CLIFTON PUBLIC SCHOOLS
PUBLIC SCHOOL #8

41 OAK STREET
CLIFTON, NEW JERSEY 07014

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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.

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting and Power (GLP)
Third Party Supplier:	South Jersey Energy / Champion Energy Services LLC

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	General Service Gas (GSG(HTG))
Third Party Supplier:	Hess

The electric usage profile represents the actual electrical usage for the facility. 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 within each facility report shows the actual natural gas energy usage for the facility. 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.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G
Rate: GLP
Meter No: 266014610
Account No: 65 185 241 03
Third Party Utility Provider: South Jersey Energy / Champion Energy Services LLC
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	8,937	32.2	$1,323
Apr-12	7,398	34.8	$1,130
May-12	8,343	34.8	$1,350
Jun-12	5,940	32.3	$1,060
Jul-12	4,056	35.8	$552
Aug-12	4,056	35.8	$552
Sep-12	4,056	35.8	$552
Oct-12	9,675	33.1	$1,162
Nov-12	8,595	35.6	$1,059
Dec-12	9,171	35.0	$1,164
Jan-13	5,598	36.8	$781
Feb-13	8,019	32.4	$1,013
Totals	**83,844**	**36.8 Max**	**$11,698**

AVERAGE DEMAND **34.5 KW average**
AVERAGE RATE **$0.140** **$/kWh**

Figure 1
Electricity Usage Profile

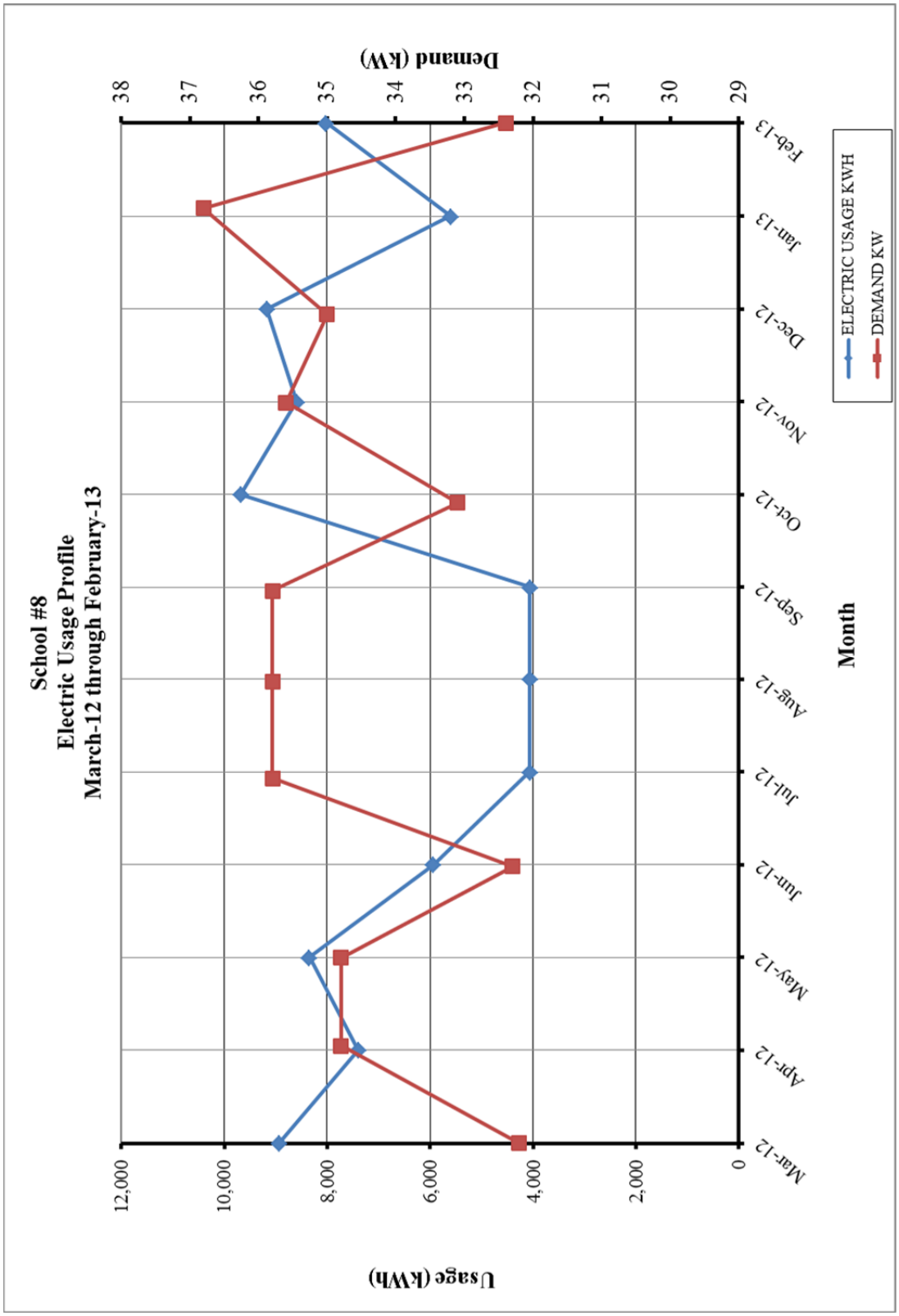
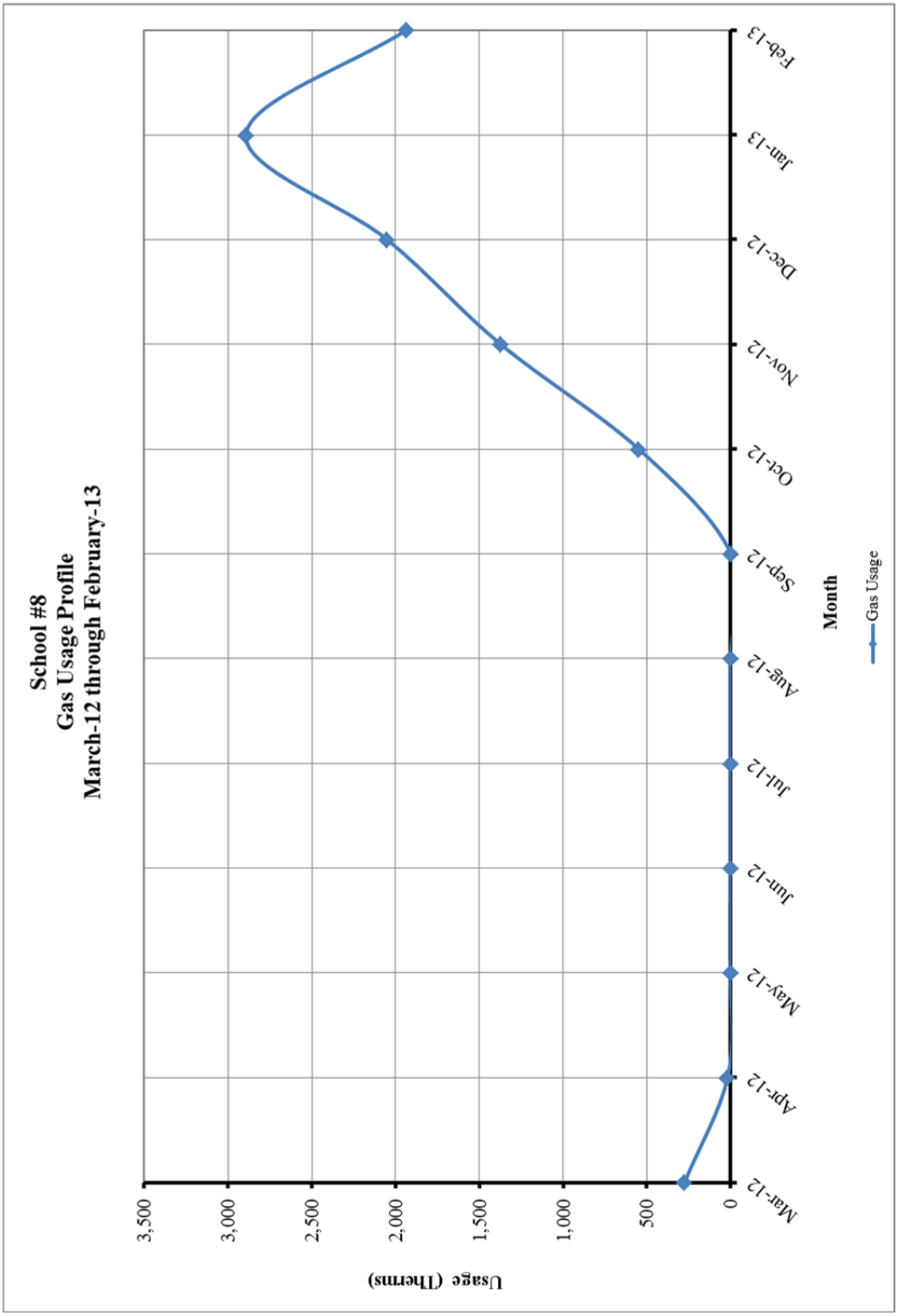


