

**CHERRY HILL
PUBLIC SCHOOLS**

**LOCAL GOVERNMENT
ENERGY AUDIT PROGRAM:
ENERGY AUDIT REPORT**

PREPARED FOR: **CHERRY HILL PUBLIC SCHOOLS
BARCLAY SCHOOL
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TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY	3
II.	INTRODUCTION	8
III.	METHOD OF ANALYSIS.....	9
IV.	HISTORIC ENERGY CONSUMPTION/COST.....	11
	A. ENERGY USAGE / TARIFFS	11
	B. ENERGY USE INDEX (EUI).....	16
	C. EPA ENERGY BENCHMARKING SYSTEM.....	18
V.	FACILITY DESCRIPTION	19
VI.	MAJOR EQUIPMENT LIST	21
VII.	ENERGY CONSERVATION MEASURES.....	22
VIII.	RENEWABLE/DISTRIBUTED ENERGY MEASURES	40
IX.	ENERGY PURCHASING AND PROCUREMENT STRATEGY	43
X.	INSTALLATION FUNDING OPTIONS.....	47
XI.	ADDITIONAL RECOMMENDATIONS.....	50
XII.	ENERGY AUDIT ASSUMPTIONS	51
	Appendix A – ECM Cost & Savings Breakdown	
	Appendix B – New Jersey Smart Start [®] Program Incentives	
	Appendix C – Portfolio Manager “Statement of Energy Performance”	
	Appendix D – Major Equipment List	
	Appendix E – Investment Grade Lighting Audit	
	Appendix F – Renewable / Distributed Energy Measures Calculations	
	Appendix G – Load Imbalance Testing	

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I. EXECUTIVE SUMMARY

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

Cherry Hill
Barclay Early Childhood Center
1220 Winston Way
Cherry Hill, NJ 08034

Municipal Contact Person: James Devereaux
Facility Contact Person: Kevin Larsen

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	\$ 26,487
Natural Gas	\$ 33,457
Total	\$ 59,944

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 $\pm 20\%$. 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	Computer Monitor Replacement	\$3,100	\$896	3.5	44.5%
ECM #2	Condensing Boiler Installation	\$188,166	\$4,887	38.5	-22.1%
ECM #3	Window AC Unit Replacement	\$625	\$73	8.6	16.8%
ECM #4	AC Unit Replacement	\$34,719	\$808	43.0	-65.1%
ECM #5	Low Flow WC & Urinals	\$31,694	\$76	417.0	-92.8%
ECM #6	Lighting Upgrade	\$1,840	\$836	2.2	581.5%
ECM #7	Lighting Controls	\$4,365	\$635	6.9	118.2%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	Solar Photovoltaic System	\$564,880	\$45,028	12.5	99.3%

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

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

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Computer Monitor Replacement	1.6	5,208	0.0
ECM #2	Condensing Boiler Installation	0.0	0	3347.0
ECM #3	Window AC Unit Replacement	0.4	348	0.0
ECM #4	AC Unit Replacement	4.8	3,848	0.0
ECM #5	Low Flow WC & Urinals	0.0	0	0.0
ECM #6	Lighting Upgrade	1.3	4,860	0.0
ECM #7	Lighting Controls	0.0	3,689	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 Photovoltaic System	57.2	86,261	0.0
Notes:	A. Demand Savings for Renewable Energy Measures fluctuate with the seasons and are estimated based on the demand the Photovoltaic System will produce.			

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

- **ECM #1:** Computer Monitor Replacement
- **ECM #3:** Window AC Unit Replacement
- **ECM #6:** Lighting Upgrade
- **ECM #7:** Lighting Controls

The ECMs above represent investments that can be fully funded simply by the energy savings. These ECMs provide instantaneous value for the facility by reducing the operating costs and improving overall function of the building operations. The CRT to LCD monitor replacement provides approximately three to four times less energy consumption while at the same time providing other benefits such as better picture quality, desk space, and overall functionality. Upgrades such as the lighting upgrades not only save energy, but also provide better quality light and help to standardize the district's replacement bulbs and ballasts to simplify replacement orders and maintenance. Lighting Controls provide very fast paybacks when considering many of the spaces are often lit for far more hours than the spaces are occupied. New window AC units that replace older units throughout the school provide energy savings as well as improved noise levels within the classrooms.

In addition to the fast payback ECMs, CEG recommends implementing ECMs with longer paybacks where the equipment is at the end of its rated life and the district is already considering replacement of that equipment. The longer payback ECMs such as AC unit replacements and condensing boilers are sometimes difficult to justify the up-front cost based on the energy savings alone. Installed costs are much easier to justify when looking at the net increase in installed cost for high efficiency equipment versus standard efficiency. It is important to note that the calculations for the equipment replacements is an estimate for the total installed cost without any "avoided costs" included. When equipment is replaced due to end of life cycle, the savings from the purchase of high efficiency equipment over standard efficiency equipment becomes more easily justified. It is highly recommended to utilize the ECMs (including the long payback ECMs) as a standard for energy efficiency for all future equipment replacement at Barclay Early Childhood Development Center.

A solar photovoltaic (PV) system installation was evaluated for this facility. A solar PV system could provide a 6.9% internal rate of return for a \$565,000 project. REMs such as this should be considered as investments of capital for the school district. Inherently solar PV systems do not provide additional savings through "avoided cost," however the investment in renewable can be very financially beneficial none the less. The solar PV system calculation is based on a 100% owner purchased system. If grants become available as well as additional funding, a solar PV system could prove to become an even greater investment for the BOE.

The ECMs and REMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. There are maintenance and operational measures that

can provide significant energy savings and provide immediate benefit. 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 windows and doors.
3. Clean all light fixtures to maximize light output and limit the use of task lighting.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to “screen saver” mode which saves the screen life, not energy.
6. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

Overall, Barclay School is below average with respect to its energy efficiency compared to other schools in the region. The energy star rating for this facility is 13 out of 100 where 50 is representing the average rating for K-12 schools. With the implementation of the above recommended measures Cherry Hill BOE will realize further energy savings and improve its overall performance. If all ECMs under 10 years are implemented (assuming 8 window AC units replaced), the total project would be approximately \$15,000 installed with a simple payback of 4.8 years. This project represents an 11% reduction in electric utility costs, as well as 13.1 Ton reduction of CO₂ pollution annually. It is highly recommended to proceed with the implementation of all ECMs that are financially feasible for the BOE.

II. INTRODUCTION

This comprehensive energy audit covers the 32,300 square foot Barclay Early Childhood Center, which includes the following spaces: General Classrooms, Library, Teacher's Lounge, All-Purpose Room/Kitchen, and Administration Offices.

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/ft²/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:

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

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

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

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

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

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

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. Public Service Electric and Gas (PSE&G) provides electricity to the facility under their General Lighting and Power Service rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. Public Service Electric and Gas (PSE&G) provides natural gas to the facility under the Large Volume Gas Service rate structure. 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.

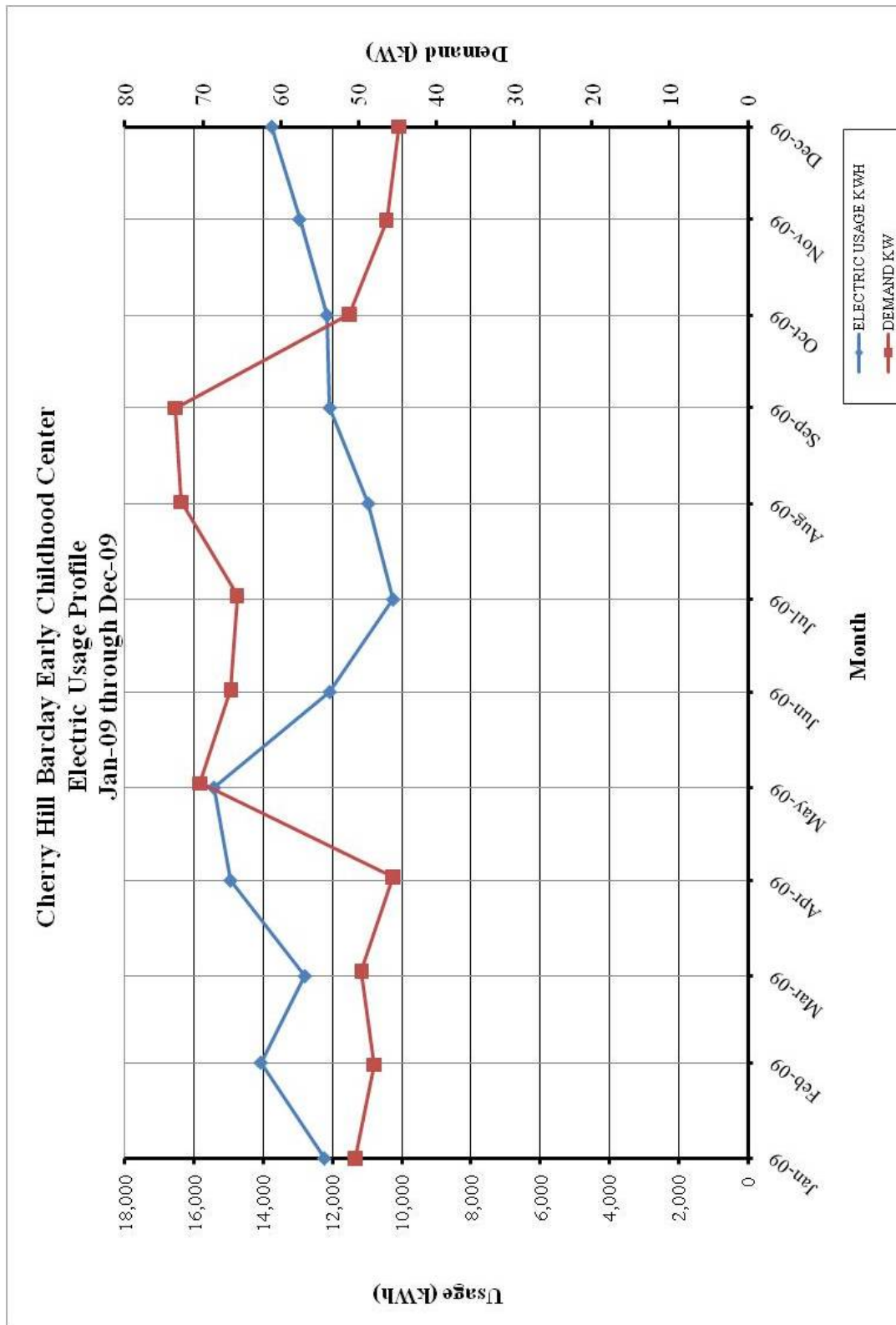
The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

<u>Description</u>	<u>Average</u>
Electricity	17.2¢ / kWh
Natural Gas	\$1.46 / Therm

**Table 3
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: GLP			
Meter No: 728005253			
Account No: 6183605808 (Jan.-March), 6652608006 (April-Dec.)			
Third Party Utility South Jersey Energy Company (May through Dec)			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	12,240	50.4	\$2,025
Feb-09	14,080	48.0	\$2,306
Mar-09	12,800	49.6	\$2,154
Apr-09	14,960	45.6	\$2,361
May-09	15,440	70.4	\$2,346
Jun-09	12,080	66.4	\$2,437
Jul-09	10,240	65.6	\$2,171
Aug-09	10,960	72.8	\$2,359
Sep-09	12,080	73.6	\$2,527
Oct-09	12,160	51.2	\$1,841
Nov-09	12,960	46.4	\$1,929
Dec-09	13,760	44.8	\$2,031
Totals	153,760	73.6 Max	\$26,487
AVERAGE DEMAND		57.1 KW average	
AVERAGE RATE		\$0.172 \$/kWh	

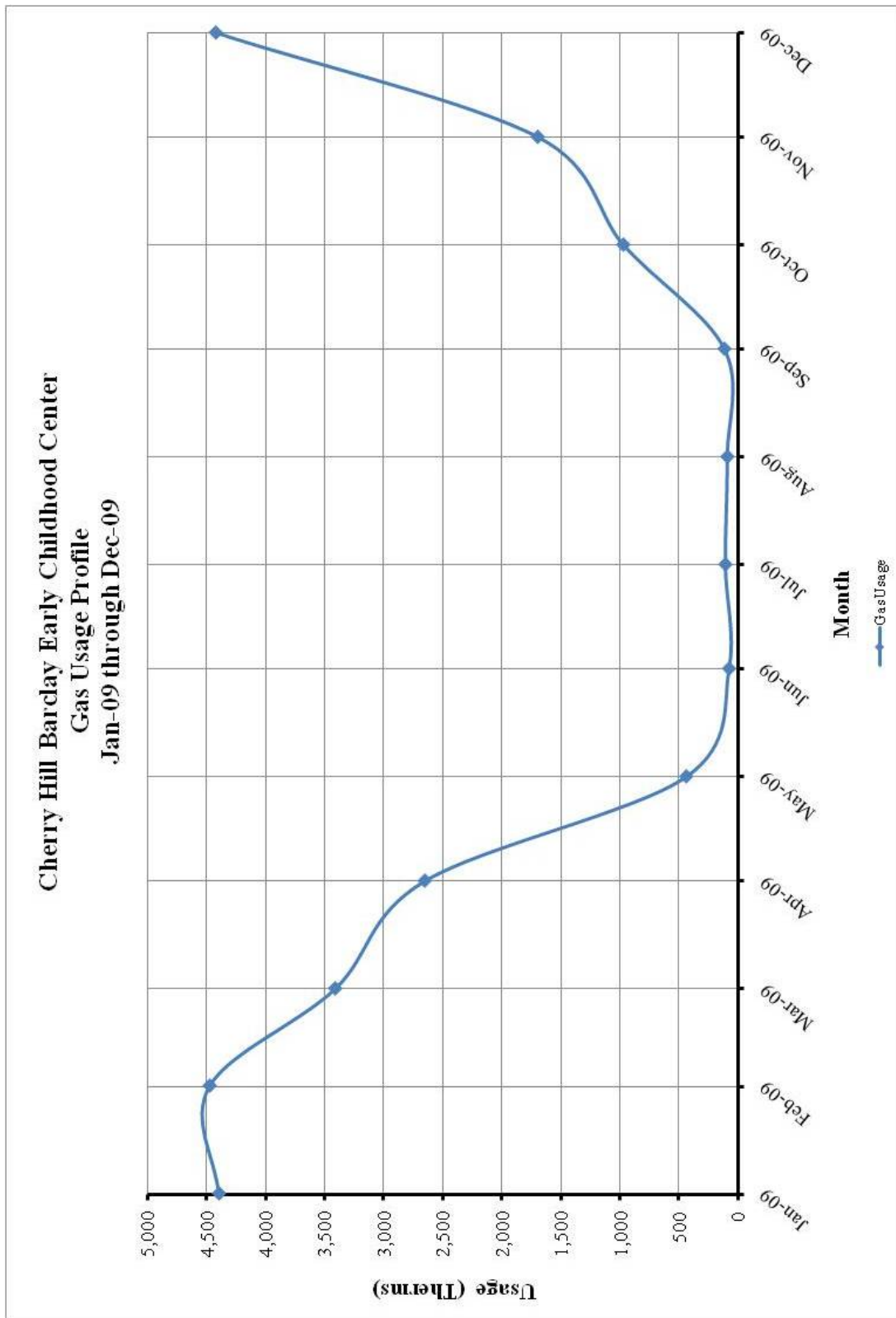
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: LVG		
Meter No: 2599861		
Account No: 6183605808 (Jan.-March), 6652608006 (April-Dec.)		
Third Party Utility Provider: Hess Corporation		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	4,396.30	\$6,711.82
Feb-09	4,475.51	\$6,831.22
Mar-09	3,411.86	\$5,366.93
Apr-09	2,653.43	\$3,513.85
May-09	439.00	\$665.81
Jun-09	75.92	\$192.72
Jul-09	106.72	\$232.91
Aug-09	90.22	\$211.80
Sep-09	114.76	\$243.97
Oct-09	971.52	\$1,362.38
Nov-09	1,696.57	\$2,609.65
Dec-09	4,423.53	\$5,513.89
TOTALS	22,855.33	\$33,456.95
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:

