Local Government Energy Audit:
Energy Audit Report

Shady Lane School

130 Peach Street

Westville, NJ 08093

Deptford Township Board of Education

August 6, 2018

Final Report by:

TRC Energy Services

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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 the Shady Lane School.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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 protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Shady Lane School is a 63,015 square foot facility comprised of classrooms, offices, library, gym, storage rooms, closets, kitchen, hallways and mechanical spaces. The building functions all year from 6:00 AM to 5:00 PM on weekdays. The school is closed on weekends.

Originally the building was constructed in 1957. The gym, kitchen and libraries are heated using two gas-fired non-condensing hot water boilers located in the boiler room. The classrooms (lower and upper level) are heated using five gas-fired condensing hot water boilers. Space cooling in the building is provided by multiple window AC and split AC units. Larger areas such as the library and main office suites are cooled using rooftop package units. Lighting at the Shady Lane School consists of aging and inefficient linear T8 tubes and compact fluorescent lamps (CFL) that 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 eight measures and recommends six measures which together represent an opportunity for Shady Lane School to reduce annual energy costs by roughly $20,555 and annual greenhouse gas emissions by 131,368 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 4.1 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Shady Lane School's annual energy use by 13%.

Figure 1 – Previous 12 Month Utility Costs

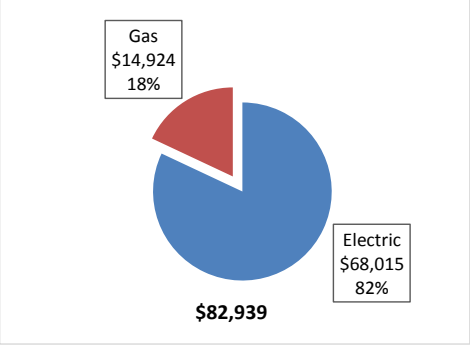
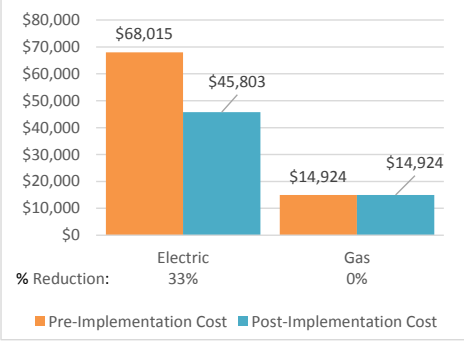


Figure 2 – Potential Post-Implementation Costs



A detailed description of Shady Lane 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 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			**102,772**	**21.6**	**0.0**	**$16,193.40**	**$63,827.16**	**$11,705.00**	**$52,122.16**	**3.2**	**103,491**
ECM 1	Install LED Fixtures	Yes	7,656	1.0	0.0	$1,206.37	$7,422.86	$1,900.00	$5,522.86	4.6	7,710
ECM 2	Retrofit Fixtures with LED Lamps	Yes	95,116	20.6	0.0	$14,987.04	$56,404.30	$9,805.00	$46,599.30	3.1	95,781
Lighting Control Measures			**19,312**	**4.3**	**0.0**	**$3,042.85**	**$25,462.00**	**$2,380.00**	**$23,082.00**	**7.6**	**19,447**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	19,312	4.3	0.0	$3,042.85	$25,462.00	$2,380.00	$23,082.00	7.6	19,447
Motor Upgrades			**143**	**0.0**	**0.0**	**$22.48**	**$1,495.39**	**$0.00**	**$1,495.39**	**66.5**	**144**
	Premium Efficiency Motors	No	143	0.0	0.0	$22.48	$1,495.39	$0.00	$1,495.39	66.5	144
Variable Frequency Drive (VFD) Measures			**5,149**	**1.1**	**0.0**	**$811.25**	**$8,540.77**	**$400.00**	**$8,140.77**	**10.0**	**5,185**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	Yes	2,059	0.7	0.0	$324.46	$3,275.85	$400.00	$2,875.85	8.9	2,074
ECM 5	Install VFDs on Hot Water Pumps	Yes	3,089	0.4	0.0	$486.79	$5,264.92	$0.00	$5,264.92	10.8	3,111
Electric Unitary HVAC Measures			**10,367**	**6.1**	**0.0**	**$1,633.50**	**$38,838.40**	**$1,686.76**	**$37,151.64**	**22.7**	**10,440**
	Install High Efficiency Electric AC	No	10,367	6.1	0.0	$1,633.50	$38,838.40	$1,686.76	$37,151.64	22.7	10,440
Plug Load Equipment Control - Vending Machine			**3,224**	**0.0**	**0.0**	**$507.94**	**$460.00**	**$0.00**	**$460.00**	**0.9**	**3,246**
ECM 6	Vending Machine Control	Yes	3,224	0.0	0.0	$507.94	$460.00	$0.00	$460.00	0.9	3,246
TOTALS			**140,966**	**33.1**	**0.0**	**$22,211.43**	**$138,623.72**	**$16,171.76**	**$122,451.96**	**5.5**	**141,951**
TOTAL OF ALL RECOMMENDED MEASURES			**130,456**	**27**	**0**	**$ 20,555.44**	**$ 98,289.93**	**$ 14,485.00**	**$ 83,804.93**	**4.1**	**131,368**
TOTAL OF ALL NON-RECOMMENDED MEASURES			**10,510**	**6**	**0**	**$ 1,655.98**	**$ 40,333.78**	**$ 1,686.76**	**$ 38,647.02**	**23.3**	**10,583**

* - 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).

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 measure 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.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

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.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlets when not in use.