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSE&G	
Rate:	GSG (HTG)	
Meter No:	2522644, 3498836	
Account No:	65 185 241 03	
Third Party Utility Provider:	Hess	
TPS Meter No:	446575/446945, 447975	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-12	275.90	$234.47
Apr-12	18.82	$34.30
May-12	0.00	$21.52
Jun-12	0.00	$32.28
Jul-12	0.36	$14.46
Aug-12	0.36	$14.46
Sep-12	0.36	$14.90
Oct-12	550.74	$535.93
Nov-12	1,375.36	$1,347.85
Dec-12	2,052.31	$2,008.45
Jan-13	2,893.71	$2,811.97
Feb-13	1,932.75	$1,899.89
TOTALS	**9,100.67**	**$8,970.49**
AVERAGE RATE:	**$0.99**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The public school #8 is located at 41 Oak Street in Clifton, New Jersey. The 21,600 SF elementary school was built in 1926 with a 6,230 SF addition completed in 1964. The building is a two story building comprised of classrooms, offices, multi-purpose room, media center and mechanical rooms.

Occupancy Profile

The typical hours of operation for the Elementary School are Monday through Friday between 7:00 AM and 4:00 PM. Maintenance staff is present in the building as early as 6:00 AM. The school's enrollment is approximately 220 students, grades kindergarten through 5th, and has 16 teachers, support staff, and administrative personnel.

Building Envelope

Exterior Walls for the elementary school are brick face with a concrete block construction. The amount of installation within the walls is unknown. Typical windows throughout the school are double pane, operable, ¼" clear glass with aluminum frames. The windows appear to be in good condition and well maintained. The roof is a flat EPDM rubber roof on metal decking. The amount of insulation below the roof is unknown.

HVAC Systems

The school HVAC system consists of two steam boilers, unit ventilators and steam radiators in the classrooms, and some window mounted air conditioning units. Additionally the gym is heated and ventilated by an older heating a ventilation unit.

The boilers are gas-fired steam boilers. The boiler in the main boiler room is a Rockmills model MP-80 and has an output capacity rating of 80 boiler horsepower and a nameplate efficiency of approximately 80%. The boiler in the gym boiler room is a Weil McLain series 2 boiler with a nameplate input rating of 1860 MBH, and an output of 1346 MBH.

Fresh air is supplied to the building by the unit ventilators in the classrooms. These units have steam heating coils and a fan set up in a blow though arrangement. Most of these units have an outside air inlet and supply air directly to the space in which it is located. The unit ventilators all appear to be very old and well beyond their useful life. It was reported at the time of the site visit that some of them are not vented to the outside and do not circulate air very well. Outside air is brought into the gym by an older heating and ventilation unit located behind the stage.

Exhaust System

Air is exhausted from the toilet rooms through switch operated exhaust fans. There are also two exhaust fans that exhaust air from the gym through the roof. The gym exhaust fans are controlled by a timer.

HVAC System Controls

The HVAC systems within the building are controlled through local electronic controls and timers. The classrooms have individual thermostats to control a steam valve at the unit ventilators and radiators. The larger systems that are on a timer are set up for an occupied schedule of approximately 6:00 AM till 3:00 PM.

Domestic Hot Water

Domestic hot water for the restrooms is provided by two domestic hot water heaters. One, located in the main boiler room, is a Rheem model 21V40-38. This water heater has a 40 gallon tank and an input capacity of 38 MBH of natural gas. The other heater is located in the gym boiler room and is a Rheem model 82V40-2 electric water heater with a 40 gallon tank and an input rating of 9,000 Watts.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

Miscellaneous

The kitchen is equipped with two TurboAire Energy Star rated refrigerators, one warming cart, one Powers Chest cooler, and one EPCO rack heater.