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

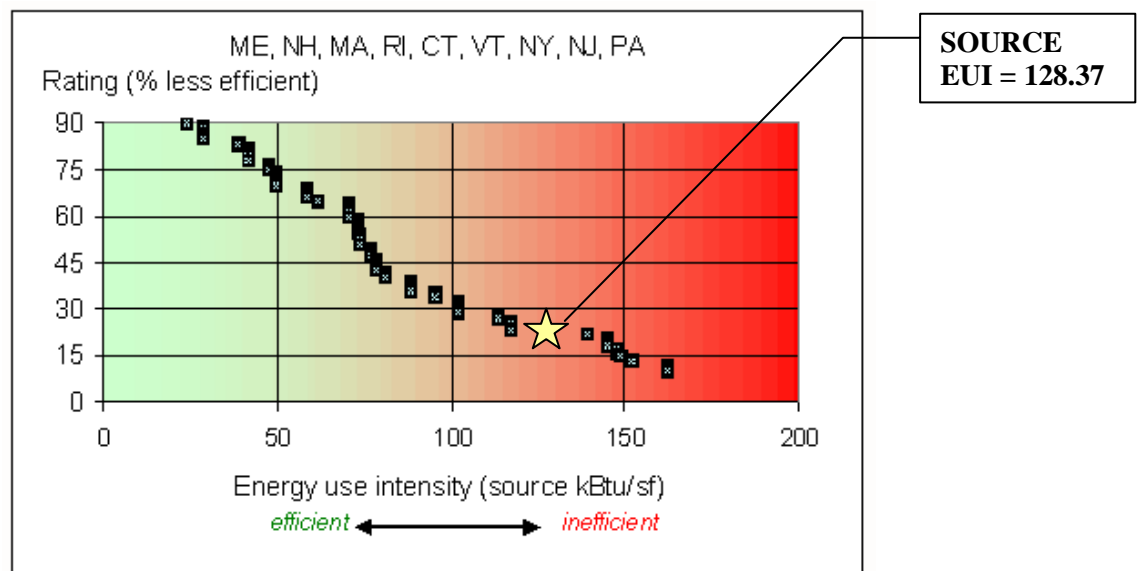
$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Gas Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons	kBtu		
ELECTRIC	153760.0			524,937	3.340	1,753,288
NATURAL GAS		22855.3		2,285,533	1.047	2,392,953
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				2,810,470		4,146,242
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	32,300 SQUARE FEET					
BUILDING SITE EUI	87.01 kBtu/SF/YR					
BUILDING SOURCE EUI	128.37 kBtu/SF/YR					

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

Figure 3
Source Energy Use Intensity Distributions: Elementary Schools



Based on the information compiled for the studied facility, as compared to the national average the energy usage is in the 25th percentile for energy efficiency compared to the baseline data.

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: cherryhillpublicschools

Password: lgeaceg2009

Security Question: "What is your birth city?"

Security Answer: "Cherry Hill"

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
Barclay Early Childhood Center	25	50

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

V. FACILITY DESCRIPTION

The 32,300 SF Barclay Early Childhood Center was built in 1959. No additions have been added to the school since its original construction. The typical hours of operation for this facility are between 7:00 AM and 5:00 PM. The school enrollment is approximately 275 students and 20 teachers. The building envelope consists of block wall construction with brick facing. The insulation within the wall structure is unknown, however it is estimated at a minimum that the wall construction includes an air space. The windows are double-pane, aluminum frame windows installed as part of a recent renovation and are in good condition. The windows include shades to reduce glare and overall heat gain in the cooling season. Weather stripping and overall envelope seals are in good / fair condition. The roof is constructed of a built up roof system. The insulation thickness below the roof membrane is unknown (estimated to be 1-2" thick).

HVAC Systems

The central heating system consists of two 1959 vintage Kewanee firetube boilers (Model No. KP-78S – 2,625 MBH input) that serve the building's heating hot water loop. The boilers are dual fuel capable with oil back-up and were converted to gas in 1994. The boilers require continuous maintenance due to their age and are far beyond their service life of 30 years along with an estimated thermal efficiency of only 60%. The boiler water is circulated throughout the building by two base-mounted end suction pumps made by Bell & Gossett (Model No. 185011). These 3HP pumps are constant volume and in fair condition. The heating system is controlled by a central control system made by Honeywell. The control system was added after the original installation of the heating system and therefore includes a relay panel that converts the DDC control signals to the original pneumatic system. The controls provide schedules for operation of the heating system boilers, pumps, and unit ventilators. The controls also include monitoring of the outside air temperature, air compressor, supply water temperature, etc.

Terminal heating equipment throughout the building includes unit ventilators made by Nesbitt in conjunction with fin-tube baseboard radiators for perimeter heating. The unit ventilators include hot water coils fed from the boiler water loop. The unit ventilators are old and in many cases very dirty from dust and debris. Although the overall condition of these units is poor, there is little energy savings related with their replacement since the heating system efficiency is based on the central boilers and hot water pumps. The All Purpose Room utilizes heating and ventilation air handling units in addition to the unit ventilators with ducted air distribution. These units are in fair condition. The corridors and entrances are heated by ceiling-mounted hot water cabinet heaters controlled by internal and wall thermostats.

Cooling is provided to the Library Room by a split Mitsubishi rooftop condensing unit (Mr. Slim Model No. PU30EK) and an indoor evaporator unit (Model No. PK30FK). The All-Purpose Room is heated/cooled by a Lennox packaged rooftop unit with gas-fired heating and DX coil (Model No. LGA150SH2Y with 235 MBH input for heating). Additional heating is provided by three Nesbitt unit ventilators (one is not functional) and perimeter fin-tube radiators. There are approximately 28 window AC units throughout the facility. The window AC units range from old units in fair/poor condition, to new and in good condition.

Exhaust System

Air is exhausted from the toilet rooms through roof exhausters. Mechanical/electrical rooms, administration suite, and storage rooms have individual roof exhaust fans. Classrooms and corridors are tied into a common relief/exhaust system. The toilets have a small Reznor make-up air unit for heating the outside air along with 100% exhaust.

Domestic Hot Water

Domestic hot water for the kitchen, restrooms and teacher's lounge is provided by a Bradford White Ultra-High Efficiency gas-fired hot water heater with an input of 125 MBH and a 60-gallon capacity. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

Lighting

Typical lighting throughout the building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. A small number of older T12 lamps with magnetic ballasts and several incandescent lamps have been observed and are recommended for replacement.

Electrical Distribution System & Load Imbalance Testing

The electrical service for this facility is provided by a 300 KVA utility pad mount transformer. The transformer supplies 208V, 3PH power. The main power feed is supplied to an 800 amp distribution panel made by GE located on the outside of the building next to the main electric room. The 800 amp GE panel is approximately 10 years old and in good condition. The main distribution panel (MDP) supplies power to all sub-panels throughout the building including a 400Amp distribution panel. The 400 amp distribution panel was originally used to serve the whole facility. The 800 amp MDP was installed in 1999 and currently sub-feeds the 400 amp distribution panel as well as other panels in the building. The 400 amp distribution panel made by GE is old and in poor condition. No efficiency changes are anticipated by the replacement of any electrical distribution equipment in this facility since there are no transformers located in the facility.

208V – 3 Phase power is supplied to the service MDP and distributed to all sub-panels in the building. This voltage is used for all equipment, lighting and plug loads in the building. Equipment loads, lighting, and plug loads are primarily fed through branch panels of various size and manufacturer including Siemens, GE, and Metropolitan. The branch panels range from old and poor condition to relatively new and good condition.

As required by the project scope of work, CEG has performed testing on the facility's existing main power distribution to document any load imbalances utilizing actual field measurements. Field data was recorded from 3:13 PM, June 18th, 2010 through 2:19 PM, June 21st, 2010. The electrical testing data is included in the **Load Imbalance Testing Appendix**. As a result of the testing, it was found that Barclay Early Childhood Development Center has an overall load imbalance of 12% at 24% of the capacity of the incoming utility transformer. See the attached appendix for the testing details.

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: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located in the offices, computer labs, lounges, and classrooms. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that in some conditions the computers were left on and allowed to run 24 / 7, while in other rooms the computers were shut down. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on manufacture's specifications.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the school. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the school employees. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors:	31
Weeks per Yr:	40
Hrs per Week:	84 (12 hrs per day cumulative average)

$$\text{Electric Usage} = \frac{\# \text{ of Computers} \times \text{Monitor Power (W)} \times \text{Operation (Hrs)}}{1000 \left(\frac{\text{W}}{\text{KW}} \right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	31	31	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	84	84	
Operating Weeks per Yr	40	40	
Elec Cost (\$/kWh)	0.172	0.172	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	7,812	2,604	5,208
Energy Cost (\$)	\$1,344	\$448	\$896
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours based on estimated average.		

Installation cost of new monitors is estimated based on current pricing for a 17" LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be \$100.

Installation Costs: # Monitors X Cost per Monitor
 31 Monitors X \$100 per Monitor
 \$3100

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,100
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$3,100
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$896
Total Yearly Savings (\$/Yr):	\$896
Estimated ECM Lifetime (Yr):	5
Simple Payback	3.5
Simple Lifetime ROI	44.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$4,480
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	\$1,003.42

ECM #2: Condensing Boiler Installation

Description:

The central heating system consists of two Kewanee cast iron boilers that serve the building's heating hot water loop. The boilers are dual fuel capable with oil back-up. The existing boiler was installed in 1959 during the original building construction and is 26 years past the service life of a typical cast iron boiler. The boilers require continued maintenance due to their age. With the increased efficiency of the condensing boilers, the savings can be substantial.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The existing boiler's efficiency is approximately 75%, which makes the condensing boiler a 13% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of two condensing gas fired boilers to replace the existing boilers located in the original boiler room. The basis for this ECM is Aerco, Benchmark BMK-3.0LN-2 condensing boiler or equivalent. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

Baseline Hot Water Gas Use: 96.91 Therms (Ave from June & September Gas Use)

Existing Heating Natural Gas: 22,658.39 Therms – (96.91 Therms X 10 Months)
21,689.29 Therms (Sept through June Use - Baseline)

$$\text{Bldg Heat Required} = \text{Existing Nat Gas (Therms)} \times \text{Heating Eff.}(\%) \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg Heat Required (BTU)}}{\text{Heating Eff.}(\%) \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)}$$

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

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boiler	New Condensing Boilers	
Existing Nat Gas (Therms)	22,658	0	
Boiler Efficiency (%)	75%	88%	13%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	1,699	1,699	
Gas Cost (\$/Therm)	1.46	1.46	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	22,658	19,311	3,347
Energy Cost (\$)	\$33,081	\$28,194	\$4,887
COMMENTS:			

Installation cost of the two new 3,000 MBH condensing boilers, demolition, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be \$194,166.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: \$1.00 per MBH.

$$\text{Smart Start}^{\circledR} \text{ Incentive} = 2 \times (\text{Boiler MBH} \times \$1.00) = 2 \times (3,000 \times \$1.00) = \$6,000$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$194,166
NJ Smart Start Equipment Incentive (\$):	\$6,000
Net Installation Cost (\$):	\$188,166
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,887
Total Yearly Savings (\$/Yr):	\$4,887
Estimated ECM Lifetime (Yr):	30
Simple Payback	38.5
Simple Lifetime ROI	-22.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$146,610
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	(\$92,378.27)

ECM #3: Window AC Unit Replacement

Description:

The primary source of cooling for the classrooms and offices throughout the facility are window air conditioners. These units vary in size, capacity and efficiency. The units have been replaced on an “as needed” basis throughout the school district. Some window AC units are old and inefficient. Approximately 30% of the window AC units are estimated to be 10 years old or older.

While some of the units are new, many of the units are significantly older and inefficient. It is recommended to utilize the energy star ratings as a minimum standard for replacing any window unit that is in need of replacement. Existing units that are old, however still working should be considered for replacement if the efficiency is below 8.0 to 8.5 EER. Window AC units that are over 10 years old are very likely to fall in this efficiency range.

This ECM shows the savings and payback for inefficient window air conditioners with new, Energy Star rated units. Qualifying product list can be found at Energy Star website at: www.energystar.gov/products. Although energy star rated products provide a valuable benchmark, it is recommended to consider even higher EER ratings for potential AC unit replacements where available.

Energy Savings Calculations:

Average Summer Electric Cost: \$0.210/kWh (June through September)
 Typical AC Unit Size: 18,000 BTU/HR

Estimated Full Load Hours of Unit: 800/Year

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

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

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

The typical unit size at this facility is 18,000 BTU/HR. The estimated installation cost is estimated to be \$625 per window AC unit (\$475 Materials). This is based on installation of the

window AC units by Cherry Hill staff at a cost of \$100 per unit for small AC units (12,000 BTU/HR and below), and \$150 per units for larger AC units (18,000 BTU/HR and above).

