROOM 176	CLASSROOM 177	CLASSROOM 180
Manufacturer	General Electric	General Electric	Friedrich
Model #	N/A	AEM18DKG1	CP18N30
Serial #	N/A	FM884659	N/A
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	10.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	3	5
ASHRAE Service Life	15	15	15
Remaining Life	10	12	10
Comments	-	-	11128

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Classroom	Classroom	Classroom
Area Served	Classroom 153	Classroom 152	Classroom 151
Manufacturer	Whirlpool	Friedrich	Friedrich
Model #	N/A	CP18N30	CP18N30
Serial #	N/A	LHAR00652	LHAR01460
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	2	2
ASHRAE Service Life	15	15	15
Remaining Life	10	13	13
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	3	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	Whirlpool	General Electric
Model #	AGV18DJG1	N/A	ASF05LAS1
Serial #	AL222776	N/A	DG429971
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	0.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	10.8 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	115-1-60
Approx Age	4	15 +	7
ASHRAE Service Life	15	15	15
Remaining Life	11	-	8
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	General Electric	General Electric
Model #	N/A	AGM18DHG1	AGM18DHG1
Serial #	N/A	GH001196	GH001193
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	10.7 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	15 +	5	5
ASHRAE Service Life	15	15	15
Remaining Life	-	10	10
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001474	GH001434	GH001476
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001438	GH001068	GH001093
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGV06LHG1
Serial #	GH001098	GH001666	DH198886
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	0.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	9.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	115/1/60
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001204	GH001230	GH001207
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	CLASSROOM	CLASSROOM	CLASSROOM
Area Served	CLASSROOM	CLASSROOM	CLASSROOM
Manufacturer	ELECTROLUX / FRIGIDARE	Whirlpool	General Electric
Model #	FAM186R2A	N/A	AEM18DKG1
Serial #	KK90827005	N/A	FM884656
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	9.7 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	2	10	3
ASHRAE Service Life	15	15	15
Remaining Life	13	5	12
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	Ice Machine	WINDOW
Qty	1	1	1
Location	CLASSROOM	Teachers Lounge	N/A
Area Served	CLASSROOM	Teachers Lounge	N/A
Manufacturer	FRIEDRICH	General Electric	ELECTROLUX / FRIGIDARE
Model #	CP18N30	ASV08FLS1	FAM186R2A
Serial #	LHAR00694	AR396130	KK85029520
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	0.8	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.6 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	115/1/60	230/208-1-60
Approx Age	3	3	2
ASHRAE Service Life	15	15	15
Remaining Life	12	12	13
Comments	-	-	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	N/A	N/A	CLASSROOM
Area Served	N/A	N/A	CLASSROOM
Manufacturer	FEDDERS	FEDDERS	Whirl pool
Model #	A2118E7A-C	N/A	N/A
Serial #	DJ984290 117	N/A	N/A
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	8.8 EER	8.8 EER	8.8 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	12	12	12
ASHRAE Service Life	15	15	15
Remaining Life	3	3	3
Comments	-	-	-

Rooftop / AC Units

Tag	H & V	AC	-
Unit Type	Horizontal	WINDOW	-
Qty	2	3	-
Location	Cafetorium	Cafetorium	-
Area Served	Cafetorium	Cafetorium	-
Manufacturer	Century	FRIEDRICH	-
Model #	SCM-68-FK3-9N	CP18N30	-
Serial #	AK9	LHAR01459	-
Cooling Type	N/A	DX, R-22	-
Cooling Capacity (Tons)	N/A	1.5	-
Cooling Efficiency (SEER/EER)	N/A	9.7 EER	-
Heating Type	HW	N/A	-
Heating Input (MBH)	N/A	N/A	-
Efficiency	N/A	N/A	-
Fuel	208/60	230/208-1-60	-
Approx Age	15 +	3	-
ASHRAE Service Life	15	15	-
Remaining Life	N/A	12	-
Comments	3/4 hp-1/3 hp 2 spd., pnuematic control valve	-	-