Energy Efficient Practices

TRC also identified nine 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 O&M costs. Potential opportunities identified at Shady Lane School include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- 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 Shady Lane 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	132	kW DC STC
Electric Generation	157,261	kWh/yr
Displaced Cost	$13,680	/yr
Installed Cost	$343,200	

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)
- Energy Savings Improvement Program (ESIP)

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 ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM 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 that 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 ECMs, 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 8.4 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 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
William Blatchley	Business Administrator	blatchley.w@deptford.k12.nj.us	856-232-2700 x 3007
Designated Representative			
Samuel Ringelberg	Development Engineer	Sam.Ringelberg@schneider-electric.com	717-579-0958
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	732-855-0033

2.2 General Site Information

On May 3, 2017, TRC performed an energy audit at the Shady Lane School located in Westville, New Jersey. TRC's team met with Roy Greggory to review the facility operations and help focus our investigation on specific energy-using systems.

Shady Lane School is a 63,015 square foot facility comprised of classrooms, offices, library, gym, storage rooms, closets, kitchen, hallways and mechanical spaces. The building functions all year from 6:00 AM to 5:00 PM on weekdays. The school is closed on the weekends.

Originally the building was constructed in 1957. The gym, kitchen and libraries are heated using two gas-fired non-condensing hot water boilers located in the boiler room. The classrooms (lower and upper level) are heated using five gas-fired condensing hot water boilers. Space cooling in the building is provided by multiple window AC and split AC units. Larger areas such as the library and main office suites are cooled using rooftop package units. Lighting at the Shady Lane School consists of aging and inefficient linear T8 tubes and Compact fluorescent lamps (CFL) that are in need of replacement.

2.3 Building Occupancy

The typical schedule is presented in the table below. The building functions all year from 6:00 AM to 5:00 PM on weekdays. The school is closed on the weekends. This school serves students from second through fifth grade. During a typical day, the facility is occupied by approximately 80 staff and 435 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Shady Lane School	Weekday	6 AM - 5 PM
Shady Lane School	Weekend	No operation

2.4 Building Envelope

The building is constructed of concrete block and structural steel with a masonry and brick facade. The school was originally constructed in 1957 and expanded in 1973. Additions were made in 2003. The buildings have flat roof sections covered with slag that was found to be in good condition. The windows are single pane in the older sections and double pane in the newer part of the building. The exterior doors are constructed of aluminum and in good condition.

Image 1 Building Envelope

2.5 On-Site Generation

Shady Lane School does not have any on-site electric generation systems currently installed.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). Most of the fixtures are 2-lamp or 3-lamp, 4-foot long troffers. Areas including the hallways and parts of the library are illuminated with 24W or 26W CFL lamps in recessed can ceiling fixtures.

Lighting control all of the spaces is provided by manual switches. The building's exterior lighting consists of 100-Watt metal halide wall packs and 26-Watt CFL canopy fixtures controlled using photo cells and timers. Exit signs at the facility are 2-Watt LED fixtures.

Image 2 Lighting System

Hot Water Heating System

The hot water system consists of two sets of boilers. The gym, kitchen and libraries are heated using two gas-fired non-condensing HB Smith hot water boilers located in the boiler room. These each have an output capacity of 359 MBh and a combustion efficiency of 79%. Hot water is circulated using two constant speed 1.5 hp pumps. The classrooms (lower and upper level) are heated using five gas-fired condensing Weil McLain hot water boilers. Hot water is circulated to the upper level using two 7.5 hp pumps and to the lower level classrooms by two 3 hp pumps. The 7.5 hp and 3 hp pumps both are equipped with variable frequency drives (VFD). The VFD function helps reduce the energy use of the facility by slowing the motor speed to match flow requirements.

In the non-condensing boiler, hot water is supplied at 180°F when the outside air temperature is below 20°F and the setpoint is reset to 140°F when the outside air is above 60°F. In the condensing boilers, hot water is supplied at 180°F when the outside air temperature is below 20°F and the setpoint is modulated until the is 60°F. Above this temperature, the boilers are shutdown above this temperature.

The boilers provide hot water to the unit ventilators that serve the classrooms and air handlers that serve the larger spaces such as the gym and the library. The space temperatures are controlled by the building automation system. The unoccupied heating setpoint is 63°F.

The HB Smith boilers are 14 years old and Weil McLain boilers are seven years old. All boilers are in fair condition and well maintained.

Image 3 Hot Water Heating System

Direct Expansion Air Conditioning System (DX)

Space cooling in the classrooms is provided using window AC (Frigidaire) units with cooling capacities ranging from 1.25 to 2 tons. The units range from seven to 14 years old. The majority of units have a SEER of 11.4 and are in good condition.

Most of the individual offices and the main office in the new section are cooled by split AC units. The library, old main office and parts of the new main office are cooled using the rooftop packaged units. The packaged units are 12 tons, 4 tons and 2.5 tons respectively. The library and new main office units are 14 years old, and the unit that serves the new main office is six years old. All units older than 10 years old have been evaluated for replacement. The window AC units and the split AC unit zones are controlled by zone thermostats located in the respective spaces. Space temperatures in areas served by the packaged units are controlled by the building automation system. The unoccupied cooling setpoint is set to 80°F.

Image 4 Air Conditioning System

Domestic Water Heating System

The domestic hot water heating system for the facility consists of one gas fired AO Smith water heater serving the kitchen and restrooms and two electric Whirlpool water heaters serving the lower level and upper level classrooms respectively.

The gas fired heater has an input capacity of 140 MBh and a tank capacity of 140 gallons. This unit is rated at 80% efficiency and is 14 years old. The electric water heaters each have an input capacity of 4.5 kW, one has a tank capacity of 80 gallons and the other of 50 gallons. The larger unit is seven years old and the smaller unit is one year old.

Food Service Equipment

The kitchen in the facility is used to mostly reheat and serve food for the students. The kitchen has two gas convection oven. There are three stand-up refrigerators, refrigerator chest and freezer chest used to store food.

