Local Government Energy Audit:
Energy Audit Report

Brookside Elementary School

20 Lake Dr

Westwood, New Jersey 07675

Westwood Regional School District

October 4, 2018

Final Report by:

TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Brookside Elementary School.

The goal of an LGEA report is to provide public facilities and local governments with valuable information on their facilities' energy usage. Each LGEA report includes specific energy conservation measures (ECMs) and energy management options, which have been determined to be likely to benefit that facility. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) and other sources which may be available to assist with ECM implementation.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey school districts in controlling energy costs and help protect our environment by promoting more efficient use of energy resources statewide.

1.1 Facility Summary

Brookside Elementary School is a 48,920 square foot, two-story facility comprised of classroom space, an all-purpose room, kitchen, cafeteria and library. The school is occupied between 6:00 AM and 6:00 PM, Monday through Friday. The gymnasium/all-purpose room is occupied between 8:00 AM and 3:00 PM on Saturdays and partially on Sundays.

The main maintenance concern of the facility is the high bay lighting in the gymnasium. These are aging and inefficient light fixtures which are in need of replacement. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 12 energy conservation measure of which 11 are recommended. The recommended measures represent an opportunity for Brookside Elementary School to reduce its annual energy costs by $22,486 and its annual greenhouse gas emissions by 150,421 lbs CO_2e. We estimate that if all measures are implemented as recommended, the project would pay for itself in energy savings in 7.3 years. A breakdown of current utility costs is shown in Figure 1. The estimated reduction in utility costs for the proposed measures in shown in Figure 2. Together these measures represent an opportunity to reduce Brookside Elementary School's annual energy use by 18% overall.

Figure 1 – Previous 12 Month Utility Costs

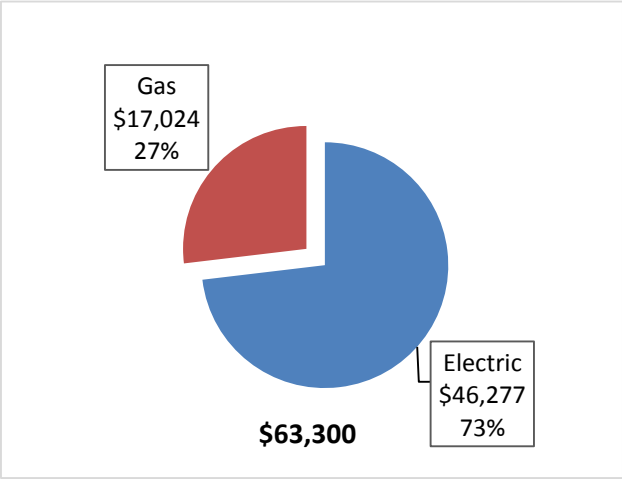
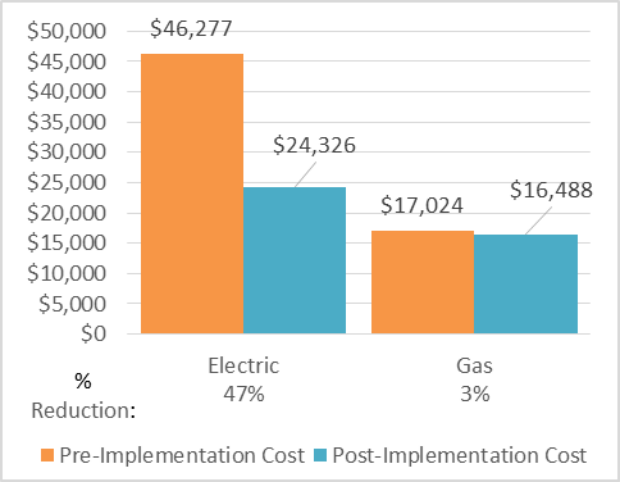


Figure 2 – Potential Post-Implementation Costs



A detailed description of Brookside Elementary School's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**110,323**	**24.2**	**0.0**	**0.0**	**0.0**	**0.0**	**$17,096.59**	**$134,374.92**	**$11,855.00**	**$122,519.92**	**7.2**	**111,095**
ECM 1	Delamp and Retrofit Classroom Fixtures with LED Lamps and Drivers	Yes	58,999	13.8	0.0	0.0	0.0	0.0	$9,143.04	$29,673.00	$3,780.00	$25,893.00	2.8	59,412
ECM 2	Install LED Fixtures	Yes	20,666	3.6	0.0	0.0	0.0	0.0	$3,202.53	$85,243.34	$4,900.00	$80,343.34	25.1	20,810
ECM 3	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	422	0.1	0.0	0.0	0.0	0.0	$65.40	$592.50	$75.00	$517.50	7.9	425
ECM 4	Retrofit Fixtures with LED Lamps	Yes	30,236	6.7	0.0	0.0	0.0	0.0	$4,685.63	$18,866.08	$3,100.00	$15,766.08	3.4	30,447
Lighting Control Measures			**15,569**	**3.4**	**0.0**	**0.0**	**0.0**	**0.0**	**$2,412.75**	**$23,656.00**	**$3,055.00**	**$20,601.00**	**8.5**	**15,678**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	15,324	3.4	0.0	0.0	0.0	0.0	$2,374.74	$23,296.00	$3,055.00	$20,241.00	8.5	15,431
ECM 6	Install Photocell Controls	Yes	245	0.0	0.0	0.0	0.0	0.0	$38.01	$360.00	$0.00	$360.00	9.5	247
Variable Frequency Drive (VFD) Measures			**10,883**	**1.9**	**0.0**	**0.0**	**0.0**	**0.0**	**$1,686.55**	**$7,213.60**	**$0.00**	**$7,213.60**	**4.3**	**10,959**
ECM 7	Install VFDs on Hot Water Pumps	Yes	10,883	1.9	0.0	0.0	0.0	0.0	$1,686.55	$7,213.60	$0.00	$7,213.60	4.3	10,959
Electric Unitary HVAC Measures			**2,768**	**2.0**	**0.0**	**0.0**	**0.0**	**0.0**	**$428.99**	**$8,162.40**	**$368.00**	**$7,794.40**	**18.2**	**2,788**
ECM 8	Install High Efficiency Electric AC	Yes	2,768	2.0	0.0	0.0	0.0	0.0	$428.99	$8,162.40	$368.00	$7,794.40	18.2	2,788
HVAC System Improvements			**4,693**	**0.0**	**63.8**	**0.0**	**0.0**	**63.8**	**$1,241.14**	**$30,426.91**	**$0.00**	**$30,426.91**	**24.5**	**12,193**
	Install Programmable Thermostats and EC Motors	No	4,693	0.0	63.8	0.0	0.0	63.8	$1,241.14	$30,426.91	$0.00	$30,426.91	24.5	12,193
Domestic Water Heating Upgrade			**0**	**0.0**	**0.9**	**0.0**	**0.0**	**0.9**	**$6.91**	**$28.68**	**$0.00**	**$28.68**	**4.1**	**100**
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	0.9	0.0	0.0	0.9	$6.91	$28.68	$0.00	$28.68	4.1	100
Custom Measures			**2,099**	**0.0**	**65.7**	**0.0**	**0.0**	**65.7**	**$854.34**	**$5,857.00**	**$0.00**	**$5,857.00**	**6.9**	**9,801**
ECM 10	Computer Power Management Software	Yes	2,083	0.0	0.0	0.0	0.0	0.0	$322.83	$3,355.00	$0.00	$3,355.00	10.4	2,098
ECM 11	Building Envelope Weatherization	Yes	16	0.0	65.7	0.0	0.0	65.7	$531.51	$2,502.00	$0.00	$2,502.00	4.7	7,703
TOTALS FOR HIGH PRIORITY MEASURES			**141,643**	**31.5**	**66.5**	**0.0**	**0.0**	**66.5**	**$22,486.13**	**$179,292.60**	**$15,278.00**	**$164,014.60**	**7.3**	**150,421**
TOTALS FOR ALL EVALUATED MEASURES			**146,336**	**31.5**	**130.3**	**0.0**	**0.0**	**130.3**	**$23,727.28**	**$209,719.51**	**$15,278.00**	**$194,441.51**	**8.2**	**162,614**