III. 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.

IV. ENERGY CONSERVATION MEASURES

Energy Conservation Measures are developed specifically for this facility. The energy savings and calculations are highly dependent on the information received from the site survey and interviews with operations personnel. The assumptions and calculations should be reviewed by the owner to ensure accurate representation of this facility. The following ECMs were analyzed:

Table 3
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Upgrade - General	$17,845	$1,527	11.7	28.4%
ECM #2	Lighting Upgrade - MPR	$5,040	$113	44.6	-66.4%
ECM #3	Lighting Upgrade - Exterior	$1,080	$249	4.3	245.8%
ECM #4	Lighting Controls Upgrade	$3,890	$385	10.1	48.5%
ECM #5	DDC Controls Upgrade	$176,780	$1,090	162.2	-90.8%
ECM #6	New Burner and Controls	$0	$778	65.6	-68.0%
ECM #7	Steam Trap Replacement	$32,085	$914	35.1	-71.5%
ECM #8	CRT Monitor Replacement	$10,780	$660	16.3	-8.2%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	69.09 KW PV System	$244,316	$14,820	16.5	-9.0%

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

Table 4
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Upgrade - General	5.5	10,904	-
ECM #2	Lighting Upgrade - MPR	0.5	806	-
ECM #3	Lighting Upgrade - Exterior	0.4	1,776	-
ECM #4	Lighting Controls Upgrade	-	2,747	-
ECM #5	DDC Controls Upgrade	0.0	2,376	765
ECM #6	New Burner and Controls	0.0	0	786
ECM #7	Steam Trap Replacement	0.0	0	2,120
ECM #8	CRT Monitor Replacement	2.5	4,715	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	69.09 KW PV System	69.1	79,837	

Table 5
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrade - General	$1,527	$19,795	$1,950	$17,845	11.7
Lighting Upgrade - MPR	$113	$5,440	$400	$5,040	44.6
Lighting Upgrade - Exterior	$249	$1,680	$600	$1,080	4.3
Lighting Controls Upgrade	$385	$4,500	$610	$3,890	10.1
~~DDC Controls Upgrade~~	~~$1,090~~	~~$176,780~~	~~$0~~	~~$176,780~~	~~162.2~~
~~New Burner and Controls~~	~~$778~~	~~$51,000~~	~~$0~~	~~$51,000~~	~~65.6~~
Steam Trap Replacement	$914	$32,085	$0	$32,085	35.1
CRT Monitor Replacement	$660	$10,780	$0	$10,780	16.3
Design / Construction Extras (15%)		$11,142		*$11,142*	
Total Project	**$3,848**	**$85,422**	**$3,560**	**$81,862**	**21.3**

Note: ECM's with the strike-through font are not included in the ESIP.

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade – General

Description:

The majority of the interior lighting throughout Clifton Elementary School #8 is provided with fluorescent fixtures with older generation, 700 series and 741/ECO 32W T8 lamps and electronic ballasts. Although these T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. Concord Engineering recommends that most of these fixtures remain unmodified due to the extensive costs which will be incurred if these fixtures are to be re-lamped and re-ballasted which results in a long payback period. For other areas that are over lit, Concord Engineering recommends that the fixture be retrofitted with new Super T-8 lamps/reflector, de-lamped to the appropriate light levels, and a new high-efficiency electronic ballast be installed.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

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.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$19,795
NJ Smart Start Equipment Incentive ($):	$1,950
Net Installation Cost ($):	$17,845
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,527
Total Yearly Savings ($/Yr):	$1,527
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.7
Simple Lifetime ROI	28.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$22,905
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	$384.23

ECM #2: Lighting Upgrade – Multi-Purpose Room

Description:

The Multi-Purpose Room at Clifton Elementary School #8 is currently lit via 250 watt Metal Halide HID fixtures. The space would be better served with a more efficient, fluorescent lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient T5 high output system that includes new four lamp, 54 watt high output fixtures.

This measure replaces all the HID, 250 watt HID MH fixtures with a well-designed T5 high output (HO) system. T5 High output fixtures with reflectors and wire guards will be required in order to meet the mandated 50 foot-candle average within the spaces.

Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in **Investment Grade Lighting Audit Appendix** that outlines the proposed retrofits, costs, savings, and payback periods.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,440
NJ Smart Start Equipment Incentive ($):	$400
Net Installation Cost ($):	$5,040
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$113
Total Yearly Savings ($/Yr):	$113
Estimated ECM Lifetime (Yr):	15
Simple Payback	44.6
Simple Lifetime ROI	-66.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$1,695
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	($3,691.01)

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at Clifton Elementary School #8 is currently lit via 70 watt high pressure sodium (HPS) wall packs. The exterior would be better served with more efficient LED lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient LED lighting system that includes LED lamps for the existing 70 watt HPS wall packs on the exterior with 20 watt Lumarck LED Wall packs.

Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in **Investment Grade Lighting Audit Appendix** that outlines the proposed retrofits, costs, savings, and payback periods.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,680
NJ Smart Start Equipment Incentive ($):	$600
Net Installation Cost ($):	$1,080
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$249
Total Yearly Savings ($/Yr):	$249
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.3
Simple Lifetime ROI	245.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,735
Internal Rate of Return (IRR)	22%
Net Present Value (NPV)	$1,892.55

ECM #4: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Elementary School #8 are 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 20% of the total light energy controlled by occupancy sensors (The majority of the savings is expected to be after school hours when rooms are left with lights on)

This ECM includes installation of ceiling or switch mount sensors for individual offices, classrooms, large bathrooms, and Media Centers. 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:

$$\text{Energy Savings} = (\%\ \text{Savings} \times \text{Controlled Light Energy}\ (\text{kWh/Yr}))$$

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

Rebates and Incentives:

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

Smart Start Incentive
= (# Wall mount sensors × $20 per sensor)
+ (# Ceiling mount sensors × $35 per sensor)

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,500
NJ Smart Start Equipment Incentive ($):	$610
Net Installation Cost ($):	$3,890
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$385
Total Yearly Savings ($/Yr):	$385
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.1
Simple Lifetime ROI	48.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$5,775
Internal Rate of Return (IRR)	5%
Net Present Value (NPV)	$706.11

ECM #5: Digital Energy Management System (DDC EMS)

Description:

Currently, Clifton Public School #8 uses a pneumatic control system. This system is very old and offers limited control options for the HVAC systems.

Concord Engineering recommends installing a DDC system throughout the school to control all of the HVAC systems including the boilers, indoor air handling units, and roof exhaust fans.

The system will include new temperature sensors and new local thermostats with limited over-ride capability, a front end computer and main controller. The system will also include central controls for lighting. With the communication between the control devices and the front end computer interface, the facility manager will be able to take advantage of scheduling for occupied and unoccupied periods based on the actual occupancy of each space in the facility. Due to the fact that the building may have diverse hours of occupancy, including evening and weekend activities, having supervisory control over all of the equipment makes sense. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the electricity and 10% for natural gas used for HVAC in this building.