Building Plug Load

There are roughly 100 computer work stations and 23 laptops throughout the facility. Other office and classroom plug loads includes printers, paper shredders, projectors and smart boards. The kitchenette equipment in the facility include refrigerators, coffee machines, toasters, toaster oven and microwave ovens. There are two refrigerated beverage machines in the teachers' lounge. These do not have any controls installed on them.

2.7 Water-Using Systems

A sampling of restrooms found that all of the faucets are rated for 2.2 gallons per minute (gpm) or lower, the toilets are rated at 1.6 gallons per flush (gpf) and the urinals are rated at 1.6 gpf.

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

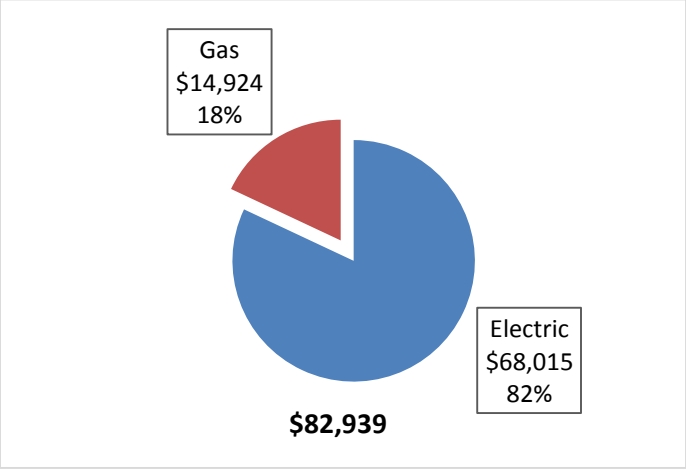
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Shady Lane School		
Fuel	**Usage**	**Cost**
Electricity	431,657 kWh	$68,015
Natural Gas	18,998 Therms	$14,924
Total		**$82,939**

The current annual energy cost for this facility is $82,939 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.158/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. Third party electric supply is provided by South Jersey Energy Company and Direct Energy. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

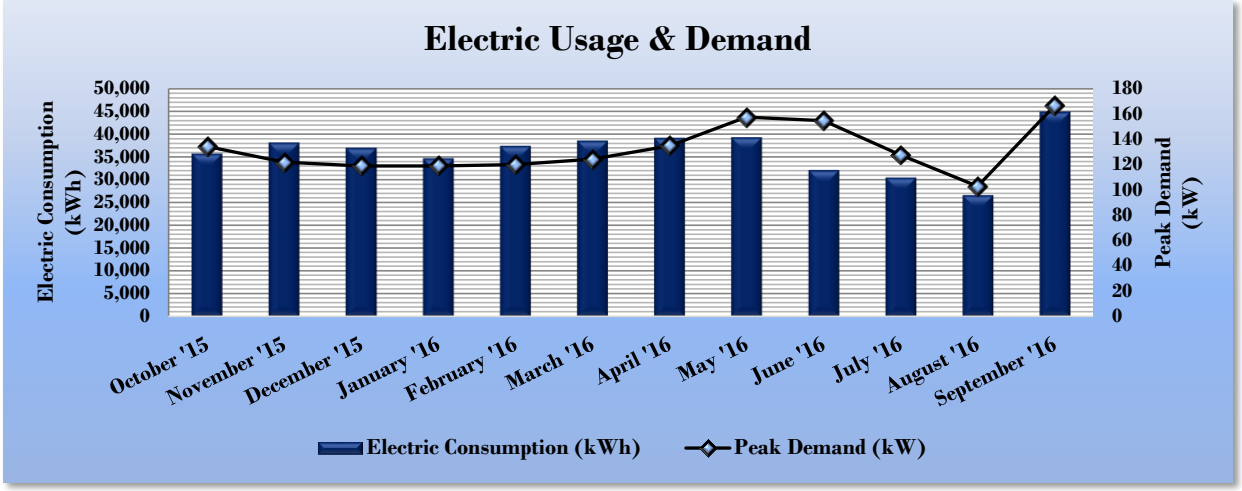


Figure 10 - Electric Usage & Demand

Electric Billing Data for Shady Lane School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
10/29/15	30	35,640	134	$748	$5,053
12/1/15	33	38,040	122	$532	$5,204
12/31/15	30	36,880	119	$518	$4,982
2/1/16	32	34,600	119	$518	$4,850
3/2/16	30	37,280	120	$524	$5,119
4/1/16	30	38,440	124	$548	$5,424
5/2/16	31	39,080	135	$594	$5,540
6/1/16	30	39,200	158	$694	$5,608
6/30/16	29	32,000	155	$1,947	$6,746
8/1/16	32	30,360	128	$1,605	$6,076
8/30/16	29	26,520	103	$1,293	$5,301
9/29/16	30	44,800	166	$2,122	$8,298
Totals	**366**	**432,840**	**166.4**	**$11,643**	**$68,201**
Annual	**365**	**431,657**	**166.4**	**$11,612**	**$68,015**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.786/therm, which is the blended rate used throughout the analyses in this report. Third party gas supply is provided by Direct Energy. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