Rooftop / AC Units

Tag	EF-1	EF-2, 4	EF-3
Unit Type	EXHAUST	EXHAUST	EXHAUST
Qty	1	2	1
Location	Fan Room 1	Fan Room 2, 4	Fan Room 3
Area Served	Crawl Space	Crawl Space	Crawl Space
Manufacturer	Greenheck	Greenheck	Greenheck
Model #	24 BISW	20 BISW	20 BISW
Serial #	-	N/A	N/A
Motor HP	2	1	1
Air Flow (CFM)	6300	3150	3120
Efficiency	N/A	N/A	N/A
Fuel	208/3/60	208/3/60	208/3/60
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - John Fenwick Elementary School

Boilers

Tag	Boiler-1	Burner	-
Unit Type	Cast Iron Boiler	Boiler Burner	-
Qty	1	1	-
Location	Boiler Room	Boiler Room	-
Area Served	Building Heat	Boiler - 1	-
Manufacturer	H.B. Smith	Power Flame	-
Model #	28A-18	C4-GO-25	-
Serial #	28A-18-081285 11768h	Inv. 89973 s/n 079154852	-
Input Capacity (MBH)	5,862	6300 MBH / 45.0 GPH	-
Rated Output Capacity (MBH)	4,629	N/A	-
Approx. Efficiency %	79%	N/A	-
Fuel	Natural Gas/#2 Oil	Natural Gas/#2 Oil	-
Approx Age	19	19	-
ASHRAE Service Life	30	21	-
Remaining Life	11	2	-
Comments	NJ118048-09H	-	-

Boilers

Tag	Boiler-2	Burner	-
Unit Type	Cast Iron Boiler	Boiler Burner	-
Qty	1	1	-
Location	Boiler Room	Boiler Room	-
Area Served	Building Heat	Boiler - 2	-
Manufacturer	H.B. Smith	Power Flame	-
Model #	28A-18	C4-GO-25	-
Serial #	N91 406/2	Inv. 89979, S/N 19151813	-
Input Capacity (MBH)	5,862	6307 MBH / 40.5 GPH	-
Rated Output Capacity (MBH)	4,629	5862	-
Approx. Efficiency %	79%	-	-
Fuel	Natural Gas/#2 Oil	Natural Gas/#2 Oil	-
Approx Age	19	19	-
ASHRAE Service Life	30	21	-
Remaining Life	11	2	-
Comments	NJ11769-07H	-	-

Boilers

Tag	Boiler-3	Burner	-
Unit Type	Cast Iron Boiler	Boiler Burner	-
Qty	1	1	-
Location	Boiler Room	Boiler Room	-
Area Served	Domestic Water	Boiler - 3	-
Manufacturer	H.B. Smith	Power Flame	-
Model #	19 Series - 4	CR1-GO-10	-
Serial #	N91 346/3	Inv. 89974, S/N 079154853	-
Input Capacity (MBH)	520	800 MBH / 6.0 GPH	-
Rated Output Capacity (MBH)	413	5862	-
Approx. Efficiency %	79.4%	-	-
Fuel	Natural Gas/#2 Oil	Natural Gas/#2 Oil	-
Approx Age	19	19	-
ASHRAE Service Life	30	21	-
Remaining Life	11	2	-
Comments	NJ11770-07H	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - John Fenwick Elementary School

Domestic Water Heaters

Tag	WH	WH	-
Unit Type	Tank	Tank	-
Qty	1	1	-
Location	1974 Addition	Kitchen	-
Area Served	Laundry 179	Kitchen	-
Manufacturer	State Industries	State Industries	-
Model #	ES66SOMSK 200	ES650D0RS	-
Serial #	0822J008568	A05A036365	-
Size (Gallons)	6	50	-
Input Capacity (MBH/KW)	1650 WATTS	4500 WATTS	-
Recovery (Gal/Hr)	N/A	N/A	-
Efficiency %	N/A	N/A	-
Fuel	Electric	Electric	-
Approx Age	2	5	-
ASHRAE Service Life	12	12	-
Remaining Life	10	7	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - John Fenwick Elementary School