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

HVAC System Improvements generally involve the installation of automated controls to reduce heating and cooling demand during periods of reduced demand. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperature conditions. These measures save energy by reducing the demand on HVAC systems and the amount of time systems operate.

Domestic Hot Water upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

Energy Efficient Practices

TRC also identified 14 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and operation and maintenance costs. Potential opportunities identified at Brookside Elementary School include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Install Destratification Fans
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

For details on these energy efficient practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Brookside Elementary School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	91	kW DC STC
Electric Generation	68,473	kWh/yr
Displaced Cost	$5,960	/yr
Installed Cost	$260,300	

For details on our evaluation and on-site generation potential, please refer to Section 6.

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the energy conservation measures and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with measure installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement measures, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.34 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
John Baumann	Director of Buildings and Grounds	john.baumann@wwrsd.org	201-664-0880 ext 2010
Keith Rosado	School Business Administrator / Board Secretary	keith.rosado@wwrsd.org	201-664-0880 ext 2004
TRC Energy Services			
Aimee Lalonde	Auditor	alalonde@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 20, 2017, TRC performed an energy audit at Brookside Elementary School located in Westwood, New Jersey. TRC's team met with John Baumann, Director of Buildings and Grounds to review the facility operations and help focus our investigation on specific energy-using systems.

Brookside Elementary School is a 48,920 square foot, two-story facility comprised of classroom space, an all-purpose room, kitchen, cafeteria and library. The building was constructed in 1970. The major concern at this building are the old HID high bay fixtures in the gymnasium.

2.3 Building Occupancy

The school is occupied between 6:00 AM and 6:00 PM, Monday through Friday. The gymnasium/all-purpose room is occupied between 8:00 AM and 3:00 PM on Saturdays and partially on Sundays. The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 403 students and 49 staff members.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Brookside Elementary School	Weekday	6 AM to 6 PM
Brookside Elementary School	Weekend	Partial
Gym	Weekday	6 AM to 10 PM
Gym	Weekend	8 AM to 3 PM

2.4 Building Envelope

The building is constructed of concrete block with a brick facade. The building has flat roof sections and a pitched roof which all appear to be in fair condition. The building has double-pane windows, which are operable with metal or wooden frames. The perimeter of window frames are in poor condition and are showing signs of excessive infiltration. The exterior doors are constructed of metal with metal frames and are in fair condition. The door seals have worn or missing weather-stripping materials which increases the level of outside air infiltration. There is an opportunity for energy savings by caulking the perimeter of window frames and installing weather-stripping to exterior doors.

2.5 On-Site Generation

Brookside Elementary School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System

Lighting at the facility is provided mostly by fixtures with 32-Watt linear fluorescent T8 lamps and electronic ballasts as well as some incandescent, compact fluorescent lamp (CFL) and LED lamp fixtures. The majority of the fixtures are in good condition. Light fixtures throughout the building are manually controlled via wall switches. Some of the classrooms have bi-level switching capabilities. Classrooms were noted to be over lit and provide an opportunity for energy savings by retrofitting the existing fixtures with a reduced number of LED lamps. There is an opportunity for energy savings by upgrading to LED technology and installing occupancy based sensors in designated locations.

The gymnasium is illuminated by metal halide high bay fixtures which are in poor condition. There is an opportunity for energy savings by replacing these one for one with reduced wattage LED high bay fixtures with occupancy based controls.

The exterior includes metal halide, incandescent, compact fluorescent lamp (CFL) and LED fixtures. A majority of these fixtures are controlled by a timeclock, however the under canopy light fixtures were noted to be on during the day and the timeclock is not operating correctly.

Hot Water Heating System

The hot water system consists of two condensing hot water modulating boilers with a maximum output capacity of 2,850 MBH. The boilers have a nominal combustion efficiency of 92.7%. The boilers are seven years old, are in good condition and well maintained. The hydronic heating hot water pump motors are 7.5 HP and operate in start/stop fashion. The heating system is controlled by basic boiler controls which include outside air temperature reset controls. The boilers provide hot water to radiators, unit ventilators and ceiling hung HVAC units throughout the building.

Air Conditioning System

Some of the classrooms and offices are cooled by window air-conditioning (AC) units. Some areas are cooled by split AC systems and the outdoor condensing units are located on the roof of the building. A majority of the cooling equipment is highly efficient and in good condition. There are a few less efficient units that are in poor condition. There is an opportunity for energy savings by replacing these less efficient with higher efficiency equipment.

Window AC units are manually turned on and off as needed throughout the summer months. There is one split system that serves the IT room which needs to be conditioned year round. The split AC systems are controlled by a programmable thermostats that are located in the spaces they serve.






Domestic Water Heating System

The domestic water heating system for the facility consists of a gas-fired non-condensing storage tank water heater with an input rating of 76 kBtu/hr each and a nominal efficiency of 80% and is in good condition. The tank has a capacity of 75 gallons. A fractional horsepower recirculation pump distributes 120°F-140°F water to the restrooms and sinks throughout the building. Sink aerators throughout the building are fit with higher flow restrictors (2.0 gallon per minute [gpm] and higher). There is an opportunity for energy savings by replacing these with low flow-aerators.


Food Service Equipment

The school has a gas-fired oven and electric holding cabinets. The kitchen is used to warm up and serve lunch every school day. The kitchen has single tank conveyor dishwashing machine. This has a gas-fired domestic water heater. The equipment is in fair condition and there are no recommendations for improvement.



Refrigeration

The kitchen has a number of refrigerators and a refrigerator chest that are all in good condition.


Building Plug Load

There are 57 computers throughout the building. There is no centralized PC power management software installed. Plug loads in the building also include general office and café equipment. Additionally there are many fans and smart boards in classroom spaces. There is a non-refrigerated snack vending machine located in the lounge.