The basis for the DDC system expansion is the Automated Logic Energy Management System or similar.

Energy Savings Calculations:

Energy savings for each utility is calculated with the equation below.

$$\text{Energy Savings (Utility)} = \text{Current Energy Consumption} \times \text{Estimated Savings, \%}$$

Following table summarizes energy savings for this facility via implementation of an Energy Management System:

DDC ENERGY MANAGEMENT SYSYEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Nat Gas Usage (Therms)	7,653	-	
Existing Electricity Usage (kWh)	23,755	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	10%	
Gas Cost ($/Therm)	*$0.99*	$0.99	
Electricity Cost ($/kWh)	*$0.140*	$0.140	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Usage (Therms)	7,653	6,888	765
Electricity Usage (kWh)	23,755	21,380	2,376
Nat Gas Cost ($)	$7,576	$6,819	$758
Electricity Cost ($)	$3,326	$2,993	$333
Energy Cost ($)	$10,902	$9,812	$1,090
COMMENTS:			

Demand savings due to implementation of this ECM is minimal.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately $6.35 per SF in accordance with recent Contractor pricing for systems of this magnitude. Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$176,780
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$176,780
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,090
Total Yearly Savings ($/Yr):	$1,090
Estimated ECM Lifetime (Yr):	15
Simple Payback	162.2
Simple Lifetime ROI	-90.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$16,350
Internal Rate of Return (IRR)	-21%
Net Present Value (NPV)	($163,767.65)

ECM #6: Steam Boiler Burner & Controls Upgrade

Description:

The majority of the heating is provided to the Clifton Public School #8 facility by one Rockmills firetube steam boiler and one Weil McLain steam boiler. These boilers are very old and have outdated burner controls. Based on the age and condition of the boilers and burners, it is estimated that they should receive a 5%-10% increase in efficiency with new burners and controls.

This ECM will install new Cleaver Brooks Profire burner with Honeywell controls on each of these boilers with separate motors that will control fuel flow, excess air oxygen trim and variable speed on the blower. Installation of this system will result in improved operating efficiency of the boilers and less cycling of boilers since the boilers can operate closer to the demanded load requirement.

Energy Savings Calculations:

Annual Heating Energy Savings = Existing Fuel Consumption **x** 5% Efficiency Increase

Heating Cost Savings = Annual Heating Energy **x** Fuel Cost $/Unit

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$51,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$51,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$778
Total Yearly Savings ($/Yr):	$778
Estimated ECM Lifetime (Yr):	21
Simple Payback	65.6
Simple Lifetime ROI	-68.0%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$16,338
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	($39,007.11)

ECM #7: Steam Trap Replacement Program

Description:

Steam traps are required for the proper operation of steam distribution systems. Traps are mechanical devices installed on steam pipes to remove condensate from steam flow. When working properly, traps allow condensate to pass, while keeping the steam in the system to deliver heat where it is needed. Unfortunately steam traps have a tendency to leak. On average, steam traps have a useful life of 5 years, and with the large quantity of traps typically used within a facility, maintenance personnel have a hard time keeping up with the replacements. As a result, steam is lost and energy is wasted.

This ECM would replace approximately nine (9) steam traps throughout the building. All non-thermostatic traps will be replaced with either bucket or float & thermostatic traps. Thermostatic traps will be repaired with cage units and new covers. Where repairing is not feasible, the thermostatic traps will be replaced. Schedule 80 piping and extra heavy fittings will be used, and all piping and fittings between the unions will be replaced along with the steam traps. In addition, a complete steam trap survey will be performed along with tagging and implementing a 3-year, revolving, steam trap maintenance program.

Energy Savings Calculations:

See **Appendix G** for a detailed analysis.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$32,085
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$32,085
Maintenance Savings ($/Yr):	($1,185)
Energy Savings ($/Yr):	$2,099
Total Yearly Savings ($/Yr):	$914
Estimated ECM Lifetime (Yr):	10
Simple Payback	35.1
Simple Lifetime ROI	-71.5%
Simple Lifetime Maintenance Savings	($11,846)
Simple Lifetime Savings	$9,141
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	($24,287.36)

ECM #8: CRT Monitor Replacement

Description:

Clifton School #8 still utilizes CRT Monitors for use by its staff and students. These monitors not only utilize more energy in operating mode, but also while in idle mode. Typical monitors throughout the buildings consisted of 15 inch size monitors.

This ECM will replace all remaining fifty-eight (58) existing CRT monitors throughout the school with new 19" Widescreen Dell LCD Model P1911 with AX510 sounds bars. It is expected the IT department will distribute and install the monitors throughout the district.

Energy Savings Calculations / Results:

Savings calculations were based on operating occupied hours per week of operating staff and students, and estimated idle time of monitors per week outside occupied hours. Power consumption data is based on actual monitor characteristics for a Dell CRT Model E773c, and Dell LCD Model P1911.

$$Energy\ Savings = Qty \times Op\ Hrs \times P_O + Qty \times IdleHrs \times P_I$$

Qty = Quantity
Op Hrs = Operating Hours per Year
Idle Hrs = Idle Hours per Year
P_O = Operating Power Consumption Watts
P_I = Idle Power Consumption Watts

CRT MONITOR REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	15" CRT	19" LCD	
# of Monitors	53	53	
Power Cons. (W)	71	23	48
Idle Power Cons. (W)	5	0.5	4.5
Operating Hrs per Week	33	33	
Operating Weeks per Yr	41	41	
Idle Hrs per Week	136	136	
Idle Weeks per Yr	41	41	
Elec Cost ($/kWh)	0.140	0.140	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Demand (kW)	3.763	1.219	2.544
Electric Usage (kWh)	6,486	1,772	4,715
Energy Cost ($)	$908	$248	$660
COMMENTS:	Savings Based on Dell 15" CRT Monitor Compared with Dell 19 " LCD Model P1911 w/ AX510 Soundbar		

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$10,780
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$10,780
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$660
Total Yearly Savings ($/Yr):	$660
Estimated ECM Lifetime (Yr):	15
Simple Payback	16.3
Simple Lifetime ROI	-8.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$9,900
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	($2,900.96)

REM #1: 38.78 kW Solar System

Description:

The Clifton Elementary School #8 has available roof space that could accommodate a significant amount of solar generation, provided the roof can accommodate the additional panel weight. Based on the available areas a 38.78 kilowatt solar array could be installed. The array will produce approximately 44,762 kilowatt-hours annually that will reduce the overall electric usage of the facility by 53.39%.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas. Financial results in table below are based on 100% financing of the system over a fifteen year period.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	38.78
Electric Generation (KWH/Yr):	44,762
Installation Cost ($):	$244,316
SREC Revenue ($/Yr):	$8,553
Energy Savings ($/Yr):	$6,267
Total Yearly Savings ($/Yr):	$14,820
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	16.5
Analysis Period Electric Savings ($):	$116,553
Analysis Period SREC Revenue ($):	$123,905
Net Present Value (NPV)	($99,491.72)

V. 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. While the District is already performing many of these functions through routine maintenance it is important to continue to address these items as they provide an energy savings benefit.

A. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

D. Turn off computers when not in use. Ensure computers are not running in screen saver mode.

E. Replace older style CRT monitors with newer energy efficient LCD/LED monitors.

F. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Clifton Public Schools – School #8

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade - General	$9,295	$10,500	$1,950	$17,845	$1,527	$0	$1,527	15	$22,905	$0	28.4%	11.7	3.30%	$384.23
ECM #2	Lighting Upgrade - MPR	$1,800	$3,640	$400	$5,040	$113	$0	$113	15	$1,695	$0	-66.4%	44.6	-11.30%	($3,691.01)
ECM #3	Lighting Upgrade - Exterior	$1,200	$480	$600	$1,080	$249	$0	$249	15	$3,735	$0	245.8%	4.3	21.87%	$1,892.55
ECM #4	Lighting Controls Upgrade	$2,900	$1,600	$610	$3,890	$385	$0	$385	15	$5,775	$0	48.5%	10.1	5.40%	$706.11
ECM #5	DDC Controls Upgrade	$176,780	$0	$0	$176,780	$1,090	$0	$1,090	15	$16,350	$0	-90.8%	162.2	-21.15%	($163,767.65)
ECM #6	New Burner and Controls	$26,000	$25,000	$0	$51,000	$778	$0	$778	21	$16,338	$0	-68.0%	65.6	-8.63%	($39,007.11)
ECM #7	Steam Trap Replacement	$8,685	$23,400	$0	$32,085	$2,099	($1,185)	$914	10	$9,141	-$11,846	-71.5%	35.1	-18.08%	($24,287.36)
ECM #8	CRT Monitor Replacement	$10,780	$0	$0	$10,780	$660	$0	$660	15	$9,900	$0	-8.2%	16.3	-1.05%	($2,900.96)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	69.09 KW PV System	$244,316	$0	$0	$244,316	$6,267	$8,553	$14,820	15	$222,300	$128,300	-9.0%	16.5	-1.16%	($67,395.99)

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* .

APPENDIX B

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 11, 2013:

Electric Chillers

Water-Cooled Chillers	$16 - $170 per ton
Air-Cooled Chillers	$8 - $52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2007

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 - $92 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
A/C Economizing Controls	≤ 5 tons $85/unit; >5 tons $170/unit

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	$2.00 per MBH, but not less than $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	$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	$1,200 - $2,700
Low Intensity Infrared Heating	$300 - $500 per unit

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per VFD rated hp
Compressors	$5,250 to $12,500 per drive
Cooling Towers ≥ 10 hp	$60 per VFD rated hp
Boiler Fans ≥ 5 HP	$65 to $155 per hp
Boiler Feed Water Pumps ≥ 5 HP	$60 to $155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit $55 – $300 per hp New Hood $55 - $250 per hp

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons, 0.67 energy factor or better	$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 (Expires 3/1/2013)	$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities (Expires 3/1/2013)	$25 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	$15 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $200 per fixture
Metal Halide w/Pulse Start Including Parking Lot	$25 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

Prescriptive Lighting - LED

LED Display Case Lighting	$30 per display case
LED Shelf-Mtd. Display & Task Lights	$15 per linear foot
LED Portable Desk Lamp	$20 per fixture
LED Wall-wash Lights	$30 per fixture
LED Recessed Down Lights	$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	$100 per fixture
LED Parking Garage Luminaries	$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	$150 per fixture
LED High-Bay-Aisle Lighting	$150 per fixture
LED Bollard Fixtures	$50 per fixture
LED Linear Panels (1x4, 2x2, 2x4 Troffers only)	$100 per fixture
LED Fuel Pump Canopy	$100 per fixture
LED Screw-based & Pin-based (PAR, MR, BR, R) Standards (A-Style) and Decorative Lamps	$20 per lamp
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$30 per 4 foot $42 per 5 foot $65 per 6 foot
LED Retrofit Kits	To be evaluated through the customer measure path

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25-$50 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

Premium Motors

Three-Phase Motors (Expires 3/1/2013)	$45 - $700 per motor
Fractional HP Motors Electronic Commutated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic commutated motor

Refrigeration Doors/Covers

Energy-Efficient Doors/Covers for Installation on Open Refrigerated Cases	$100 per door
Aluminum Night Curtains for Installation on Open Refrigerated Cases	$3.50 per linear foot

Refrigeration Controls

Door Heater Controls	$50 per control
Electric Defrost Controls	$50 per control
Evaporator Fan Controls	$75 per control
Novelty Cooler Shutoff	$50 per control

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2007 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 an IRR of at least 10%.

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
6-Clifton BOE - PS 8

Building ID: 3477564
For 12-month Period Ending: February 28, 2013[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 11, 2013

Facility
6-Clifton BOE - PS 8
41 Oak Street
Clifton, NJ 07014

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

Primary Contact for this Facility
Karen Perkins
745 Clifton Avenue
Clifton, NJ 07013

Year Built: 1926
Gross Floor Area (ft²): 27,830

Energy Performance Rating[2] (1-100) 84

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	283,050
Natural Gas (kBtu)[4]	841,092
Total Energy (kBtu)	1,124,142

Energy Intensity[4]

Site (kBtu/ft²/yr)	40
Source (kBtu/ft²/yr)	66

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	85

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	59
National Median Source EUI	96
% Difference from National Median Source EUI	-31%
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[5] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Certifying Professional
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. 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	6-Clifton BOE - PS 8	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	41 Oak Street, Clifton, NJ 07014	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 a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Elementary School 8 (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	27,830 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	49 (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	0 %	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: Public Service Electric & Gas Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/16/2013	02/15/2013	5,598.00
12/16/2012	01/15/2013	9,171.00
11/16/2012	12/15/2012	8,595.00
10/16/2012	11/15/2012	9,675.00
09/16/2012	10/15/2012	4,056.00
08/16/2012	09/15/2012	4,056.00
07/16/2012	08/15/2012	4,056.00
06/16/2012	07/15/2012	5,940.00
05/16/2012	06/15/2012	8,343.00
04/16/2012	05/15/2012	7,398.00
03/16/2012	04/15/2012	8,937.00
Electric Consumption (kWh (thousand Watt-hours))		**75,825.00**
Electric Consumption (kBtu (thousand Btu))		**258,714.90**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**258,714.90**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