Pumps

Tag	P-1	P-2	P-3
Unit Type	in-line	in-line	in-line
Qty	1	1	1
Location	Boiler Room	Boiler Room	Boiler Room
Area Served	Zone #1	Zone #2	Zone #2 Standby
Manufacturer	TACO	TACO	TACO
Model #	N/A	N/A	N/A
Serial #	N/A	N/A	N/A
Horse Power	0.50	0.75	0.75
Flow	28 GPM @ xxFT HD	57 GPM @ xxFT HD	57 GPM @ xxFT HD
Motor Info	Emerson P55BLZ-696, Cat 132-066	Emerson P63CZE-3022	Emerson P63CZE-3022
Electrical Power	200/3/60	200/3/60	200/3/60
RPM	1725	1725	1725
Motor Efficiency %	N/A	N/A	N/A
Approx Age	19	19	19
ASHRAE Service Life	10	10	10
Remaining Life	(9)	(9)	(9)
Comments	MFG No. L037	MFG No. 2-91	MFG No. 2-91

Pumps

Tag	P-4	P-5	P-6
Unit Type	Base Mtd End Suction	Base Mtd End Suction	Base Mtd End Suction
Qty	1	1	1
Location	Boiler Room	Boiler Room	Boiler Room
Area Served	Zone #3	Zone #4	Zone #3 & #4 Bypass
Manufacturer	TACO	TACO	TACO
Model #	FM1506 5.45 B2C1A2L0	FM2007 6.85 B2D1A2L0	FM2007 6.85 B2D1A2L0
Serial #	84690	N/A	86524
Horse Power	3	3	3
Flow	72 GPM @ xxFT HD	140 GPM @ xxFT HD	140 GPM @ xxFT HD
Motor Info	m/n 5K182AD210A, s/n VEK0A053B05	m/n 5K182AD210A, s/n VEK0A053B05	m/n 5K182AD210A, s/n ODK9A002B08
Electrical Power	200-230/460	200-230/460	200-230/460
RPM	1745	1745	1745
Motor Efficiency %	84.0%	84.0%	84.0%
Approx Age	19	19	19
ASHRAE Service Life	20	20	20
Remaining Life	1	1	1
Comments	Dayton 3KW34G, JO 3593040307	-	-

Pumps

Tag	P-7	P-8	P-9 & 10
Unit Type	In-line	In-line	in-line
Qty	1	1	2
Location	Boiler Room	Boiler Room	Boiler Room
Area Served	Zone #5	Zone #5	Domestic Circulator
Manufacturer	Bell & Gossett	Bell & Gossett	Bell & Gossett
Model #	1 1/4 A Series 60	1 1/4 A Series 60	EQJ 48S17D1051R P
Serial #	N/A	N/A	E6312
Horse Power	3/4	3/4	1/6
Flow	28 GPM @ XXFT HD	28 GPM @ XXFT HD	N/A
Motor Info	N/A	N/A	N/A
Electrical Power	208/3/60	208/3/60	115-1-60
RPM	N/A	N/A	1725
Motor Efficiency %	N/A	N/A	N/A
Approx Age	19	19	19
ASHRAE Service Life	10	10	10
Remaining Life	(9)	(9)	(9)
Comments	-	-	Type - SS

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - John Fenwick Elementary School

Kiln

Tag	**Kiln**	-	-
Unit Type	Electric Kiln	-	-
Qty	1	-	-
Location	Boiler Room	-	-
Area Served	Kiln	-	-
Manufacturer	Cress	-	-
Model #	B-27-H	-	-
Serial #	46034	-	-
Electrical	240 VAC	-	-
Amps	45	-	-
Efficiency %	-	-	-
Fuel	Electric	-	-
Approx Age	-	-	-
Comments	Used two times a year.	-	-

