



Local Government Energy Audit: Energy Audit Report



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White Rock Elementary School

Jefferson Township Board of Education

2 Francine Place
Oak Ridge, NJ 07438

July 16, 2018

Final Report by:
TRC Energy Services

Disclaimer

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

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

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

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

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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) Report for White Rock Elementary 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.

I.1 Facility Summary

White Rock Elementary School is a three-story building totaling 65,684 square feet. The building has a flat roof and exterior walls are finished with brick masonry. The windows throughout the facility are double paned operable windows. Interior lighting consists mostly of linear fluorescent lamps and fixtures and lighting control is provided by manual wall switches. Heating is provided by non-condensing oil-fired boilers and cooling is provided by a combination of rooftop packaged, split system and window air conditioning units.

A thorough description of the facility and our observations are located in Section 2.

I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated eight measures which together represent an opportunity for White Rock Elementary School to reduce annual energy costs by \$14,496 and annual greenhouse gas emissions by 134,036 lbs CO₂e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 10.7 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 White Rock Elementary School’s annual energy use by 9%.

Figure 1 – Previous 12 Month Utility Costs

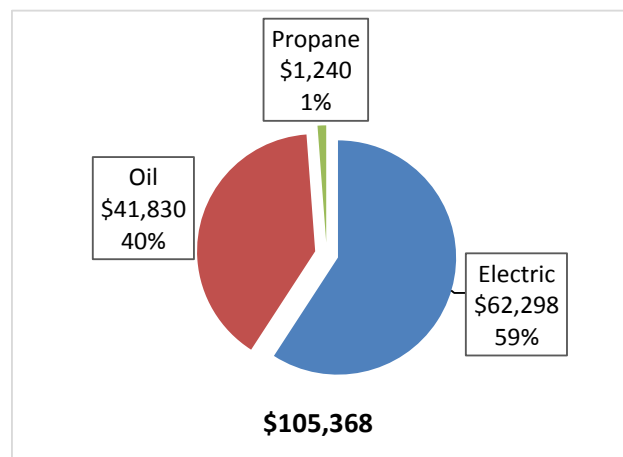
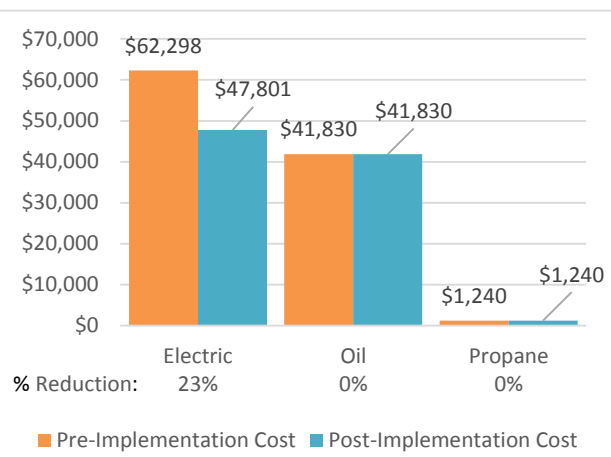


Figure 2 – Potential Post-Implementation Costs



A detailed description of White Rock Elementary School’s existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			70,160	28.0	\$7,641.05	\$68,254.33	\$12,020.00	\$56,234.33	7.4	70,651
ECM 1	Install LED Fixtures	Yes	11,659	6.4	\$1,269.80	\$16,276.87	\$3,150.00	\$13,126.87	10.3	11,741
ECM 2	Retrofit Fixtures with LED Lamps	Yes	57,594	21.5	\$6,272.50	\$50,364.13	\$8,870.00	\$41,494.13	6.6	57,997
ECM 3	Install LED Exit Signs	Yes	907	0.1	\$98.74	\$1,613.33	\$0.00	\$1,613.33	16.3	913
Lighting Control Measures			10,976	4.1	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	10,976	4.1	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053
Motor Upgrades			151	0.1	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152
ECM 5	Premium Efficiency Motors	Yes	151	0.1	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152
Electric Unitary HVAC Measures			31,126	26.1	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343
ECM 6	Install High Efficiency Electric AC	Yes	31,126	26.1	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343
HVAC System Improvements			12,452	2.8	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539
ECM 7	Install Dual Enthalpy Outside Economizer Control	Yes	12,452	2.8	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539
Domestic Water Heating Upgrade			8,241	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298
ECM 8	Install Low-Flow Domestic Hot Water Devices	Yes	8,241	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298
TOTALS			133,106	61.0	\$14,496.31	\$174,076.86	\$19,319.10	\$154,757.76	10.7	134,036

* - 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.