WINDOW AC UNIT CALCULATIONS								
Capacity BTU/H	Full Load Hrs	Typical Eff. (10 Yrs & Older) EER	New Eff. EER	Energy Savings kWh	Demand Savings kW	Cooling Cost Savings	Net Installed Cost	Simple Payback
6,000	800	8.5	10.7	116	0.15	\$24	\$300	12.3
8,000	800	8.5	10.8	160	0.20	\$34	\$350	10.4
12,000	800	8.5	10.8	241	0.30	\$50	\$400	7.9
18,000	800	8.5	10.7	348	0.44	\$73	\$625	8.6
24,000	800	8	9.4	357	0.45	\$75	\$725	9.7

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$625
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$625
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$73
Total Yearly Savings (\$/Yr):	\$73
Estimated ECM Lifetime (Yr):	10
Simple Payback	8.6
Simple Lifetime ROI	16.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$730
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	(\$2.30)

ECM #4: AC Units Replacement

Description:

Portions of the facility are cooled by direct expansion outdoor air cooled condensing systems. Both packaged and split systems were discovered and analyzed. Some of the existing units have surpassed their useful life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a condensing unit is twenty (20) years and fifteen (15) years for a packaged rooftop unit. Other systems are within the useful life but are not as efficient as the latest technology available. Usually, energy savings derived from replacing condensing units does not justify a reasonable payback term. Nevertheless, as the equipment ages, it loses efficiency due to clogged condensers, internal parts wear and deposits of oil and other contaminants on the heat exchangers. Replacing an older condensing unit avoids these issues along with some energy savings.

This energy conservation measure includes replacement of the packaged and split system condensing units on the roof with new equipment at equal capacities with R-410a refrigerant and replacement of the DX coil in the matched air handlers as required accommodating higher pressure refrigerant. The cost of this ECM also includes running new refrigerant lines.

It must be noted that manufacturing of the refrigerant gas R-22 is being phased out gradually. After 2010, HVAC manufacturers will continue to produce condensers and heat pumps using R-22 only from pre-existing R-22 supplies. The availability of R-22 gas will decline and R-22 equipment will be more expensive to maintain. On the other hand, converting most R-22 refrigeration systems into an alternative R-410a system requires replacement of the condensing unit, evaporator coils in the air handling unit, refrigerant pipes and fittings.

The unit's cooling efficiencies and capacities are as shown below. The owner should have a professional engineer verify heating and cooling loads prior to moving forward with this ECM.

AC UNITS			
Tag	Cooling Capacity (Tons)	Existing EER	Proposed EER
RTU-1	12.5	9.6	11.5
AC-1	2.5	10	17.5
AC-2	1.5	10	21

Energy Savings Calculations:

Full Load Cooling Hrs. = 800 hrs/yr.
 Average Cost of Electricity = \$0.210/kWh (June through September)

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

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

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

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

AC UNIT CALCULATIONS								
Tag	Cooling Capacity (Tons)	Energy Savings kWh	Demand Savings kW	Cooling Cost Savings	Total Installed Cost	Incentive	Net Cost	Simple Payback
RTU-1	12.5	2065	2.6	\$434	\$17,925	\$988	\$16,938	39
AC-1	2.5	1029	1.3	\$216	\$9,075	\$230	\$8,845	41
AC-2	1.5	754	0.9	\$158	\$9,075	\$138	\$8,937	56
Total	16.5	3848	4.8	\$808	\$36,075	\$1,356	\$34,720	43

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

$$\text{SmartStart}^{\text{®}} \text{ Incentive} = (\text{Cooling Tons} \times \$/\text{Ton Incentive})$$

AC unit Smart Start Incentives were calculated in the table above for each AC unit.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$36,075
NJ Smart Start Equipment Incentive (\$):	\$1,356
Net Installation Cost (\$):	\$34,719
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$808
Total Yearly Savings (\$/Yr):	\$808
Estimated ECM Lifetime (Yr):	15
Simple Payback	43.0
Simple Lifetime ROI	-65.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$12,120
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	(\$25,073.15)

ECM #5: Low Flow Water Closets & Urinals

Description:

The facility utilizes a mixture of old and new plumbing fixtures. Some of the bathroom groups are more modern than other sections based on upgrades that have taken place. The typical water closet and urinal water consumption only meet the minimum federally required standard for water efficiency. New fixtures are available that use less water than today's requirements and can add up to significant water reduction over a long period.

This ECM includes the replacement of the existing water closets and urinals within the older bathroom groups within the facility. Even though in some cases the new addition only utilize the standard consumption fixtures, this ECM is limiting the replacements to the older fixtures throughout the facility since the newer bathroom groups are relatively new. The estimated usage of the plumbing fixtures is based on floor area of the building served by the older un-renovated bathroom groups throughout the facility.

The proposed retrofit includes installation of low flow flushometer style water closets that utilize 1.28 gallons per flush and ultra-low flushometer style urinals that utilize 1/8 gallons per flush. For the basis of this calculation the LEED rating system was used to estimate the occupancy usage for students within the school. This ECM does not include private bathrooms for teachers use and is based solely on the large public bathrooms used by the students. When water consumption information was not available, the GPF values were estimated for the existing fixtures.

Energy Savings Calculations:

$$\text{Water Cons} = \text{Occupancy} \left(\frac{\text{Days}}{\text{Yr}} \right) \times \text{Use} \left(\frac{\text{Flush}}{\text{Person per Day}} \right) \times \text{Fixture} \left(\frac{\text{Gal}}{\text{Flush}} \right)$$

$$\text{Water Cost} = \frac{\text{Water Cons}(\text{Gallons}) \times \text{Ave Cost} \left(\frac{\$}{1000 \text{ Gal}} \right)}{1000(\text{Gal})}$$

WATER CONSERVATION CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Fixtures	Low Flow Fixtures	
Total Number of Students	275	275	
Estimated % Floor Area Served by Older Bathrooms	100%	100%	
Occupied Days Per Year	180	180	
WC Uses per Day per Person	0.6	0.6	
Urinal Uses per Day per Person	0.4	0.4	
Total Urinal Flushes Per Day	55	55	
Total WC Flushes Per Day	82.5	82.5	
Urinal Gallons Per Flush (GPF)	1.0	0.125	0.875
WC Gallons Per Flush (GPF)	1.6	1.28	0.32
Water Cost (\$/1000)	\$5.70	\$5.70	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Water Consumption (Gal)	33,660	20,246	13,415
Water Cost (\$)	\$192	\$115	\$76
COMMENTS:	*Savings are based on LEED Reference Guide for Green Building Design and Construction - 2009 Edition for WC and Urinal water usage.		

The cost for installation of 20 water closets and 2 low flow urinals throughout the facility is estimated to be \$31,694

There are no Smart Start rebates for installation of low flow plumbing fixtures.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$31,694
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$31,694
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$76
Total Yearly Savings (\$/Yr):	\$76
Estimated ECM Lifetime (Yr):	30
Simple Payback	417.0
Simple Lifetime ROI	-92.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$2,280
Internal Rate of Return (IRR)	-12%
Net Present Value (NPV)	(\$30,204.37)

ECM #6: Lighting Upgrade

Description:

The majority of the lighting at this facility is T-8 bulbs with electronic ballasts. The light fixtures installed in the building is the result of a district wide lighting upgrade to replace existing T-12 fixtures with magnetic ballast approximately 10 years ago. It was discovered that not all fixtures included T-8 bulbs and electronic ballasts. Approximately 10% of the existing fixtures still utilized magnetic ballasts with T-12 bulbs. It was also discovered that in some locations, T-12 bulbs were utilized in conjunction with electronic ballasts. In many cases a mixture of ballasts and bulbs were found within a single room. It is unclear whether the lighting retrofit was incomplete in providing a uniform lighting installation, or whether the mixture of fixture components are a result of the replacement of bulbs and ballasts over the years.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 bulbs. T8 fixtures will provide adequate lighting and will save the owner on electrical costs due to the better performance of the lamp and ballasts. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is 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.

It is important to note that the retrofit does not include the cost to replace the existing T-12 fixtures currently powered by electronic ballasts. There is very minimal energy savings from the retrofit of a T-12 to T-8 fixture where the existing T-12 fixture is powered by an electronic ballast. For the purpose standardizing the district's bulb and ballast maintenance requirements, it is highly recommended to retrofit all light fixtures to T-8 bulbs and corresponding ballasts. This retrofit provides standardization throughout the district, not energy savings.

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 T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\# \text{ of } 1-4 \text{ lamp fixtures} \times \$10)$$

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (2 \text{ fixtures} \times \$10) = \$20$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{repackment \$ per lamp} + \text{Labor \$ per lamp})$$

$$\text{Savings} = (0 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$0$$

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,860
NJ Smart Start Equipment Incentive (\$):	\$20
Net Installation Cost (\$):	\$1,840
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$836
Total Yearly Savings (\$/Yr):	\$836
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.2
Simple Lifetime ROI	581.5%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$12,540
Internal Rate of Return (IRR)	45%
Net Present Value (NPV)	\$8,140.11

Energy Savings Calculations:

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

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

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

$$\begin{aligned} \text{Smart Start}^{\circledR} \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (0 \times \$20) + (24 \times \$35) = \$840 \end{aligned}$$

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$5,205
NJ Smart Start Equipment Incentive (\$):	\$840
Net Installation Cost (\$):	\$4,365
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$635
Total Yearly Savings (\$/Yr):	\$635
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.9
Simple Lifetime ROI	118.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$9,525
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	\$3,215.59

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy measures (REM) for the municipality utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around \$350, this value was used in our financial calculations. This equates to \$0.35 per kWh generated.

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 5000 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 70.61 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 86,261 KWh annually, reducing the overall utility bill by approximately 56% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

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

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

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

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

Direct purchase involves the BOE 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	12.55 Years	6.9%

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

The solar PV system analysis shows that based on the combination of solar renewable energy credits and the savings in electric costs as a result of the system's production, this measure will provide a 6.9% rate of return on the BOE's initial investment. It is recommended to implement the installation of a solar PV system if funding is available and otherwise would be invested at a rate of return less than this measure. Another option to consider is a Power Purchase Agreement

(PPA). A PPA is a source of funding available to entities that have the potential for a solar PV system installation, however lacks the funding to implement. It could be advantageous for the BOE to solicit Power Purchase Agreement (PPA) with a third party who will own, operate, and maintain the system for a contracted period (typically 15 years). During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the BOE at a reduced rate compared to their existing electric rate. This type of agreement allows the BOE to take advantage of renewable energy without the upfront costs of installation. The BOE should consider both options as a viable route for investing in renewable energy technologies.

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

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

A 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. For this report, the facility's energy consumption data was gathered from the school district and presented 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 Overview:

The electricity usage profile demonstrates a typical cooling load profile for school facilities that have partial occupancy during the summer months. Historical usage is relatively steady throughout the year with an average monthly usage of 12,813kWh and an average monthly demand of 57kW. Largest consumption months were February, April, May and December.

The historical usage profile is beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to the relatively flat load profile and reduction in summer load. 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 PSE&G's BGS-FP default rate are recommended.

Natural Gas Overview:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months have low consumption. The average winter (Nov-Mar) consumption is 3,681 therms and the average summer (Apr-Oct) consumption is 636 therms.

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 the 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 a firm, fixed price for 100% of the facilities natural gas requirements are recommended.

Tariff Analysis:

Electricity:

This facility currently receives electric distribution service through PSE&G on rate schedule GLP (General Power and Light) and has contracted a Third Party Supplier (TPS) to provide electric commodity service as of May 2009. For electric supply (generation) service, the client

has a choice to either use PSE&G'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 facility's current BGS-FP average price to compare for PSE&G's GLP rate is \$0.1129/kwh. Based upon the current third party supplier electric rate of \$0.1075/kwh contracted with South Jersey Energy, this facility will yield a projected savings of \$800.00 annually over the BGS-FP default rate with PSE&G.

The utility, PSE&G 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 or natural gas from. PSE&G's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge (kWh and Demand), Societal Benefits Charge (SBC), and Securitization Transition Charge.

Natural Gas:

This facility currently receives natural gas distribution service through PSE&G on rate schedule LVG (Large Volume General Service) and has contracted a Third Party Supplier (TPS) to provide firm natural gas commodity service.

PSE&G 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 natural gas BGSS charges from PSE&G for rate schedule LVG. <http://www.pseg.com/companies/pseandg/schedules/pdf/commodity.pdf>

The 2009 BGSS average monthly price to compare for the facility was \$0.711/therm. Based upon the current natural gas rate of \$0.919/therm identified from the Hess Energy bills, this

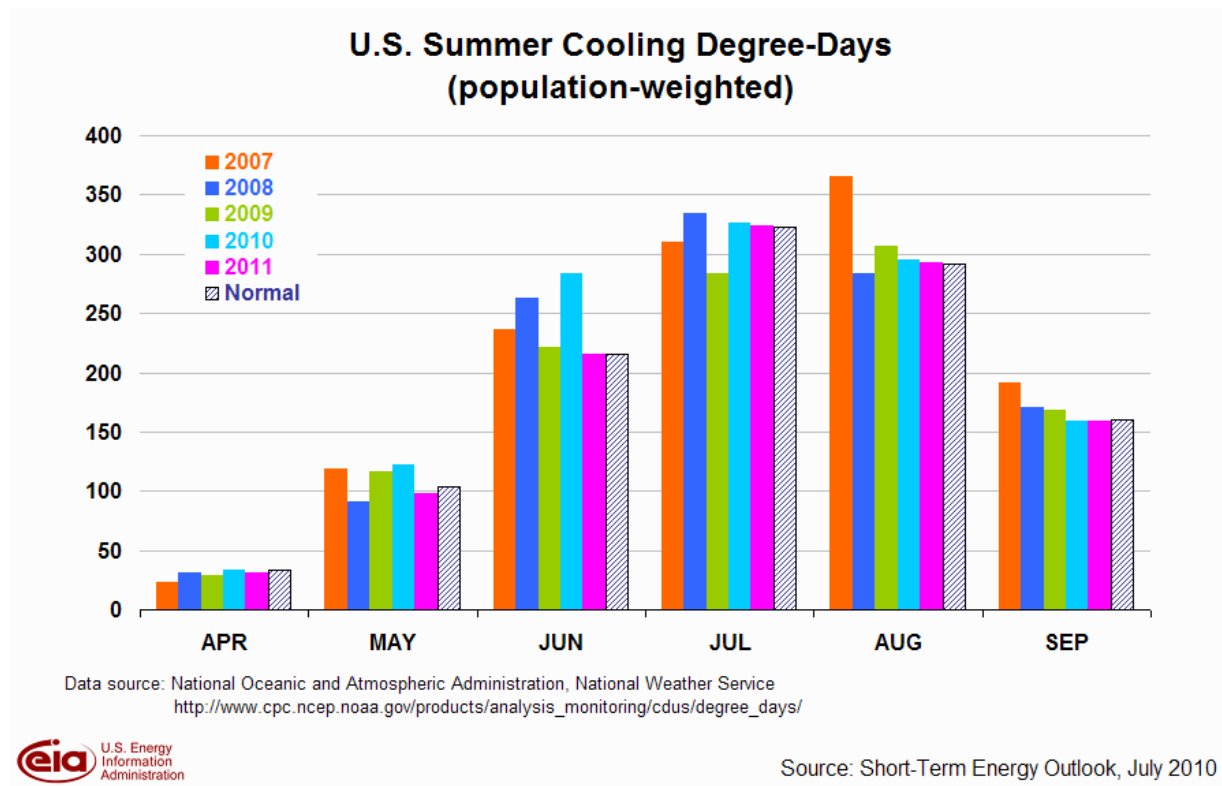
facility paid approximately \$4,700.00 over the BGSS default rate with PSE&G for 2009. Please refer to the recommendations section for additional information.