Investment Grade Lighting Audit

CEG Job #: 9C10083

Project: John Fenwick Elementary School
183 Smith St
Salem NJ 08079

Bldg. Sq. Ft. 56,913

John Fenwick Elementary School

KWH COST: $0.143

ECM #6: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
221.11	Boy's Rest Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	$23.05	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$18.59	$14.00	$14.00	0.01	31.2	$4.46	3.14
221.11	Girl's Rest Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	$23.05	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$18.59	$14.00	$14.00	0.01	31.2	$4.46	3.14
242.11	Vestibule	4400	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.11	470.8	$67.32	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	431.2	$61.66	$28.00	$28.00	0.01	39.6	$5.66	4.94
242.11	Lobby	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	941.6	$134.65	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	862.4	$123.32	$28.00	$56.00	0.02	79.2	$11.33	4.94
221.11	Copy Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	161.2	$23.05	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$18.59	$14.00	$14.00	0.01	31.2	$4.46	3.14
242.21	Corridor	4400	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.93	8,474.4	$1,211.84	18	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.76	7761.6	$1,109.91	$28.00	$504.00	0.16	712.8	$101.93	4.94
746	Lunch Room	2600	12	1	250w MH LoBay w/Prismatic Lens	295	3.54	9,204.0	$1,316.17	12	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	2.12	5522.4	$789.70	$220.00	$2,640.00	1.42	3681.6	$526.47	5.01
221.11	Kitchen	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$46.10	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$37.18	$14.00	$28.00	0.02	62.4	$8.92	3.14
221.11	Stage	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$46.10	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$37.18	$14.00	$28.00	0.02	62.4	$8.92	3.14
242.21	Nurse	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
222.21		2600	5	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$115.26	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$92.95	$14.00	$70.00	0.06	156	$22.31	3.14
227.211	Teacher's Lounge	2600	9	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.31	795.6	$113.77	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Faculty Rest Room	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$39.78	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	$36.44	$28.00	$28.00	0.01	23.4	$3.35	8.37

Investment Grade Lighting Audit

221.31	Therapy Room	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.31	Classroom 45	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.11	Storage 45	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	148.8	$21.28	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.16	$14.00	$28.00	0.02	28.8	$4.12	6.80
221.31	Classroom 44	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 44	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 43	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 43	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 42	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 42	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 41	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 41	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 35	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37

Investment Grade Lighting Audit

227.211	Rest Room 35	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 34	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 34	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 33	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 33	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 32	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 32	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 31	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 31	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 25	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 25	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 24	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14

Investment Grade Lighting Audit

242.21	Classroom 24	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 24	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 23	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 23	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 22	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 22	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 21	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$345.77	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$278.85	$14.00	$210.00	0.18	468	$66.92	3.14
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$119.35	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$109.31	$28.00	$84.00	0.03	70.2	$10.04	8.37
227.211	Rest Room 21	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.03	88.4	$12.64	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Speech	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$79.57	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$72.87	$28.00	$56.00	0.02	46.8	$6.69	8.37
221.12	Closet	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	148.8	$21.28	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.16	$14.00	$28.00	0.02	28.8	$4.12	6.80
221.31	Classroom 10	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 11	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 12	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 13	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14

Investment Grade Lighting Audit

221.31	Classroom 14	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 15	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 16	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 17	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 18	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Classroom 19	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$414.93	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$334.62	$14.00	$252.00	0.22	561.6	$80.31	3.14
221.31	Girl's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.12	322.4	$46.10	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$37.18	$14.00	$28.00	0.02	62.4	$8.92	3.14
221.31	Boy's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.12	322.4	$46.10	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$37.18	$14.00	$28.00	0.02	62.4	$8.92	3.14
652	Boiler Room	4400	5	1	"Industrial" Relector, 42w CFL	42	0.21	924.0	$132.13	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31		4400	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.12	545.6	$78.02	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	440	$62.92	$14.00	$28.00	0.02	105.6	$15.10	1.85
211.11	Library Corridor	4400	2	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.07	290.4	$41.53	2	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.05	220	$31.46	$7.00	$14.00	0.02	70.4	$10.07	1.39
242.11	Library	2600	62	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	6.63	17,248.4	$2,466.52	62	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	6.08	15797.6	$2,259.06	$28.00	$1,736.00	0.56	1450.8	$207.46	8.37
221.31	Classroom A11	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.31	Classroom A14	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
242.31	Faculty Room	2600	8	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic	107	0.86	2,225.6	$318.26	8	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.78	2038.4	$291.49	$28.00	$224.00	0.07	187.2	$26.77	8.37
613	Wash Room	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.10	260.0	$37.18	1	1	(1) 26w CFL Lamp	26	0.03	67.6	$9.67	$20.00	$20.00	0.07	192.4	$27.51	0.73
221.31	Classroom A17	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14