2.7 Water-Using Systems

The restrooms throughout the building have sinks with higher flow restrictors. A sampling of restrooms found that the faucets are rated for 2.0 gallons per minute (gpm) or higher. There is an opportunity for energy savings by replacing these with low flow aerators.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

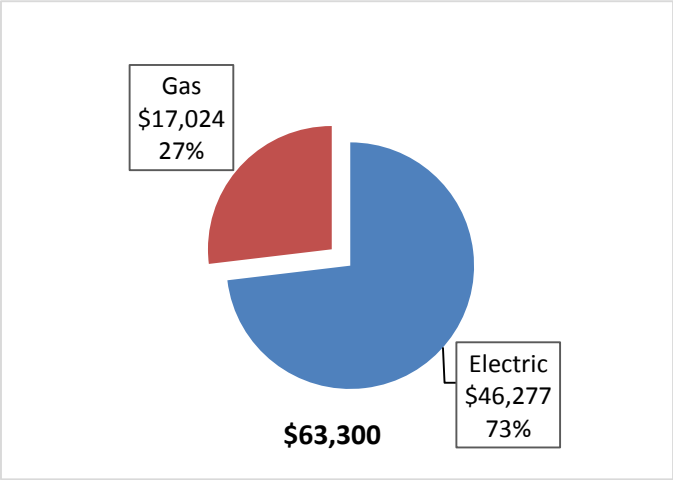
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Brookside Elementary School		
Fuel	**Usage**	**Cost**
Electricity	298,620 kWh	$46,277
Natural Gas	21,126 Therms	$17,024
Total		**$63,300**

The current annual energy cost for this facility is $63,300 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric rate over a recent 12-month period was $0.155/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility pays electric demand charges. The monthly electricity consumption and peak demand are shown in the chart below. The relatively high summer power demand is typical for year round operation for buildings with a significant cooling load.

Figure 9 - Electric Usage & Demand

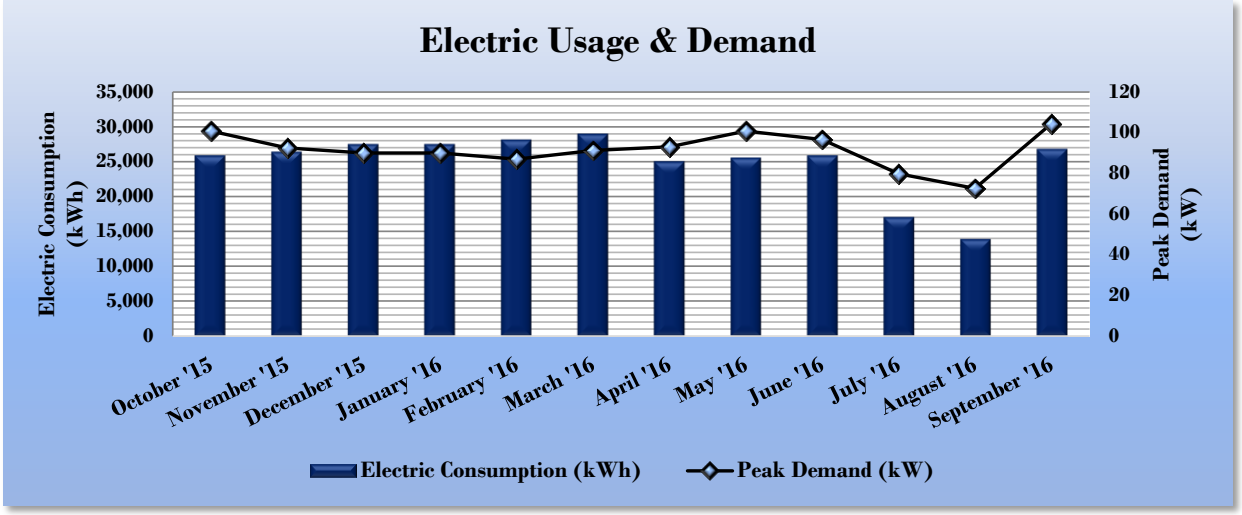


Figure 10 - Electric Usage & Demand

Electric Billing Data for Brookside Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
10/27/15	29	25,860	101	$1,462	$3,727
11/25/15	29	26,400	92	$1,425	$3,738
12/28/15	33	27,510	90	$1,409	$3,800
1/28/16	31	27,510	90	$1,409	$3,800
2/29/16	32	28,140	87	$1,390	$3,802
3/30/16	30	28,980	91	$1,481	$4,004
4/28/16	29	25,020	93	$1,489	$3,647
5/27/16	29	25,560	101	$1,524	$3,615
6/28/16	32	25,860	97	$1,973	$4,205
7/28/16	30	17,040	80	$2,249	$3,774
8/26/16	29	13,920	73	$2,159	$3,355
9/27/16	32	26,820	104	$2,575	$4,810
Totals	**365**	**298,620**	**104.4**	**$20,544**	**$46,277**
Annual	**365**	**298,620**	**104.4**	**$20,544**	**$46,277**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average natural gas rate over a recent 12-month period was found to be $0.806/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. The high winter use typifies a predominant heating-driven gas use profile.

Figure 11 - Natural Gas Usage

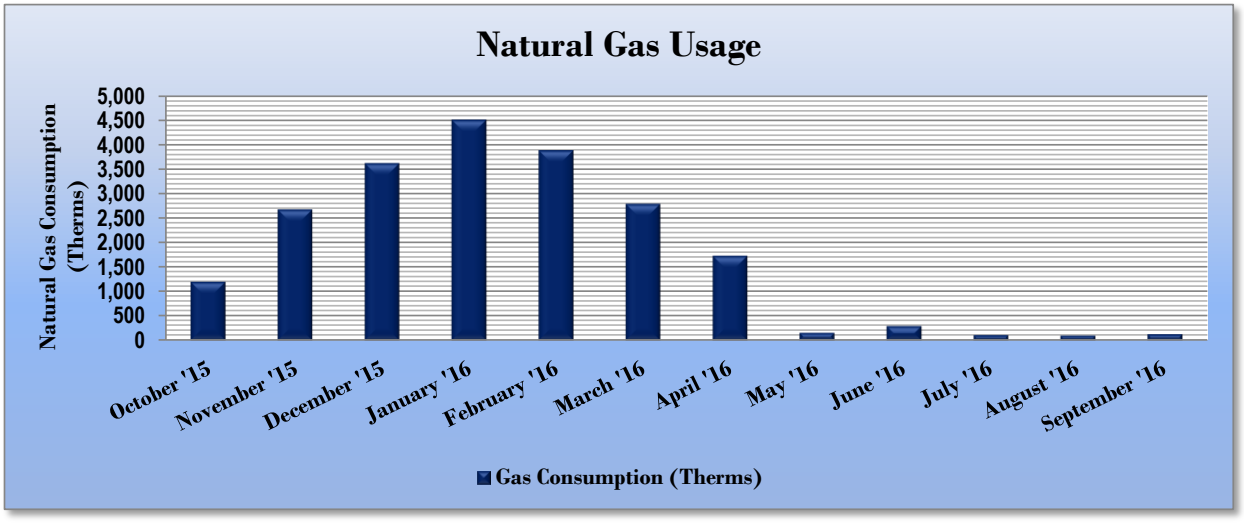


Figure 12 - Natural Gas Usage

Gas Billing Data for Brookside Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
10/27/15	29	1,193	$746
11/25/15	29	2,668	$2,370
12/28/15	33	3,613	$2,865
1/28/16	31	4,496	$3,565
2/29/16	32	3,877	$3,019
3/30/16	30	2,782	$2,358
4/28/16	29	1,725	$1,039
5/27/16	29	153	$190
6/28/16	32	290	$371
7/28/16	30	106	$165
8/26/16	29	97	$160
9/27/16	32	127	$176
Totals	**365**	**21,126**	**$17,024**
Annual	**365**	**21,126**	**$17,024**

3.4 Benchmarking

This facility was benchmarked using Portfolio Manager®, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager® analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Brookside Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	110.7	141.4
Site Energy Use Intensity (kBtu/ft^2)	64.0	58.2

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, as shown in the table below:

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Brookside Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	78.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	52.8	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is not is one of the building categories that are eligible to receive a score. This facility has a current score of 65.