The utility, PSE&G is 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 or natural gas from. PSE&G’s delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, & Societal Benefits Charge (SBC).

Electric and Natural Gas Commodities 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 (7/7/2010):

U.S. Natural Gas Prices. The Henry Hub spot price averaged \$4.80 per MMBtu in June, \$0.66 per MMBtu higher than the average spot price in May ([Henry Hub Natural Gas Price Chart](#)). The forecast price for the second half of 2010 averages \$4.68 per MM Btu, \$0.32 per MMBtu higher than last month's Outlook. The risk of hurricane outages and the projected reduction in drilling activity combine to strengthen prices through the year. A small decline in U.S. production alongside increased consumption leads to higher prices in 2011; the projected Henry Hub spot price averages \$5.17 per MMBtu.

Uncertainty over future natural gas prices is lower this year compared with last year at this time. Natural gas futures for September 2010 delivery for the 5-day period ending July 1 averaged \$4.77 per MMBtu, and the average implied volatility over the same period was 53 percent. This produced lower and upper bounds for the 95-percent confidence interval of \$3.16 and \$7.18 per MMBtu, respectively. At this time last year the natural gas September 2009 futures contract averaged \$4.00 per MMBtu and implied volatility averaged almost 76 percent. This rendered the lower and upper limits of the 95-percent confidence interval at \$2.25 and \$7.14 per MMBtu.

U.S. Electricity Retail Prices. EIA estimates that residential retail electricity prices during the first half of 2010 were about the same as in the first half of 2009. However, rising fuel costs for natural gas and coal generation are likely to push up retail prices later this year, causing prices over the entire year to grow by about 0.8 percent. Increased fuel costs should push residential prices higher by about 2.7 percent during 2011.

Recommendations:

CEG recommends continuing an aggregated approach for 3rd party commodity supply procurement strategies. The primary area for immediate improvement is seen in the natural gas 3rd party supplier pricing. Natural gas pricing billed by Hess Energy for 2009 usage is approximately \$2.00/mmbtu or \$0.20/therm higher than current market based pricing. New natural gas supply contracts commencing in the near future for 2010-2012 supply requirements, would yield lower pricing as well as provide cost savings verses 2009 Hess Energy billed rates.

CEG does not have detailed information or a copy of the current natural gas supply agreement. Further analysis and review of more recent utility data and the existing 3rd party natural gas supply contract is required for further recommendations. Missing data includes: Start & End date of contract, Contracted price and Product Structure contracted.

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the school district utilize the advisement of 3rd party Energy Consulting Firm experienced in the procurement of retail natural gas and 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

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 pay 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 show at least 15% reduction in the building’s current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

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

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant \$0.10 per square foot between \$5,000 and \$50,000, and not to exceed 50% of the facility’s annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)
 2. Project Implementation – Upon installation of the recommended measures along with the “Substantial Completion Construction Report,” the incentive will grant savings per KWh or Therm based on the program’s rates. Minimum saving must be 15%. (Example \$0.11 / kWh for 15% savings, \$0.12/ kWh for 17% savings, ... and \$1.10 / Therm for 15% savings, \$1.20 / Therm for 17% saving, ...) Increased incentives result from projected savings above 15%.
 3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program’s rates. Minimum savings must be 15%. (Example \$0.07 / kWh for 15% savings, \$0.08/ kWh for 17% savings, ... and \$0.70 / Therm for 15% savings, \$0.80 / Therm for 17% saving, ...) Increased incentives result from verified savings above 15%.
- v. *Direct Install Program* – The New Jersey Clean Energy’s Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 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.
- vi. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to \$20,000 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 and limit the use of task lighting.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to “screen saver” mode which saves the screen life, not energy.
- F. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

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 MeansTM 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

Cherry Hill Barclay 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	NET PRESENT VALUE
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * 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	Computer Monitor Replacement	\$3,100	\$0	\$0	\$3,100	\$896	\$0	\$896	5	\$4,480	\$0	44.5%	3.5	13.68%	\$1,003.42
ECM #2	Condensing Boiler Installation	\$91,285	\$102,881	\$6,000	\$188,166	\$4,887	\$0	\$4,887	30	\$146,610	\$0	-22.1%	38.5	-1.54%	(\$92,378.27)
ECM #3	Window AC Unit Replacement	\$475	\$150	\$0	\$625	\$73	\$0	\$73	10	\$730	\$0	16.8%	8.6	2.93%	(\$2.30)
ECM #4	AC Unit Replacement	\$17,500	\$18,575	\$1,356	\$34,719	\$808	\$0	\$808	15	\$12,120	\$0	-65.1%	43.0	-10.97%	(\$25,073.15)
ECM #5	Low Flow WC & Urinals	\$13,700	\$17,994	\$0	\$31,694	\$76	\$0	\$76	30	\$2,280	\$0	-92.8%	417.0	-12.37%	(\$30,204.37)
ECM #6	Lighting Upgrade	\$930	\$930	\$20	\$1,840	\$836	\$0	\$836	15	\$12,540	\$0	581.5%	2.2	45.27%	\$8,140.11
ECM #7	Lighting Controls	\$2,603	\$2,603	\$840	\$4,365	\$635	\$0	\$635	15	\$9,525	\$0	118.2%	6.9	11.83%	\$3,215.59
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar Photovoltaic System	\$564,880	\$0	\$0	\$564,880	\$14,837	\$30,191	\$45,028	25	\$1,125,700	\$754,775	99.3%	12.5	6.20%	\$219,199.21

- 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.



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SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Premium Motors

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

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	\$15 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	\$75 per fixture controlled
Daylight Dimming	\$75 per fixture controlled
Daylight Dimming - office	\$50 per fixture controlled

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Cherry Hill Barclay Early Childhood Center

Building ID: 2348631

For 12-month Period Ending: December 31, 2009¹

Date SEP becomes ineligible: N/A

Date SEP Generated: August 06, 2010

Facility

Cherry Hill Barclay Early Childhood Center
1220 Winston Way
Cherry Hill, NJ 08034

Facility Owner

Cherry Hill Public Schools
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Primary Contact for this Facility

James Devereaux
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Year Built: 1959

Gross Floor Area (ft²): 32,300

Energy Performance Rating² (1-100) 25

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	524,629
Natural Gas (kBtu) ⁴	2,285,534
Total Energy (kBtu)	2,810,163

Energy Intensity⁵

Site (kBtu/ft ² /yr)	87
Source (kBtu/ft ² /yr)	128

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	201
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Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	69
National Average Source EUI	102
% Difference from National Average Source EUI	26%
Building Type	K-12 School

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

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.

Certifying Professional

Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) 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	<input checked="" type="checkbox"/>
Building Name	Cherry Hill Barclay Early Childhood Center	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	K-12 School	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	1220 Winston Way, Cherry Hill, NJ 08034	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Barclay Early Childhood Center (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	32,300 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.		<input type="checkbox"/>
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.		<input type="checkbox"/>
Number of PCs	10	Is this the number of personal computers in the K12 School?		<input type="checkbox"/>
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.		<input type="checkbox"/>
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".		<input type="checkbox"/>
Percent Cooled	50 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		<input type="checkbox"/>

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'.		<input type="checkbox"/>
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ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & 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))
12/01/2009	12/31/2009	13,760.00
11/01/2009	11/30/2009	12,960.00
10/01/2009	10/31/2009	12,160.00
09/01/2009	09/30/2009	12,080.00
08/01/2009	08/31/2009	10,960.00
07/01/2009	07/31/2009	10,240.00
06/01/2009	06/30/2009	12,080.00
05/01/2009	05/31/2009	15,440.00
04/01/2009	04/30/2009	14,960.00
03/01/2009	03/31/2009	12,800.00
02/01/2009	02/28/2009	14,080.00
01/01/2009	01/31/2009	12,240.00
Electric Consumption (kWh (thousand Watt-hours))		153,760.00
Electric Consumption (kBtu (thousand Btu))		524,629.12
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		524,629.12
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	4,423.53
11/01/2009	11/30/2009	1,696.57
10/01/2009	10/31/2009	971.52
09/01/2009	09/30/2009	114.76
08/01/2009	08/31/2009	90.22
07/01/2009	07/31/2009	106.72
06/01/2009	06/30/2009	75.92
05/01/2009	05/31/2009	439.00
04/01/2009	04/30/2009	2,653.43
03/01/2009	03/31/2009	3,411.86

02/01/2009	02/28/2009	4,475.51
01/01/2009	01/31/2009	4,396.30
Gas Consumption (therms)		22,855.34
Gas Consumption (kBtu (thousand Btu))		2,285,534.00
Total Natural Gas Consumption (kBtu (thousand Btu))		2,285,534.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

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

Cherry Hill Barclay Early Childhood Center
1220 Winston Way
Cherry Hill, NJ 08034

Facility Owner

Cherry Hill Public Schools
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Primary Contact for this Facility

James Devereaux
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

General Information

Cherry Hill Barclay Early Childhood Center	
Gross Floor Area Excluding Parking: (ft ²)	32,300
Year Built	1959
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Barclay Early Childhood Center	
Space Type	K-12 School
Gross Floor Area(ft ²)	32,300
Open Weekends?	No
Number of PCs	10
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	50
Percent Heated	100
Months ^o	10
High School?	No
School District ^o	Cherry Hill

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 12/31/2009)	Baseline (Ending Date 12/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	25	25	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	87	87	54	N/A	69
Source (kBtu/ft ²)	128	128	80	N/A	102
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 ₂ e/year	201	201	125	N/A	160
kgCO ₂ e/ft ² /year	6	6	4	N/A	5

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

Notes:

o - This attribute is optional.

d - A default value has been supplied by Portfolio Manager.

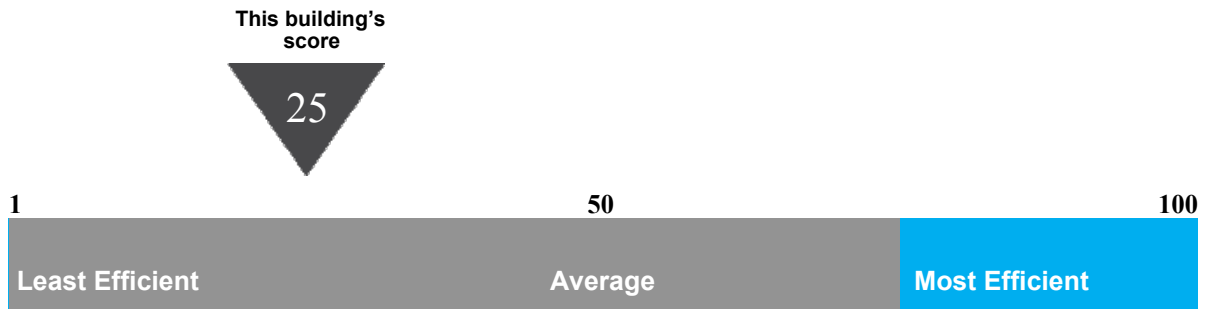
Statement of Energy Performance

2009

Cherry Hill Barclay Early Childhood Center
1220 Winston Way
Cherry Hill, NJ 08034

Portfolio Manager Building ID: 2348631

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 128 kBtu per square foot per year.*

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

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

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

Date of certification



MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Barclay School

Boilers

Tag	B-1 & 2		
Unit Type	Firetube Boilers		
Qty	2		
Location	Boiler Room		
Area Served	Entire School		
Manufacturer	Kewanee		
Model #	KP-78-S		
Serial #	K8807 K8810		
Input Capacity (MBH)	2,625		
Rated Output Capacity (MBH)	1,575		
Approx. Efficiency %	60% (Estimated)		
Fuel	Nat Gas		
Year	1959		
Ashrae Service Life	25		
Remaining Life	(26)		
Comments	Kewanee no longer produces boilers.		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Barclay School

Pumps

Tag	P-1 & P-2		
Unit Type	Centrifugal		
Qty	2		
Location	Boiler Room		
Area Served	Entire School		
Manufacturer	Bell & Gossett		
Model #	185011		
Serial #	N/A		
Horse Power	3		
Flow	N/A		
Motor Info	Baldor (1725 RPM)		
Electrical Power	60% (Estimated)		
RPM	1725		
Motor Efficiency %	86.5%		
Year	N/A		
Ashrae Service Life	20		
Remaining Life			
Comments	Motor frame 182T		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Barclay School

Domestic Hot Water Heaters

Tag	HWH-		
Unit Type	Tank Type HWH		
Qty	1		
Location	Original Boiler Room		
Area Served	Entire School		
Manufacturer	Bradford White		
Model #	EF60T125E3N2		
Serial #	BK6839627		
Size (Gallons)	60		
Input Capacity (MBH/KW)	1,575		
Recovery (Gal/Hr)	145.5		
Efficiency %	80%		
Fuel	Nat Gas		
Year	2006		
Ashrae Service Life	15		
Remaining Life	11		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Barclay School

HVAC Units

Tag	AC	MAU-	UV-
Unit Type	Rooftop AC	Make Up Air Unit	Unit Ventilators
Qty	1	1	1 per classroom
Location	Roof	Roof	classrooms
Area Served	Entire School	Toilets	classroom
Manufacturer	Lennox	Reznor	Nesbitt
Model #	LGA150SH2Y	N/A	N/A
Serial #	5601H03468	N/A	N/A
Cooling Type	DX	None	None
Cooling Capacity (Tons)	1575	N/A	N/A
Cooling Efficiency (SEER/EER)	SEER=9.5	N/A	N/A
Heating Type	Gas Heat Exchanger	Gas Heat Exchanger	Hot Water Coil
Heating Input (MBH)	235	N/A	N/A
Efficiency	80%	N/A	N/A
Fuel	Nat Gas	Nat Gas	N/A
Year	2000	N/A	1959 (Est)
Ashrae Service Life	15	15	20
Remaining Life	5		(31)
Comments	Possible water penetration issues (to be confirmed) Unit has hot gas reheat	Heating Only	Extremely Poor Condition