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

Start Date	End Date	Energy Use (therms)
01/16/2013	02/15/2013	2,893.71
12/16/2012	01/15/2013	2,052.31
11/16/2012	12/15/2012	1,375.36
10/16/2012	11/15/2012	550.74
09/16/2012	10/15/2012	0.36
08/16/2012	09/15/2012	0.36
07/16/2012	08/15/2012	0.36
06/16/2012	07/15/2012	0.00
05/16/2012	06/15/2012	0.00
04/16/2012	05/15/2012	18.82
03/16/2012	04/15/2012	275.90

gas Consumption (therms)	**7,167.92**
gas Consumption (kBtu (thousand Btu))	**716,792.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**716,792.00**
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
6-Clifton BOE - PS 8
41 Oak Street
Clifton, NJ 07014

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

Primary Contact for this Facility
Karen Perkins
745 Clifton Avenue
Clifton, NJ 07013

General Information

6-Clifton BOE - PS 8	
Gross Floor Area Excluding Parking: (ft^2)	27,830
Year Built	1926
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Elementary School 8	
Space Type	K-12 School
Gross Floor Area (ft^2)	27,830
Open Weekends?	No
Number of PCs [d]	49
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	0
Percent Heated	100
Months [o]	10
High School?	No
School District [o]	clifton

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 02/28/2013)	**Baseline** (Ending Date 02/28/2013)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	84	84	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	40	40	46	N/A	59
Source ($kBtu/ft^2$)	66	66	75	N/A	96
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	85	85	97	N/A	124
$kgCO_2e/ft^2$/year	3	3	3	N/A	4

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 Median column presents energy performance data your building would have if your building had a median rating of 50.

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

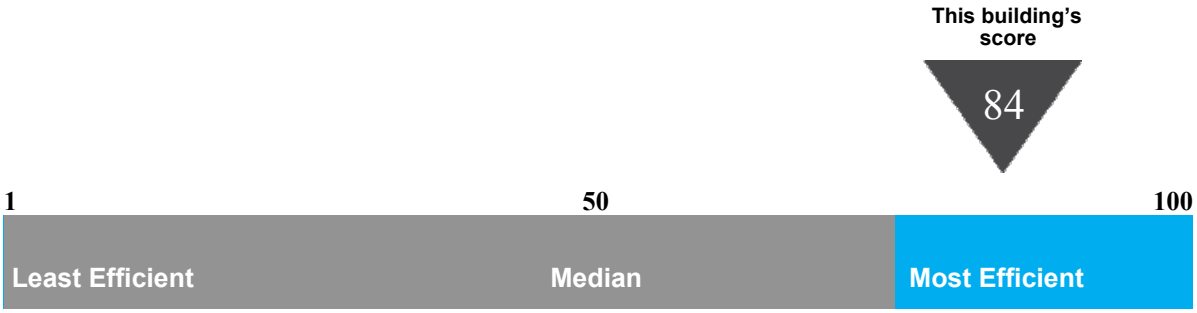
Statement of Energy Performance

2013

6-Clifton BOE - PS 8
41 Oak Street
Clifton, NJ 07014

Portfolio Manager Building ID: 3477564

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 66 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending February 2013

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: 04/11/2013

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #8

AC Units

Tag	UV		
Unit Type	Unit Ventilator		
Qty	14		
Location	Classrooms		
Area Served	Classrooms		
Manufacturer	Nesbitt		
Model #	-		
Serial #	-		
Cooling Type	N/A		
Cooling Capacity (Tons)	N/A		
Cooling Efficiency (SEER/EER)	N/A		
Heating Type	Steam		
Heating Input (MBH)	-		
Efficiency	-		
Fuel	-		
Approx Age	-		
ASHRAE Service Life	25		
Remaining Life	0		
Comments			

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #8

Boilers

Tag	B-1	B-2	
Unit Type	Steam Boiler	Steam Boiler	
Qty	1	1	
Location	Main Boiler Room	Gym Boiler Room	
Area Served	Building Heat	Building Heat	
Manufacturer	Rockmills	Weil McLain	
Model #	MP-80	MPLG-17	
Serial #	29390	34536-1	
Input Capacity (MBH)	3,266	1,860	
Rated Output Capacity (MBH)	2,678	1,346	
Approx. Efficiency %	82.0%	72.4%	
Fuel	Natural Gas	Natural Gas	
Approx Age	20	-	
ASHRAE Service Life	25	25	
Remaining Life	5	-	
Comments			

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #8

Domestic Water Heaters

Tag	DHW-1	DHW-2	
Unit Type	Hot Water Heater	Hot Water Heater	
Qty	1	1	
Location	Main Boiler Room	Gym Boiler Room	
Area Served	Building DHW	Building DHW	
Manufacturer	Rheem	Rheem	
Model #	21V40-38	82V40-2	
Serial #	RHNG 0401A02672	RH 0111243741	
Size (Gallons)	40	40	
Input Capacity (MBH/KW)	38 MBH	9 kW	
Recovery (Gal/Hr)	32.2	-	
Efficiency %	71%	100%	
Fuel	Natural Gas	Electricity	
Approx Age	9	2	
ASHRAE Service Life	10	10	
Remaining Life	1	8	
Comments			

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #8

Pumps

Tag	CRP-1	CRP-2	
Unit Type	Condensate Return Pump	Condensate Return Pump	
Qty	1	1	
Location	Main Boiler Room	Under Stage	
Area Served	B-1	B-2	
Manufacturer	Skidmore	-	
Model #	HVBF-7-110-102	-	
Serial #	173113	-	
Horse Power	3 / 4	-	
Flow	-	-	
Motor Info	AO Smith	-	
Electrical Power	200/400 V 3 Ph	-	
RPM	3450	-	
Motor Efficiency %	-	-	
Approx Age	1	-	
ASHRAE Service Life	20	20	
Remaining Life	19	-	
Comments	Pump Motors recently Replaced	No Access	

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12066
Facility Name: School #8
Address: 41 Oak Street
City, State, Zip Clifton, New Jersey