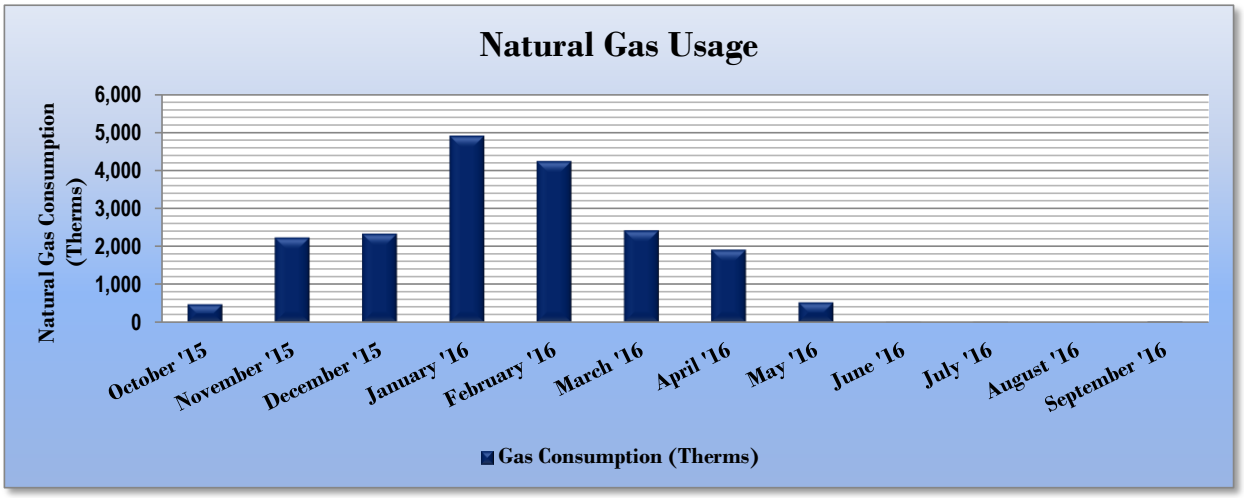


Figure 12 - Natural Gas Usage

Gas Billing Data for Shady Lane School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
10/29/15	30	473	$360
12/1/15	33	2,226	$1,719
12/31/15	30	2,326	$1,820
2/1/16	32	4,898	$3,674
3/2/16	30	4,231	$3,251
4/1/16	30	2,413	$2,155
5/2/16	31	1,909	$1,139
6/1/16	30	528	$393
6/30/16	29	14	$115
8/1/16	32	8	$112
8/30/16	29	6	$110
9/29/16	30	17	$117
Totals	**366**	**19,050**	**$14,965**
Annual	**365**	**18,998**	**$14,924**

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		
	Shady Lane School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	105.0	141.4
Site Energy Use Intensity (kBtu/ft^2)	53.5	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		
	Shady Lane School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	82.8	141.4
Site Energy Use Intensity (kBtu/ft^2)	46.4	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 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 47.

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

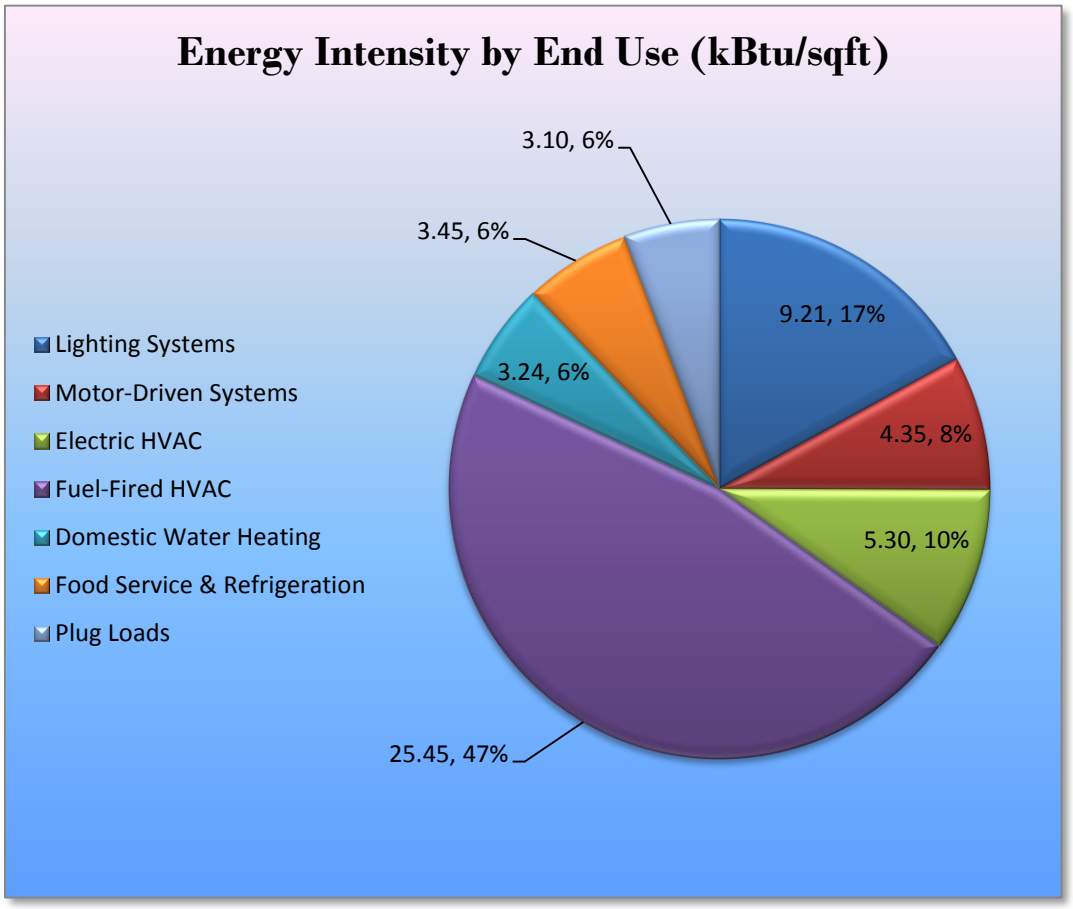
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 Shady Lane 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 June 29, 2016, 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		**102,772**	**21.6**	**0.0**	**$16,193.40**	**$63,827.16**	**$11,705.00**	**$52,122.16**	**3.2**	**103,491**
ECM 1	Install LED Fixtures	7,656	1.0	0.0	$1,206.37	$7,422.86	$1,900.00	$5,522.86	4.6	7,710
ECM 2	Retrofit Fixtures with LED Lamps	95,116	20.6	0.0	$14,987.04	$56,404.30	$9,805.00	$46,599.30	3.1	95,781
Lighting Control Measures		**19,312**	**4.3**	**0.0**	**$3,042.85**	**$25,462.00**	**$2,380.00**	**$23,082.00**	**7.6**	**19,447**
ECM 3	Install Occupancy Sensor Lighting Controls	19,312	4.3	0.0	$3,042.85	$25,462.00	$2,380.00	$23,082.00	7.6	19,447
Variable Frequency Drive (VFD) Measures		**5,149**	**1.1**	**0.0**	**$811.25**	**$8,540.77**	**$400.00**	**$8,140.77**	**10.0**	**5,185**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	2,059	0.7	0.0	$324.46	$3,275.85	$400.00	$2,875.85	8.9	2,074
ECM 5	Install VFDs on Hot Water Pumps	3,089	0.4	0.0	$486.79	$5,264.92	$0.00	$5,264.92	10.8	3,111
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$507.94**	**$460.00**	**$0.00**	**$460.00**	**0.9**	**3,246**
ECM 6	Vending Machine Control	3,224	0.0	0.0	$507.94	$460.00	$0.00	$460.00	0.9	3,246
TOTALS		**130,456**	**26.9**	**0.0**	**$20,555.44**	**$98,289.93**	**$14,485.00**	**$83,804.93**	**4.1**	**131,368**