Investment Grade Lighting Audit

221.31	Classroom A20	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.31	Classroom A10	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.31	Classroom A7	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.11	Lunch Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	$138.31	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$111.54	$14.00	$84.00	0.07	187.2	$26.77	3.14
221.31	Classroom A4	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
221.31	Classroom A1	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$322.72	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$260.26	$14.00	$196.00	0.17	436.8	$62.46	3.14
222.21	Main Office	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	967.2	$138.31	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$111.54	$14.00	$84.00	0.07	187.2	$26.77	3.14
222.21	Principal's Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$92.21	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$74.36	$14.00	$56.00	0.05	124.8	$17.85	3.14
222.21	VP Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$92.21	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$74.36	$14.00	$56.00	0.05	124.8	$17.85	3.14
222.21	Conference Room	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	967.2	$138.31	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$111.54	$14.00	$84.00	0.07	187.2	$26.77	3.14
222.25	Corridor	4400	18	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	1.12	4,910.4	$702.19	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	3960	$566.28	$14.00	$252.00	0.22	950.4	$135.91	1.85
725	Exterior	4400	3	1	150w HPS Wallpack	188	0.56	2,481.6	$354.87	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		785	225			57.34	156,512	$22,381	785	195			45.8	124,452	$17,797		$14,966	10.0	26,622	$3,807	3.93

CEG Job #: 9C10083
Project: John Fenwick Elementary School
Address: 183 Smith St
Salem NJ 08079
Building SF: 56,913

John Fenwick Elementary School

KWH COST: $0.143

ECM #7: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS												SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description		Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
221.11	Boy's Rest Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.062	161.2	$23.05	1	0	No Change		62	0.06	0%	161.2	$23.05	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Girl's Rest Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.062	161.2	$23.05	1	0	No Change		62	0.06	0%	161.2	$23.05	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Vestibule	4400	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.107	470.8	$67.32	1	0	No Change		107	0.11	0%	470.8	$67.32	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Lobby	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	941.6	$134.65	2	0	No Change		107	0.21	0%	941.6	$134.65	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Copy Room	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.062	161.2	$23.05	1	0	No Change		62	0.06	0%	161.2	$23.05	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Corridor	4400	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.926	8474.4	$1,211.84	18	0	No Change		107	1.93	0%	8474.4	$1,211.84	$0.00	$0.00	0.00	0	$0.00	0.00
746	Lunch Room	2600	12	1	250w MH LoBay w/Prismatic Lens	295	3.54	9204	$1,316.17	12	0	No Change		295	3.54	0%	9204	$1,316.17	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Kitchen	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$46.10	2	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.11	10%	290.16	$41.49	$75.00	$75.00	0.01	32.24	$4.61	16.27
221.11	Stage	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$46.10	2	0	No Change		62	0.12	0%	322.4	$46.10	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Nurse	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Switch Mnt.		107	0.29	10%	751.14	$107.41	$75.00	$75.00	0.03	83.46	$11.93	6.28
222.21		2600	5	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806	$115.26	5	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.28	10%	725.4	$103.73	$75.00	$75.00	0.03	80.6	$11.53	6.51
227.211	Teacher's Lounge	2600	9	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.306	795.6	$113.77	9	1	Dual Technology Occupancy Sensor - Switch Mnt.		34	0.28	10%	716.04	$102.39	$75.00	$75.00	0.03	79.56	$11.38	6.59
242.21	Faculty Rest Room	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	278.2	$39.78	1	1	Dual Technology Occupancy Sensor - Switch Mnt.		107	0.10	10%	250.38	$35.80	$75.00	$75.00	0.01	27.82	$3.98	18.85
221.31	Therapy Room	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom 45	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42