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
2	1 - Classroom #1	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	1 - Classroom #2	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	1 - Classroom #3	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	1 - Classroom #4	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
3	1 - Girl's Restroom	2200	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	1	0.06	128	Existing to Remain	Existing to Remain	2	58	0	0.06	128	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	1 - Girl's Restroom	2200	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	480	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	317	0.07	163	$23	0	No New Controls	0	0.0%	0	$0
4	1 - Office #5	1800	1x4 Pendant Wrap Prismatic 2-Lamp 32 W T8	2	58	4	0.23	418	Existing to Remain	Existing to Remain	2	58	0	0.23	418	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	84	$12
13	1 - Office #5	1800	60 W Incandescent A-Lamp	1	60	1	0.06	108	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	23	0.05	85	$12	6	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	5	$1
2	1 - Nurse #6	1800	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	589	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	3	0.22	389	0.11	200	$28	6	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	78	$11
3	1 - Nurse #6	1800	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	1	0.06	104	Existing to Remain	Existing to Remain	2	58	0	0.06	104	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	21	$3
2	1 - I.M.C. #7	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	0	20.0%	161	$23
5	1 - Kitchen #8	1600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	3	0.08	134	Existing to Remain	Existing to Remain	1	28	0	0.08	134	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
8	1 - Multi-Purpose #9	1800	250 W Metal Halide Recessed Cage Guard	1	285	8	2.28	4,104	Replace	2x4, 4 Lamp, 54w T5, (2) 2/54 Elect. Ballast, Recessed, lens, Wire Guard	4	229	8	1.83	3,298	0.45	806	$113	0	No New Controls	0	0.0%	0	$0
9	1 - Multi-Purpose #9	8760	1x1 Recessed 40 W CFL	1	40	3	0.12	1,051	Existing to Remain	Existing to Remain	1	40	0	0.12	1,051	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	1 - Multi-Purpose #9	1800	2-Lamp Wall Sconce 28 W CFL Covered	2	56	2	0.11	202	Existing to Remain	Existing to Remain	2	56	0	0.11	202	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	1 - Dressing Room #10	1000	3x3 Recessed 4-Lamp F17 T8	4	56	1	0.06	56	Existing to Remain	Existing to Remain	4	56	0	0.06	56	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
11	1- Stage #11	1800	1x4 Utility 2-Lamp 32 W T8	2	58	11	0.64	1,148	Existing to Remain	Existing to Remain	2	58	0	0.64	1,148	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	1 - Dressing Room #12	1000	3x3 Recessed 4-Lamp F17 T8	4	56	1	0.06	56	Existing to Remain	Existing to Remain	4	56	0	0.06	56	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	1 - Office #13	1800	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	392	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	259	0.07	133	$19	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	52	$7
2	1 - Office #14	1800	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	392	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	259	0.07	133	$19	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	52	$7

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
3	1 - Boy's Restroom	2200	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	1	0.06	128	Existing to Remain	Existing to Remain	2	58	0	0.06	128	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	1 - Boy's Restroom	2200	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	480	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	317	0.07	163	$23	0	No New Controls	0	0.0%	0	$0
4	1 - Mechanical Room	1000	1x4 Pendant Wrap Prismatic 2-Lamp 32 W T8	2	58	6	0.35	348	Existing to Remain	Existing to Remain	2	58	0	0.35	348	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
14	1 - Storage Room	1000	200 W Incandescent	1	200	1	0.20	200	Re-Lamp	42w CFL Screw Base	1	42	1	0.04	42	0.16	158	$22	0	No New Controls	0	0.0%	0	$0
6	1 - Gym Boy's Restroom	2200	1x2 Vanity 2-Lamp F17 T8	1	34	1	0.03	75	Existing to Remain	Existing to Remain	1	34	0	0.03	75	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	1 - Gym Boy's Restroom	2200	60 W Incandescent A-Lamp	1	60	2	0.12	264	Re-Lamp	13w CFL Screw Base	1	13	2	0.03	57	0.09	207	$29	0	No New Controls	0	0.0%	0	$0
15	1 - Gym Janitor Closet	1000	Phillips 28 W CFL Screw In	1	28	1	0.03	28	Existing to Remain	Existing to Remain	1	28	0	0.03	28	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	1 - Gym Girl's Restroom	2200	60 W Incandescent A-Lamp	1	60	1	0.06	132	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	29	0.05	103	$14	0	No New Controls	0	0.0%	0	$0
6	1 - Gym Girl's Restroom	2200	1x2 Vanity 2-Lamp F17 T8	1	34	1	0.03	75	Existing to Remain	Existing to Remain	1	34	0	0.03	75	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	1 - Gym Girl's Restroom	2200	3x3 Recessed 4-Lamp F17 T8	4	56	1	0.06	123	Existing to Remain	Existing to Remain	4	56	0	0.06	123	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
16	1 - Mechanical Room Gym	1000	Pendant Mount 40 W CFL	1	40	5	0.20	200	Existing to Remain	Existing to Remain	1	40	0	0.20	200	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
5	1 - Gym Entry	2200	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	4	0.11	246	Existing to Remain	Existing to Remain	1	28	0	0.11	246	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	1 - Corridor	2200	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	17	0.99	2,169	Existing to Remain	Existing to Remain	2	58	0	0.99	2,169	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	1 - Corridor	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	2	0.16	361	Existing to Remain	Existing to Remain	3	82	0	0.16	361	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
17	1 - Corridor	8760	100 W Incandescent A-Lamp	1	100	5	0.50	4,380	Re-Lamp	23w CFL Screw Base	1	23	5	0.12	1,007	0.39	3,373	$472	0	No New Controls	0	0.0%	0	$0
18	1 - Corridor	2200	70 W Low Bay Metal Halide	1	94	3	0.28	620	Existing to Remain	Existing to Remain	1	94	0	0.28	620	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	2 - Classroom 1	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Classroom 2	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Classroom 3	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Classroom 4	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Classroom 5	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Classroom 6	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
2	2 - Classroom 7	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
2	2 - Kindergarten 8	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	12	1.31	1,831	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	12	0.86	1,210	0.44	622	$87	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	242	$34
3	2 - Kindergarten 8 Toilet	1000	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	1	0.06	58	Existing to Remain	Existing to Remain	2	58	0	0.06	58	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
15	2 - Kindergarten 8 Storage	1400	Phillips 28 W CFL Screw In	1	28	1	0.03	39	Existing to Remain	Existing to Remain	1	28	0	0.03	39	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	2 - Small Group 9	1400	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	3	0.17	244	Existing to Remain	Existing to Remain	2	58	0	0.17	244	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	49	$7
2	2 - Teachers' Room 10 &11	1600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	523	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	3	0.22	346	0.11	178	$25	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	69	$10
3	2 - Teachers' Room 10 &11 Toilet	1000	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	1	0.06	58	Existing to Remain	Existing to Remain	2	58	0	0.06	58	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	2 -Classroom 12	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$58	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$23
1	2- Corridor	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	2	0.16	361	Existing to Remain	Existing to Remain	3	82	0	0.16	361	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	2- Corridor	2200	1x4 Surface Wrap Prismatic 2-Lamp 32 W T8	2	58	7	0.41	893	Existing to Remain	Existing to Remain	2	58	0	0.41	893	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	2- Corridor	2200	2x4 Surface Prismatic 3-Lamp 32 W T8	3	82	2	0.16	361	Existing to Remain	Existing to Remain	3	82	0	0.16	361	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	Stair #1	2200	2x4 Surface Prismatic 3-Lamp 32 W T8	3	82	1	0.08	180	Existing to Remain	Existing to Remain	3	82	0	0.08	180	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Stair #1	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	3	0.25	541	Existing to Remain	Existing to Remain	3	82	0	0.25	541	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Stair #2	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	2	0.16	361	Existing to Remain	Existing to Remain	3	82	0	0.16	361	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	Stair #2	2200	2x4 Surface Prismatic 3-Lamp 32 W T8	3	82	2	0.16	361	Existing to Remain	Existing to Remain	3	82	0	0.16	361	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Stair #3	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	3	0.25	541	Existing to Remain	Existing to Remain	3	82	0	0.25	541	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	Stair #3	2200	2x4 Surface Prismatic 3-Lamp 32 W T8	3	82	1	0.08	180	Existing to Remain	Existing to Remain	3	82	0	0.08	180	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
19	Exterior	4000	70 W HPS Wall Pack	70	94	6	0.56	2,256	Replace	Lumark 20W LED Wall Pack XTOR2A-PC2	1	20	6	0.12	480	0.44	1,776	$249	0	No New Controls	0	0.0%	0	$0
20	Exterior	4000	13 W CFL Wall Sconce	1	13	3	0.04	156	Existing to Remain	Existing to Remain	1	13	0	0.04	156	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
	TOTAL					**255**	**24**	**44,006**					**154**	**17**	**30,520**	**6**	**13,486**	**$1,888**			**19**	**4**	**2,747**	**$385**