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		**102,772**	**21.6**	**0.0**	**$16,193.40**	**$63,827.16**	**$11,705.00**	**$52,122.16**	**3.2**	**103,491**
ECM 1	Install LED Fixtures	7,656	1.0	0.0	$1,206.37	$7,422.86	$1,900.00	$5,522.86	4.6	7,710
ECM 2	Retrofit Fixtures with LED Lamps	95,116	20.6	0.0	$14,987.04	$56,404.30	$9,805.00	$46,599.30	3.1	95,781

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: 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	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	7,656	1.0	0.0	$1,206.37	$7,422.86	$1,900.00	$5,522.86	4.6	7,710

Measure Description

We recommend replacing existing exterior fixtures containing HID lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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 2: 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	94,919	20.5	0.0	$14,956.09	$56,135.53	$9,805.00	$46,330.53	3.1	95,583
Exterior	196	0.0	0.0	$30.95	$268.77	$0.00	$268.77	8.7	198

Measure Description

We recommend retrofitting existing incandescent and T8 linear tubes lighting technologies with LED lamps. 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 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 18 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		**19,312**	**4.3**	**0.0**	**$3,042.85**	**$25,462.00**	**$2,380.00**	**$23,082.00**	**7.6**	**19,447**
ECM 3	Install Occupancy Sensor Lighting Controls	19,312	4.3	0.0	$3,042.85	$25,462.00	$2,380.00	$23,082.00	7.6	19,447

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 3: 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)
19,312	4.3	0.0	$3,042.85	$25,462.00	$2,380.00	$23,082.00	7.6	19,447

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms and offices areas. 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.

4.1.3 Variable Frequency Drive Measures

Our recommendations for 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		**5,149**	**1.1**	**0.0**	**$811.25**	**$8,540.77**	**$400.00**	**$8,140.77**	**10.0**	**5,185**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	2,059	0.7	0.0	$324.46	$3,275.85	$400.00	$2,875.85	8.9	2,074
ECM 5	Install VFDs on Hot Water Pumps	3,089	0.4	0.0	$486.79	$5,264.92	$0.00	$5,264.92	10.8	3,111

ECM 4: Install VFDs on Constant Volume (CV) HVAC

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)
2,059	0.7	0.0	$324.46	$3,275.85	$400.00	$2,875.85	8.9	2,074

Measure Description

We recommend installing variable frequency drives (VFDs) to control supply fan motor speed on the heating and ventilating unit supplying heat to the gym, to convert a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one. Zone thermostats will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

VAV systems should not be controlled such that the supply air temperature is raised at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low, e.g. 55°F, until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

ECM 5: 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)
3,089	0.4	0.0	$486.79	$5,264.92	$0.00	$5,264.92	10.8	3,111

Measure Description

We recommend installing variable frequency drives (VFD) to control the two 1.5 hp hot water pumps supplying hot water to the kitchen, gym and labs. This measure requires that a majority of the hot water coils be served by 2-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 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 20 below.

Figure 20 – 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)
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$507.94**	**$460.00**	**$0.00**	**$460.00**	**0.9**	**3,246**
ECM 6	Vending Machine Control	3,224	0.0	0.0	$507.94	$460.00	$0.00	$460.00	0.9	3,246

ECM 6: Vending Machine Control

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)
3,224	0.0	0.0	$507.94	$460.00	$0.00	$460.00	0.9	3,246

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

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 21 – 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)
Motor Upgrades	**143**	**0.0**	**0.0**	**$22.48**	**$1,495.39**	**$0.00**	**$1,495.39**	**66.5**	**144**
Premium Efficiency Motors	143	0.0	0.0	$22.48	$1,495.39	$0.00	$1,495.39	66.5	144
Electric Unitary HVAC Measures	**10,367**	**6.1**	**0.0**	**$1,633.50**	**$38,838.40**	**$1,686.76**	**$37,151.64**	**22.7**	**10,440**
Install High Efficiency Electric AC	10,367	6.1	0.0	$1,633.50	$38,838.40	$1,686.76	$37,151.64	22.7	10,440
TOTAL OF ALL NON-RECOMMENDED MEASURES	**10,510**	**6**	**0**	**$ 1,655.98**	**$ 40,333.78**	**$ 1,686.76**	**$ 38,647.02**	**23.3**	**10,583**

* - 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).