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

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

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

Energy Efficient Practices

TRC also identified 13 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 White Rock Elementary School include:

- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Turn Off Unneeded Motors
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- 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 White Rock Elementary School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	125	kW DC STC
Electric Generation	148,921	kWh/yr
Displaced Cost	\$12,960	/yr
Installed Cost	\$325,000	

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

I.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
- 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 7.

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

For larger facilities with limited capital availability to implement 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 7.4 for additional information on the ESIP Program.

Additional information on relevant incentive programs is located in Section 7 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			
Rita Giacchi	Assistant Business Administrator	rgiacchi@jefftwp.org	973-663-3387
Designated Representative			
Joe Yuhas	Supervisor Custodian		(973) 479-9360
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On March 2, 2017, TRC performed an energy audit at White Rock Elementary School located in Oak Ridge, New Jersey. TRC’s auditor met with Joe Yuhas to review the facility operations and help focus our investigation on specific energy-using systems.

The 65,684 square foot school building is a three-story facility that was constructed in 1969. It’s comprised of classrooms, offices, gymnasium, multi-purpose room, library, faculty room, conference room, copy rooms, kitchen, mechanical rooms and storage areas.

The foundation consists of a concrete perimeter with concrete foundation walls. The exterior walls are finished with brick masonry and the exterior doors are constructed of metal. The building has a flat roof that was repaired, as part of renovation last summer. The windows throughout the facility are double paned operable windows.



Interior lighting consists mostly of 32-Watt linear T8 lamps and fixtures. Exit signs throughout the facility are a mix of LED and fluorescent fixtures. Lighting control is provided by manual wall switches. The facility has exterior lighting, consisting of LED and metal halide outdoor wall-mounted fixtures, controlled with photocells.

Heating is provided by two non-condensing oil-fired boilers. Cooling is provided by a combination of rooftop packaged, split system and window air conditioning units. Air is exhausted from toilet rooms, corridors, meeting and dining areas through the roof exhausters.

The school also houses a small non-commercial kitchen. The kitchen includes propane cooking ovens, stand-up refrigerators and freezers, and a walk-in cooler.

2.3 Building Occupancy

The typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Arthur Stanlick School	Weekday	7:00 AM - 3:30 PM
Arthur Stanlick School	Weekend	N/A

2.4 Building Envelope

The foundation consists of cast-in-place concrete perimeter wall footings with concrete foundation walls. The building has a flat roof covered with a white and black membrane that was part of a repair in the summer of 2016. The area of the roof covered with a white membrane can contribute to cooling savings by reflecting heat. The roof was found to be in good condition. The exterior walls are finished with brick masonry and the exterior doors are constructed of metal and were mentioned to be “fire-approved” doors. The windows throughout the facility are double paned operable windows and were found to be in good condition with no signs of outside air infiltration. Overall, the building envelope appears to be in good condition.



2.5 On-Site Generation

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

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps and fixtures with electronic ballasts. Most of the fixtures are 2 and 3 lamp, 4-foot long troffers with diffusers. The gymnasium and the multi-purpose rooms are lit with 28-Watt linear T5 lamps. A small area of the building (e.g. multipurpose room stage, closets, storage areas) are primarily lit with incandescent screen in lamps. Exit signs throughout the facility are a mix of LED and fluorescents fixtures. The facility has exterior lighting which consists of various wattages of metal halide and LED outdoor wall-mounted fixtures that are controlled with photocells.

Hot Water Heating System

Heating is provided by two non-condensing oil-fired boilers. The boilers are 13 years old, have an output capacity of 2,532 kBtu/hr each with a nominal efficiency of 82%. The boilers operate in lead/lag operation with only one operating at a time. The heating hot water generated by the boilers are circulated to unit ventilators and two air handlers, which have four 10 hp hot water supply pumps and two 1.5 hp return pumps. The hot water supply pumps are equipped with variable frequency drives (VFDs). The boilers are configured in a variable flow distribution and have a full modulation sequencing control system. The boiler internal control system has an outside temperature set at 51°F and interior space temperature set at 72°F. The unit ventilators are equipped with hot water coils, and direct-expansion (DX) coils for cooling and dehumidification in the classrooms. The boilers appeared to be in good condition and are well maintained.