HVAC Units

Tag	AC-	CU-	AC-
Unit Type	Window AC Unit	Condensing Unit	Split System AC
Qty	28	1	1
Location	Classrooms & Main Office	Rooftop	Library
Area Served	Classrooms & Main Office	Library	Library
Manufacturer	Goodman	Mitsubishi Electric	Mitsubishi Electric
Model #	RC18090C2D	PU30EK	PK30FK Indoor Unit
Serial #	N/A	N/A	N/A
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	1 1/2	2.5	2 1/2
Cooling Efficiency (SEER/EER)	EER=8.0 to EER=10.7		N/A
Heating Type	NA	N/A	N/A
Heating Input (MBH)	NA	N/A	N/A
Efficiency	NA	N/A	N/A
Fuel	NA	N/A	N/A
Year	2000	2000	2000
Ashrae Service Life	15	15	15
Remaining Life	5	5	5
Comments			

HVAC Units

Tag	AC-		
Unit Type	Split System AC		
Qty	1		
Location	Roof		
Area Served	Rm 118 Office		
Manufacturer	Mitsubishi		
Model #	MUM18NW		
Serial #	N/A		
Cooling Type	DX		
Cooling Capacity (Tons)	1 1/2		
Cooling Efficiency (SEER/EER)	N/A		
Heating Type	N/A		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Year	N/A		
Ashrae Service Life	15		
Remaining Life			
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C09182
Project: Barclay School
1220 Winston Way
Cherry Hill, NJ
Sq. Ft. 32,300

Barclay

KWH COST: \$0.172

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
211.11	Classroom 101	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1,560.0	\$268.32	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 102	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1,560.0	\$268.32	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 104	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1,560.0	\$268.32	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 106	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1,560.0	\$268.32	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 103	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	\$241.49	18	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 105	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1,482.0	\$254.90	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 107	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1,482.0	\$254.90	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 110	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	\$241.49	18	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 109	2600	17	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.51	1,326.0	\$228.07	17	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Boy's Restroom	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.23	603.2	\$103.75	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Kitchen	2600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	156.0	\$26.83	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Handicap Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78.0	\$13.42	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 112	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1,560.0	\$268.32	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
61	APR	2600	20	3	2x2 3 Lamp, 40w Biax	128	2.56	6,656.0	\$1,144.83	20	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
122.11	APR Storage	800	2	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	124.8	\$21.47	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	92.8	\$15.96	\$100.00	\$200.00	0.04	32	\$5.50	36.34
227.25	Corridor	3600	18	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	58	1.04	3,758.4	\$646.44	18	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Classroom	2600	19	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	1.10	2,865.2	\$492.81	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1,482.0	\$254.90	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
61	Stage	1300	6	3	2x2 3 Lamp, 40w Biax	128	0.77	998.4	\$171.72	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Main Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312.0	\$53.66	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

222.21	Principal's Office	2600	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	\$77.81	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Nurse	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
62	Nurse Restroom	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260.0	\$44.72	1	1	26w CFL Lamp	26	0.03	67.6	\$11.63	\$20.00	\$20.00	0.07	192.4	\$33.09	0.60
62	Restroom #2	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260.0	\$44.72	1	1	26w CFL Lamp	26	0.03	67.6	\$11.63	\$20.00	\$20.00	0.07	192.4	\$33.09	0.60
222.21	Breakroom	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
62	Restroom #1	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260.0	\$44.72	1	1	26w CFL Lamp	26	0.03	67.6	\$11.63	\$20.00	\$20.00	0.07	192.4	\$33.09	0.60
211.11	Boiler Room	4200	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	882.0	\$151.70	7	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60	Faculty Restroom	1300	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	44.2	\$7.60	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.25	Lobby	3600	6	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	58	0.35	1,252.8	\$215.48	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Library	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Maintenance	4200	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	378.0	\$65.02	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Classroom 118	2600	8	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.46	1,206.4	\$207.50	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Office 118	2600	4	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	603.2	\$103.75	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 122	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1,950.0	\$335.40	25	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 111 w/ Restroom	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1,482.0	\$254.90	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 113 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 124 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 126 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 115 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 117 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

211.11	Classroom 128 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1,716.0	\$295.15	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Corridor	3600	14	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.42	1,512.0	\$260.06	14	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60	Vestibule	3600	3	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.10	367.2	\$63.16	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
706	Exterior	4200	6	1	70w HPS Wallpack	92	0.55	2,318.4	\$398.76	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
624		4200	12	1	Single Head Flood, 150w PAR Lamp	150	1.80	7,560.0	\$1,300.32	12	1	100w MH Flood	115	1.38	5796	\$996.91	\$120.00	\$1,440.00	0.42	1764	\$303.41	4.75
552		4200	3	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.30	1,260.0	\$216.72	3	1	26w CFL Lamp	26	0.08	327.6	\$56.35	\$20.00	\$60.00	0.22	932.4	\$160.37	0.37
551		4200	5	1	Surface Mnt. Down Light, 100w A19 Lamp	100	0.50	2,100.0	\$361.20	5	1	26w CFL Lamp	26	0.13	546	\$93.91	\$20.00	\$100.00	0.37	1554	\$267.29	0.37
		Totals		565	69			24.46	69,710	\$11,990	565	8			1.8	6,965	\$1,198		\$1,860	1.3	4,860	\$836

CEG Job #: 9C09182
Project: Barclay School
Address: 1220 Winston Way
Cherry Hill, NJ
Building SF: 32,300

Barclay

KWH COST: \$0.172

ECM #7: Lighting Controls

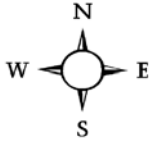
EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback	
211.11	Classroom 101	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1560	\$268.32	20	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.12	10%	1404	\$241.49	\$225.00	\$225.00	0.48	156	\$26.83	8.39	
211.11	Classroom 102	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1560	\$268.32	20	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.12	10%	1404	\$241.49	\$225.00	\$225.00	0.48	156	\$26.83	8.39	
211.11	Classroom 104	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1560	\$268.32	20	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.12	10%	1404	\$241.49	\$225.00	\$225.00	0.48	156	\$26.83	8.39	
211.11	Classroom 106	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1560	\$268.32	20	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.12	10%	1404	\$241.49	\$225.00	\$225.00	0.48	156	\$26.83	8.39	
211.11	Classroom 103	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	\$241.49	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.11	10%	1263.6	\$217.34	\$225.00	\$225.00	0.43	140.4	\$24.15	9.32	
211.11	Classroom 105	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1482	\$254.90	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.11	10%	1333.8	\$229.41	\$225.00	\$225.00	0.46	148.2	\$25.49	8.83	
211.11	Classroom 107	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1482	\$254.90	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.11	10%	1333.8	\$229.41	\$225.00	\$225.00	0.46	148.2	\$25.49	8.83	
211.11	Classroom 110	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	\$241.49	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.11	10%	1263.6	\$217.34	\$225.00	\$225.00	0.43	140.4	\$24.15	9.32	
211.11	Classroom 109	2600	17	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.51	1326	\$228.07	17	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.10	10%	1193.4	\$205.26	\$225.00	\$225.00	0.41	132.6	\$22.81	9.87	
221.11	Boy's Restroom	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.23	603.2	\$103.75	4	0	No Change	58	0.05	0%	603.2	\$103.75	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.11	Kitchen	2600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	156	\$26.83	2	0	No Change	30	0.01	0%	156	\$26.83	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.11	Handicap Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78	\$13.42	1	0	No Change	30	0.01	0%	78	\$13.42	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.11	Classroom 112	2600	20	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.60	1560	\$268.32	20	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswith or equal)	30	0.12	10%	1404	\$241.49	\$225.00	\$225.00	0.48	156	\$26.83	8.39	
61	APR	2600	20	3	2x2 3 Lamp, 40w Biax	128	2.56	6656	\$1,144.83	20	0	No Change	128	0.51	0%	6656	\$1,144.83	\$0.00	\$0.00	0.00	0	\$0.00	0.00	

122.11	APR Storage	800	2	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	124.8	\$21.47	2	0	No Change	78	0.03	0%	124.8	\$21.47	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.25	Corridor	3600	18	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	58	1.04	3758.4	\$646.44	18	0	No Change	58	0.21	0%	3758.4	\$646.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Classroom	2600	19	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	1.10	2865.2	\$492.81	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	58	0.22	10%	2578.68	\$443.53	\$225.00	\$225.00	0.88	286.52	\$49.28	4.57
211.11	Classroom	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1482	\$254.90	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1333.8	\$229.41	\$225.00	\$225.00	0.46	148.2	\$25.49	8.83
61	Stage	1300	6	3	2x2 3 Lamp, 40w Biax	128	0.77	998.4	\$171.72	6	0	No Change	128	0.15	0%	998.4	\$171.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Main Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312	\$53.66	4	0	No Change	30	0.02	0%	312	\$53.66	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Principal's Office	2600	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	\$77.81	3	0	No Change	58	0.03	0%	452.4	\$77.81	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Nurse	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	58	0.07	10%	814.32	\$140.06	\$160.00	\$160.00	0.28	90.48	\$15.56	10.28
62	Nurse Restroom	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260	\$44.72	1	0	No Change	100	0.02	0%	260	\$44.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
62	Restroom #2	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260	\$44.72	1	0	No Change	100	0.02	0%	260	\$44.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Breakroom	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	58	0.07	10%	814.32	\$140.06	\$160.00	\$160.00	0.28	90.48	\$15.56	10.28
62	Restroom #1	2600	1	1	Fan/Light Combo, (1) 100w Lamp	100	0.10	260	\$44.72	1	0	No Change	100	0.02	0%	260	\$44.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Boiler Room	4200	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	882	\$151.70	7	0	No Change	30	0.04	0%	882	\$151.70	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60	Faculty Restroom	1300	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	44.2	\$7.60	1	0	No Change	34	0.01	0%	44.2	\$7.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.25	Lobby	3600	6	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., White Diffuser	58	0.35	1252.8	\$215.48	6	0	No Change	58	0.07	0%	1252.8	\$215.48	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Library	2600	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.35	904.8	\$155.63	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	58	0.07	10%	814.32	\$140.06	\$160.00	\$160.00	0.28	90.48	\$15.56	10.28
211.11	Maintenance	4200	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	378	\$65.02	3	0	No Change	30	0.02	0%	378	\$65.02	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Classroom 118	2600	8	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.46	1206.4	\$207.50	8	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	58	0.09	10%	1085.76	\$186.75	\$225.00	\$225.00	0.37	120.64	\$20.75	10.84
222.21	Office 118	2600	4	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	603.2	\$103.75	4	0	No Change	58	0.05	0%	603.2	\$103.75	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 122	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1950	\$335.40	25	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.15	10%	1755	\$301.86	\$225.00	\$225.00	0.60	195	\$33.54	6.71

211.11	Classroom 111 w/ Restroom	2600	19	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.57	1482	\$254.90	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1333.8	\$229.41	\$225.00	\$225.00	0.46	148.2	\$25.49	8.83
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 113 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 124 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 126 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 115 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 117 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Classroom 128 w/ Restroom	2600	22	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.66	1716	\$295.15	22	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.13	10%	1544.4	\$265.64	\$225.00	\$225.00	0.53	171.6	\$29.52	7.62
60		2600	1	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.03	88.4	\$15.20	1	0	No Change	34	0.01	0%	88.4	\$15.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	Corridor	3600	14	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.42	1512	\$260.06	14	0	No Change	30	0.08	0%	1512	\$260.06	\$0.00	\$0.00	0.00	0	\$0.00	0.00
60	Vestibule	3600	3	1	15" Round Ceiling Mnt., 32w Circuline Lamp	34	0.10	367.2	\$63.16	3	0	No Change	34	0.02	0%	367.2	\$63.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
706	Exterior	4200	6	1	70w HPS Wallpack	92	0.55	2318.4	\$398.76	6	0	No Change	92	0.11	0%	2318.4	\$398.76	\$0.00	\$0.00	0.00	0	\$0.00	0.00
624		4200	12	1	Single Head Flood, 150w PAR Lamp	150	1.80	7560	\$1,300.32	12	0	No Change	150	0.36	0%	7560	\$1,300.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00
552		4200	3	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.30	1260	\$216.72	3	0	No Change	100	0.06	0%	1260	\$216.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
551		4200	5	1	Surface Mnt. Down Light, 100w A19 Lamp	100	0.50	2100	\$361.20	5	0	No Change	100	0.10	0%	2100	\$361.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
0	Totals		565	69			24.5	69,709.8	\$11,990	565	24		0	4.9		66,020.4	\$11,355.51		\$5,205	11.35	3,689	\$635	8.20

Project Name: LGEA Solar PV Project - Barclay School							
Location: Cherry Hill, NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$564,880						
Annual kWh Production	86,261						
Annual Energy Cost Reduction	\$14,837						
Annual SREC Revenue	\$30,191						
First Cost Premium	\$564,880						
Simple Payback:	12.55						Years
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.172			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	\$564,880	0	0	0	\$0	(564,880)	0
1	\$0	86,261	\$14,837	\$0	\$30,191	\$45,028	(\$519,852)
2	\$0	85,830	\$15,282	\$0	\$30,040	\$45,322	(\$474,529)
3	\$0	85,401	\$15,740	\$0	\$29,890	\$45,631	(\$428,899)
4	\$0	84,974	\$16,213	\$0	\$29,741	\$45,953	(\$382,945)
5	\$0	84,549	\$16,699	\$871	\$29,592	\$45,420	(\$337,525)
6	\$0	84,126	\$17,200	\$866	\$29,444	\$45,778	(\$291,747)
7	\$0	83,705	\$17,716	\$862	\$29,297	\$46,151	(\$245,597)
8	\$0	83,287	\$18,248	\$858	\$29,150	\$46,540	(\$199,057)
9	\$0	82,870	\$18,795	\$854	\$29,005	\$46,946	(\$152,111)
10	\$0	82,456	\$19,359	\$849	\$28,860	\$47,369	(\$104,742)
11	\$0	82,044	\$19,940	\$845	\$28,715	\$47,810	(\$56,932)
12	\$0	81,633	\$20,538	\$841	\$28,572	\$48,269	(\$8,663)
13	\$0	81,225	\$21,154	\$837	\$28,429	\$48,746	\$40,083
14	\$0	80,819	\$21,788	\$832	\$28,287	\$49,243	\$89,326
15	\$0	80,415	\$22,442	\$828	\$28,145	\$49,759	\$139,085
16	\$0	80,013	\$23,115	\$824	\$28,005	\$50,296	\$189,381
17	\$0	79,613	\$23,809	\$820	\$27,865	\$50,853	\$240,234
18	\$0	79,215	\$24,523	\$816	\$27,725	\$51,432	\$291,666
19	\$0	78,819	\$25,259	\$812	\$27,587	\$52,034	\$343,700
20	\$0	78,425	\$26,017	\$808	\$27,449	\$52,657	\$396,357
21	\$1	78,033	\$26,797	\$804	\$27,311	\$53,305	\$449,662
22	\$2	77,642	\$27,601	\$800	\$27,175	\$53,976	\$503,638
23	\$3	77,254	\$28,429	\$796	\$27,039	\$54,672	\$558,311
24	\$4	76,868	\$29,282	\$792	\$26,904	\$55,394	\$613,705
25	\$5	76,484	\$30,160	\$788	\$26,769	\$56,142	\$669,846
Totals:		2,031,960	\$540,942	\$17,402	\$711,186	\$1,234,726	\$1,322,395
Net Present Value (NPV)						\$669,871	
Internal Rate of Return (IRR)						6.9%	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Barclay School	5,000	Sunpower SPR230	307	14.7	4,514	70.61	86,261	10,131	15.64