Premium Efficiency 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)
143	0.0	0.0	$22.48	$1,495.39	$0.00	$1,495.39	66.5	144

Measure Description

We evaluated replacing standard efficiency motors with *NEMA Premium™* efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. 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 *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

Reasons for not Recommending

The projected payback period for replacing the identified motors exceeds the rated useful life of the equipment. Motors should be upgraded to higher efficiency equipment whenever they are replaced.

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)
10,367	6.1	0.0	$1,633.50	$38,838.40	$1,686.76	$37,151.64	22.7	10,440

Measure Description

We evaluated replacing standard efficiency air conditioning units with high efficiency 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.

Reasons for not Recommending

Although we evaluated the replacements of the air conditioning units and premium efficiency units, the payback period for the measure exceeds the useful life of the equipment. When the existing equipment is due for replacement, we recommend replacing them with high efficiency HVAC units.

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.

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

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 5-10°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.

Ensure Economizers are Functioning Properly

Economizers, when properly configured, can be used to significantly reduce mechanical cooling. However, if the outdoor thermostat or enthalpy control is malfunctioning or the damper is stuck or improperly adjusted, benefits from the economizer may not be fully realized. As such, periodic inspection and maintenance is required to ensure proper operation. This maintenance should be scheduled with maintenance of the facility's air conditioning system and should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position. A malfunctioning economizer can significantly increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air.

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 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

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.

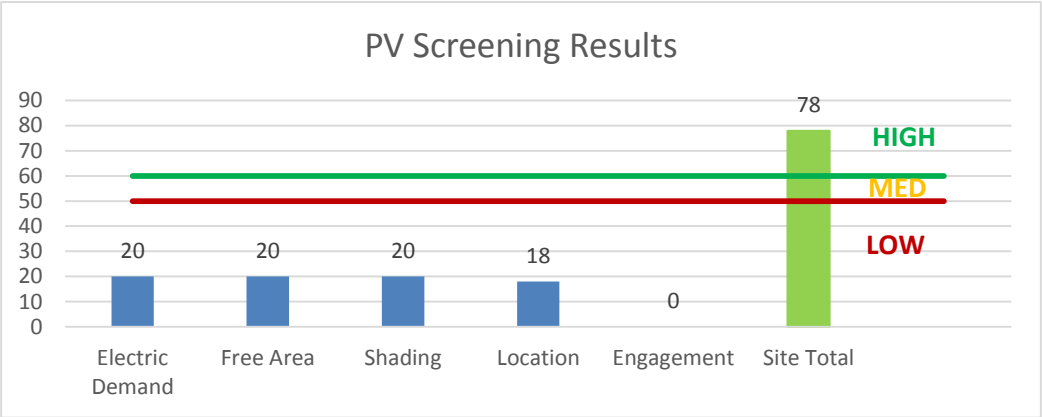
6.1 Photovoltaic

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 Shady Lane School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 22 - Photovoltaic Screening



Potential	High	
System Potential	132	kW DC STC
Electric Generation	157,261	kWh/yr
Displaced Cost	$13,680	/yr
Installed Cost	$343,200	

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 8.3 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.

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/

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.

In our opinion this school is not a good candidate for demand response program.

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 23 for a list of the eligible programs identified for each recommended ECM.

Figure 23 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install
ECM 1	Install LED Fixtures	x		x
ECM 2	Retrofit Fixtures with LED Lamps	x		x
ECM 3	Install Occupancy Sensor Lighting Controls	x		x
ECM 4	Install VFDs on Constant Volume (CV) HVAC	x		x
ECM 5	Install VFDs on Hot Water Pumps		x	x
ECM 6	Vending Machine Control	x		x

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.

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 a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will 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. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

To participate in the Direct Install program you will need to contact the participating contractor who 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.

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

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. SREC's 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 SREC's 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
Faculty Dining	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.25	1,191	0.0	$187.69	$567.20	$110.00	2.44
Men's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	780	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	780	0.02	30	0.0	$4.66	$58.50	$10.00	10.40
Women's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	780	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	780	0.02	30	0.0	$4.66	$58.50	$10.00	10.40
Gym	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.04	209	0.0	$33.01	$117.00	$20.00	2.94
Gym	8	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,760	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.21	1,008	0.0	$158.84	$2,228.00	$360.00	11.76
Storage	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	36	0.19	17	0.0	$2.75	$525.50	$90.00	158.34
PE office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.08	397	0.0	$62.56	$266.40	$50.00	3.46
Kitchen	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,760	Relamp	No	10	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,760	0.37	1,777	0.0	$280.06	$951.33	$200.00	2.68
Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.04	209	0.0	$33.01	$117.00	$20.00	2.94
Mechanical room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.17	838	0.0	$132.03	$468.00	$80.00	2.94
Girls' restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	780	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	546	0.11	150	0.0	$23.58	$504.00	$75.00	18.20
Boys' restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	780	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	546	0.11	150	0.0	$23.58	$504.00	$75.00	18.20
Hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.27	1,324	0.0	$208.55	$1,665.00	$100.00	7.50
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.29	1,390	0.0	$218.98	$796.40	$105.00	3.16
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.08	397	0.0	$62.56	$291.50	$50.00	3.86
Server closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.02	8	0.0	$1.24	$58.50	$10.00	38.99
A119 - Pre K	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.49	2,382	0.0	$375.39	$1,172.40	$215.00	2.55
A124 - Pre K	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.04	209	0.0	$33.01	$117.00	$20.00	2.94
A129 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.02	105	0.0	$16.50	$58.50	$10.00	2.94
Custodial closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.02	8	0.0	$1.24	$58.50	$10.00	38.99
Hallway	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.30	1,456	0.0	$229.40	$1,723.50	$110.00	7.03
A134	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.19	943	0.0	$148.53	$451.20	$90.00	2.43
Library	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	1.09	5,294	0.0	$834.19	$3,960.00	$610.00	4.02
Library	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.29	1,414	0.0	$222.80	$676.80	$135.00	2.43
Library lavatory	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.02	105	0.0	$16.50	$58.50	$10.00	2.94

