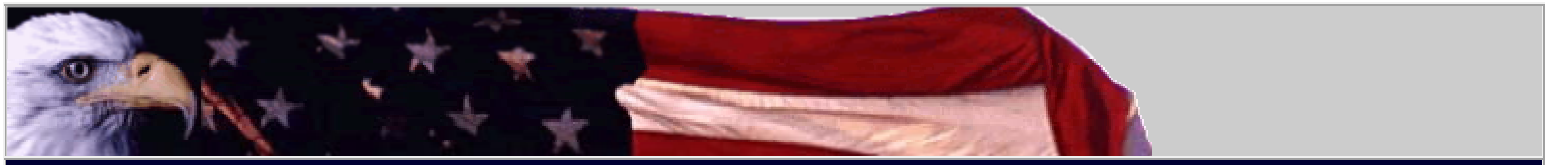

Brunswick Acres Elementary School, NJ

ENERGY AUDIT – FINAL REPORT
CEG PROJECT NO. 9C08134

SOUTH BRUNSWICK BOARD OF EDUCATION
PO BOX 181
MONMOUTH JUNCTION, NJ 08852
ATTN: MR. ANTHONY TONZINI
BUSINESS ADMINSTRATOR

CONCORD ENGINEERING GROUP

520 SOUTH BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CEG-INC.NET

CONTACTS:

MICHAEL FISCHETTE
MFISCHETTE@CEG-INC.NET

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I. EXECUTIVE SUMMARY

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

Brunswick Acres Elementary School
41 Kory Drive
Kendall Park, NJ 08824

Municipal Contact: Anthony Tonzini (Board Administrator)

This audit was performed in connection with the New Jersey Clean Energy Local Government Energy Audit Program. These energy audits are conducted to promote the office of Clean Energy's mission, 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	$ 125,138
Natural Gas	$ 38,721
Total	$ 163,859

The potential annual energy cost savings are shown below in Table 1. Be aware that the measures are not additive because of the interrelation of several of the measures. The cost of each measure for this level of auditing is ± 20% until detailed engineering, specifications, and hard proposals are obtained.

Table 1
Energy Conservation Measures (ECM's)

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	REPLACE AHU-3	$25,000	$1,690	14.8	1.4%
ECM #2	BOILER REPLACMENT	$118,750	$5,305	22.4	-33.0%
ECM #3	VARIABLE SPEED PUMPS	$14,630	$4,750	3.1	387.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	220 KW SOLAR PV	$1,983,060	$171,926	11.5	-61.0%

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 are shown below in Table 2. The information in this table corresponds to the ECM's in Table 1.

Table 2
Estimated Energy Savings

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	REPLACE AHU-3	3	17,246	-507
ECM #2	BOILER REPLACMENT	0	4,682	2,600
ECM #3	VARIABLE SPEED PUMPS	0	31,665	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	220 KW SOLAR PV	220	348,851	0

Recommendations:

Concord Engineering Group recommends the implementation of all ECM's that provide a calculated simple payback at or under seven (7) years. The potential energy and cost savings from these ECM's are economically justifiable. The following Energy Conservation Measures are recommended for the Brunswick Acres Elementary School:

- **ECM #3:** Variable Speed Pumping

II. INTRODUCTION

This comprehensive energy audit covers the Brunswick Acres Elementary School located at 41 Kory Drive, Kendall Park, NJ. Based on our survey and the documentation available, it was determined that the building area is approximately 63,000 SF.

The first task was to collect and review one year's worth of utility energy data for electricity and natural gas. This information was used to analyze operational characteristics, calculate energy benchmarks for comparison to industry averages, estimate savings potential, and establish a baseline to monitor the effectiveness of implemented measures. A computer spreadsheet was used to enter, sum, and calculate benchmarks and to graph utility information (see Appendix A).

The Energy Use Intensity (EUI) is expressed in British Thermal Units/square foot/year ($BTU/ft^2/yr$) and can be 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 annual consumption of all fuels to BTU's then dividing by the area (gross square footage) of the building. EUI is a good indicator of the relative potential for energy savings. A comparatively low EUI indicates less potential for large energy savings. Blueprints (where available) were obtained from the school district and were utilized to calculate/verify the gross area of the facility.

After gathering the utility data and calculating the EUI, the next step in the audit process is obtaining Architectural and Engineering drawings (where available). By reviewing the Architectural and Engineering drawings, questions regarding the building envelope, lighting systems/controls, HVAC equipment and controls are noted. These questions are then compared to the energy usage profiles developed during the utility data gathering step. Furthermore, 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. After this information is gathered the next step in the process is the site visit.

The site visit was spent inspecting the actual systems and answering specific questions from the preliminary review. The building manager provided occupancy schedules, O & M practices, the building energy management program, and other information that has an impact on energy consumption.

The post-site work includes evaluation of the information gathered during the site visit, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on mechanical, lighting and building envelope improvements.

III. METHOD OF ANALYSIS

CEG completed the preliminary audit tasks noted in Section II preparing for the site survey. The site survey is a critical input in deciphering where energy opportunities exist within a facility. The auditor walks the entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed using energy engineering calculations, Microsoft Excel spread sheets and Trane Trace 700™ building simulation software that calculate the anticipated energy usage for the proposed energy conservation measures (ECM's). The actual energy usage is entered directly from the utility bills provided by the Owner. The anticipated energy usage is compared to the actual usage to determine energy savings for the proposed ECM's.

It is pertinent to note, that the savings noted in this report are not duplicative. The savings for each recommendation may actually be higher if the individual recommendations were installed instead of the entire project. For example, the lighting module calculates the change in wattage and multiplies it by the new operating hours instead of the existing operating hours (if there was a change in the hours at all). The lighting controls module calculates the change in hours and multiplies it by the new system wattage instead of the existing wattage. Therefore, if you chose to install the recommended lighting system but not the lighting controls, the savings achieved with the new lighting system would actually be higher because there would have been no reduction in the hours of use.

The same principal follows for heating, cooling, and temperature recommendations – even with fuel switching. If there are recommendations to change the temperature settings to reduce fuel use, then the savings for the heating/cooling equipment recommendations are reduced, as well.

Our thermal module calculates the savings for temperature reductions utilizing automated engineering calculations within Microsoft Excel™ spreadsheets and Trane Trace 700™ building simulation software. The savings are calculated in "output" values – meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel.

Thermal recommendations (insulation, windows, etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the "thermal load" is the thermal load after the other recommendations have been accounted for.

Lastly, installation costs, refer to Appendix A, are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers. The NJ SmartStart Building® program incentives (refer to Appendix B) are calculated for the appropriate ECM's and subtracted from the installed cost prior to calculation of the simple payback. In addition, where applicable, maintenance cost savings are estimated and applied to the net savings. Simple return on

investment is calculated using the standard formula of the difference of gains minus investments, divided by the investments. Included within the gains are the annual energy savings, utility incentives and maintenance savings as a total sum. The calculation is completed assuming the project is 100% direct purchased by the Owner with an energy cost escalation of 2.4% for natural gas and 2.2% for electricity.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Electric

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from June-07 to May-08. PSE&G Electric Utility provides electricity to the facility. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. 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 most current rate structure available.

Natural Gas

Table 4 and Figure 2 show the natural gas energy usage from June-07 to May-08. Below is the average unit cost for the utilities at this facility. PSE&G Gas Utility supplies the natural gas and delivers the fuel to the burner at the facility. Below is the average unit cost for the utilities at this facility.

Description	Average
Electricity	15¢ / kWh (4.4¢ / kBtu)
*Natural Gas	$1.77 / therm (1.8¢ / kBtu)

*Note: The Natural Gas cost per Therm includes customer service charges.

Table 3
Electricity Billing Data

Brunswick Acres Elementary

Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Peak Demand	Units	Off Peak Usage	Units	On Peak Usage	Units	Total Consumption	Units	Total $
PSE&G Co (14101)	Jun-07	6/5/2007	7/6/2007	6201948015E	Electric	31	241	kw	21600	kwh	42000	kwh	63600	kwh	$ 12,642.08
PSE&G Co (14101)	Jul-07	7/6/2007	8/3/2007	6201948015E	Electric	28	241	kw	28000	kwh	37200	kwh	65200	kwh	$ 11,959.44
PSE&G Co (14101)	Aug-07	8/3/2007	9/13/2007	6201948015E	Electric	41	241	kw	41200	kwh	56400	kwh	97600	kwh	$ 17,674.78
PSE&G Co (14101)	Sep-07	9/13/2007	10/3/2007	6201948015E	Electric	20	241	kw	15200	kwh	28800	kwh	44000	kwh	$ 6,904.65
PSE&G Co (14101)	Oct-07	10/3/2007	11/1/2007	6201948015E	Electric	29	241	kw	19600	kwh	41600	kwh	61200	kwh	$ 8,304.75
PSE&G Co (14101)	Nov-07	11/1/2007	12/4/2007	6201948015E	Electric	33	241	kw	24400	kwh	42800	kwh	67200	kwh	$ 8,859.40
PSE&G Co (14101)	Dec-07	12/4/2007	1/4/2008	6201948015E	Electric	31	205	kw	27200	kwh	48800	kwh	76000	kwh	$ 9,877.22
PSE&G Co (14101)	Jan-08	1/4/2008	2/4/2008	6201948015E	Electric	31	205	kw	32000	kwh	50000	kwh	82000	kwh	$ 10,464.72
PSE&G Co (14101)	Feb-08	2/4/2008	3/5/2008	6201948015E	Electric	30	205	kw	34000	kwh	52000	kwh	86000	kwh	$ 11,161.65
PSE&G Co (14101)	Mar-08	3/5/2008	4/4/2008	6201948015E	Electric	30	205	kw	28800	kwh	38800	kwh	67600	kwh	$ 8,818.31
PSE&G Co (14101)	Apr-08	4/4/2008	5/5/2008	6201948015E	Electric	31	205	kw	22000	kwh	41200	kwh	63200	kwh	$ 8,416.62
PSE&G Co (14101)	May-08	5/5/2008	6/4/2008	6201948015E	Electric	30	205	kw	21600	kwh	39200	kwh	60800	kwh	$ 10,054.67
						Max Peak:	241	kw			**12 Month Total:**		834,400	kwh	$ 125,138.29
													Avg. Cost per kwh:	$	0.150
													Avg. Cost per kBtu:	$	0.044