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

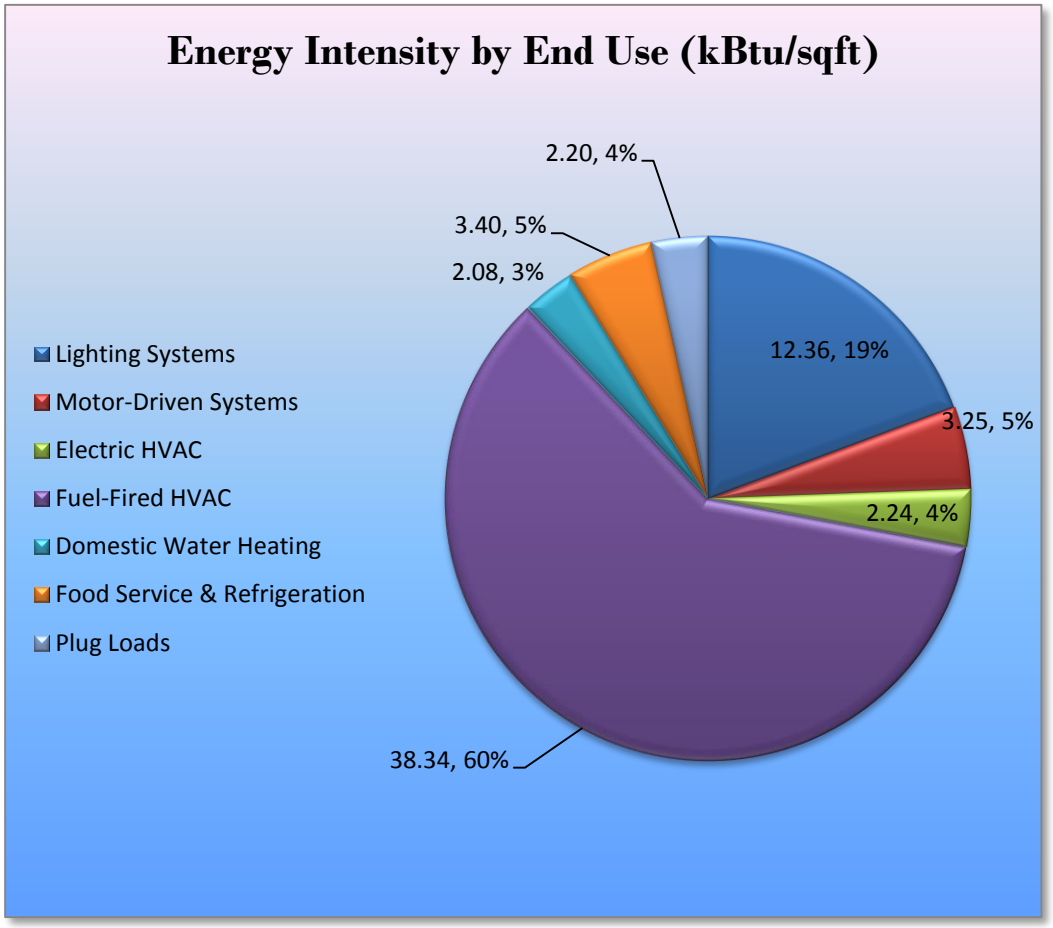
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 15 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Brookside Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated March 17, 2014, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**110,323**	**24.2**	**0.0**	**$17,096.59**	**$134,374.92**	**$11,855.00**	**$122,519.92**	**7.2**	**111,095**
ECM 1	Delamp T-8 Fixtures & Add Reflectors	58,999	13.8	0.0	$9,143.04	$29,673.00	$3,780.00	$25,893.00	2.8	59,412
ECM 2	Install LED Fixtures	20,666	3.6	0.0	$3,202.53	$85,243.34	$4,900.00	$80,343.34	25.1	20,810
ECM 3	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	422	0.1	0.0	$65.40	$592.50	$75.00	$517.50	7.9	425
ECM 4	Retrofit Fixtures with LED Lamps	30,236	6.7	0.0	$4,685.63	$18,866.08	$3,100.00	$15,766.08	3.4	30,447
Lighting Control Measures		**15,569**	**3.4**	**0.0**	**$2,412.75**	**$23,656.00**	**$3,055.00**	**$20,601.00**	**8.5**	**15,678**
ECM 5	Install Occupancy Sensor Lighting Controls	15,324	3.4	0.0	$2,374.74	$23,296.00	$3,055.00	$20,241.00	8.5	15,431
ECM 6	Install Daylight Dimming Controls	245	0.0	0.0	$38.01	$360.00	$0.00	$360.00	9.5	247
Variable Frequency Drive (VFD) Measures		**10,883**	**1.9**	**0.0**	**$1,686.55**	**$7,213.60**	**$0.00**	**$7,213.60**	**4.3**	**10,959**
ECM 7	Install VFDs on Hot Water Pumps	10,883	1.9	0.0	$1,686.55	$7,213.60	$0.00	$7,213.60	4.3	10,959
Electric Unitary HVAC Measures		**2,768**	**2.0**	**0.0**	**$428.99**	**$8,162.40**	**$368.00**	**$7,794.40**	**18.2**	**2,788**
ECM 8	Install High Efficiency Electric AC	2,768	2.0	0.0	$428.99	$8,162.40	$368.00	$7,794.40	18.2	2,788
Domestic Water Heating Upgrade		**0**	**0.0**	**0.9**	**$6.91**	**$28.68**	**$0.00**	**$28.68**	**4.1**	**100**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	0.9	$6.91	$28.68	$0.00	$28.68	4.1	100
Custom Measures		**2,099**	**0.0**	**65.7**	**$854.34**	**$5,857.00**	**$0.00**	**$5,857.00**	**6.9**	**9,801**
ECM 10	Computer Power Management Software	2,083	0.0	0.0	$322.83	$3,355.00	$0.00	$3,355.00	10.4	2,098
ECM 11	Building Envelope Weatherization	16	0.0	65.7	$531.51	$2,502.00	$0.00	$2,502.00	4.7	7,703
TOTALS		**141,643**	**31.5**	**66.5**	**$22,486.13**	**$179,292.60**	**$15,278.00**	**$164,014.60**	**7.3**	**150,421**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**110,323**	**24.2**	**0.0**	**$17,096.59**	**$134,374.92**	**$11,855.00**	**$122,519.92**	**7.2**	**111,095**
ECM 1	Delamp T-8 Fixtures & Add Reflectors	58,999	13.8	0.0	$9,143.04	$29,673.00	$3,780.00	$25,893.00	2.8	59,412
ECM 2	Install LED Fixtures	20,666	3.6	0.0	$3,202.53	$85,243.34	$4,900.00	$80,343.34	25.1	20,810
ECM 3	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	422	0.1	0.0	$65.40	$592.50	$75.00	$517.50	7.9	425
ECM 4	Retrofit Fixtures with LED Lamps	30,236	6.7	0.0	$4,685.63	$18,866.08	$3,100.00	$15,766.08	3.4	30,447