Direct Expansion Air Conditioning System (DX)

There are seven Lennox rooftop packaged units, nine Lennox and seven Airedale split systems, and two window units that provide cooling to various spaces in the building. The packaged units utilize a scroll compressor and a direct-expansion (DX) coil. They are sized from 5 to 12 tons and the split system is sized from 1 to 3.5 tons. The Lennox packaged units and the Airedale split systems are approximately 18 years old and appeared to be running with minimum efficiency at the time of our site visit. It seems they've reached the end of their useful services lives and should be considered for replacement. Air is exhausted from bathrooms, corridors, meeting and dining areas through the roof exhausters. The heating and cooling system utilizes a central web access control system manufactured by Automated Logic.



Ventilation – Air-Handling System

There are two air handlers equipped with hot water coils for heating that serve the multi-purpose room. The gymnasium has two McQuay air handlers located on the roof that provide tempered air via variable volume duct distribution. The media center has one AAON make up air unit. The air handling system is controlled with a web access building energy management system (BEMS) and appeared to be in good condition.



Building Energy Management System (BEMS)



The majority of the facility system is controlled with a web access building energy management system (BEMS). The HVAC system includes a central control system manufactured by Automated Logic. The system automates the on/off control and temperature setbacks.

Domestic Hot Water Heating System

Domestic hot water for the facility is provided by one electric Bradford White water heater located in the boiler room, and has a storage tank capacity of 80 gallons. The water heater is 12 years old and appears to be in good condition.

Food Service & Refrigeration

The school also houses a small non-commercial kitchen. The kitchen includes propane cooking ovens, stand-up refrigerators and freezer, and a walk in cooler. The walk-in unit appears to be in good condition and the kitchen is well maintained.

Building Plug Load

There are 73 computers with LCD monitors and 112 computers with CRT monitors throughout the facility. The school district should consider replacing the CRT monitors with LCD monitors. There is no centralized PC power management software currently installed. There is one server room that has cooling provided by a rooftop unit. There are no vending machine in the facility.

2.7 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf. The school has no locker rooms.

3 SITE ENERGY USE AND COSTS

Utility data for electricity, No. 2 fuel oil and propane was analyzed to identify opportunities for savings. In addition, data for electricity, No. 2 fuel oil and Propane 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 3.5 for additional information.

3.1 Total Cost of Energy

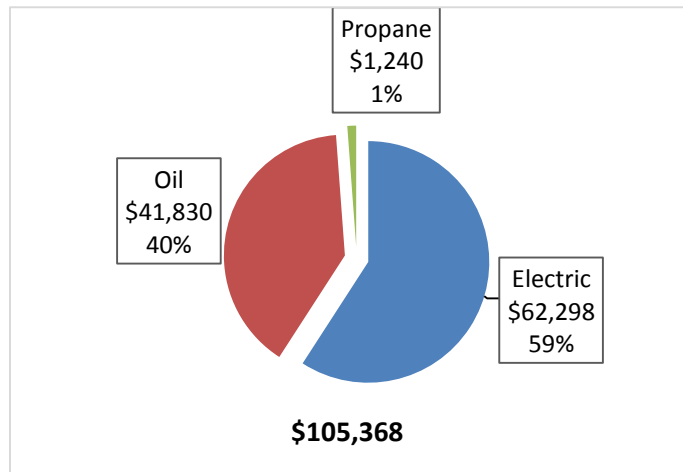
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for White Rock School		
Fuel	Usage	Cost
Electricity	572,018 kWh	\$62,298
No. 2 Fuel Oil	22,611 Gallons	\$41,830
Propane	479 Gallons	\$1,240
Total		\$105,368

The current annual energy cost for this facility is \$105,368 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was \$0.109/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