Figure 1
Electricity Usage Profile

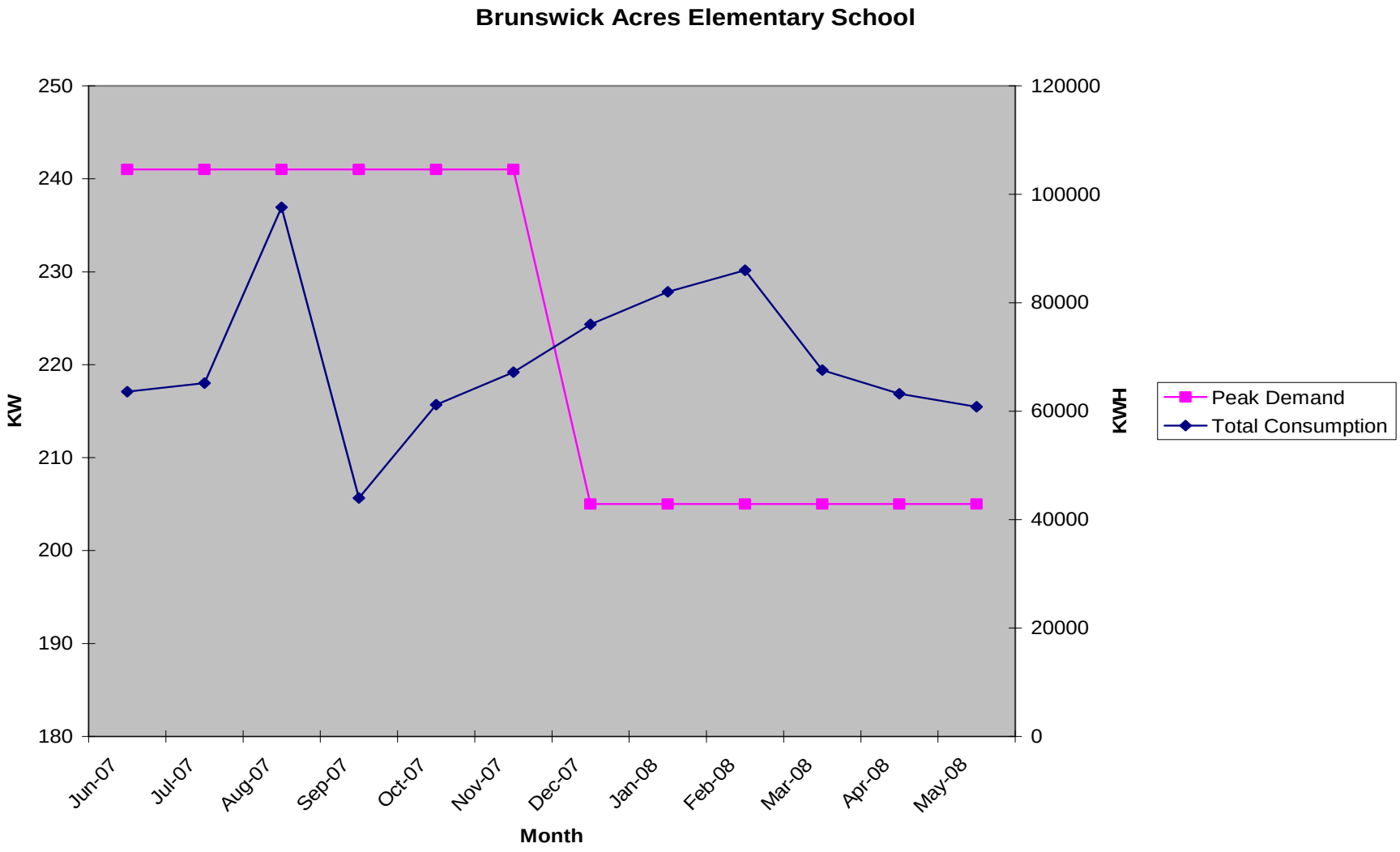


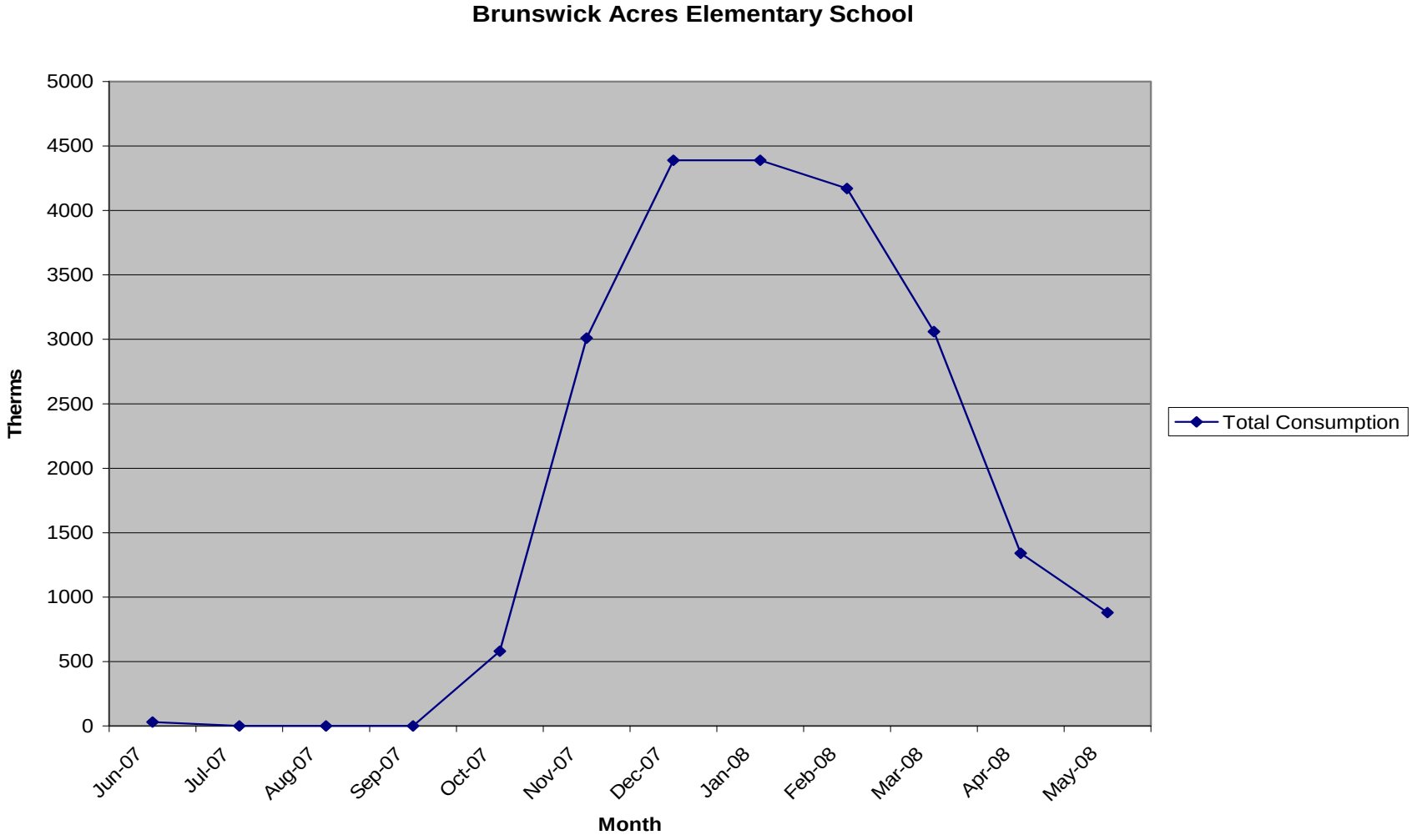
Table 4
Natural Gas Billing Data

Brunswick Acres Elementary

Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Consumption	Units	Total $
PSE&G CO (14105)	Jun-07	6/5/2007	7/6/2007	6201948015G	Gas	31	30	therms	$ 144.90
PSE&G CO (14105)	Jul-07	7/6/2007	8/3/2007	6201948015G	Gas	28	0	therms	$ 92.03
PSE&G CO (14105)	Aug-07	8/3/2007	9/4/2007	6201948015G	Gas	32	0	therms	$ 93.57
PSE&G CO (14105)	Sep-07	9/4/2007	10/3/2007	6201948015G	Gas	29	0	therms	$ 95.24
PSE&G CO (14105)	Oct-07	10/3/2007	11/1/2007	6201948015G	Gas	29	580	therms	$ 1,671.23
PSE&G CO (14105)	Nov-07	11/1/2007	12/4/2007	6201948015G	Gas	33	3010	therms	$ 5,564.28
PSE&G CO (14105)	Dec-07	12/4/2007	1/4/2008	6201948015G	Gas	31	4390	therms	$ 7,761.05
PSE&G CO (14105)	Jan-08	1/4/2008	2/4/2008	6201948015G	Gas	31	4390	therms	$ 7,761.04
PSE&G CO (14105)	Feb-08	2/4/2008	3/5/2008	6201948015G	Gas	30	4170	therms	$ 7,270.68
PSE&G CO (14105)	Mar-08	3/5/2008	4/4/2008	6201948015G	Gas	30	3060	therms	$ 4,704.42
PSE&G CO (14105)	Apr-08	4/4/2008	5/5/2008	6201948015G	Gas	31	1340	therms	$ 2,131.34
PSE&G CO (14105)	May-08	5/5/2008	6/4/2008	6201948015G	Gas	30	880	therms	$ 1,431.59
						12 Month Total:	21,850	therms	$ 38,721.37
						Average Cost per therm:	$ 1.772		

Average Cost per KBtu:	$0.018

Figure 2
Natural Gas Usage Profile



B. Energy Use Intensity (EUI)

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. Their website allows the user to determine how well the client's building Energy Use Intensity compares with similar facilities throughout the U.S. and in your specific region or state.