221.11	Storage 45	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	148.8	$21.28	2	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.11	10%	133.92	$19.15	$75.00	$75.00	0.01	14.88	$2.13	35.25
221.31	Classroom 44	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 44	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 43	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 43	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 42	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 42	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 41	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 41	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 35	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 35	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 34	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41

227.211	Rest Room 34	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 33	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 33	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 32	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 32	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 31	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 31	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 25	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 25	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 24	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 24	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 23	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41

227.211	Rest Room 23	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 22	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 22	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 21	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$345.77	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.84	10%	2176.2	$311.20	$225.00	$225.00	0.09	241.8	$34.58	6.51
242.21		2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$119.35	3	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.29	10%	751.14	$107.41	$160.00	$160.00	0.03	83.46	$11.93	13.41
227.211	Rest Room 21	2600	1	2	2x2, 2 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	34	0.034	88.4	$12.64	1	0	No Change		34	0.03	0%	88.4	$12.64	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Speech	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	556.4	$79.57	2	1	Dual Technology Occupancy Sensor - Switch Mnt.		107	0.19	10%	500.76	$71.61	$75.00	$75.00	0.02	55.64	$7.96	9.43
221.12	Closet	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	148.8	$21.28	2	0	No Change		62	0.12	0%	148.8	$21.28	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom 10	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 11	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 12	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 13	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 14	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 15	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 16	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42

221.31	Classroom 17	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 18	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Classroom 19	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$414.93	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	1.00	10%	2611.44	$373.44	$225.00	$225.00	0.11	290.16	$41.49	5.42
221.31	Girl's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.124	322.4	$46.10	2	0	No Change		62	0.12	0%	322.4	$46.10	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Boy's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.124	322.4	$46.10	2	0	No Change		62	0.12	0%	322.4	$46.10	$0.00	$0.00	0.00	0	$0.00	0.00
652	Boiler Room	4400	5	1	"Industrial" Relector, 42w CFL	42	0.21	924	$132.13	5	0	No Change		42	0.21	0%	924	$132.13	$0.00	$0.00	0.00	0	$0.00	0.00
221.31		4400	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.124	545.6	$78.02	2	0	No Change		62	0.12	0%	545.6	$78.02	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Library Corridor	4400	2	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.066	290.4	$41.53	2	0	No Change		33	0.07	0%	290.4	$41.53	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Library	2600	62	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	6.634	17248.4	$2,466.52	62	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		107	5.97	10%	15523.56	$2,219.87	$225.00	$450.00	0.66	1724.84	$246.65	1.82
221.31	Classroom A11	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom A14	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
242.31	Faculty Room	2600	8	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic	107	0.856	2225.6	$318.26	8	1	Dual Technology Occupancy Sensor - Remote Mnt.		107	0.77	10%	2003.04	$286.43	$160.00	$160.00	0.09	222.56	$31.83	5.03
613	Wash Room	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.1	260	$37.18	1	0	No Change		100	0.10	0%	260	$37.18	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	Classroom A17	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom A20	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom A10	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom A7	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97