AC Energy & Cost Savings



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	70.6 kW
DC to AC Derate Factor:	0.810
AC Rating:	57.2 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.58	4587	788.96
2	3.33	5416	931.55
3	4.31	7564	1301.01
4	5.20	8616	1481.95
5	5.85	9840	1692.48
6	6.14	9578	1647.42
7	6.06	9676	1664.27
8	5.54	8892	1529.42
9	4.85	7645	1314.94
10	3.76	6243	1073.80
11	2.65	4374	752.33
12	2.23	3830	658.76
Year	4.38	86261	14836.89

= Proposed PV Layout

Note: Estimated kWh based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

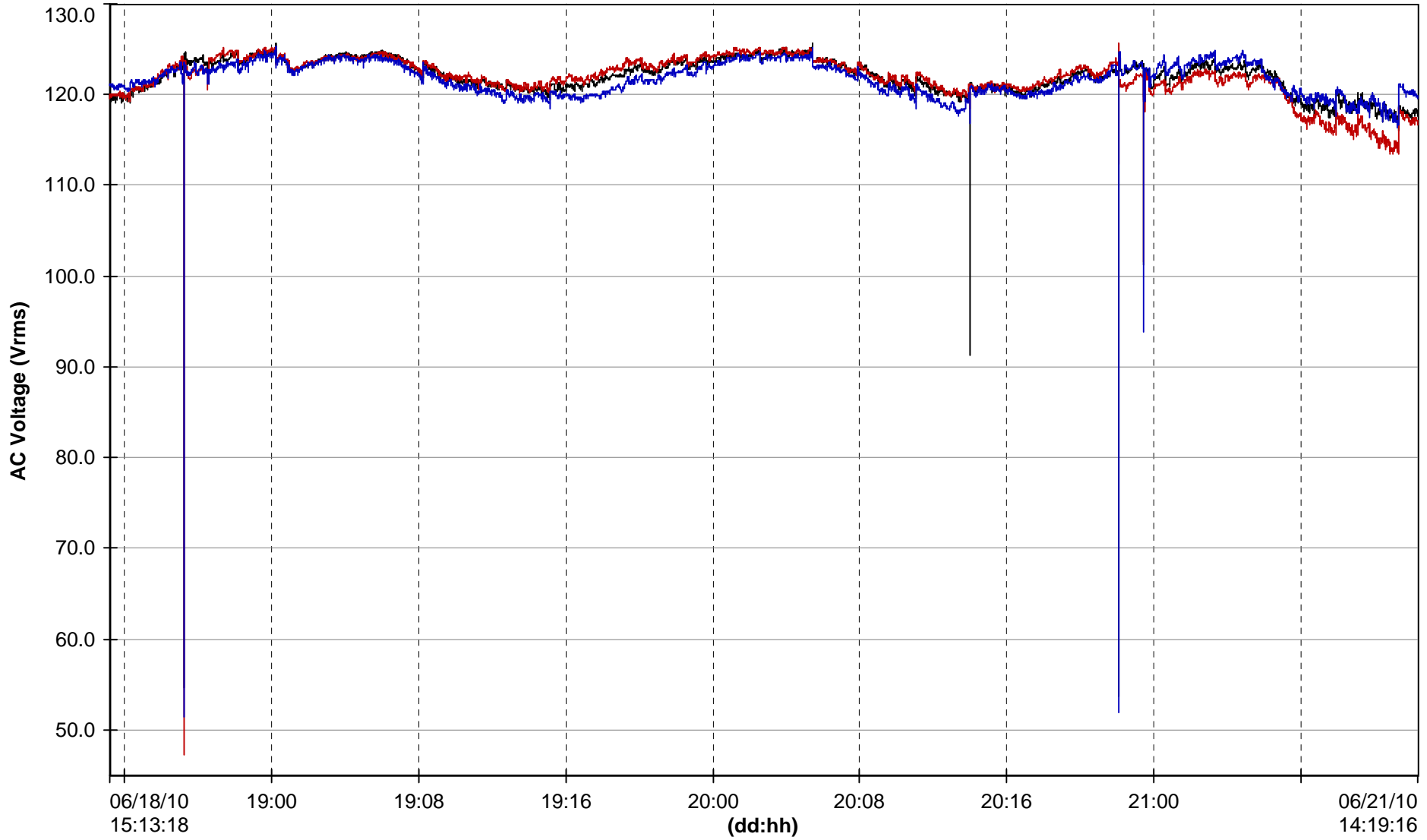


Barclay Early Childhood Center

Electrical Load Study
June 18 – 21, 2010

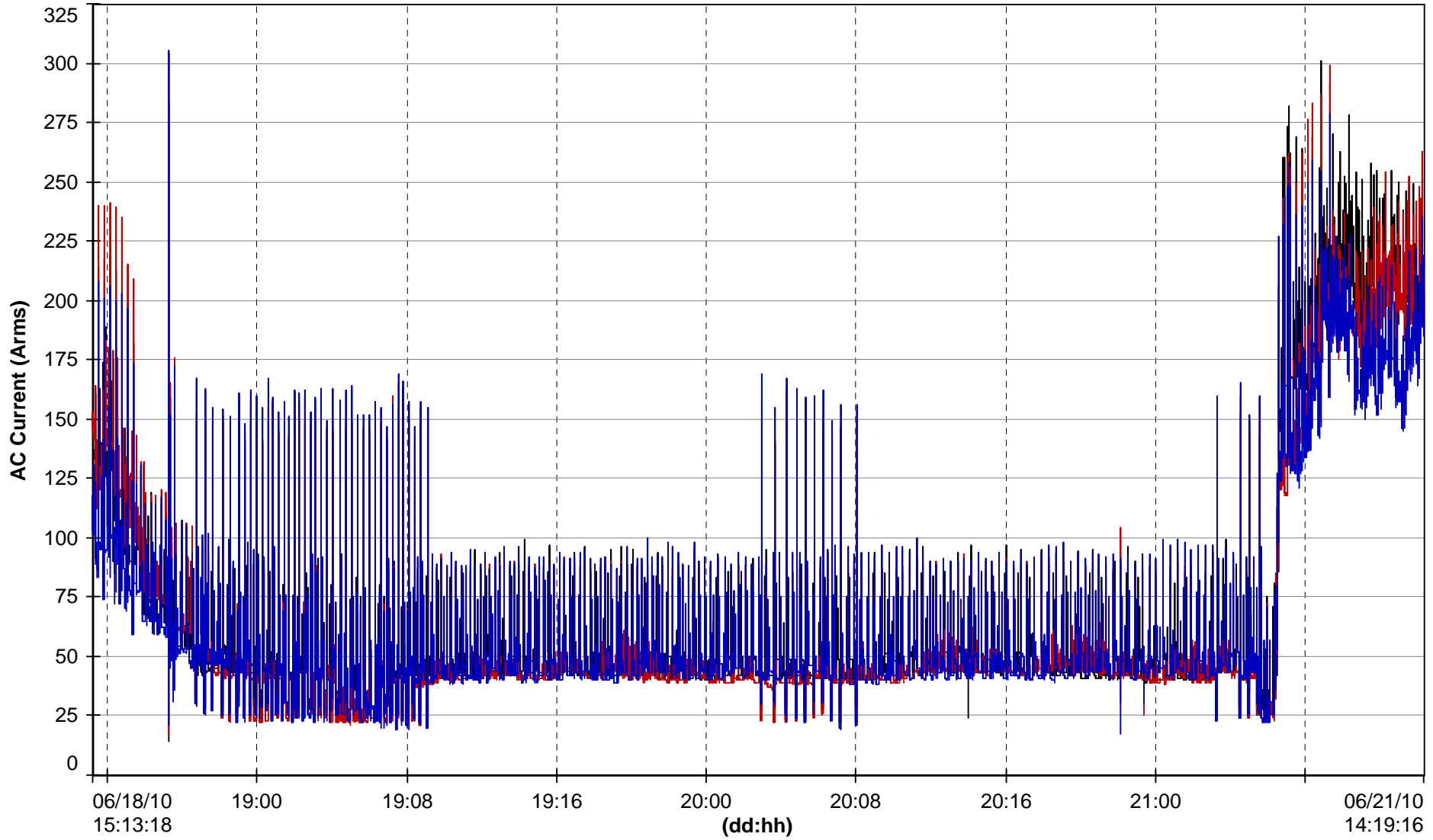
Cherry Hill School District

Main Service Phase Voltage



Barclay Early Childhood Center

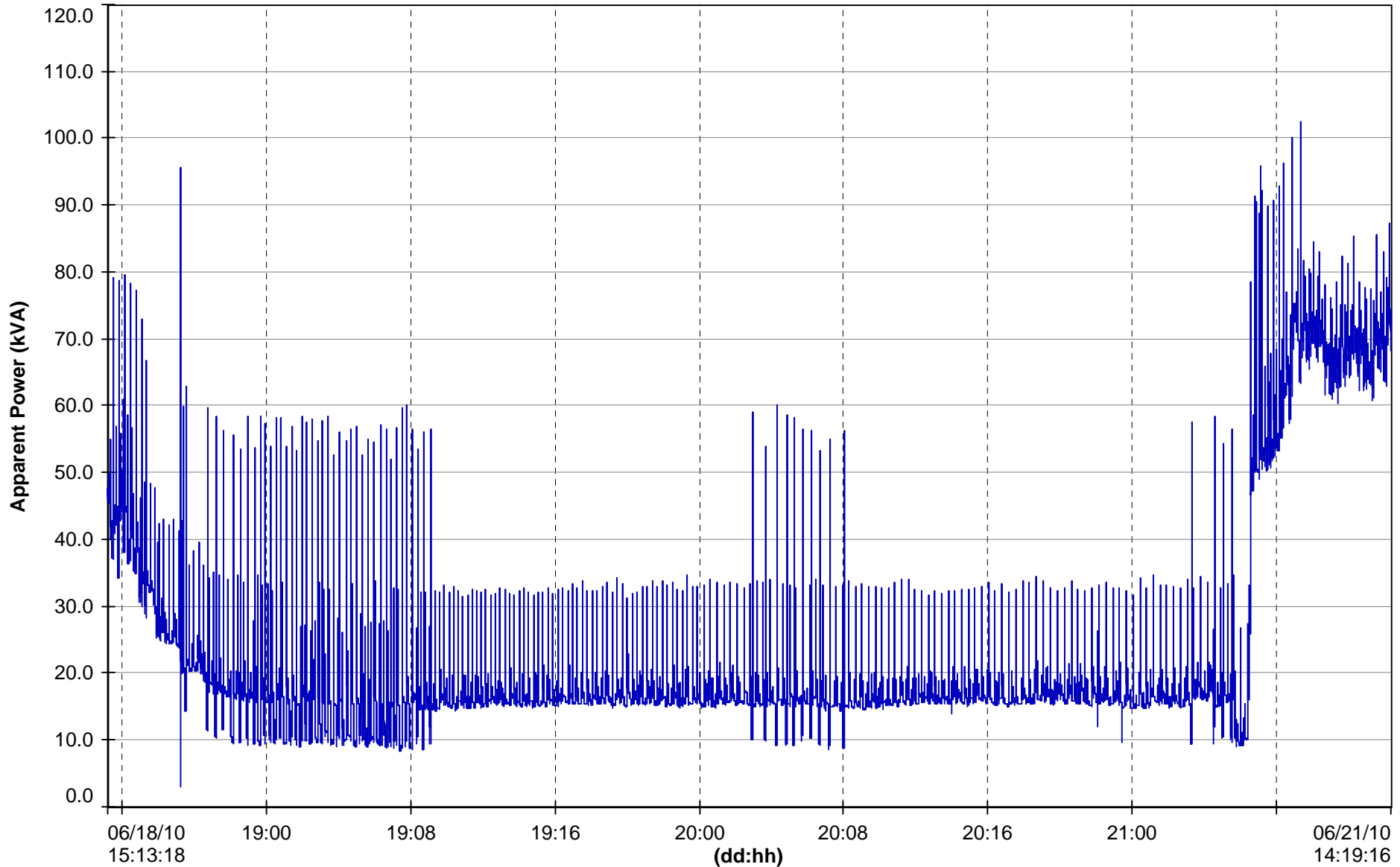
Main Service Line Current



	Maximum	Minimum	Average
— la	301	14	63
— lb	308	13	60
— lc	310	12	58

Barclay Early Childhood Center

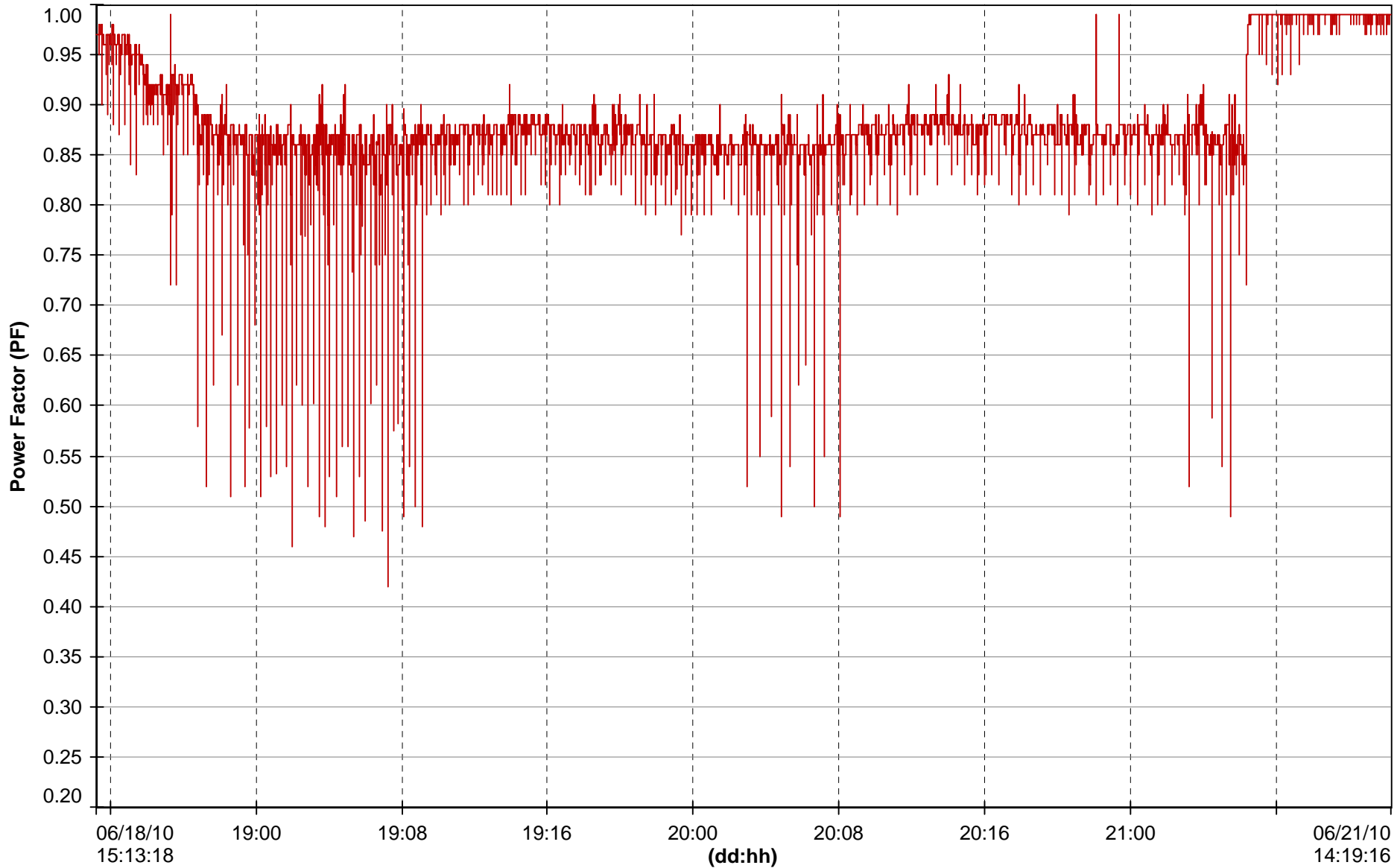
Main Service Apparent Power



	Maximum	Minimum	Average
kVA 3ø 4 wire	102.4	2.4	21.8

Barclay Early Childhood Center

Main Service Power Factor



	Maximum	Minimum	Average
PF	1.00	0.42	0.88

Barclay Early Childhood Center

Cherry Hill School District

Barclay Early Childhood Center

June 18 - 21, 2010

Load Study
15-Minute Data Averages

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/18/10 15:28	119.7	119.9	121.0	130	138	98	43.8	0.97
6/18/10 15:43	119.7	119.9	120.8	127	125	95	41.5	0.97
6/18/10 15:58	119.7	120.1	121.0	121	122	87	39.7	0.97
6/18/10 16:13	119.8	119.9	120.7	123	133	96	42.1	0.97
6/18/10 16:28	119.8	120.1	120.9	122	131	90	41.2	0.96
6/18/10 16:43	120.7	120.6	121.2	113	133	88	40.2	0.96
6/18/10 16:58	120.6	120.7	121.4	109	123	88	38.7	0.96
6/18/10 17:13	120.9	121.0	121.4	93	102	78	33.0	0.95
6/18/10 17:28	120.9	121.0	121.5	89	106	72	32.2	0.95
6/18/10 17:43	121.3	121.4	121.5	94	102	79	33.3	0.95
6/18/10 17:58	121.4	121.9	121.7	80	89	75	29.6	0.93
6/18/10 18:13	122.0	122.5	122.2	68	77	67	26.0	0.91
6/18/10 18:28	122.4	122.8	122.6	71	76	68	26.2	0.91
6/18/10 18:43	122.8	123.1	122.7	66	76	62	25.0	0.91
6/18/10 18:58	122.7	123.1	122.7	68	75	65	25.5	0.91
6/18/10 19:13	123.1	123.5	122.7	67	73	61	24.8	0.91
6/18/10 19:28	123.6	123.1	122.2	59	67	53	22.0	0.92
6/18/10 19:43	123.5	122.0	122.4	55	57	46	19.3	0.92
6/18/10 19:58	123.8	122.5	122.9	55	62	53	20.8	0.92
6/18/10 20:13	123.8	122.7	122.7	54	62	54	20.9	0.92
6/18/10 20:28	123.7	122.7	122.8	61	64	52	21.8	0.91
6/18/10 20:43	123.3	122.8	122.4	53	58	50	19.7	0.91
6/18/10 20:58	123.4	124.0	122.8	43	47	43	16.4	0.88
6/18/10 21:13	123.6	124.4	123.0	43	48	48	17.0	0.88
6/18/10 21:28	124.0	124.6	123.1	42	45	46	16.5	0.88
6/18/10 21:43	123.8	124.5	123.3	45	43	41	15.9	0.87
6/18/10 21:58	124.3	124.7	123.4	45	43	50	17.1	0.87
6/18/10 22:13	124.2	124.4	123.4	40	36	41	14.5	0.86
6/18/10 22:28	123.5	123.7	122.8	47	42	47	16.8	0.87
6/18/10 22:43	123.8	124.0	123.4	40	36	40	14.2	0.87
6/18/10 22:58	124.3	124.1	123.8	45	39	41	15.4	0.86
6/18/10 23:13	124.4	124.4	123.9	42	41	42	15.6	0.86
6/18/10 23:28	124.7	124.8	124.3	40	37	36	14.1	0.86
6/18/10 23:43	124.6	124.8	124.3	42	36	40	14.6	0.85
6/18/10 23:58	124.7	124.8	124.3	38	34	41	14.2	0.85
6/19/10 0:13	124.7	125.0	124.4	46	37	40	15.4	0.86
6/19/10 0:28	124.1	124.1	123.8	40	35	41	14.3	0.86