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 1: Delamp and Retrofit Classroom Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	58,999	13.8	0.0	$9,143.04	$29,673.00	$3,780.00	$25,893.00	2.8	59,412
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LED lamp and drivers. In some instances, we have recommended installing a reduced number of tubes as compared to the existing case. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

ECM 2: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	15,103	2.9	0.0	$2,340.51	$80,556.00	$4,500.00	$76,056.00	32.5	15,209
Exterior	5,563	0.7	0.0	$862.03	$4,687.34	$400.00	$4,287.34	5.0	5,601

Measure Description

We recommend replacing the metal halide high bay fixtures in the all-purpose room one-for-one with new LED high bay fixtures. This measure includes the replacement of fixtures and assumes the ability to reuse the existing mounting configuration. The existing lamps frequently burn out and the maintenance is problematic due to the need to use a lift. The proposed fixtures are new high performance LEDs which have much longer lifespans. Therefore, this measure saves energy by reducing the electrical demand and use of the gymnasium light fixtures, improves light output as well as significantly reduces required maintenance.

This measure also recommends replacing the exterior HID fixtures with LED fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable or improved light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice than older technologies.

This measure is recommended based on the energy savings potential as well as the condition of the existing interior fixtures. The fixtures included in this measure are in poor condition and/or were missing lenses.

ECM 3: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	422	0.1	0.0	$65.40	$592.50	$75.00	$517.50	7.9	425
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

ECM 4: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	26,474	6.2	0.0	$4,102.57	$18,221.04	$3,080.00	$15,141.04	3.7	26,659
Exterior	3,762	0.4	0.0	$583.06	$645.04	$20.00	$625.04	1.1	3,789

Measure Description

We recommend retrofitting existing incandescent, halogen, and T8 fixtures. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than ten times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for upgrades to existing lighting controls are summarized in Figure 178 below.

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**15,569**	**3.4**	**0.0**	**$2,412.75**	**$23,656.00**	**$3,055.00**	**$20,601.00**	**8.5**	**15,678**
ECM 5	Install Occupancy Sensor Lighting Controls	15,324	3.4	0.0	$2,374.74	$23,296.00	$3,055.00	$20,241.00	8.5	15,431
ECM 6	Install Daylight Dimming Controls	245	0.0	0.0	$38.01	$360.00	$0.00	$360.00	9.5	247

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled

ECM 5: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
15,324	3.4	0.0	$2,374.74	$23,296.00	$3,055.00	$20,241.00	8.5	15,431

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, restrooms, the gym, hallways, library, lounge and main office. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 6: Install Photocell Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
245	0.0	0.0	$38.01	$360.00	$0.00	$360.00	9.5	247

Measure Description

We recommend installing photocell controls that use photosensors to reduce electric lighting run hours for exterior light fixtures during the daytime. This will limit the operation of exterior fixtures to dusk to dawn hours.

4.1.3 Variable Frequency Drive Measures

Our recommendations for upgrades to variable frequency drive (VFD) measures are summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**10,883**	**1.9**	**0.0**	**$1,686.55**	**$7,213.60**	**$0.00**	**$7,213.60**	**4.3**	**10,959**
ECM 7	Install VFDs on Hot Water Pumps	10,883	1.9	0.0	$1,686.55	$7,213.60	$0.00	$7,213.60	4.3	10,959

ECM 7: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
10,883	1.9	0.0	$1,686.55	$7,213.60	$0.00	$7,213.60	4.3	10,959

Measure Description

We recommend installing a variable frequency drives (VFD) to control a hot water pumps. This measure requires that a majority of the hot water coils be served by two-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.1.4 Electric Unitary HVAC Measures

Our recommendation for unitary HVAC measures is summarized in Figure 20 below.

Figure 20 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**2,768**	**2.0**	**0.0**	**$428.99**	**$8,162.40**	**$368.00**	**$7,794.40**	**18.2**	**2,788**
ECM 8	Install High Efficiency Electric AC	2,768	2.0	0.0	$428.99	$8,162.40	$368.00	$7,794.40	18.2	2,788

ECM 8: Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,768	2.0	0.0	$428.99	$8,162.40	$368.00	$7,794.40	18.2	2,788

Measure Description

We recommend replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendation for domestic water heating system improvements is summarized in Figure 21 below.

Figure 21 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**0.9**	**$6.91**	**$28.68**	**$0.00**	**$28.68**	**4.1**	**100**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	0.9	$6.91	$28.68	$0.00	$28.68	4.1	100

ECM 9: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	0.9	$6.91	$28.68	$0.00	$28.68	4.1	100

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Low-flow faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy. Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.6 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Our recommendations for custom measures are summarized in Figure 22 below.

Figure 22 - Summary of Custom ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Custom Measures		**2,099**	**0.0**	**65.7**	**$854.34**	**$5,857.00**	**$0.00**	**$5,857.00**	**6.9**	**9,801**
ECM 10	Computer Power Management Software	2,083	0.0	0.0	$322.83	$3,355.00	$0.00	$3,355.00	10.4	2,098
ECM 11	Building Envelope Weatherization	16	0.0	65.7	$531.51	$2,502.00	$0.00	$2,502.00	4.7	7,703

ECM 10: Computer Power Management Software

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,083	0.0	0.0	$322.83	$3,355.00	$0.00	$3,355.00	10.4	2,098

Measure Description

We recommend the implementation of computer power management software. The computing environment in most school and office facilities includes desktops, which are typically left on overnight and on weekends and holidays. Screen savers are commonly confused as a power management strategy. This contributes to excessive electrical energy consumption, which may be avoided by proper management.

There are innovative software packages available in the market today that are designed to deliver significant energy saving and provide ongoing tracking measurements. Operational and maintenance benefits are captured through the use of a central power management platform where issues may be diagnosed and problematic devices may be isolated. Energy savings policies may be enforced as well as identifying and eliminating underutilized devices. This measure investigates the potential benefits to implementing computer power management software to better match the energy use to user needs.

ECM 11: Building Envelope Weatherization

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
16	0.0	65.7	$531.51	$2,502.00	$0.00	$2,502.00	4.7	7,703

Measure Description

We recommend weather-stripping the exterior doors throughout the building. There are four double doors and three single doors which were noted to have missing or worn weather-stripping with clear air gaps. There is approximately 616 linear feet of window frames which is recommended to be caulked. Building envelopes that limit air infiltration and that have adequate insulation play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Cracks and gaps throughout your building such as around windows and doors, through utility openings, at the foundation and roof, may not seem significant, but their effects add up. Reducing uncontrolled air infiltration through air sealing is a cost effective way to improve the performance and energy efficiency of your facility. The proper sealing of sources for air infiltration and exfiltration will mitigate the air through the building and thus reduce the load on the facility's heating and cooling equipment. Exterior doors should be properly weather-stripped which may include the installation of a bottom sweep, center sweep and weather-stripping around the perimeter of the door.