221.11	Lunch Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.372	967.2	$138.31	6	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.33	10%	870.48	$124.48	$75.00	$75.00	0.04	96.72	$13.83	5.42
221.31	Classroom A4	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
221.31	Classroom A1	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$322.72	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount		62	0.78	10%	2031.12	$290.45	$225.00	$225.00	0.09	225.68	$32.27	6.97
222.21	Main Office	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.372	967.2	$138.31	6	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.33	10%	870.48	$124.48	$75.00	$75.00	0.04	96.72	$13.83	5.42
222.21	Principal's Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$92.21	4	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.22	10%	580.32	$82.99	$75.00	$75.00	0.02	64.48	$9.22	8.13
222.21	VP Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$92.21	4	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.22	10%	580.32	$82.99	$75.00	$75.00	0.02	64.48	$9.22	8.13
222.21	Conference Room	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.372	967.2	$138.31	6	1	Dual Technology Occupancy Sensor - Switch Mnt.		62	0.33	10%	870.48	$124.48	$75.00	$75.00	0.04	96.72	$13.83	5.42
222.25	Corridor	4400	18	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	1.116	4910.4	$702.19	18	0	No Change		62	1.12	0%	4910.4	$702.19	$0.00	$0.00	0.00	0	$0.00	0.00
725	Exterior	4400	3	1	150w HPS Wallpack	188	0.564	2481.6	$354.87	3	0	No Change		188	0.56	0%	2481.6	$354.87	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		785	225			57.3	156,512.4	$22,381	785	63				52.5		143,995.2	$20,591.31		$11,400	4.82	12,517	$1,790	6.37

Project Name: LGEA Solar PV Project - Salem City BOE - John Fenwick Elementary School
Location: Salem, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$1,235,790
Annual kWh Production	163,962
Annual Energy Cost Reduction	$23,447
Annual SREC Revenue	$57,387
First Cost Premium	**$1,235,790**
Simple Payback:	**15.29** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	300	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$61,790	0	0	0	$0	0	0	(61,790)	0
1	$0	163,962	$23,447	$0	$57,387	$81,611	$17,960	($18,738)	($80,527)
2	$0	163,142	$24,150	$0	$57,100	$80,313	$19,258	($18,321)	($98,849)
3	$0	162,326	$24,874	$0	$56,814	$78,921	$20,651	($17,882)	($116,731)
4	$0	161,515	$25,621	$0	$56,530	$77,428	$22,143	($17,420)	($134,151)
5	$0	160,707	$26,389	$1,655	$56,248	$75,827	$23,744	($18,590)	($152,741)
6	$0	159,904	$27,181	$1,647	$55,966	$74,111	$25,461	($18,071)	($170,812)
7	$0	159,104	$27,996	$1,639	$55,686	$72,270	$27,301	($17,527)	($188,339)
8	$0	158,309	$28,836	$1,631	$55,408	$70,296	$29,275	($16,957)	($205,296)
9	$0	157,517	$29,701	$1,622	$55,131	$68,180	$31,391	($16,361)	($221,657)
10	$0	156,730	$30,592	$1,614	$54,855	$65,911	$33,660	($15,738)	($237,395)
11	$0	155,946	$31,510	$1,606	$54,581	$63,478	$36,094	($15,086)	($252,481)
12	$0	155,166	$32,456	$1,598	$54,308	$60,868	$38,703	($14,406)	($266,886)
13	$0	154,390	$33,429	$1,590	$54,037	$58,071	$41,501	($13,695)	($280,582)
14	$0	153,618	$34,432	$1,582	$53,766	$55,070	$44,501	($12,955)	($293,537)
15	$0	152,850	$35,465	$1,574	$53,498	$51,853	$47,718	($12,183)	($305,719)
16	$0	152,086	$36,529	$1,566	$53,230	$48,404	$51,167	($11,378)	($317,098)
17	$0	151,326	$37,625	$1,559	$52,964	$44,705	$54,866	($10,541)	($327,639)
18	$0	150,569	$38,754	$1,551	$52,699	$40,739	$58,832	($9,669)	($337,308)
19	$0	149,816	$39,916	$1,543	$52,436	$36,486	$63,085	($8,762)	($346,070)
20	$0	149,067	$41,114	$1,535	$52,173	$31,925	$67,646	($7,819)	($353,890)
21	$0	148,322	$42,347	$1,528	$51,913	$29,086	$62,187	$1,458	($352,431)
22	$0	147,580	$43,618	$1,520	$51,653	$23,504	$51,174	$19,072	($333,359)
23	$0	146,842	$44,926	$1,512	$51,395	$0	$0	$94,808	($238,551)
24	$0	146,108	$46,274	$1,505	$51,138	$0	$0	$95,907	($142,644)
25	$0	145,377	$47,662	$1,497	$50,882	$0	$0	$97,047	($45,597)
	Totals:	3,862,281	$854,845	$33,077	$1,351,798	$1,289,057	$868,317	$16,192	($5,800,288)
					Net Present Value (NPV)			**($146,633)**	
					Internal Rate of Return (IRR)			**-0.9%**	