6/19/10 0:43	124.2	124.3	124.0	38	35	39	13.9	0.85
6/19/10 0:58	123.8	123.9	123.7	43	35	38	14.3	0.85
6/19/10 1:13	122.8	122.8	122.6	36	33	34	12.7	0.86
6/19/10 1:28	122.9	122.9	122.5	39	33	34	12.9	0.85
6/19/10 1:43	123.0	123.1	122.8	38	33	37	13.1	0.85
6/19/10 1:58	123.2	123.5	123.1	37	35	35	13.1	0.87
6/19/10 2:13	123.4	123.6	123.4	41	35	34	13.5	0.85
6/19/10 2:28	123.4	123.7	123.4	38	36	38	13.8	0.86
6/19/10 2:43	123.7	123.8	123.7	40	37	37	13.9	0.85
6/19/10 2:58	124.0	124.0	123.8	38	36	35	13.4	0.86
6/19/10 3:13	124.2	124.2	124.0	34	32	30	12.0	0.85
6/19/10 3:28	124.1	124.1	123.9	37	30	33	12.4	0.84
6/19/10 3:43	124.3	124.1	124.1	35	33	35	12.7	0.86

Cherry Hill School District

Barclay Early Childhood Center

June 18 - 21, 2010

Load Study
15-Minute Data Averages

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/19/10 3:58	124.4	124.3	124.2	38	32	32	12.7	0.86
6/19/10 4:13	124.5	124.3	124.2	39	33	40	14.0	0.85
6/19/10 4:28	124.2	124.1	123.9	32	26	31	11.0	0.85
6/19/10 4:43	124.2	124.1	123.9	39	28	32	12.3	0.84
6/19/10 4:58	124.1	124.0	123.8	35	30	33	12.2	0.86
6/19/10 5:13	124.2	124.0	123.9	37	30	36	12.7	0.85
6/19/10 5:28	124.5	124.2	124.1	39	31	36	13.2	0.84
6/19/10 5:43	124.6	124.4	124.2	32	27	28	10.9	0.86
6/19/10 5:58	124.6	124.6	124.1	35	27	30	11.4	0.84
6/19/10 6:13	124.6	124.5	124.0	36	34	35	13.0	0.85
6/19/10 6:28	124.5	124.4	123.9	36	32	31	12.2	0.85
6/19/10 6:43	124.3	124.2	123.8	36	29	28	11.5	0.83
6/19/10 6:58	124.3	124.0	123.7	33	28	28	11.0	0.84
6/19/10 7:13	123.9	123.8	123.3	39	30	31	12.3	0.84
6/19/10 7:28	123.7	123.6	123.0	38	33	32	12.6	0.86
6/19/10 7:43	123.3	123.5	122.7	37	35	34	13.0	0.86
6/19/10 7:58	123.0	123.1	122.4	41	33	35	13.3	0.84
6/19/10 8:13	122.4	122.6	122.0	36	33	31	12.2	0.86
6/19/10 8:28	123.3	123.4	122.6	41	35	38	13.9	0.84
6/19/10 8:43	123.1	123.2	122.4	43	36	39	14.4	0.85
6/19/10 8:58	122.9	123.2	122.2	39	35	40	13.9	0.86
6/19/10 9:13	122.4	122.5	121.8	42	34	35	13.6	0.85
6/19/10 9:28	122.2	122.1	121.5	42	39	43	15.1	0.87
6/19/10 9:43	122.0	122.0	121.2	42	41	46	15.6	0.86
6/19/10 9:58	121.8	122.0	121.2	46	43	43	15.9	0.86
6/19/10 10:13	121.6	122.0	121.0	44	42	44	15.6	0.86
6/19/10 10:28	121.4	121.9	120.8	47	41	42	15.8	0.86
6/19/10 10:43	121.3	121.9	120.9	43	41	42	15.2	0.87
6/19/10 10:58	121.5	121.9	120.9	44	41	44	15.6	0.87
6/19/10 11:13	121.3	121.6	120.6	48	41	43	15.9	0.87
6/19/10 11:28	121.3	121.5	120.5	42	42	44	15.4	0.87
6/19/10 11:43	121.5	121.7	120.5	45	41	42	15.6	0.87
6/19/10 11:58	121.3	121.2	120.4	46	42	44	15.8	0.87
6/19/10 12:13	121.2	121.2	120.3	43	43	44	15.8	0.87
6/19/10 12:28	120.9	121.1	120.1	48	43	41	15.8	0.87
6/19/10 12:43	120.9	120.8	119.4	44	43	47	16.0	0.87
6/19/10 12:58	121.2	121.3	120.1	44	42	46	15.9	0.87
6/19/10 13:13	121.0	121.1	120.1	47	43	42	15.9	0.87
6/19/10 13:28	120.8	120.9	119.6	45	43	46	16.1	0.87
6/19/10 13:43	120.6	120.8	119.6	47	44	45	16.3	0.87
6/19/10 13:58	120.7	121.1	119.7	44	43	44	15.7	0.88
6/19/10 14:13	120.4	120.6	119.6	45	42	44	15.6	0.88
6/19/10 14:28	120.4	120.9	119.8	49	42	43	16.1	0.87
6/19/10 14:43	120.6	121.2	120.0	44	42	45	15.8	0.87
6/19/10 14:58	120.4	120.9	119.6	47	42	41	15.6	0.88
6/19/10 15:13	120.3	120.9	119.5	47	42	44	15.9	0.88
6/19/10 15:28	121.0	121.7	120.3	44	41	46	15.8	0.88
6/19/10 15:43	120.8	121.6	119.9	49	42	42	16.0	0.87
6/19/10 15:58	120.6	121.4	119.8	44	42	45	15.8	0.88
6/19/10 16:13	120.9	121.9	119.9	44	43	43	15.7	0.88