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Total KW_{AC}	Panel Weight (41.9 lbs)	W/SQFT
School #8	7200	SHARP NU-U235F2	165	17.5	2,894	38.78	44,762	31.4	6,914	13.40

= Proposed Roof PV Layout = Proposed Parking PV Layout

Notes:

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

Project Name: **LGEA Solar PV Project - School #8**
Location: **Clifton, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$244,316
Annual kWh Production	44,762
Annual Energy Cost Reduction	$6,267
Average Annual SREC Revenue	$8,553

Simple Payback: **16.49** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.140**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

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	$0	0	0	0	$0	0	0	0	0
1	$0	44,762	$6,267	$0	$11,191	$14,377	$10,363	($7,283)	($7,283)
2	$0	44,538	$6,455	$0	$11,135	$13,738	$11,002	($7,151)	($14,434)
3	$0	44,315	$6,648	$0	$11,079	$13,059	$11,681	($7,013)	($21,447)
4	$0	44,094	$6,848	$0	$11,023	$12,339	$12,401	($6,869)	($28,316)
5	$0	43,873	$7,053	$452	$10,968	$11,574	$13,166	($7,170)	($35,486)
6	$0	43,654	$7,265	$450	$8,731	$10,762	$13,978	($9,194)	($44,680)
7	$0	43,436	$7,483	$447	$8,687	$9,900	$14,840	($9,018)	($53,698)
8	$0	43,219	$7,707	$445	$8,644	$8,984	$15,756	($8,834)	($62,532)
9	$0	43,003	$7,938	$443	$8,601	$8,013	$16,727	($8,644)	($71,177)
10	$0	42,788	$8,177	$441	$6,418	$6,981	$17,759	($10,586)	($81,763)
11	$0	42,574	$8,422	$439	$6,386	$5,886	$18,855	($10,371)	($92,133)
12	$0	42,361	$8,675	$436	$6,354	$4,723	$20,017	($10,148)	($102,281)
13	$0	42,149	$8,935	$434	$6,322	$3,488	$21,252	($9,917)	($112,198)
14	$0	41,938	$9,203	$432	$4,194	$2,177	$22,563	($11,775)	($123,974)
15	$0	41,728	$9,479	$430	$4,173	$786	$23,955	($11,518)	($135,492)
	Totals:	648,432	$116,553	$4,848	$123,905	$126,786	$244,316	($135,492)	($986,895)

Net Present Value (NPV) **($99,492)**

APPENDIX G

STEAM TRAP REPLACEMENT ANALYSIS

Calculation Assumptions		
Description	**Value**	**Units**
Ann. Gas Usage	9,101	Therm
Less DHW Gas Usage	2,582	Therm
Less Other Gas Usage	0	Therm
Net Heating Gas Usage	6,519	Therm
Est. Steam Production	486,018	lbs
Boiler Efficiency	75%	
Makeup Water	50	°F
Condenstate Return	200	°F
30% Makeup		
Feedwater Enthalpy	155	btu/lb
Steam Enthalpy	1161	btu/lb
Steam Production Conversion	74.55	lb / Th
Hours per Day On	6	
Days per Week	5.5	
Htg Months per Year	6	
Ann. System Operation	858	hrs / yr
Gas Cost ($/Th)	$0.99	
Trap Failure Rate	15.00%	

Building Area	Estimated Quantity
Boiler Plant	1
Classroom UV	15
Radiators	25
TOTAL	41

STEAM TRAP LOSS CALCULATION

Steam Trap Sizes	Trap Orifice Diamter (in)	Steam Loss lb/hr (15 PSI)	Quantity of Traps	Estimated Quantity Failed	Annual Steam Loss lbs	Annual Steam Loss Therm	Cost Savings
1/2" Trap	1/8"	13.70	0	0	0	0	$0
3/4" Trap	3/16"	30.70	40	6	158,044	2,120	$2,099
1" Trap	1/4"	54.70	0	0	0	0	$0
1 -1/2" Trap	3/8"	123.00	1	0	0	0	$0
TOTAL			**41**	**6**	**158,044**	**2,120**	**$2,099**