Project Name: LGEA Solar PV Project - Salem City BOE - John Fenwick Elementary School
Location: Salem, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,235,790
Annual kWh Production	163,962
Annual Energy Cost Reduction	$23,447
Annual SREC Revenue	$57,387
First Cost Premium	**$1,235,790**
Simple Payback:	**15.29** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.143**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$1,235,790	0	0	0	$0	(1,235,790)	0
1	$0	163,962	$23,447	$0	$57,387	$80,833	($1,154,957)
2	$0	163,142	$24,150	$0	$57,100	$81,250	($1,073,707)
3	$0	162,326	$24,874	$0	$56,814	$81,689	($992,018)
4	$0	161,515	$25,621	$0	$56,530	$82,151	($909,867)
5	$0	160,707	$26,389	$1,655	$56,248	$80,982	($828,886)
6	$0	159,904	$27,181	$1,647	$55,966	$81,500	($747,386)
7	$0	159,104	$27,996	$1,639	$55,686	$82,044	($665,341)
8	$0	158,309	$28,836	$1,631	$55,408	$82,614	($582,728)
9	$0	157,517	$29,701	$1,622	$55,131	$83,210	($499,518)
10	$0	156,730	$30,592	$1,614	$54,855	$83,833	($415,684)
11	$0	155,946	$31,510	$1,606	$54,581	$84,485	($331,199)
12	$0	155,166	$32,456	$1,598	$54,308	$85,165	($246,034)
13	$0	154,390	$33,429	$1,590	$54,037	$85,876	($160,158)
14	$0	153,618	$34,432	$1,582	$53,766	$86,616	($73,542)
15	$0	152,850	$35,465	$1,574	$53,498	$87,388	$13,847
16	$0	152,086	$36,529	$1,566	$53,230	$88,193	$102,039
17	$0	151,326	$37,625	$1,559	$52,964	$89,030	$191,069
18	$0	150,569	$38,754	$1,551	$52,699	$89,902	$280,971
19	$0	149,816	$39,916	$1,543	$52,436	$90,809	$371,780
20	$0	149,067	$41,114	$1,535	$52,173	$91,752	$463,532
21	$1	148,322	$42,347	$1,528	$51,913	$92,732	$556,264
22	$2	147,580	$43,618	$1,520	$51,653	$93,750	$650,014
23	$3	146,842	$44,926	$1,512	$51,395	$94,808	$744,823
24	$4	146,108	$46,274	$1,505	$51,138	$95,907	$840,729
25	$5	145,377	$47,662	$1,497	$50,882	$97,047	$937,776
	Totals:	3,862,281	$854,845	$33,077	$1,351,798	$2,173,566	($3,528,180)
				Net Present Value (NPV)		**$937,801**	
				Internal Rate of Return (IRR)		**4.7%**	

Building	Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
John Fenwick Elementary School	9750	Sunpower SPR230	597	14.7	8,778	137.31	163,962	19,701	15.64

.= Proposed PV Layout

PVWatts AC Energy & Cost Savings

Cautions for Interpreting the Results

John Fenwick Elementary School

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	137.3 kW
DC to AC Derate Factor:	0.810
AC Rating:	111.2 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	137.0°
Energy Specifications	
Cost of Electricity:	0.1 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.45	8416	12.03
2	3.21	10051	14.37
3	4.21	14385	20.57
4	5.12	16511	23.61
5	5.79	18839	26.94
6	6.11	18577	26.57
7	6.02	18671	26.70
8	5.48	17093	24.44
9	4.74	14612	20.90
10	3.65	11758	16.81
11	2.55	8105	11.59
12	2.12	6941	9.93
Year	4.29	163962	234.47

Notes:

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