Energy Use Intensity (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically one year, to British Thermal Units (BTU) and dividing this number by the building square footage. The EUI for this facility is calculated as follows:

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

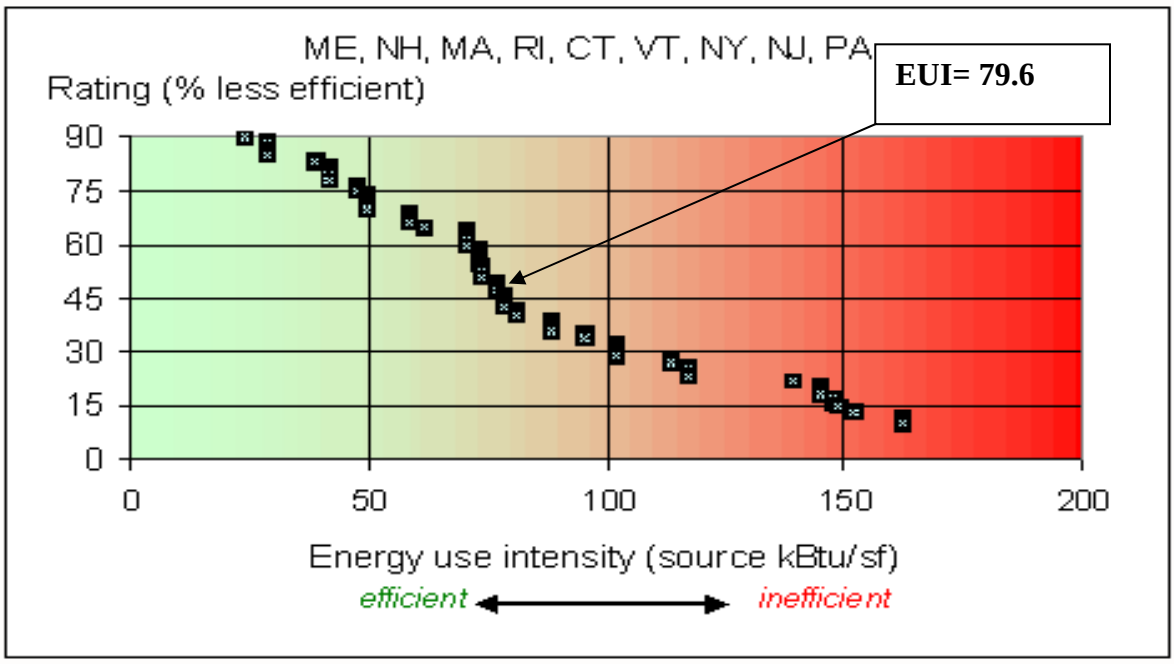
Electric = ((834,400 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu / 1 kBtu)
= 2,848,641 kBtu

Gas =((21,850 therms) * (100,000 Btu/h / 1 therm)) / (1000 Btu/h / 1 kBtu/h) = 2,185,000 kBtu/h

$$\text{Building EUI} = \frac{\text{(2,848,641 kBTU/h + 2,185,000 kBtu/h)}}{\text{63,258 SF}} = \frac{\text{5,033,641 kBtu/h}}{\text{63,258 SF}} = 79.57 \text{ kBtu/SF}$$

Brunswick Acres Elementary EUI = 79.57 kBtu/SF

Figure 3
Energy Use Intensity Distributions – Schools



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 you to track and assess 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 more emphasis is being placed throughout multiple arenas 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. Therefore, it is vital that local government municipalities assess their energy usage, benchmark this usage utilizing Portfolio Manager, set priorities and goals to lessen their energy usage and move forward with these priorites and goals. Saving energy will in-turn save the environment.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the school district in order to allow access to monitor their 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:	southbrunswick
Password:	lgeaceg09002
Security Question:	What is your birth city?
Security Answer:	“South Brunswick”

Utilizing the utility bills and other information gathered during the energy audit process, CEG entered the respective data into Portfolio Manager and the following is a summary of the results:

Table 5
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Brunswick Acres	42	50

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "Other" category. The "Other" category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Performance Rating cannot be calculated if more then 10% of a building is classified as "Other," or if the building is an office with less than 5,000 square feet of floor space.

The Energy Use Intensity (EUI) is also an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the municipality can strive to meet. CEG recommends that the South Brunswick School District keep their Portfolio Manager account up to date to monitor the performance of the building.

The EUI calculated in the previous section and in the Energy Star Portfolio Manager is a good indicator of the energy performance of the Brunswick Acres Elementary School, in addition to the Energy Star Performance Rating.

The EUI distribution, Figure 3, is specific for Schools. The Brunswick Acres school has an EUI of 79.6 rating for this type of facility. The lower the EUI the less energy the facility uses per square foot. A low EUI indicates a more efficient building. There maybe some opportunity for improvement making the facility more energy efficient and saving more on the utility costs.

Refer to Appendix D for detailed energy benchmarking report entitled "STATEMENT OF ENERGY PERFORMANCE."

V. FACILITY DESCRIPTION

The Brunswick Acres Elementary School is a single story slab on grade building. The original portion of the building contained a gymnasium, multi-purpose room, music, bathrooms, admin offices and a large open space for classrooms. Original construction totalled approximately 34,000 sqaure feet. In 1988 there was an addition on the east end of the building that added four classrooms and bathrooms. The addition totalled 7,800 square feet. In 2004 there was a large renovation and addition project which added approximately 12,000 square feet and renovated 30,000 square feet. At the completion of this project the building totalled 63,000 square feet. The 2004 addition/renovation added 8 classrooms, 4 at the north end and 4 at the east end, and a stage at the multi-purpose room. The majority of the building is constructed of block walls with face brick. The roof structure is steel open web joists with asphault roofing on a metal deck. Windows are clear, double-pane, insulating type. Overall the building is in good condition.

Heating System

The core of the building is heated by heating hot water supplied by (2) Patterson Kelly natural gas fired boilers. Each boiler is approximately 83% efficient and have a total of 3400 MBH input. The heating hot water is circulated by (2) constant speed inline 5 hp circulator pumps. There are (2) air handlers and about 28 vav boxes which have hot water heating coils which are fed from the boilers. The air handlers are indoor and were installed in 2004. They are in great condition.

The west wing of the building, consisting of the cafeteria, administrative offices and multi-purpose room, has (2) roof mounted energy recovery units with natural gas fired heaters along with an indoor air handling unit. The indoor air handler has a 36 kW electric heating coil and serves the admin offices. This air handler is original and appears to be near the end of it's useful life. The energy recovery units serve the cafeteria and the multi-purpose room and are in good condition. The music room at the rear of the original building is served by a unit ventilator with a hot water coil. The unit is original and appears to be near the end of it's useful life. We analyzed the option to replace this unit with a packaged rooftop unit and it did not pay back. The 1988 classroom addition has thru-wall cooling and heating units with electric heating coils.

The east and north additions have rooftop units with natural gas fired heaters. The rooftop units were installed in 2004 and are in good condition. Each room served by these units has an electric reheat coil for individual space control.

Domestic Hot Water

The building's domestic hot water is provided by a 40 gallon, 4500 Watt electric heater. The unit is located at the bathrooms in the front of the building. The unit is an AO Smith with a 0.92 energy factor. This unit appears to be in good condition. We analyzed the option of replacing this unit with a natural gas fired instantaneous water heater and it did not pay back. The mimimal use of this unit did not make it a viable option.

Cooling System

The core of the building is cooled by (2) air handlers located in the mezzanine. Each air handler has a dx cooling coil which is fed refrigerant from an outdoor condensing unit. The air handlers have a 50 ton cooling capacity each. Vav boxes are located downstream of the air handlers to provide individual control at each room. The air handlers and vav boxes were installed during the 2004 addition/renovation project and are in very good condition. The west wing of the building, consisting of the cafeteria, administrative offices and multi-purpose room, has (2) roof mounted energy recovery units with integral cooing systems along with an indoor air handling unit that has a split outdoor condensing unit. The indoor air handler (AHU-3) serves the admin offices and has a 8.5 ton cooling capacity. the admin offices. As mentioned before this unit is near the end of it's useful life. The energy recovery units serve the cafeteria and the multi-purpose room and are in good condition. The 1988 classroom addition has thru-wall cooling and heating units. The east and north additions have rooftop units with integral cooling systems. Both of these units have constant volume airflow and are in very good condition.

Lighting System

Typical lighting throughout the building uses fluorescent tube fixtures with energy efficient T-8 lamps and electronic ballasts. A limited number of fixtures use compact fluorescent lamps.

The exterior lighting uses mainly high intensity discharge wall mounted fixtures.

The existing lighting control system utilizes energy efficient occupancy sensors and "A/B" switching in most areas. Standard switching is used in remaining locations. "A/B" switching allows the occupant the ability to control approximately 50% of the lighting in an area with one switch and the remaining 50% with a separate switch if increased light levels are needed.

School "As Built" drawings indicate that the facility has recently undergone a lighting and lighting controls upgrade and this was confirmed during the field survey. The light fixtures and lighting controls currently installed are estimated to be approximately three years old, energy efficient and are not recommended for replacement at this time.

Refer to Appendix E for a detailed Investment Grade Lighting Audit.

MAJOR EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial savings. In addition, 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 if a manufacturers 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.

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, lack of nameplates, etc.

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

VI. ENERGY CONSERVATION MEASURES (ECM)

ECM #1: Replace AHU-3

Description:

The existing lower west wing of the school which includes receiving, administrative offices, mechanical room and bathrooms is currently served by an air handling unit located in the receiving area. The unit is original and was installed in 1975. It has a direct expansion (dx) cooling coil and a 35 kW electric heating coil. The unit's cooling coil is coupled with an outdoor condensing unit which appears to have been replaced about 10 years ago. The cooling circuit is sized for about 9 Tons of cooling while delivering about 3000 cfm. The electric heating coil has 6 stages of control.

In this ECM we are proposing to replace the existing unit with a new 10 Ton packaged rooftop unit with electric cooling and natural gas heating. The new unit would be equal to McQuay Maverick which is what we modeled for this ECM. The new unit would have a new thermostat with economizer mode for free cooling during the "shoulder" months. The rooftop unit would require a smaller electrical circuit than the existing unit along with a new gas pipe run to its location. We recommend keeping the majority of the existing ductwork.

The calculations for this ECM were performed using Trane Trace 700™ building simulation software and the estimated payback is approximately 15 years. Outputs from the simulation software are located in Appendix G. A summary of the calculations is shown below.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$25,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$25,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,690
Total Yearly Savings ($/Yr):	$1,690
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.8
Simple Lifetime ROI	1.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$25,350
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($4,824.89)

ECM #2: Boiler Replacement

Description:

The existing boilers heating the school are approximately 85% efficient and have a remaining useful life of about 14 more years. We are suggesting replacing the boilers with new 92% efficient (97% part load eff.) boilers with fully modulating capabilities. The existing boilers do not modulate. We recommend installing 2 new Lochinvar Intellifin IBN 1700 boilers with 1700 MBH input. The total boiler output would be about 3400 MBH, equal to the existing capacity. Our model of the existing facility corresponds with this capacity therefore we don't suggest changing the capacity of the boilers.