4.2 ECMs Evaluated But Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

Figure 23 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements	**4,693**	**0.0**	**63.8**	**$1,241.14**	**$30,426.91**	**$0.00**	**$30,426.91**	**24.5**	**12,193**
Install Programmable Thermostats and EC Motors	4,693	0.0	63.8	$1,241.14	$30,426.91	$0.00	$30,426.91	24.5	12,193
TOTALS	**4,693**	**0.0**	**63.8**	**$1,241.14**	**$30,426.91**	**$0.00**	**$30,426.91**	**24.5**	**12,193**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Install Programmable Thermostats and EC Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
4,693	0.0	63.8	$1,241.14	$30,426.91	$0.00	$30,426.91	24.5	12,193

Measure Description

In many cases we recommend replacing manual thermostats with programmable thermostats. Manual thermostats are generally adjusted to a single heating and cooling setpoint and left at that setting regardless of occupancy in the area served by the HVAC equipment. As a result, the same level of heating and cooling is provided regardless of the occupancy in the space. Programmable thermostats can be set to maintain different temperature settings for different times of day and for different days of the week. By reducing heating temperature setpoints and raising cooling temperature setpoints when space are unoccupied, the operation of the HVAC equipment is reduced while still maintaining reasonable space temperatures for building usage at all times. Programmable thermostats provide energy savings by reducing heating and cooling energy usage when a room is unoccupied.

We evaluated replacing standard efficiency motors with high efficiency EC motors in the unit ventilators throughout the building. The advantages of replacing existing permanent split capacity (PSC) motors with electronically commutated motors (ECM) is the increase in control ability of the motor. EC Motors may be programmed to vary speed and can reach efficiencies up to 80% above standard PSC motors. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the ECM motors in the market today which have capabilities to vary in speed to meet the needs of the space with less energy consumption. Savings are based on the difference between baseline and proposed efficiencies, variable speed impacts and the assumed annual operating hours.

Reasons for not Recommending

This measure is cost prohibitive. Installation of a controls tailored to the existing HVAC equipment on a room by room basis is not recommended on the basis of energy savings alone due to the poor payback period. However, this measure was at least evaluated to demonstrate the potential savings and that adding controls should be considered future and in the future, perhaps as a capital improvement measure.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Perform Proper Lighting Maintenance

In order to sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20%-60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6–12 months.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Install Destratification Fans

Allowing air to thermally stratify in spaces with high ceilings results in additional energy consumption by requiring the heating system to heat a volume of space much larger than the actual occupied space. Additional inefficiencies also occur because there are higher temperatures at the ceiling level than at the floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, requiring additional energy consumption by the heating equipment in order to compensate for the accelerated heat transfer.

Destratification fans are specially designed to deliver a columnar, laminar flow of air balancing the air temperature from floor to ceiling. In addition to fuel savings, the use of destratification fans will reduce the recovery time necessary to warm the space after nightly temperature setbacks and will increase the comfort level of the occupants.

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

Clean Evaporator/Condenser Coils on AC Systems

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

Perform Proper Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

Refer to Section 4.1.5 for any low-flow ECM recommendations.

6 On-Site Generation Measures

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

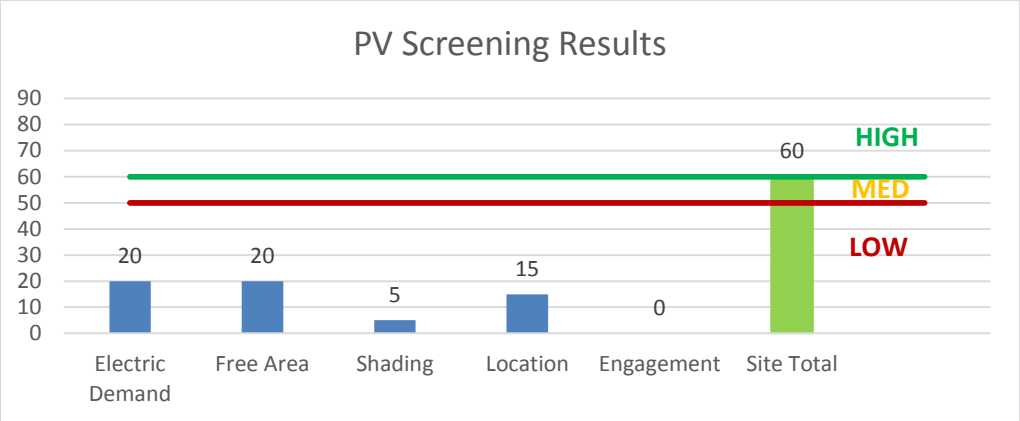
6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a High potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If Brookside Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 24 - Photovoltaic Screening



Potential	High	
System Potential	91	kW DC STC
Electric Generation	68,473	kWh/yr
Displaced Cost	$5,960	/yr
Installed Cost	$260,300	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.6 for additional information.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ**: http://www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

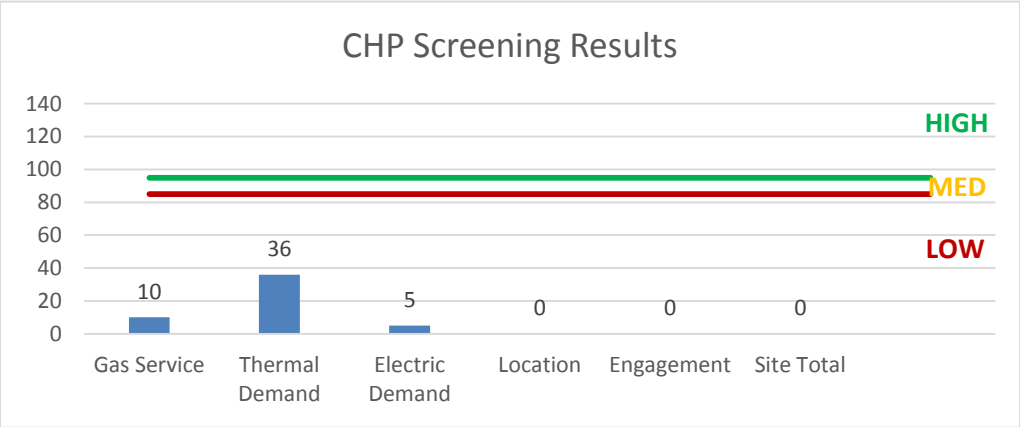
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a Low potential for installing a cost-effective CHP system.

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

Figure 25 - Combined Heat and Power Screening



7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 26 for a list of the eligible programs identified for each recommended ECM.

Figure 26 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Delamp and Retrofit Classroom Fixtures with LED Lamps and Drivers	x		x			
ECM 2	Install LED Fixtures	x		x			
ECM 3	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x		x			
ECM 4	Retrofit Fixtures with LED Lamps	x		x			
ECM 5	Install Occupancy Sensor Lighting Controls	x		x			
ECM 6	Install Photocell Controls			x			
ECM 7	Install VFDs on Hot Water Pumps			x			
ECM 8	Install High Efficiency Electric AC	x		x			
ECM 9	Install Low-Flow Domestic Hot Water Devices			x			
ECM 10	Computer Power Management Software						
ECM 11	Building Envelope Weatherization						

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey's largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity's annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: www.njcleanenergy.com/ci.

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: www.njcleanenergy.com/SSB.

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number which enables it to generate New Jersey SRECs. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SRECs to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

(1) Use an Energy Services Company or "ESCO."
(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
(3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party (i.e., non-utility) energy supplier.