	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
PE closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.05	265	0.0	$41.71	$233.00	$40.00	4.63
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	36	0.16	15	0.0	$2.36	$467.00	$80.00	164.16
Boiler room 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.13	628	0.0	$99.02	$351.00	$60.00	2.94
Room 10,11,12,14	72	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	72	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	1.97	9,530	0.0	$1,501.55	$5,292.00	$860.00	2.95
Room 13	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.49	2,382	0.0	$375.39	$1,172.40	$215.00	2.55
Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.58	2,828	0.0	$445.60	$1,353.60	$270.00	2.43
Room 7,8,9	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	1.15	5,559	0.0	$875.90	$3,267.00	$525.00	3.13
Hallway	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.45	2,184	0.0	$344.10	$1,907.20	$165.00	5.06
Hallway	8	Compact Fluorescent: 2 Lamps	Wall Switch	52	2,760	Relamp	Yes	8	LED Screw-In Lamps: 2 Lamps	Occupancy Sensor	36	1,932	0.14	673	0.0	$106.10	$1,130.05	$0.00	10.65
Hallway	6	Compact Fluorescent: 2 Lamps	Wall Switch	48	2,760	Relamp	Yes	6	LED Screw-In Lamps: 2 Lamps	Occupancy Sensor	36	1,932	0.09	429	0.0	$67.58	$915.04	$0.00	13.54
A119 - Pre K	2	Compact Fluorescent: 2 Lamps	Wall Switch	52	2,760	Relamp	No	2	LED Screw-In Lamps: 2 Lamps	Wall Switch	36	2,760	0.02	99	0.0	$15.60	$215.01	$0.00	13.78
Hallway	3	Compact Fluorescent: 2 Lamps	Wall Switch	52	2,760	Relamp	No	3	LED Screw-In Lamps: 2 Lamps	Wall Switch	36	2,760	0.03	149	0.0	$23.41	$322.52	$0.00	13.78
Library	8	Compact Fluorescent: 2 Lamps	Wall Switch	52	2,760	Relamp	No	8	LED Screw-In Lamps: 2 Lamps	Wall Switch	36	2,760	0.08	396	0.0	$62.41	$860.05	$0.00	13.78
Library	1	Compact Fluorescent: 2 Lamps	Wall Switch	48	2,760	Relamp	No	1	LED Screw-In Lamps: 2 Lamps	Wall Switch	36	2,760	0.01	37	0.0	$5.80	$107.51	$0.00	18.53
Room 28,27,15,16,17,18,19	126	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	126	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	3.44	16,677	0.0	$2,627.71	$9,261.00	$1,505.00	2.95
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.49	2,357	0.0	$371.34	$1,128.00	$225.00	2.43
APR/Gym upper	12	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,760	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.62	3,024	0.0	$476.51	$3,781.60	$660.00	6.55
Mini Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.04	209	0.0	$33.01	$117.00	$20.00	2.94
IMC	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	40	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.87	4,190	0.0	$660.15	$2,340.00	$400.00	2.94
Roof access room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,760	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,760	0.07	333	0.0	$52.51	$215.40	$30.00	3.53
Hallway	22	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	22	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.90	4,368	0.0	$688.21	$5,974.40	$330.00	8.20
Room 20,21,22,23,24,25,26	126	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	126	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	3.44	16,677	0.0	$2,627.71	$9,261.00	$1,505.00	2.95
Boys' restroom	8	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	780	Relamp	Yes	8	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	546	0.21	281	0.0	$44.32	$882.27	$195.00	15.51
Girls' restroom	8	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	780	Relamp	Yes	8	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	546	0.21	281	0.0	$44.32	$882.27	$195.00	15.51
Hallway	30	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	30	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	1.23	5,956	0.0	$938.47	$3,606.00	$625.00	3.18

	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
Nurse's office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.13	628	0.0	$99.02	$300.80	$60.00	2.43
Nurse's office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.22	1,047	0.0	$165.04	$585.00	$100.00	2.94
Nurse's office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.06	314	0.0	$49.51	$150.40	$30.00	2.43
Maintenance office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.16	794	0.0	$125.13	$621.00	$95.00	4.20
Room 6 A	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.13	628	0.0	$99.02	$300.80	$60.00	2.43
Girls' restroom	9	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	780	Relamp	Yes	9	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	546	0.23	316	0.0	$49.86	$958.80	$215.00	14.92
Boys' restroom	9	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	780	Relamp	Yes	9	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	546	0.23	316	0.0	$49.86	$958.80	$215.00	14.92
Room 6 A	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.37	1,787	0.0	$281.54	$946.80	$170.00	2.76
Room 6A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.04	209	0.0	$33.01	$117.00	$20.00	2.94
Teacher's room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.11	529	0.0	$83.42	$350.00	$60.00	3.48
Teacher's room lavatory	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,760	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,760	0.02	86	0.0	$13.50	$63.80	$10.00	3.98
Nurse's office	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.29	1,414	0.0	$222.80	$676.80	$135.00	2.43
Nurse's office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.02	105	0.0	$16.50	$58.50	$10.00	2.94
Maintenance entrance	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.13	628	0.0	$99.02	$300.80	$60.00	2.43
Main office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,760	0.13	628	0.0	$99.02	$300.80	$60.00	2.43
Main office	6	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,760	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,760	0.12	590	0.0	$93.02	$351.00	$60.00	3.13
Room 4,3,2,1	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,760	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.46	2,250	0.0	$354.53	$1,264.50	$205.00	2.99
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,760	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.29	1,390	0.0	$218.98	$796.40	$140.00	3.00
All school	26	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	26	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior - wall pack	19	Metal Halide: (1) 100W Lamp	Wall Switch	128	4,380	Fixture Replacement	No	19	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	48	4,380	1.00	7,656	0.0	$1,206.37	$7,422.86	$1,900.00	4.58
Exterior - wall pack	2	Compact Fluorescent: 2 Lamps	Wall Switch	26	4,380	Relamp	No	2	LED Screw-In Lamps: 2 Lamps	Wall Switch	18	4,380	0.01	79	0.0	$12.38	$107.51	$0.00	8.68
Exterior - canopy	3	Compact Fluorescent: 1 Lamp	Wall Switch	26	4,380	Relamp	No	3	LED Screw-In Lamps: 1 Lamp	Wall Switch	18	4,380	0.02	118	0.0	$18.57	$161.26	$0.00	8.68