The calculations for this ECM were performed using Trane Trace 700™ building simulation software and the estimated payback is approximately 15 years. Outputs from the simulation software are located in Appendix G. A summary of the calculations is shown below.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$124,000
NJ Smart Start Equipment Incentive ($):	$5,250
Net Installation Cost ($):	$118,750
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$5,305
Total Yearly Savings ($/Yr):	$5,305
Estimated ECM Lifetime (Yr):	15
Simple Payback	22.4
Simple Lifetime ROI	-33.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$79,575
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($55,419.25)

ECM # 3: Variable Speed Pumping

The existing hot water pumps are constant speed. The system has a bypass valve which allows for recirculation when terminal equipments' control valves close down. We suggest installing new pumps with variable frequency drives (VFD). The existing 2-way control valves at all of the terminal equipment can remain. The new pumps would be controlled by remote pressure sensors to keep the system charged properly. The VFD's modulate the pump's speed in order to maintain the necessary system pressure as prescribed at the BMS.

The calculations for this ECM were performed using Trane Trace 700™ building simulation software and the estimated payback is approximately 3.1 years. Outputs from the simulation software are located in Appendix G. A summary of the calculations is shown below.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$14,750
NJ Smart Start Equipment Incentive ($):	$120
Net Installation Cost ($):	$14,630
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,750
Total Yearly Savings ($/Yr):	$4,750
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.1
Simple Lifetime ROI	387.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$71,250
Internal Rate of Return (IRR)	32%
Net Present Value (NPV)	$42,075.19

VII: RENEWABLE/DISTRIBUTED ENERGY MEASURES (REM #1)

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 technologies for the Brunswick Acres Elementary School, to evaluate if there is any potential for solar or wind energy generation.

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). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park a vehicle under the array, this way no parking lot area is lost. 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 14,085 S.F. can be utilized for a PV system on the roof. A depiction of the area utilized is shown in Appendix F following the financial calculations. Using this square footage it was determined that a system size of 220.34 kilowatts could be installed to help reduce the maximum peak monthly demand. The required square footage for a system of this size is approximately 14,000 S.F. and has an estimated kilowatt hour production of 343,851 KWh annually, reducing the overall electric consumption by approximately 41.2%. A detailed financial analysis can be found in Appendix F. 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.

CEG has reviewed financing options for the owner. Two options were studied and they are as follows: Self-financed and direct purchase without finance. Self-finance was calculated with 95% of the total project cost financed at a 7% interest rate over 25 years. Direct purchase involves the local government paying for 100% of the total project cost upfront. Both of these calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following are the payback periods for the respective method of payment:

PAYMENT TYPE	SIMPLE PAYBACK	INTERNAL RATE OF RETURN
Self-Finance	11.5 Years	9.9 %
Direct Purchase	11.5 Years	7.7 %

The above information is concluded as REM #1 showing installation costs, energy savings and other pertinent summarized information in Section I of this report.

Wind energy production is another option available through the Renewable Energy Incentive Program. Small wind turbines can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG has reviewed the applicability of wind energy for South Brunswick and has determined it is not a viable option. Low average wind speeds for the area are not adequate for wind turbine generation. Typical wind turbines start producing energy at 8 mph wind speeds. South Brunswick averages 4 mph wind speeds making this application impractical.

VII. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profile for June 2007 through May 2008.

Electricity:

The Electric Usage Profile demonstrates a very a-typical load profile. The winter demonstrates an increasing consumption profile beginning in October and peaking in February. Typically the winter profile should demonstrate a decrease in consumption. The summer peak can be attributed to cooling load. And in this facility the cooling is provided by (2) air handlers located on the mezzanine. The air handlers have 50 ton-capacity each. The west wing of the building, consisting of the cafeteria, administrative offices and multi-purpose room, has (2) roof mounted energy recovery units with integral cooing systems along with an indoor air handling unit that has a split outdoor condensing unit. The indoor air handler (AHU-3) serves the admin offices and has an 8.5 ton cooling capacity. There is also the presence of a 40-gallon electric heater for domestic hot water. This will add to the winter increasing consumption as well. As well as the electric coils present in the west wing. A summer peak was observed in August, followed by a sharp decline in September. This faclity utilizes the Delivery service (LPLS), and its Commodity service (BGS) from Public Service Electric and Gas Company (PSE&G). A base-load shaping is important because a flat consumption profile will yield more competitive pricing when shopping for a Third Party Supplier.

Natural Gas:

The Natural Gas Usage Profile demonstrates a typical heating load (November –March), and complimentary cooling load (April –October). Consequently there is a clear separation between summer and winter loads consistent with Wholesale Energy Pricing. Heating loads carry a much higher average cost because of the higher demand for natural gas during the winter. In this facility the core heating is supplied via heating hot water which is sourced via (2) two Patterson Kelly natural gas fired boilers. The west wing of the building is heated via (2) two roof mounted energy recovery units with natural gas fired heaters along with an indoor air handling unit. The east and north additions are heated via natural gas-fired roof tip units. This facility utilizes the Delivery service (LVG) from Public Service Electric and Gas (PSE&G) while it receives its Commodity service from Woodruff Energy, the Third Party Supplier.

Tariff Analysis:

Electricity:

South Brunswick receives electrical service through Public Service Electric and Gas Company (PSE&G) on a LPLS (Large Power Lighting Service) rate. This utility tariff is for delivery service for general purposes at secondary distribution voltages where the customers measured peak demand exceeds 150 kW in any given month and also at primary distribution voltages. Customers may either purchase electric supply from a Third Party Supplier (TPS) of from PSE&G's Basic Generation Service default service as detailed in the rate schedule. The rate schedule has a Delivery Charge; Distribution kW and kWh Charge, Societal Benefits Charge, Non-utility Generation Charge, Securitization Charge, System Control Charge, Customer Account Services Charge, Standby Fee, Base Rate Distribution Adjustment Charge, Solar Pilot Recovery Charge and RGGI Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). South Brunswick should investigate why there is such a high peak in electric consumption in August. A flat load profile will allow for a more competitive energy price when shopping for an "alternate energy source".

Natural Gas:

South Brunswick receives natural gas service through Public Service Electric and Gas Company LVG (Large Volume Gas) rate class, when not receiving commodity by a Third Party Supplier. This utility tariff is for firm delivery service for general purposes. This rate schedule has a Delivery Charge, Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

From review of the information provided by the School District, South Brunswick is utilizing the services of a Third Party Supplier, Woodruff Energy for natural gas service. The contract is administered through the Middlesex Regional Educational Services Commission (MRESC) for the term, August 1, 2008 through July 31, 2010. The agreement is between the MRESC and South Brunswick BOE and it does not define the full and final price. Based on the limited data available, it appears that South Brunswick is paying over 20% above market price.

Additionally, the MRESC charges $.0325 per deka-therm for administering this RFP. The South Brunswick BOE could realize additional savings by evaluating a new natural gas contract. It should be noted that there was not a Woodruff Energy Contract available for review, nor a complete delivered natural gas price.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities. CEG's primary observation is seen in the electricity costs. South Brunswick's "weighted average price-to-compare" per kWh (kilowatt hour) for all buildings is $.1479/kWh (kWh is the common unit of electric measure).

The price to compare is defined as the price that would be compared to the equivalent utility price extracting the utility transmission and distribution costs (wires charges). This would be a market based price that would be supplied by a Third Party Supplier (TPS) or an alternative supplier.

The average "price-to-compare" per decatherm for natural gas is $12.50/dth (Dth is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. South Brunswick could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (June 2007 through May 2008) and current electric rates, South Brunswick would see an improvement of over $150,000 or over 20% annually. (Note: Savings were calculated using South Brunswick High School's Average Annual Consumption of 5,749,304 kWh's and a variance of approximately $.03/kWh and utilizing a fixed one-year commodity contract). South Brunswick should aggregate its entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with South Brunswick's natural gas costs and the contract with MRESC and Woodruff Energy. CEG recognized a segment of the natural gas cost is not competitive with current market prices. Based on the current market, South Brunswick is paying approximately $1.717 per unit above market in the PSEG territory and about $.58 per unit above market in the Elizabethtown Gas and New Jersey Natural Gas territories. CEG recommends further advisement on these prices. South Brunswick should also consider procuring energy (natural gas) on its own. By procuring energy through the MRESC it is paying a premium of $.0325 per unit. CEG recommends alternative sourcing strategies.
CEG has observed that there is a cost differential from Phase I. For the facilities in Phase II CEG observes improvement of up to $100,000 in natural gas costs. Since energy prices have dropped since last we analyzed the energy costs, South Brunswick could now see an improvement of up to 60% in the variance to market based pricing.

CEG recommends that South Brunswick schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that might be available to South Brunswick. Through its meeting with the Local Distribution Company (LDC), South Brunswick will learn more about the competitive supply process. South Brunswick can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. South Brunswick should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends South Brunswick pay attention to credit

mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, South Brunswick should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

Finally, if South Brunswick frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

VIII. INSTALLATION FUNDING OPTIONS

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

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

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

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

All in all, incentives provide financial motivation and much needed support for the implementation of energy conservation measures. Along with the NJ Smart Start program, the Pay for Performance Program incentives, sponsored by NJ Clean Energy Program, are applicable for this facility. The existing average operating demand above 200 KW and high energy consumption qualifies for the Pay for Performance Program. The incentive based on a 15% electrical energy reduction for this facility would qualify for an additional $18,771 in the Pay for Performance Program. If natural gas consumption could be reduced by 15% the resultant incentive would be approximately $5,808. This would equate to a total incentive equal to approximately $24,579. This option is one to consider for a whole-building approach to energy reduction. The Pay for Performance Program represents a significant commitment to energy reduction of a facility. This option should be reviewed in more detail with a Pay for Performance Program partner.

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.

IX. 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. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.

D. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc.

E. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.

F. Recalibrate existing sensors serving the office spaces

G. Install a Vending Miser system to turn off the vending machines in the lunch room when not in use.

H. Clean all light fixtures to maximize light output.

I. Confirm that outside air economizers on the rooftop units that serve the Office Areas are functioning properly to take advantage of free cooling.

APPENDIX

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Brunswick Acres Elementary School

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	REPLACE AHU-3	$15,000	$10,000	$0	$25,000	$1,690	$0	$1,690	15	$25,350	$0	1.4%	14.8	0.17%	($4,824.89)
ECM #2	BOILER REPLACMENT	$57,000	$67,000	$5,250	$118,750	$5,305	$0	$5,305	15	$79,575	$0	-33.0%	22.4	-4.63%	($55,419.25)
ECM #3	VARIABLE SPEED PUMPS	$6,000	$8,750	$120	$14,630	$4,750	$0	$4,750	15	$71,250	$0	387.0%	3.1	31.96%	$42,075.19
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	220 KW SOLAR PV	$0	$0	$0	$1,983,060	$51,578	$120,348	$171,926	15	$773,670	$1,805,220	-61.0%	11.5	3.48%	$69,381.43

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*.