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.23	396	0.0	$61.37	$702.00	$120.00	9.48
Main Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,439	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.27	1,170	0.0	$181.24	$855.00	$135.00	3.97
Private Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,463	0.16	601	0.0	$93.21	$416.80	$80.00	3.61
Conference Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,090	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,463	0.19	706	0.0	$109.38	$496.53	$100.00	3.63
Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.04	225	0.0	$34.83	$117.00	$20.00	2.78
Lounge	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.06	337	0.0	$52.25	$175.50	$30.00	2.78
Copy Area	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.25	1,278	0.0	$198.07	$642.50	$110.00	2.69
Small Room "E"	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,463	0.12	451	0.0	$69.91	$341.60	$65.00	3.96
Small Room "F"	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,463	0.12	451	0.0	$69.91	$341.60	$65.00	3.96
Office Room "G"	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,463	0.12	451	0.0	$69.91	$341.60	$65.00	3.96
Health Office "D"	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.15	787	0.0	$121.91	$409.50	$70.00	2.78
Restroom	1	Incandescent: Box Fixture	Wall Switch	60	2,961	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.03	180	0.0	$27.97	$53.75	$5.00	1.74
Lobby	9	Compact Fluorescent: Plug in Lamps	Wall Switch	46	2,961	Relamp	No	9	LED Screw-In Lamps: Screw in Lamps	Wall Switch	14	2,961	0.19	981	0.0	$152.00	$967.55	$0.00	6.37
Lobby	10	Compact Fluorescent: Plug in Lamps	Wall Switch	13	2,961	Relamp	No	10	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.04	204	0.0	$31.67	$537.53	$0.00	16.98
Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.11	568	0.0	$88.03	$504.00	$40.00	5.27
Hallway	5	Compact Fluorescent: Biax Lamps	Wall Switch	54	2,961	Relamp & Reballast	No	5	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	2,961	0.09	485	0.0	$75.21	$592.50	$75.00	6.88
All Purpose Room	24	Metal Halide: (1) 250W Lamp	None	295	2,961	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	125	2,073	3.26	16,960	0.0	$2,628.25	$69,724.80	$4,440.00	24.84
Storage Rooms	2	Incandescent: Box Fixture	Wall Switch	60	500	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	500	0.07	61	0.0	$9.45	$107.51	$10.00	10.32
Storage/Office	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,090	None	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,090	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Stage	6	Metal Halide: (1) 250W Lamp	None	295	2,961	Fixture Replacement	No	6	LED - Fixtures: High-Bay	None	125	2,961	0.67	3,474	0.0	$538.32	$16,111.20	$900.00	28.26
Hallway	3	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,961	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,961	0.12	633	0.0	$98.16	$285.40	$60.00	2.30
Hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.27	1,420	0.0	$220.08	$855.00	$100.00	3.43
Speech Room "K"	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,463	0.12	451	0.0	$69.91	$341.60	$65.00	3.96
Speech Room "K"	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,090	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,090	0.02	79	0.0	$12.29	$58.50	$10.00	3.95
Faculty Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,090	0.03	119	0.0	$18.44	$75.20	$15.00	3.26

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,090	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,090	0.03	119	0.0	$18.44	$75.20	$15.00	3.26
IT Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,090	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,090	0.07	269	0.0	$41.72	$190.27	$40.00	3.60
Media Center/Library	45	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	2,961	Relamp	Yes	45	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	2,073	1.04	5,387	0.0	$834.79	$3,856.50	$815.00	3.64
Media Center/Library	14	LED - Fixtures: Downlight Pendant	Wall Switch	9	2,961	None	No	14	LED - Fixtures: Downlight Pendant	Wall Switch	9	2,961	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lounge	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,090	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,463	0.11	401	0.0	$62.14	$350.00	$60.00	4.67
Room "L"	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,090	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,463	0.11	401	0.0	$62.14	$350.00	$60.00	4.67
1st Floor Hallway	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.52	2,698	0.0	$418.15	$1,381.50	$190.00	2.85
Stairs	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,961	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	None	15	2,961	0.07	358	0.0	$55.41	$215.40	$30.00	3.35
Stairs	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.13	674	0.0	$104.50	$351.00	$60.00	2.78
2nd Floor Hallway	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.52	2,698	0.0	$418.15	$1,381.50	$190.00	2.85
2nd Floor Hallway	2	Linear Fluorescent - T5: 4' T5 (28W) - 4L	None	120	2,961	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	None	58	2,961	0.08	422	0.0	$65.44	$190.27	$40.00	2.30
Office 8	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,439	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.08	351	0.0	$54.37	$291.50	$50.00	4.44
Faculty Restroom	1	Incandescent: Screw in Lamps	Wall Switch	60	2,439	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,439	0.03	149	0.0	$23.04	$53.75	$5.00	2.12
Classroom 15	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 16	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 17	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 18	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 19	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 20	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 21	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 22	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 23	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 24	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Boy's Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,439	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.14	585	0.0	$90.62	$832.50	$120.00	7.86
Closets	3	Incandescent: Box Fixture	Wall Switch	100	500	Relamp	No	3	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	500	0.18	157	0.0	$24.33	$161.26	$15.00	6.01

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girl's Restroom	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,439	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.16	702	0.0	$108.74	$621.00	$95.00	4.84
Classroom 11	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 12	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Restrooms	9	Incandescent: Box Fixture	Wall Switch	100	1,400	Relamp	No	9	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	1,400	0.54	1,319	0.0	$204.34	$483.78	$45.00	2.15
Classroom 4	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 5	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 6	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 7	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 8	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 9	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 10	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Room 0	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,439	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.27	1,170	0.0	$181.24	$855.00	$135.00	3.97
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	500	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.03	28	0.0	$4.41	$75.20	$15.00	13.65
Closet	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	500	None	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Girl's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,961	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,073	0.10	500	0.0	$77.48	$460.27	$75.00	4.97
Girl's Restroom	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	None	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boy's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,961	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,073	0.10	500	0.0	$77.48	$460.27	$75.00	4.97
Boy's Restroom	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	None	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lounge	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,439	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,707	0.24	1,029	0.0	$159.51	$591.67	$120.00	2.96
Classroom 13	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Classroom 14	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	0.71	3,058	0.0	$473.96	$1,717.50	$220.00	3.16
Storage "P"	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.06	114	0.0	$17.64	$175.50	$30.00	8.25
Hallway	2	Linear Fluorescent - T5: 4' T5 (28W) - 4L	None	120	2,961	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	None	58	2,961	0.08	422	0.0	$65.44	$190.27	$40.00	2.30
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,073	0.19	994	0.0	$154.05	$679.50	$70.00	3.96
Classroom 1	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	1.00	4,282	0.0	$663.54	$2,188.50	$280.00	2.88