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
Mechanical room	Gym, kitchen lab	2	Heating Hot Water Pump	1.5	84.0%	No	2,745	Yes	86.5%	Yes	2	0.43	3,232	0.0	$509.27	$6,760.31	$0.00	13.27
Boiler rooms 2	Classrooms and upstairs	2	Heating Hot Water Pump	7.5	91.0%	Yes	3,391	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler rooms 2	Classrooms, lower level	2	Heating Hot Water Pump	3.0	89.5%	Yes	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU - 1 - 2nd level IMC	IMC	1	Supply Fan	5.0	89.5%	Yes	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU - 2 - 2nd level IMC	Gym, Cafeteria	1	Supply Fan	3.0	89.5%	Yes	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler room	DHW	3	Water Supply Pump	0.5	60.0%	Yes	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Unit Vents	29	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust fans	18	Exhaust Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym	1	Supply Fan	5.0	89.5%	No	2,745	No	89.5%	Yes	1	0.68	2,059	0.0	$324.46	$3,275.85	$400.00	8.86

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
A119,A124, Room 10, 11, 13, 14	A119,A124, Room 10, 11, 13, 14	6	Window AC	1.25		Yes	6	Window AC	1.25		12.00		No	0.36	606	0.0	$95.47	$8,165.70	$0.00	85.53
Room 7,9	Room 7,9	2	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 28,16,17,18,19,20,21,22	Room 28,16,17,18,19,20,21,22	8	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 27	Room 27	2	Split-System AC	2.00		Yes	2	Split-System AC	2.00		16.00		No	1.64	2,776	0.0	$437.42	$5,984.88	$368.00	12.84
Roof	IMC	1	Split-System AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Old Main office	Roof	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 23,24,25,26	Room 23,24,25,26	4	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 6A,6,4,3,2,1	Room 6A,6,4,3,2,1	6	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Teacher's room	Teacher's room	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Principal's office	Principal's office	1	Split-System AC	1.53		Yes	1	Split-System AC	1.53		14.00		No	0.38	640	0.0	$100.89	$2,289.22	$140.76	21.30
Main office new section	Main office new section	1	Ductless Mini-Split AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main office new section	Main office new section	1	Ductless Mini-Split AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Library	1	Packaged AC	12.00		Yes	1	Packaged AC	12.00		11.50		No	2.96	4,998	0.0	$787.58	$16,726.20	$948.00	20.03
Roof	New main office	1	Packaged AC	2.50		Yes	1	Packaged AC	2.50		14.00		No	0.80	1,346	0.0	$212.15	$5,672.40	$230.00	25.65
Classroom	Classroom	1	Window AC	2.00		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	Gym, Kitchen, libraries	2	Non-Condensing Hot Water Boiler	359.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler room	Classroom lower and upper level	5	Condensing Hot Water Boiler	702.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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	Kitchen and restroom	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler room 2	Classroom areas - lower	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof access room	upper level classrooms	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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& 2	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen 1& 2	1	Refrigerator Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen 1& 2	2	Freezer Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen 1& 2	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	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&2	4	Gas Convection Oven (Half Size)	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?
Shady Lane School	100	Computer	145.0	Yes
Shady Lane School	23	Laptop	75.0	Yes
Shady Lane School	36	Printer - Small	20.0	Yes
Shady Lane School	2	Printer - Medium	40.0	Yes
Shady Lane School	3	Printer - Big	200.0	Yes
Shady Lane School	1	Paper Shredder	200.0	Yes
Shady Lane School	31	Projector	150.0	Yes
Shady Lane School	6	Microwave	1,000.0	Yes
Shady Lane School	1	Refrigerator - small	40.0	Yes
Shady Lane School	5	Refrigerator - medium	60.0	Yes
Shady Lane School	3	Refrigerator - large	218.0	Yes
Shady Lane School	4	Coffe machine	400.0	Yes
Shady Lane School	1	Toaster	1,000.0	Yes
Shady Lane School	3	Toaster oven	1,200.0	Yes
Shady Lane School	1	Television	120.0	Yes
Shady Lane School	6	Standing fan	60.0	Yes
Shady Lane School	31	Smart board	5.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	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
Teacher's lounge	2	Refrigerated	Yes	0.00	3,224	0.0	$507.94	$460.00	$0.00	0.91

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Shady Lane School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 63,015
Built: 1957

For Year Ending: November 30, 2016
Date Generated: January 04, 2018

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
Shady Lane School 130, Peach Street Westville, New Jersey 08093	_____ , (___)___-____	___ _____ , (___)___-____ _____

Property ID: 6138723

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
53.7 kBtu/ft²

Source EUI
105.5 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,481,627 (44%)
Natural Gas (kBtu)	1,902,183 (56%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	52.7
National Median Source EUI (kBtu/ft²)	103.6
% Diff from National Median Source EUI	2%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	265

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

___ _____
,
(___)___-____
_____

Professional Engineer Stamp (if applicable)