CONSTRUCTION COST AND REBATES

BASE CASE - EXISTING EQUIPMENT	Qty	Unit Cost $	Material $	Labor $	Total $
Total Cost			$0	$0	**$0**
ECM # 1 - REPLACE AHU-3	Qty	Unit Cost $	Material $	Labor $	Total $
Indoor Air Handler - 10 Tons w/HW coil	1	$8,000	$8,000	$6,000	$18,000
Outdoor Condensing Unit - 10 Tons	1	$5,500	$5,500	$5,000	$10,500
Piping	1	$1,500	$1,500	$1,500	$3,000
Controls	1			$1,500	$1,500
Total after Rebate					**$33,000**
ECM # 2 - BOILER REPLACEMENT	Qty	Unit Cost $	Material $	Labor $	Total $
1700 MBH Input Lochinvar Boiler (97% Eff.)	2	$27,500	$55,000	$55,000	$110,000
Demo Old Boilers				$10,000	$10,000
Controls	2	$1,000	$2,000	$2,000	$4,000
Boiler Rebate					$5,250
Total after Rebate					**$118,750**
ECM # 3 - VARIABLE FREQUENCY DRIVE PUMPS	Qty	Unit Cost $	Material $	Labor $	Total $
5 HP Premium Efficiency Motors	2	$1,000	$2,000	$3,500	$5,500
Variable Frequency Drive (5 Hp)	2	$2,000	$4,000	$7,000	$9,250
Rebate					$120
Total after Rebate					**$14,630**
REM# 1 - SOLAR PV	Qty	Unit Cost $	Material $	Labor $	Total $
PV Solar	958	$1,525	$1,460,950	$522,110	$1,983,060
Total					**$1,983,060**

Annual Maintenance Cost				
ECM	**Base**	**Additional**	**Solar PV**	**Total**
BASE CASE - EXISTING EQUIPMENT	$16,000	$0	$0	$16,000
ECM #1 - REPLACE AHU-3	$16,000	$0	$0	$16,000
ECM #2 - BOILER REPLACEMENT	$16,000	$0	$0	$16,000
ECM #3 - VARIABLE FREQUENCY DRIVE PUMPS	$16,000	$0	$0	$16,000
REM #1 - SOLAR PV	#REF!	$0	#REF!	#REF!

EQUIPMENT REPLACEMENT COST FOR EACH ECM

BASE CASE - EXISTING EQUIPMENT

	$	Life	Yr Incurred
Existing Split System AHU-3	$35,000	20	2
Existing Patterson Kelley Boilers	$60,000	25	14
Existing Constant Speed Pumps	$10,000	10	4
Existing Electric Domestic Water Heater	$8,500	15	10
Existing UV-1	$10,000	20	2

ECM # 1 - REPLACE AHU-3

	$	Life	Yr Incurred
Existing Split System AHU-3	$0	20	0
Existing Patterson Kelley Boilers	$60,000	25	14
Existing Constant Speed Pumps	$10,000	10	4
Existing Electric Domestic Water Heater	$8,500	15	10
Existing UV-1	$10,000	20	2
New Split System AHU-3	$14,500	20	20
New Boilers	$0	25	0
New Hot Water Pumps - Premium Eff.	$0	10	0
New Gas Fired Domestic Water Heater	$0	25	0
New Split System UV-1	$0	20	0

ECM # 2 - BOILER REPLACEMENT

	$	Life	Yr Incurred
Existing Split System AHU-3	$35,000	20	2
Existing Patterson Kelley Boilers	$0	25	0
Existing Constant Speed Pumps	$10,000	10	4
Existing Electric Domestic Water Heater	$8,500	15	10
Existing UV-1	$10,000	20	2
New Split System AHU-3	$0	20	0
New Boilers	$55,000	25	25
New Hot Water Pumps - Premium Eff.	$0	10	0
New Gas Fired Domestic Water Heater	$0	25	0
New Split System UV-1	$0	20	0

ECM # 3 - VARIABLE FREQUENCY DRIVE PUMPS

	$	Life	Yr Incurred
Existing Split System AHU-3	$35,000	20	2
Existing Patterson Kelley Boilers	$60,000	25	14
Existing Constant Speed Pumps	$0	10	0
Existing Electric Domestic Water Heater	$8,500	15	10
Existing UV-1	$10,000	20	2
New Split System AHU-3	$0	20	0
New Boilers	$0	25	0
New Hot Water Pumps - Premium Eff.	$5,000	10	10
New Gas Fired Domestic Water Heater	$0	25	0
New Split System UV-1	$0	20	0

REM #1 SOLAR PV

	$	Life	Yr Incurred
Existing Split System AHU-3	$35,000	20	2
Existing Patterson Kelley Boilers	$60,000	25	14
Existing Constant Speed Pumps	$10,000	10	4
Existing Electric Domestic Water Heater	$8,500	15	10
Existing UV-1	$10,000	20	2
New Split System AHU-3	$0	20	0
New Boilers	$0	25	0
New Hot Water Pumps - Premium Eff.	$0	10	0
New Gas Fired Domestic Water Heater	$0	25	0
New Split System UV-1	$0	20	0

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of January, 2009:

Electric Chillers

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

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

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

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 - $30 per fixture, (depending on quantity)
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

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

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

Brunswick Acres Elementary

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
AHU-1	TRANE	MCCBOI7UAODOOA	HORIZONTAL AIR HANDLER / VAV	467 MBH COOLING, 507 MBH HEATING, 11,000 CFM	N/A	CLASSROOMS	MEZZ CEILING ABOVE MEDIA ROOM	11 YEARS	RETURN FAN, ECONOMIZER, HW HEATING, DX COOLING , REMOTE AIR COOLED CONDENSING UNIT W/ HW VAV REHEAT COILS & VFD CONTROL.
AHU-2	TRANE	MCCBOI7UAODOOA	HORIZONTAL AIR HANDLER / VAV	467 MBH COOLING, 507 MBH HEATING, 11,000 CFM	N/A	CLASSROOMS & MEDIA CTR	MEZZ CEILING ABOVE MEDIA ROOM	11 YEARS	RETURN FAN, ECONOMIZER, HW HEATING, DX COOLING , REMOTE AIR COOLED CONDENSING UNIT W/ HW VAV REHEAT COILS & VFD CONTROL.
RTU-1	TRANE	YFD241C4LA	GAS FIRED ROOFTOP / CONSTANT VOLUME	20 TONS, 350 MBH INPUT, 283 MBH OUTPUT	11 EER, 81 %	CLASSROOMS, D400 THRU D403	ROOF ABOVE D-WING	11 YEARS	ECONOMIZER, EXHAUST FAN SECTION, GAS HEATING. ELECTRIC REHEAT COILS IN DUCTWORK.
RTU-2	TRANE	YFD241C4LA	GAS FIRED ROOFTOP / CONSTANT VOLUME	20 TONS, 350 MBH INPUT, 283 MBH OUTPUT	11 EER, 81 %	CLASSROOMS, E507 THRU E510	ROOF ABOVE E-WING	11 YEARS	ECONOMIZER, EXHAUST FAN SECTION, GAS HEATING. ELECTRIC REHEAT COILS IN DUCTWORK.
AHU-3	TRANE	T-10	HORIZ. AIR-HANDLING UNIT	4000 CFM, 8.5 TONS	10 EER	MAIN OFFICE, NURSE AREA, STAFF ROOMS	MECHANICAL / CUSTODIAL OFFICE	2 YEARS	DX W/ REMOTE AIR COOLED CONDENSING UNIT.
ERU-1	ANNEX-AIR	ERP-E-04-HW C-HG-AC	ROOFTOP DX / GAS - ERU W/ HEAT WHEEL	4700 CFM, 15 TONS, 200/250 MBH HEAT	78% EFF	CAFETERIA	STORAGE ROOM ROOF NEXT TO CAFETERIA	11 YEARS	ENERGY RECOVERY WHEEL UNIT, WITH GAS HEAT AND REMOTE AIR COOLED CONDENSING UNIT
ERU-2	ANNEX-AIR	ERP-E-12-HW C-HG-AC	ROOFTOP DX / GAS - ERU W/ HEAT WHEEL	9600 CFM, 30 TONS, 320/400 MBH HEAT	78 % EFF	GYM	STAGE ROOF	11 YEARS	ENERGY RECOVERY WHEEL UNIT, WITH GAS HEAT AND INTEGRAL AIR COOLED CONDENSING UNIT
UV-1	NESBITT	VERTICAL FLOOR	DX / HOT WATER UNIT VENTILATOR	1500 CFM, 4 TONS	N/A	MUSIC CLASSROOM	MUSIC CLASSROOM	2 YEARS	VERTICAL FLOOR MOUNTED W/ OUTSIDE AIR WALL BOX
ACCU-3	SANYO-PAC-1	C3672R	CONDENSING UNIT	3 TONS	16 SEER	MUSIC CLASSROOM	CAFETERIA ROOF	5 YEARS	R-410A, 230/60/1, PIPED TO WALL HUNG AHU.
ACCU-4	INTERNATIONAL	AGO48GB2	CONDENSING UNIT	4 TONS	10 EER	MUSIC CLASSROOM	CAFETERIA ROOF	5 YEARS	R-22, PIPED TO UV-1
PTAC-1	SANYO	STW1523C2	WINDOW TYPE THRU-WALL	14.2 MBH COOLING, 3.45 KW HEATING	9.5 EER	CLASSROOMS E501 THRU E506	CLASSROOMS E501 THRU E506	4 YEARS	3 - PER CLASSROOM
ACCU-1	TRANE	RAUC-C50	REMOTE CONDENSING UNIT	50 TONS	11 EER	AHU-1	ROOF OVER MEDIA ROOM	11 YEARS	DUAL CIRCUIT, 4 SCROLL COMPRESSORS
ACCU-2	TRANE	RAUC-C50	REMOTE CONDENSING UNIT	50 TONS	11 EER	AHU-1	ROOF OVER MEDIA ROOM	11 YEARS	DUAL CIRCUIT, 4 SCROLL COMPRESSORS
DHW-1	AO SMITH	ECT-40-200	ELECTRIC DOMESTIC HOT WATER HEATER	40 GAL., 4500 WATTS, 52 GAL/HR RECOVERY	.92 ENERGY FACTOR	RESTROOMS FRONT OF BUILDING	F603 MECHANICAL / CUSTODIAL ROOM	10 YEARS	PROMAX, 240/60/1.
B-1	PATTERSON-KELLY	N-1700-2	HOT WATER	1700 MBH INPUT, 1445 MBH OUTPUT	85%	BUILDING HOT WATER LOOP	REAR BOILER ROOM	14 YEARS	THERMIFIC BOILER, NON-CONDENSING TYPE, LEAD-LAG WITH B-2.
B-2	PATTERSON-KELLY	N-1700-2	HOT WATER	1700 MBH INPUT, 1445 MBH OUTPUT	85%	BUILDING HOT WATER LOOP	REAR BOILER ROOM	14 YEARS	THERMIFIC BOILER, NON-CONDENSING TYPE, SEQUENCED WITH B-1 TO FOLLOW LOAD.
P-1	ARMSTRONG	4380	IN-LINE CENTRIFUGAL	230 GPM, 5 HP	N/A	BUILDING HOT WATER LOOP	REAR BOILER ROOM	4 YEARS	PIPE MOUNTED
P-2	ARMSTRONG	4380	IN-LINE CENTRIFUGAL	230 GPM, 5 HP	N/A	BUILDING HOT WATER LOOP	REAR BOILER ROOM	4 YEARS	PIPE MOUNTED, SEQUENCED WITH P-1.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Brunswick Acres Elementary