Cherry Hill School District

Barclay Early Childhood Center

June 18 - 21, 2010

Load Study
15-Minute Data Averages

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/19/10 16:28	120.9	121.9	119.8	48	45	43	16.3	0.87
6/19/10 16:43	121.1	121.8	119.7	44	45	45	16.2	0.87
6/19/10 16:58	120.9	121.7	119.5	47	45	45	16.5	0.87
6/19/10 17:13	121.1	121.6	119.7	45	45	45	16.2	0.87
6/19/10 17:28	121.4	121.8	120.0	45	43	43	15.8	0.87
6/19/10 17:43	121.2	122.1	120.0	48	43	46	16.6	0.87
6/19/10 17:58	121.6	122.3	119.8	43	43	45	15.8	0.87
6/19/10 18:13	121.7	122.4	120.1	47	43	41	15.9	0.87
6/19/10 18:28	121.8	122.8	120.3	45	43	46	16.2	0.87
6/19/10 18:43	122.1	122.9	120.7	43	46	44	16.2	0.87
6/19/10 18:58	122.1	122.9	120.9	49	46	42	16.6	0.86
6/19/10 19:13	122.1	123.0	120.6	43	46	43	16.1	0.87
6/19/10 19:28	122.7	123.7	121.6	44	44	42	15.9	0.87
6/19/10 19:43	122.7	123.5	121.4	47	43	44	16.4	0.86
6/19/10 19:58	123.1	123.7	121.7	43	44	44	15.9	0.87
6/19/10 20:13	123.1	123.7	122.0	47	43	45	16.5	0.86
6/19/10 20:28	122.7	123.2	121.4	43	43	43	15.8	0.87
6/19/10 20:43	122.6	123.1	121.5	44	42	45	15.9	0.87
6/19/10 20:58	122.5	122.9	121.4	46	42	48	16.5	0.86
6/19/10 21:13	122.6	123.2	121.8	43	43	46	16.0	0.87
6/19/10 21:28	123.0	123.4	121.9	47	42	46	16.5	0.86
6/19/10 21:43	123.3	123.7	122.3	42	41	47	15.9	0.86
6/19/10 21:58	123.6	124.1	122.5	42	41	46	15.8	0.86
6/19/10 22:13	123.5	123.9	122.4	47	40	44	16.0	0.86
6/19/10 22:28	123.6	124.0	122.6	42	41	45	15.8	0.86
6/19/10 22:43	123.5	123.8	122.7	46	41	48	16.5	0.85
6/19/10 22:58	123.3	123.5	122.3	44	41	43	15.6	0.86
6/19/10 23:13	123.4	123.7	122.4	42	42	44	15.7	0.86
6/19/10 23:28	123.8	124.1	123.0	47	43	45	16.7	0.85
6/19/10 23:43	123.8	124.3	123.2	43	43	43	15.9	0.85
6/19/10 23:58	123.6	124.1	123.1	44	42	46	16.2	0.85
6/20/10 0:13	123.6	124.3	123.3	43	41	43	15.6	0.86
6/20/10 0:28	124.0	124.4	123.5	43	40	44	15.8	0.86
6/20/10 0:43	124.1	124.5	123.5	46	40	43	16.1	0.86
6/20/10 0:58	124.2	124.6	123.9	41	40	44	15.4	0.86
6/20/10 1:13	124.2	124.7	123.8	44	40	47	16.3	0.85
6/20/10 1:28	124.5	124.9	124.2	46	40	44	16.1	0.85
6/20/10 1:43	124.3	124.8	124.0	41	41	47	16.0	0.86
6/20/10 1:58	124.3	124.8	124.1	47	41	46	16.6	0.85
6/20/10 2:13	124.3	124.6	124.0	43	41	44	15.9	0.86
6/20/10 2:28	124.6	124.8	124.2	41	41	46	16.0	0.86
6/20/10 2:43	124.2	124.7	123.9	47	40	47	16.6	0.85
6/20/10 2:58	124.2	124.7	124.0	39	36	41	14.4	0.85
6/20/10 3:13	124.4	124.7	124.1	44	39	41	15.3	0.86
6/20/10 3:28	124.4	124.6	124.0	44	38	44	15.6	0.86
6/20/10 3:43	124.7	124.7	124.1	38	33	41	13.9	0.85
6/20/10 3:58	124.8	125.0	124.3	47	40	42	16.0	0.86
6/20/10 4:13	124.4	124.6	123.9	42	38	45	15.5	0.86
6/20/10 4:28	124.5	124.5	124.0	40	35	40	14.3	0.85
6/20/10 4:43	124.4	124.7	124.2	45	40	44	16.0	0.86

Cherry Hill School District

Barclay Early Childhood Center

June 18 - 21, 2010

Load Study
15-Minute Data Averages

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/20/10 4:58	124.5	124.7	124.1	37	33	38	13.5	0.86
6/20/10 5:13	124.7	124.6	124.2	47	40	44	16.3	0.85
6/20/10 5:28	124.7	124.7	124.2	38	35	38	13.7	0.86
6/20/10 5:43	123.8	123.7	123.1	41	37	45	15.1	0.86
6/20/10 5:58	123.9	123.9	123.1	43	38	43	15.2	0.84
6/20/10 6:13	123.8	123.8	123.1	38	37	41	14.3	0.85
6/20/10 6:28	123.6	123.7	123.2	45	41	42	15.8	0.85
6/20/10 6:43	123.7	123.6	123.0	40	37	38	14.1	0.84
6/20/10 6:58	123.2	123.3	122.8	42	40	45	15.7	0.85
6/20/10 7:13	123.3	123.4	122.7	42	34	35	13.6	0.85
6/20/10 7:28	122.8	122.7	122.3	43	40	42	15.2	0.86
6/20/10 7:43	122.6	122.7	122.1	45	40	43	15.6	0.86
6/20/10 7:58	122.8	122.9	122.0	44	40	41	15.3	0.86
6/20/10 8:13	123.2	123.1	122.2	39	34	34	13.1	0.86
6/20/10 8:28	123.0	122.7	121.9	47	41	44	16.1	0.86
6/20/10 8:43	122.3	122.2	121.4	42	42	44	15.5	0.86
6/20/10 8:58	122.2	121.9	121.1	45	41	40	15.3	0.87
6/20/10 9:13	121.8	121.8	120.7	46	42	41	15.6	0.87
6/20/10 9:28	121.3	121.3	120.4	43	41	45	15.6	0.87
6/20/10 9:43	121.7	121.9	120.8	48	41	41	15.7	0.87
6/20/10 9:58	121.4	122.0	120.8	43	41	43	15.4	0.87
6/20/10 10:13	121.0	121.2	120.3	43	40	45	15.5	0.87
6/20/10 10:28	121.2	121.7	120.6	47	40	43	15.8	0.87
6/20/10 10:43	121.2	121.7	120.7	43	41	45	15.7	0.87
6/20/10 10:58	120.8	121.2	119.7	47	42	44	16.0	0.87
6/20/10 11:13	121.4	121.9	120.5	45	43	44	15.9	0.87
6/20/10 11:28	121.4	122.1	120.3	44	44	45	16.1	0.87
6/20/10 11:43	121.3	121.7	120.1	48	45	44	16.6	0.87
6/20/10 11:58	120.7	121.2	119.8	44	45	44	16.1	0.88
6/20/10 12:13	120.4	121.1	119.3	47	45	43	16.1	0.88
6/20/10 12:28	120.6	120.8	119.1	46	46	43	16.3	0.87
6/20/10 12:43	120.3	120.4	118.9	45	46	47	16.4	0.87
6/20/10 12:58	120.1	120.2	118.5	49	45	42	16.2	0.88
6/20/10 13:13	120.1	120.4	118.8	44	46	43	15.9	0.88
6/20/10 13:28	119.8	120.2	118.1	46	46	45	16.4	0.88
6/20/10 13:43	119.8	120.3	118.4	48	44	44	16.2	0.88
6/20/10 13:58	119.7	120.1	119.4	43	45	44	15.8	0.88
6/20/10 14:13	120.8	120.9	120.6	49	45	45	16.7	0.88
6/20/10 14:28	120.6	120.7	120.3	44	44	47	16.2	0.88
6/20/10 14:43	120.8	120.9	120.5	45	44	45	16.2	0.88
6/20/10 14:58	120.9	121.0	120.5	48	44	45	16.5	0.87
6/20/10 15:13	121.1	121.3	121.0	44	43	45	15.9	0.88
6/20/10 15:28	120.9	120.9	120.7	48	45	45	16.7	0.87
6/20/10 15:43	120.9	120.8	120.5	45	46	47	16.6	0.87
6/20/10 15:58	120.8	121.0	120.7	44	44	45	16.0	0.88
6/20/10 16:13	120.6	121.1	120.4	49	45	44	16.6	0.87
6/20/10 16:28	120.4	120.8	120.1	44	44	44	15.8	0.89
6/20/10 16:43	120.3	120.6	119.8	46	42	44	15.9	0.89
6/20/10 16:58	120.0	120.6	119.8	47	43	47	16.4	0.88
6/20/10 17:13	120.3	120.7	119.9	44	44	43	15.6	0.89

Cherry Hill School District

Barclay Early Childhood Center

June 18 - 21, 2010

Load Study
15-Minute Data Averages

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/20/10 17:28	120.2	120.9	120.1	48	41	42	15.7	0.88
6/20/10 17:43	120.6	121.2	120.1	44	44	46	16.2	0.88
6/20/10 17:58	121.0	121.3	120.3	44	46	43	16.1	0.88
6/20/10 18:13	121.0	121.6	120.3	46	44	43	16.0	0.87
6/20/10 18:28	121.2	121.6	120.4	44	45	45	16.2	0.87
6/20/10 18:43	121.5	121.7	120.9	48	48	44	16.9	0.87
6/20/10 18:58	121.6	122.2	120.8	42	46	44	16.0	0.87
6/20/10 19:13	121.5	122.1	121.1	44	47	45	16.5	0.87
6/20/10 19:28	121.5	122.2	121.4	47	46	45	16.7	0.86
6/20/10 19:43	122.2	122.6	121.6	43	43	44	15.8	0.87
6/20/10 19:58	122.4	123.0	121.7	47	45	47	17.0	0.86
6/20/10 20:13	122.5	123.0	122.0	43	45	48	16.5	0.86
6/20/10 20:28	122.7	122.9	122.0	42	45	44	16.0	0.87
6/20/10 20:43	122.3	122.5	121.7	48	45	46	17.0	0.86
6/20/10 20:58	121.8	122.2	121.6	41	44	46	16.0	0.88
6/20/10 21:13	121.9	122.3	121.6	44	43	47	16.4	0.87
6/20/10 21:28	121.9	122.6	122.0	45	44	46	16.5	0.87
6/20/10 21:43	122.4	123.2	122.6	41	42	44	15.5	0.88
6/20/10 21:58	122.7	123.6	123.1	46	42	47	16.6	0.86
6/20/10 22:13	122.8	122.5	122.9	43	43	44	15.9	0.87
6/20/10 22:28	122.5	121.0	122.6	44	42	46	16.0	0.87
6/20/10 22:43	122.6	121.0	122.8	47	43	47	16.6	0.86
6/20/10 22:58	123.0	121.5	123.3	43	43	42	15.6	0.87
6/20/10 23:13	123.2	122.0	123.0	46	41	46	16.3	0.86
6/20/10 23:28	122.5	121.5	122.4	42	41	47	15.8	0.87
6/20/10 23:43	122.5	122.0	122.4	41	41	44	15.5	0.87
6/20/10 23:58	121.3	120.7	122.0	46	40	46	15.9	0.87
6/21/10 0:13	121.8	120.9	122.3	41	40	46	15.4	0.87
6/21/10 0:28	122.2	121.2	123.3	44	41	47	16.1	0.87
6/21/10 0:43	121.9	120.7	123.1	43	40	44	15.4	0.88
6/21/10 0:58	121.6	120.4	122.8	41	41	45	15.4	0.87
6/21/10 1:13	121.9	120.8	123.2	46	45	46	16.7	0.86
6/21/10 1:28	122.4	121.4	123.2	42	43	46	15.9	0.87
6/21/10 1:43	122.0	121.3	122.5	42	44	46	16.1	0.86
6/21/10 1:58	122.3	121.7	123.3	44	44	45	16.2	0.86
6/21/10 2:13	123.0	122.1	123.7	42	40	41	15.0	0.87
6/21/10 2:28	123.2	122.4	123.7	46	41	47	16.3	0.86
6/21/10 2:43	123.2	122.2	123.9	41	41	46	15.7	0.86
6/21/10 2:58	123.3	122.5	124.2	42	40	42	15.2	0.87
6/21/10 3:13	123.3	122.3	124.4	45	40	44	15.8	0.86
6/21/10 3:28	122.9	121.7	123.6	41	41	42	15.1	0.87
6/21/10 3:43	122.5	121.6	123.4	48	44	47	16.9	0.87
6/21/10 3:58	122.9	121.6	123.5	47	45	46	16.9	0.87
6/21/10 4:13	123.0	121.9	123.8	45	43	49	16.7	0.87
6/21/10 4:28	123.0	122.1	124.0	49	43	48	17.2	0.86
6/21/10 4:43	123.3	122.2	124.0	38	37	38	13.8	0.86
6/21/10 4:58	123.2	122.2	124.4	41	40	45	15.6	0.86
6/21/10 5:13	122.3	121.3	123.6	44	37	41	14.8	0.86
6/21/10 5:28	122.7	121.6	123.6	43	41	43	15.5	0.87
6/21/10 5:43	123.0	122.0	123.5	42	36	39	14.4	0.86

Cherry Hill School District

Barclay Early Childhood Center
Load Study
15-Minute Data Averages

June 18 - 21, 2010

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/21/10 5:58	123.1	122.0	123.2	30	24	25	9.6	0.86
6/21/10 6:13	122.4	121.8	122.0	29	25	26	9.8	0.85
6/21/10 6:28	122.2	121.4	121.6	37	31	33	12.2	0.88
6/21/10 6:43	121.9	121.4	121.5	117	103	112	40.4	0.99
6/21/10 6:58	121.4	121.1	121.1	161	122	135	50.6	0.99
6/21/10 7:13	120.7	119.9	120.4	172	135	138	53.5	0.99
6/21/10 7:28	119.8	119.4	119.9	169	134	132	51.8	0.99
6/21/10 7:43	119.4	118.4	120.3	176	146	136	54.7	0.99
6/21/10 7:58	119.5	117.8	119.9	171	153	138	55.0	0.99
6/21/10 8:13	118.9	117.4	119.8	171	160	144	56.2	0.99
6/21/10 8:28	118.5	117.1	119.3	178	171	154	59.5	0.99
6/21/10 8:43	118.6	117.2	119.4	187	184	164	63.3	0.99
6/21/10 8:58	119.4	117.9	119.9	204	184	164	65.7	0.99
6/21/10 9:13	118.7	117.0	119.6	219	202	194	72.8	0.99
6/21/10 9:28	118.6	116.4	119.5	203	191	179	67.6	0.99
6/21/10 9:43	117.9	116.3	119.2	215	197	189	70.7	0.99
6/21/10 9:58	118.7	116.7	119.3	209	188	188	69.1	0.99
6/21/10 10:13	119.2	117.3	120.3	214	191	185	70.1	0.99
6/21/10 10:28	119.3	117.1	119.4	212	190	183	69.2	0.99
6/21/10 10:43	118.7	116.3	118.5	207	188	178	67.6	0.99
6/21/10 10:58	118.7	115.9	118.8	205	188	161	65.1	0.99
6/21/10 11:13	119.4	116.9	118.9	196	183	161	64.0	0.99
6/21/10 11:28	119.3	116.9	119.1	194	181	165	64.0	0.99
6/21/10 11:43	118.7	116.4	118.5	210	193	169	67.3	0.99
6/21/10 11:58	118.9	115.7	119.7	202	192	162	65.5	0.99
6/21/10 12:13	118.2	115.2	119.2	211	197	167	67.4	0.99
6/21/10 12:28	118.1	114.9	118.2	209	201	176	68.5	0.99
6/21/10 12:43	118.3	114.8	118.2	199	195	174	66.5	0.99
6/21/10 12:58	117.7	114.2	118.0	205	198	164	66.0	0.99
6/21/10 13:13	117.7	114.4	117.4	199	199	155	64.4	0.99
6/21/10 13:28	118.0	116.9	119.8	193	196	156	64.3	0.99
6/21/10 13:43	118.1	117.6	120.5	203	203	173	68.6	0.99
6/21/10 13:58	117.9	117.3	120.3	196	202	179	68.3	0.99
6/21/10 14:13	118.0	117.1	120.3	189	201	176	66.9	0.99
6/21/10 14:19	118.1	117.2	119.8	199	215	193	71.8	0.99