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,961	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.02	112	0.0	$17.42	$58.50	$10.00	2.78
Restrooms	2	Incandescent: Box Fixture	Wall Switch	60	2,961	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.07	361	0.0	$55.94	$107.51	$10.00	1.74
Cubbies	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,961	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,961	0.10	506	0.0	$78.37	$225.60	$45.00	2.30
Vestibule	1	Incandescent: Box Fixture	Wall Switch	60	2,961	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	7	2,961	0.03	180	0.0	$27.97	$53.75	$5.00	1.74
Classroom 2	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	1.00	4,282	0.0	$663.54	$1,918.50	$245.00	2.52
Classroom 3	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,439	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,707	1.00	4,282	0.0	$663.54	$1,918.50	$245.00	2.52
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.06	114	0.0	$17.64	$150.40	$30.00	6.82
Storage	2	Incandescent: Screw in Lamps	Wall Switch	100	1,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	1,000	0.12	209	0.0	$32.43	$107.51	$10.00	3.01
Custodian Shop	5	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,439	None	No	5	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,439	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	None	No	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,961	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Locker Room	4	Incandescent: Box Fixture	Wall Switch	100	2,961	Relamp	No	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,961	0.24	1,240	0.0	$192.11	$215.01	$20.00	1.02
Garage	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,439	None	No	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,439	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	2	Metal Halide: (2) 400W Lamps	None	916	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	400	4,380	0.68	5,198	0.0	$805.55	$3,905.99	$200.00	4.60
Exterior	1	Metal Halide: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	125	4,380	0.11	856	0.0	$132.70	$390.68	$100.00	2.19
Exterior	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	12	4,380	None	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	12	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	23	4,380	None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	23	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	1	Incandescent: Screw in Lamps	Wall Switch	200	4,380	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	14	4,380	0.12	937	0.0	$145.19	$53.75	$5.00	0.34
Exterior	1	Metal Halide: (1) 100W Lamp	None	128	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	60	4,380	0.04	343	0.0	$53.08	$390.68	$100.00	5.48
Exterior	3	Halogen Incandescent: Screw in Lamps	None	150	4,380	Relamp	No	3	LED Screw-In Lamps: Screw in Lamps	None	11	4,380	0.27	2,100	0.0	$325.50	$161.26	$15.00	0.45
Exterior	4	Compact Fluorescent: Plug in Lamps	None	46	8,760	Relamp	Yes	4	LED Screw-In Lamps: Screw in Lamps	Daylight Dimming	14	4,380	0.10	1,572	0.0	$243.54	$790.02	$0.00	3.24

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Hydronic Heating System	2	Heating Hot Water Pump	7.5	91.0%	No	2,035	No	91.0%	Yes	2	1.85	10,883	0.0	$1,686.55	$7,213.60	$0.00	4.28
Boiler Room	Domestic Water	1	Water Supply Pump	0.2	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Pnuematic Controls	1	Air Compressor	5.0	89.0%	No	2,974	No	89.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	1	Exhaust Fan	1.0	85.0%	No	1,647	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	1	Exhaust Fan	0.8	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	1	Exhaust Fan	0.3	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	13	Exhaust Fan	0.2	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	2	Exhaust Fan	0.3	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	2	Exhaust Fan	0.3	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	3	Exhaust Fan	0.5	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	1	Exhaust Fan	0.1	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	HV Units	25	Supply Fan	0.2	45.0%	No	1,647	No	45.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library	HVAC Units	2	Supply Fan	0.3	72.0%	No	1,647	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Outdoor Condensing Unit	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Condensing Unit	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.68	918	0.0	$142.32	$2,992.44	$184.00	19.73
Roof	Outdoor Condensing Unit - IT Room	1	Split-System Air-Source HP	2.00	25.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Condensing Unit - Library	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.68	918	0.0	$142.32	$2,992.44	$184.00	19.73
Roof	Outdoor Condensing Unit	1	Split-System AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Condensing Unit	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom/Offices	Classroom/Offices	3	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom/Offices	Classroom/Offices	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom/Offices	Classroom/Offices	1	Window AC	2.00		Yes	1	Window AC	2.00		12.00		No	0.69	931	0.0	$144.34	$2,177.52	$0.00	15.09
Classroom/Offices	Classroom/Offices	1	Window AC	1.23		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Whole Building	2	Condensing Hot Water Boiler	2,850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Programmable Thermostat Recommendations

		Recommendation Inputs				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Thermostat Quantity	Motor Total Existing Demand of System to Control (kW)	Annual Operating Hours	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Entire Building	Heating System and HV Supply Fan Motors	25	5.18	1,647.00	2,850.00	0.00	4,693	63.8	$1,241.14	$30,426.91	$0.00	24.52

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Whole Building	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	2	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	0.4	$3.14	$14.34	$0.00	4.56
Restrooms	2	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	0.5	$3.77	$14.34	$0.00	3.80

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Refrigerator Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Insulated Food Holding Cabinet (1/2 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Brookside Elementary	57	Computers	120.0	
Brookside Elementary	8	Projector	250.0	
Brookside Elementary	2	TV	120.0	
Brookside Elementary	20	Printer	250.0	
Brookside Elementary	17	Smart Board	200.0	
Brookside Elementary	2	Mini Fridge	260.0	
Brookside Elementary	4	Microwave	1,500.0	
Brookside Elementary	52	Fan	100.0	
Brookside Elementary	24	Speakers	150.0	

Custom Recommendations

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
57	*Mon - Fri 8AM-5PM*	*Mon - Fri 5PM-8AM*	*Weekends & Holidays*	Energy Rate (W)*	Weekly Run Hours	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	*Weekends & Holidays*	*Energy Rate (W)**	*Weekly Run Hours*	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	Weekends & Holidays	Energy Rate (W)*	*Weekly Run Hours*
Existing Conditions	50%	10%	0%	120	**28**	5%	5%	5%	80	**8**	45%	85%	95%	5	**132**
Proposed Conditions	50%	5%	0%	120	**24**	5%	0%	0%	80	**2**	45%	95%	100%	5	**142**

Usage per Device			Energy Impact & Financial Analysis					
Weeks of Use	Annual kWh Usage	*Diversity Factor***	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Desktop*	*Add'l Hardware Cost*	Total Installation Cost	Simple Payback Period (Years)
48	225	90%	2,083	$323	$15.00	$2,500.0	$3,355	10.39
48	185							

Building Envelope Weatherization

Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis				
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Energy Use (mmBtu)*	Assumed % Electric HVAC Savings	Assumed % Gas HVAC Savings	Total Annual kWh Savings	Total Annual mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
32,140	1,875.8	0.1%	3.5%	16	66	$532	$2,502	4.71

	qty	unit	$/unit	est. costs
Weather-strip Exterior Double Doors	4	EA	8	$ 32
Weather-strip Exterior Single Doors	3	EA	2	$ 6
Caulk the Perimeter of Windows & Seal Wall Cracks	616	LF	4	$ 2,464
			Total Estimated Costs	**$ 2,502**

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Brookside Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 48,920
Built: 1970

For Year Ending: August 31, 2016
Date Generated: August 29, 2017

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Brookside Elementary School Lake Dr Ave Westwood, New Jersey 07676	Westwood BOE 701 Ridgewood Rd Township of Washington, NJ 07675 201-664-0880 ext 2010	John Baumann 701 Ridgewood Rd Township of Washington, NJ 07675 201-664-0880 ext 2010 john.baumann@wwrsd.org

Property ID: 5969178

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
63.8 kBtu/ft²

Source EUI
110 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,007,587 (32%)
Natural Gas (kBtu)	2,113,328 (68%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	73.7
National Median Source EUI (kBtu/ft²)	127
% Diff from National Median Source EUI	-13%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	224

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

Aimee Lalonde
1430 Broadway
10th Floor
New York, NY 10018
347-913-2422
alalonde@trcsolutions.com

Professional Engineer Stamp (if applicable)