Building ID: 1819242
For 12-month Period Ending: May 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 13, 2009

Facility
Brunswick Acres Elementary
41 Kory Drive
Kendall Park, NJ 08824

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1971
Gross Floor Area (ft²): 63,258

Energy Performance Rating[2] (1-100) 42

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	2,173,645
Electricity (kBtu)	2,820,205
Total Energy (kBtu)	4,993,850

Energy Intensity[5]

Site (kBtu/ft²/yr)	80
Source (kBtu/ft²/yr)	186

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	556

Electric Distribution Utility
PSE&G - Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	75
National Average Source EUI	175
% Difference from National Average Source EUI	6%
Building Type	K-12 School

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Brunswick Acres Elementary	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	41 Kory Drive, Kendall Park, NJ 08824	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Brunswick Acres Elementary (K-12 School)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	63,258 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	111 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

Months	12 (Optional)	Is this school in operation for at least 8 months of the year?		
High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: PSE&G - Public Service Elec & Gas Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
04/05/2008	05/04/2008	63,200.00
03/05/2008	04/04/2008	67,600.00
02/05/2008	03/04/2008	86,000.00
01/05/2008	02/04/2008	82,000.00
12/05/2007	01/04/2008	76,000.00
11/05/2007	12/04/2007	67,200.00
10/05/2007	11/04/2007	61,200.00
09/05/2007	10/04/2007	44,000.00
08/05/2007	09/04/2007	97,600.00
07/05/2007	08/04/2007	65,200.00
06/05/2007	07/04/2007	63,600.00
Electric Consumption (kWh (thousand Watt-hours))		**773,600.00**
Electric Consumption (kBtu)		**2,639,523.20**
Total Electricity Consumption (kBtu)		**2,639,523.20**
Is this the total Electricity consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
04/05/2008	05/04/2008	1,340.00
03/05/2008	04/04/2008	3,060.00
02/05/2008	03/04/2008	4,170.00
01/05/2008	02/04/2008	4,390.00
12/05/2007	01/04/2008	4,390.00
11/05/2007	12/04/2007	3,010.00
10/05/2007	11/04/2007	580.00
09/05/2007	10/04/2007	0.00
08/05/2007	09/04/2007	0.00
07/05/2007	08/04/2007	0.00

06/05/2007	07/04/2007	30.00
Gas Consumption (therms)		**20,970.00**
Gas Consumption (kBtu)		**2,097,000.00**
Total Natural Gas Consumption (kBtu)		**2,097,000.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

Certifying Professional

(When applying for the ENERGY STAR, this must be the same PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Brunswick Acres Elementary
41 Kory Drive
Kendall Park, NJ 08824

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Brunswick Acres Elementary	
Gross Floor Area Excluding Parking: (ft^2)	63,258
Year Built	1971
For 12-month Evaluation Period Ending Date:	May 31, 2008

Facility Space Use Summary

Brunswick Acres Elementary	
Space Type	K-12 School
Gross Floor Area(ft^2)	63,258
Open Weekends?	Yes
Number of PCs[d]	111
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months[o]	12
High School?	No
School District[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2008)	**Baseline** (Ending Date 05/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	42	42	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	80	80	58	N/A	75
Source (kBtu/ft^2)	186	186	137	N/A	175
Energy Cost					
$/year	$ 162,377.56	$ 162,377.56	$ 119,314.87	N/A	$ 152,585.95
$/$ft^2$/year	$ 2.57	$ 2.57	$ 1.89	N/A	$ 2.42
Greenhouse Gas Emissions					
$MtCO_2e$/year	556	556	409	N/A	522
$kgCO_2e/ft^2$/year	9	9	7	N/A	8

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.

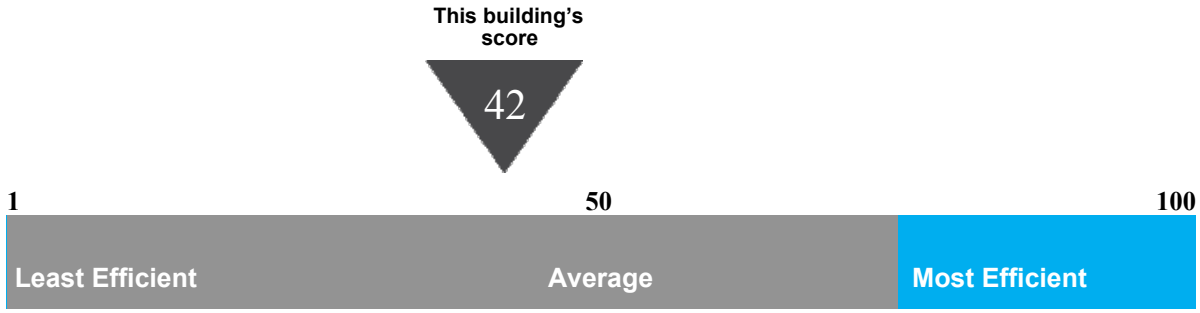
Statement of Energy Performance

2008

Brunswick Acres Elementary
41 Kory Drive
Kendall Park, NJ 08824

Portfolio Manager Building ID: 1819242

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 186 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending May 2008

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

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

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 08/13/2009

LIGHTING ANALYSIS

Brunswick Acres Elementary School

Appendix E

CEG Project #: 9C08134
Project Name : South Brunswick Schools Energy Audit
Address: 41 Kory Drive
City, State: Kendall Park, NJ 08824

Date 11/20/2009
kWh Cost $0.150

		Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Room Number	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
	First Floor - Gym & Cafeteria Wing															
403	Cafeteria	1200	8	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	440	$79.20	8	Existing to Remain	440	0	0	$0.00		$0.00	$0.00	$0.00
Stage	Stage	500	4	(1)300 Inc. Lamps. Hi-hat Fixture w/Elec. Ballast - 300w	1200	$90.00	4	Existing to Remain	1200	0	0	$0.00		$0.00	$0.00	$0.00
Stage	Stage	500	16	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	880	$66.00	16	Existing to Remain	880	0	0	$0.00		$0.00	$0.00	$0.00
Stage	Stage	500	4	(2)32w T8 Lamps. Plastic Fixture w/Elec. Ballast - 55w	220	$16.50	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
Gym	Gym 8 x 32 x 12	900	12	(8)42w T42 Lamps. Hi-hat Fixture w/Elec. Ballast - 318w	3816	$515.16	12	Existing to Remain	3816	0	0	$0.00		$0.00	$0.00	$0.00
Ex. Kitchen	Ex. Kitchen	1200	5	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	540	$97.20	5	Existing to Remain	540	0	0	$0.00		$0.00	$0.00	$0.00
Gym Storage	Gym Storage	900	4	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	220	$29.70	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
Gym Corr/	Gym Corridor - North/South East/West - 21 Lgts	4000	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$104.40	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
Gym Corr/	Gym Corridor - North/South East/West - 21 Lgts	4000	3	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	324	$194.40	3	Existing to Remain	324	0	0	$0.00		$0.00	$0.00	$0.00
Gym Corr/	Gym Corridor - North/South East/West - 21 Lgts	4000	4	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	220	$132.00	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 23 Fixtures	4000	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$104.40	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 23 Fixtures	4000	3	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	324	$194.40	3	Existing to Remain	324	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 23 Fixtures	4000	4	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	220	$132.00	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
Ex. Receiving	Ex. Receiving	1800	6	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	330	$89.10	6	Existing to Remain	330	0	0	$0.00		$0.00	$0.00	$0.00
Main't. Office	Head Custodian Office	2000	1	(3)13w CF Lamps. Surface Square' Fixture w/Elec. Ballast - 128w	128	$38.40	1	Existing to Remain	128	0	0	$0.00		$0.00	$0.00	$0.00

		Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Room Number	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
Ex. Faculty	Lunch Room	1080	11	(4)32w T8 Lamps. Recessed Fixture w/Elec. Ballast - 108w	1188	$192.46	11	Existing to Remain	1188	0	0	$0.00		$0.00	$0.00	$0.00
2 Toilet Rms.	Adjacent to Lunch Room	550	2	(3)13w CF Lamps. Surface Square' Fixture w/Elec. Ballast - 128w	256	$21.12	2	Existing to Remain	256	0	0	$0.00		$0.00	$0.00	$0.00
Nurse's Office	Exam Rooms - 2 Bed Lights	500	2	(2)32w T8 Lamps. Plastic Fixture w/Elec. Ballast - 55w	110	$8.25	2	Existing to Remain	110	0	0	$0.00		$0.00	$0.00	$0.00
Nurse's Office	Nurse's Suite	1450	8	(4)32w T8 Lamps. Recessed Fixture w/Elec. Ballast - 108w	864	$187.92	8	Existing to Remain	864	0	0	$0.00		$0.00	$0.00	$0.00
Main Office	Main Office Suites	2000	19	(4)32w T8 Lamps. Recessed Fixture w/Elec. Ballast - 108w	2052	$615.60	19	Existing to Remain	2052	0	0	$0.00		$0.00	$0.00	$0.00
Main Office	Office Suites- Two Toilet Rooms	550	2	(3)13w CF Lamps. Surface Square' Fixture w/Elec. Ballast - 128w	256	$21.12	2	Existing to Remain	256	0	0	$0.00		$0.00	$0.00	$0.00
Music Room	Existing Music Room	1080	28	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	1540	$249.48	28	Existing to Remain	1540	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 26 Fixtures	4000	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$104.40	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 26 Fixtures	4000	3	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	324	$194.40	3	Existing to Remain	324	0	0	$0.00		$0.00	$0.00	$0.00
Gym Lobby	Gym Lobby & Toilet Rooms - 26 Fixtures	4000	4	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	220	$132.00	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
	First Floor - Gym & Cafeteria Summary		**159**		**16194**	**$3,610**	**159**		**16194**	**0**	**0**	**$0**			**$0**	**$0**
	First Floor - Modular Wing															
1	Conference Room	720	6	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	330	$35.64	6	Existing to Remain	330	0	0	$0.00		$0.00	$0.00	$0.00
100	Main Vestible	350	1	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	108	$5.67	1	Existing to Remain	108	0	0	$0.00		$0.00	$0.00	$0.00
101	Main Lobby	350	1	(4)32w T8 Lamps. 4' x 4' Fixture w/Elec. Ballast - 108w	108	$5.67	1	Existing to Remain	108	0	0	$0.00		$0.00	$0.00	$0.00
103	Janitor Closet	400	1	(2)T8 "U" Lamps. Surface Fixture w/Elec. Ballast - 55w	55	$3.30	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
104	Men's Restroom	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
105	Women's Restroom	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
106	Corridor	1800	13	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1404	$379.08	13	Existing to Remain	1404	0	0	$0.00		$0.00	$0.00	$0.00
107	Kindergarten	1620	23	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	1265	$307.40	23	Existing to Remain	1265	0	0	$0.00		$0.00	$0.00	$0.00
108	Kindergarten	1620	23	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	1265	$307.40	23	Existing to Remain	1265	0	0	$0.00		$0.00	$0.00	$0.00

		Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Room Number	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
109	1st Grade	1620	17	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	935	$227.21	17	Existing to Remain	935	0	0	$0.00		$0.00	$0.00	$0.00
110	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
111	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
112	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
113	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
114	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
115	Toilet Room	300	1	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	55	$2.48	1	Existing to Remain	55	0	0	$0.00		$0.00	$0.00	$0.00
116	First Grade	1260	20	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	1100	$207.90	20	Existing to Remain	1100	0	0	$0.00		$0.00	$0.00	$0.00
117	Second Grade	1260	20	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	1100	$207.90	20	Existing to Remain	1100	0	0	$0.00		$0.00	$0.00	$0.00
118	Second Grade	1260	20	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	1100	$207.90	20	Existing to Remain	1100	0	0	$0.00		$0.00	$0.00	$0.00
119	Storage Room	500	4	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	220	$16.50	4	Existing to Remain	220	0	0	$0.00		$0.00	$0.00	$0.00
120	Corridor	1800	12	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1296	$349.92	12	Existing to Remain	1296	0	0	$0.00		$0.00	$0.00	$0.00
122	Electrical Room	70	2	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	110	$1.16	2	Existing to Remain	110	0	0	$0.00		$0.00	$0.00	$0.00
	First Floor - Modular Wing Summary		**171**		**10836**	**$2,282**	**171**		**10836**	**0**	**0**	**$0**			**$0**	**$0**
	First Floor - Media Wing															
C303	Autistic Classroom	1620	10	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	870	$211.41	10	Existing to Remain	870	0	0	$0.00		$0.00	$0.00	$0.00
C304	Autistic Classroom	1620	10	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	870	$211.41	10	Existing to Remain	870	0	0	$0.00		$0.00	$0.00	$0.00
C306	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
C307	Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
C309	Classroom	1620	11	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	957	$232.55	11	Existing to Remain	957	0	0	$0.00		$0.00	$0.00	$0.00
B208	Small Group	1620	3	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	261	$63.42	3	Existing to Remain	261	0	0	$0.00		$0.00	$0.00	$0.00
B206	Office	1800	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$46.98	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
B205	Office	1800	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$46.98	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
B204	Small Group	1620	4	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	348	$84.56	4	Existing to Remain	348	0	0	$0.00		$0.00	$0.00	$0.00

		Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Room Number	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
B201	Small Group	1620	3	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	261	$63.42	3	Existing to Remain	261	0	0	$0.00		$0.00	$0.00	$0.00
B200	Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
A108	Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
A107	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
A106	Clerk's Office	1450	4	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	348	$75.69	4	Existing to Remain	348	0	0	$0.00		$0.00	$0.00	$0.00
A105	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
A104	Art Classroom	1080	18	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	990	$160.38	18	Existing to Remain	990	0	0	$0.00		$0.00	$0.00	$0.00
A103	Basic Skills	1080	6	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	522	$84.56	6	Existing to Remain	522	0	0	$0.00		$0.00	$0.00	$0.00
A102	Small Group	1620	6	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	522	$126.85	6	Existing to Remain	522	0	0	$0.00		$0.00	$0.00	$0.00
A100	Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
C310	Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
C302	Autistic Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
C300	Corridor 300	1800	42	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	4536	$1,224.72	42	Existing to Remain	4536	0	0	$0.00		$0.00	$0.00	$0.00
C305	Resource/Clerk's Office	1450	4	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	348	$75.69	4	Existing to Remain	348	0	0	$0.00		$0.00	$0.00	$0.00
C325	Electrical Closet	200	2	(2)32w T8 Lamps. 1' x 4' Fixture w/Elec. Ballast - 55w	110	$3.30	2	Existing to Remain	110	0	0	$0.00		$0.00	$0.00	$0.00
C320	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
C301	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
A101	Autistic Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
B202	Classroom	1620	9	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	783	$190.27	9	Existing to Remain	783	0	0	$0.00		$0.00	$0.00	$0.00
A308	Electrical Closet	200	2	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	110	$3.30	2	Existing to Remain	110	0	0	$0.00		$0.00	$0.00	$0.00
Media Center	Media Center	1800	55	(2)32w T8 Lamps. Pendant Fixture w/Elec. Ballast - 55w	3025	$816.75	55	Existing to Remain	3025	0	0	$0.00		$0.00	$0.00	$0.00
Media Center Office	Media Center Office	1800	2	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	174	$46.98	2	Existing to Remain	174	0	0	$0.00		$0.00	$0.00	$0.00
	First Floor - Media Wing Summary		**318**		**26084**	**$6,370**	**318**		**26084**	**0**	**0**	**$0**			**$0**	**$0**
	First Floor - North East Wing															

		Existing Lt Fixtures					Proposed Lt Fixtures			Proposed Ltg Savings				Proposed Ltg Installation Cost		
Room Number	**Fixture Location**	**Usage, Hrs/Yr**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Annual Energy Cost**	**Fixt Qty**	**Lighting Fixture Description**	**Total Watts - Location**	**Energy Savings, Watts**	**Energy Savings, kWh/Yr**	**Savings/Yr, $**	**Simple Payback, Yrs**	**Unit Cost, Installed**	**Total Cost, Installed**	**Rebate Estimate**
E507	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
E508	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
E509	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
E510	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
Corridor 100	Corridor 100	1800	7	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	756	$204.12	7	Existing to Remain	756	0	0	$0.00		$0.00	$0.00	$0.00
Classroom Closets	Classroom Closets	900	4	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	432	$58.32	4	Existing to Remain	432	0	0	$0.00		$0.00	$0.00	$0.00
Classroom Closets	Classroom Closets	500	4	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	348	$26.10	4	Existing to Remain	348	0	0	$0.00		$0.00	$0.00	$0.00
Boys Restroom	Boys Restroom	300	1	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	87	$3.92	1	Existing to Remain	87	0	0	$0.00		$0.00	$0.00	$0.00
Girls Restroom	Girls Restroom	300	1	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	87	$3.92	1	Existing to Remain	87	0	0	$0.00		$0.00	$0.00	$0.00
	First Floor - North East Wing Summary		**65**		**5886**	**$1,311**	**65**		**5886**	**0**	**0**	**$0**			**$0**	**$0**
	First Floor - New North Wing															
D400	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
D401	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
D402	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
D403	General Classroom	1620	12	(3)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1044	$253.69	12	Existing to Remain	1044	0	0	$0.00		$0.00	$0.00	$0.00
Corridor	Corridor	1800	10	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	1080	$291.60	10	Existing to Remain	1080	0	0	$0.00		$0.00	$0.00	$0.00
Classroom Closets	Classroom Closets	900	4	(4)32w T8 Lamps. 2' x 4' Fixture w/Elec. Ballast - 87w	432	$58.32	4	Existing to Remain	432	0	0	$0.00		$0.00	$0.00	$0.00
	First Floor - New North Wing Summary		**282**		**5688**	**$1,365**	**62**		**5688**	**0**	**0**	**$0**			**$0**	**$0**
		Totals:	**995**		**64688**	**$14,937**	**775**		**64688**	**0**	**0**	**$0**			**$0**	**$0**
	COMMENTS:															

Project Name: Brunswick Acres Elementary School
Location: Kendall Park, NJ
Description: Photovoltaic System 95% Financing - 20 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 20 year
Total Construction Cost	$1,983,060
Annual kWh Production	343,851
Annual Energy Cost Reduction	$51,578
Annual SREC Revenue	$120,348
First Cost Premium	**$1,983,060**
Simple Payback:	**11.53** Years

Life Cycle Cost Analysis

Analysis Period (years): 25
Financing Term (mths): 240
Average Energy Cost ($/kWh) **$0.150**
Financing Rate: 7.00%
Financing %: 95%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
SREC Value ($/kWh) $0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$99,153	0	0	0	$0	0	0	(99,153)	0
1	$0	343,851	$51,578	$0	$120,348	$130,454	$44,817	($3,346)	($102,499)
2	$0	342,131	$53,125	$0	$119,746	$127,214	$48,057	($2,400)	($104,899)
3	$0	340,421	$54,719	$0	$119,147	$123,740	$51,531	($1,405)	($106,304)
4	$0	338,719	$56,360	$0	$118,552	$120,015	$55,256	($359)	($106,663)
5	$0	337,025	$58,051	$3,471	$117,959	$116,020	$59,251	($2,732)	($109,395)
6	$0	335,340	$59,793	$3,454	$117,369	$111,737	$63,534	($1,563)	($110,959)
7	$0	333,663	$61,586	$3,437	$116,782	$107,144	$68,127	($339)	($111,298)
8	$0	331,995	$63,434	$3,420	$116,198	$102,219	$73,052	$942	($110,356)
9	$0	330,335	$65,337	$3,402	$115,617	$96,938	$78,333	$2,281	($108,075)
10	$0	328,683	$67,297	$3,385	$115,039	$91,276	$83,995	$3,680	($104,395)
11	$0	327,040	$69,316	$3,369	$114,464	$85,204	$90,067	$5,141	($99,255)
12	$0	325,405	$71,395	$3,352	$113,892	$78,693	$96,578	$6,665	($92,590)
13	$0	323,778	$73,537	$3,335	$113,322	$71,711	$103,560	$8,254	($84,337)
14	$0	322,159	$75,743	$3,318	$112,756	$64,225	$111,046	$9,910	($74,427)
15	$0	320,548	$78,016	$3,302	$112,192	$56,197	$119,074	$11,635	($62,792)
16	$0	318,945	$80,356	$3,285	$111,631	$47,589	$127,682	$13,431	($49,361)
17	$0	317,351	$82,767	$3,269	$111,073	$38,359	$136,912	$15,300	($34,061)
18	$0	315,764	$85,250	$3,252	$110,517	$28,462	$146,809	$17,244	($16,817)
19	$0	314,185	$87,807	$3,236	$109,965	$17,849	$157,422	$19,265	$2,448
20	$0	312,614	$90,442	$3,220	$109,415	$6,469	$168,802	$21,366	$23,814
21	$0	311,051	$93,155	$3,204	$108,868	$5,484	$155,181	$38,154	$61,968
22	$0	309,496	$95,950	$3,188	$108,323	$3,753	$127,700	$69,632	$131,600
23	$0	307,948	$98,828	$3,172	$107,782	$0	$0	$203,438	$335,038
24	$0	306,408	$101,793	$3,156	$107,243	$0	$0	$205,880	$540,918
25	$0	304,876	$104,847	$3,140	$106,707	$0	$0	$208,413	$749,331
	Totals:	6,559,951	$1,385,910	$53,507	$2,295,983	$1,621,512	$1,883,907	$2,166,788	$256,637

Net Present Value (NPV)	**$73,153**
Internal Rate of Return (IRR)	**9.9%**

Project Name: **Brunswick Acres Elementary School**
Location: **Kendall Park, NJ**
Description: **Photovoltaic System - Direct Purchase**

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,983,060
Annual kWh Production	343,851
Annual Energy Cost Reduction	$51,578
Annual SREC Revenue	$120,348
First Cost Premium	**$1,983,060**
Simple Payback:	**11.53** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.150**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$1,983,060	0	0	0	$0	(1,983,060)	0
1	$0	343,851	$51,578	$0	$120,348	$171,925	($1,811,135)
2	$0	342,131	$53,125	$0	$119,746	$172,871	($1,638,264)
3	$0	340,421	$54,719	$0	$119,147	$173,866	($1,464,398)
4	$0	338,719	$56,360	$0	$118,552	$174,912	($1,289,486)
5	$0	337,025	$58,051	$3,471	$117,959	$172,538	($1,116,947)
6	$0	335,340	$59,793	$3,454	$117,369	$173,708	($943,240)
7	$0	333,663	$61,586	$3,437	$116,782	$174,932	($768,308)
8	$0	331,995	$63,434	$3,420	$116,198	$176,213	($592,096)
9	$0	330,335	$65,337	$3,402	$115,617	$177,552	($414,544)
10	$0	328,683	$67,297	$3,385	$115,039	$178,951	($235,593)
11	$0	327,040	$69,316	$3,369	$114,464	$180,411	($55,182)
12	$0	325,405	$71,395	$3,352	$113,892	$181,935	$126,754
13	$0	323,778	$73,537	$3,335	$113,322	$183,525	$310,279
14	$0	322,159	$75,743	$3,318	$112,756	$185,181	$495,459
15	$0	320,548	$78,016	$3,302	$112,192	$186,906	$682,365
16	$0	318,945	$80,356	$3,285	$111,631	$188,702	$871,067
17	$0	317,351	$82,767	$3,269	$111,073	$190,571	$1,061,638
18	$0	315,764	$85,250	$3,252	$110,517	$192,515	$1,254,153
19	$0	314,185	$87,807	$3,236	$109,965	$194,536	$1,448,689
20	$0	312,614	$90,442	$3,220	$109,415	$196,637	$1,645,326
21	$1	311,051	$93,155	$3,204	$108,868	$198,819	$1,844,145
22	$2	309,496	$95,950	$3,188	$108,323	$201,085	$2,045,230
23	$3	307,948	$98,828	$3,172	$107,782	$203,438	$2,248,668
24	$4	306,408	$101,793	$3,156	$107,243	$205,880	$2,454,548
25	$5	304,876	$104,847	$3,140	$106,707	$208,413	$2,662,961
	Totals:	6,559,951	$1,385,910	$53,507	$2,295,983	$4,646,021	$3,628,386
				Net Present Value (NPV)		**$2,662,986**	
				Internal Rate of Return (IRR)		**7.7%**	

Building	Usable Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Brunswick Acres Elementary	14,085	Sunpower SPR230	958	14.7	14,087	220.34	343,851	31,614	15.64

.= Proposed PV Layout

Roof Area	11,160	90%	10,044 S.F.	683 Panels	157.09 Kw
Roof Area	4,490	90%	4,041 S.F.	275 Panels	63.25 Kw
Total Roof Area			14,085 S.F.	958 Panels	220.34 Kw

Notes:

1. Estimated kWH based on 4.68 hours full output per day per 365 day year. Actual kWH will vary day to day.

ENERGY CONSUMPTION SUMMARY

	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
BASE CASE – EXISTING BUILDING					
Primary heating					
Primary heating	222,081	2,168,917	54.5 %	2,926,879	4,557,186
Other Htg Accessories	44,360		2.8 %	151,401	454,247
Heating Subtotal	**266,441**	**2,168,917**	**57.3 %**	**3,078,280**	**5,011,434**
Primary cooling					
Cooling Compressor	149,719		9.5 %	510,992	1,533,129
Tower/Cond Fans	15,755		1.0 %	53,772	161,332
Condenser Pump			0.0 %	0	0
Other Clg Accessories	3,424		0.2 %	11,687	35,064
Cooling Subtotal....	**168,899**		**10.7 %**	**576,451**	**1,729,525**
Auxiliary					
Supply Fans	151,226		9.6 %	516,135	1,548,561
Pumps	12,018		0.8 %	41,018	123,066
Stand-alone Base Utilities	4,508		0.3 %	15,386	46,162
Aux Subtotal....	167,752		10.7 %	572,539	1,717,789
Lighting					
Lighting	309,529		19.7 %	1,056,423	3,169,585
Receptacle					
Receptacles	26,721		1.7 %	91,199	273,624
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	**939,342**	**2,168,917**	**100.0 %**	**5,374,891**	**11,901,956**

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

ENERGY CONSUMPTION SUMMARY

	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
ECM #1 REPLACE AHU-3					
Primary heating					
Primary heating	209,457	2,219,608	54.7 %	2,934,483	4,481,270
Other Htg Accessories	44,360		2.8 %	151,401	454,247
Heating Subtotal	**253,817**	**2,219,608**	**57.5 %**	**3,085,884**	**4,935,517**
Primary cooling					
Cooling Compressor	145,719		9.3 %	497,340	1,492,168
Tower/Cond Fans	15,593		1.0 %	53,220	159,677
Condenser Pump			0.0 %	0	0
Other Clg Accessories	2,964		0.2 %	10,117	30,355
Cooling Subtotal....	**164,277**		**10.5 %**	**560,677**	**1,682,199**
Auxiliary					
Supply Fans	151,226		9.6 %	516,135	1,548,561
Pumps	12,018		0.8 %	41,018	123,066
Stand-alone Base Utilities	4,508		0.3 %	15,386	46,162
Aux Subtotal....	167,752		10.7 %	572,539	1,717,789
Lighting					
Lighting	309,529		19.7 %	1,056,423	3,169,585
Receptacle					
Receptacles	26,721		1.7 %	91,199	273,624
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	**922,096**	**2,219,608**	**100.0 %**	**5,366,721**	**11,778,714**

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

ENERGY CONSUMPTION SUMMARY

	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
ECM #2 BOILER REPLACEMENT					
Primary heating					
Primary heating	222,081	1,908,890	52.3 %	2,666,853	4,283,474
Other Htg Accessories	47,343		3.2 %	161,580	484,790
Heating Subtotal	**269,424**	**1,908,890**	**55.5 %**	**2,828,433**	**4,768,264**
Primary cooling					
Cooling Compressor	149,719		10.0 %	510,992	1,533,129
Tower/Cond Fans	15,755		1.1 %	53,772	161,332
Condenser Pump			0.0 %	0	0
Other Clg Accessories	3,424		0.2 %	11,687	35,064
Cooling Subtotal....	**168,899**		**11.3 %**	**576,451**	**1,729,525**
Auxiliary					
Supply Fans	151,226		10.1 %	516,135	1,548,561
Pumps	4,353		0.3 %	14,858	44,578
Stand-alone Base Utilities	4,508		0.3 %	15,386	46,162
Aux Subtotal....	160,088		10.7 %	546,379	1,639,302
Lighting					
Lighting	309,529		20.7 %	1,056,423	3,169,585
Receptacle					
Receptacles	26,721		1.8 %	91,199	273,624
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	**934,660**	**1,908,890**	**100.0 %**	**5,098,885**	**11,580,299**

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

ENERGY CONSUMPTION SUMMARY

	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
ECM #3 VARIABLE FREQUENCY PUMPS					
Primary heating					
Primary heating	222,081	2,168,917	55.6 %	2,926,879	4,557,186
Other Htg Accessories	12,694		0.8 %	43,326	129,990
Heating Subtotal	**234,775**	**2,168,917**	**56.4** %	**2,970,205**	**4,687,177**
Primary cooling					
Cooling Compressor	149,719		9.7 %	510,992	1,533,129
Tower/Cond Fans	15,755		1.0 %	53,772	161,332
Condenser Pump			0.0 %	0	0
Other Clg Accessories	3,424		0.2 %	11,687	35,064
Cooling Subtotal....	**168,899**		**10.9** %	**576,451**	**1,729,525**
Auxiliary					
Supply Fans	151,226		9.8 %	516,135	1,548,561
Pumps	12,018		0.8 %	41,018	123,066
Stand-alone Base Utilities	4,508		0.3 %	15,386	46,162
Aux Subtotal....	167,752		10.9 %	572,539	1,717,789
Lighting					
Lighting	309,529		20.1 %	1,056,423	3,169,585
Receptacle					
Receptacles	26,721		1.7 %	91,199	273,624
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	**907,677**	**2,168,917**	**100.0** %	**5,266,817**	**11,577,699**

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.