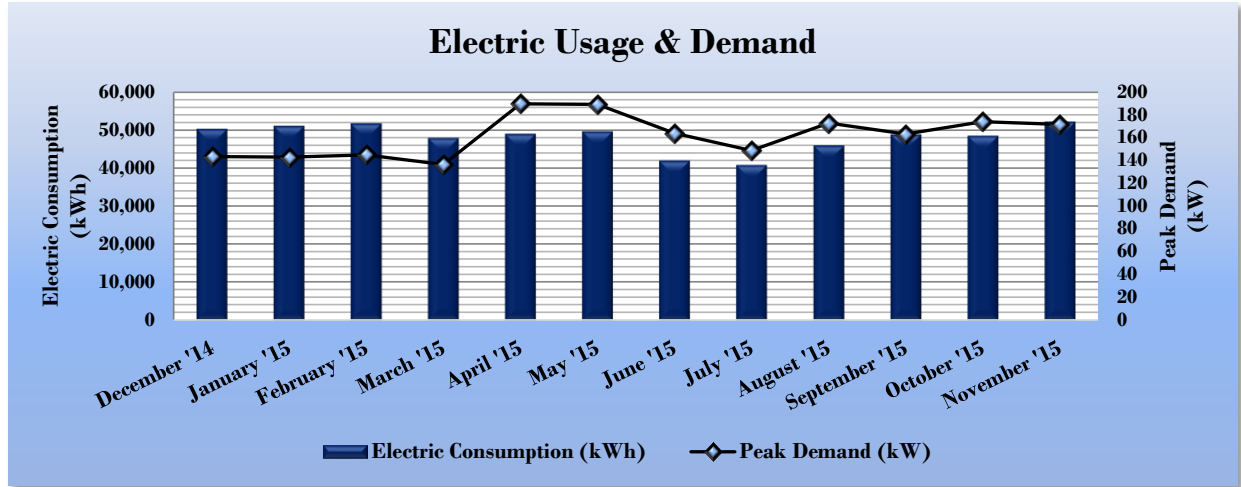


Figure 10 - Electric Usage & Demand

Electric Billing Data for White Rock School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/12/15	32	50,180	143		\$5,285
2/11/15	30	50,980	143		\$5,443
3/13/15	30	51,620	145		\$5,624
4/13/15	31	47,780	136		\$5,121
5/13/15	30	48,900	190		\$5,460
6/12/15	30	49,540	189		\$5,582
7/14/15	32	41,860	164		\$4,520
8/13/15	30	40,740	149		\$4,337
9/14/15	32	45,860	173		\$4,953
10/15/15	31	48,740	163		\$5,341
11/12/15	28	48,420	174		\$5,362
12/14/15	32	52,100	172		\$5,782
Totals	368	576,720	189.75	\$0	\$62,810
Annual	365	572,018	189.75	\$0	\$62,298

3.3 No. 2 Fuel Oil Usage

No. 2 fuel oil is provided by Finch Fuel. The average oil cost for the past 12 months is \$1.850/Gallon, which is the blended rate used throughout the analyses in this report. The oil consumption is shown in the table below.

Figure 11 –No. 2 Fuel Oil Usage

No. 2 Fuel Oil Billing Data for White Rock School				
Period Ending	Days in Period	Oil Usage (Gallons)	Fuel Cost	TRC Estimated Usage?
12/5/15	30	2,321	\$4,294	Yes
1/4/16	31	3,138	\$5,805	Yes
2/5/16	29	4,277	\$7,912	Yes
3/4/16	30	3,308	\$6,120	Yes
4/5/16	30	2,035	\$3,765	Yes
5/5/16	31	329	\$609	Yes
6/5/16	30	0	\$0	Yes
7/5/16	31	0	\$0	Yes
8/5/16	31	0	\$0	Yes
9/5/16	31	2,337	\$4,323	Yes
10/5/16	30	2,485	\$4,597	Yes
11/5/16	31	2,381	\$4,405	Yes
Totals	365	22,611	\$41,830	12
Annual	365	22,611	\$41,830	

3.4 Propane Usage

Propane is provided by Suburban Propane. The average propane cost for the past 12 months is \$2.590/Gallon, which is the blended rate used throughout the analyses in this report. The propane consumption is shown in the table below.

Figure 12 –Propane Usage

Propane Billing Data for White Rock School				
Period Ending	Days in Period	Propane Usage (Gallons)	Fuel Cost	TRC Estimated Usage?
2/10/16	29	48	\$124	Yes
3/10/16	31	48	\$124	Yes
4/10/16	30	48	\$124	Yes
5/10/16	31	48	\$124	Yes
6/10/16	30	48	\$124	Yes
7/10/16	31	0	\$0	Yes
8/10/16	31	0	\$0	Yes
9/10/16	30	48	\$124	Yes
10/10/16	31	48	\$124	Yes
11/10/16	30	48	\$124	Yes
12/10/16	31	48	\$124	Yes
1/10/17	31	48	\$124	Yes
Totals	366	480	\$1,243	12
Annual	365	479	\$1,240	

3.5 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		
	White Rock School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	142.2	141.4
Site Energy Use Intensity (kBtu/ft ²)	109.0	58.2

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	White Rock School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	120.5	141.4
Site Energy Use Intensity (kBtu/ft ²)	71.2	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 74.

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

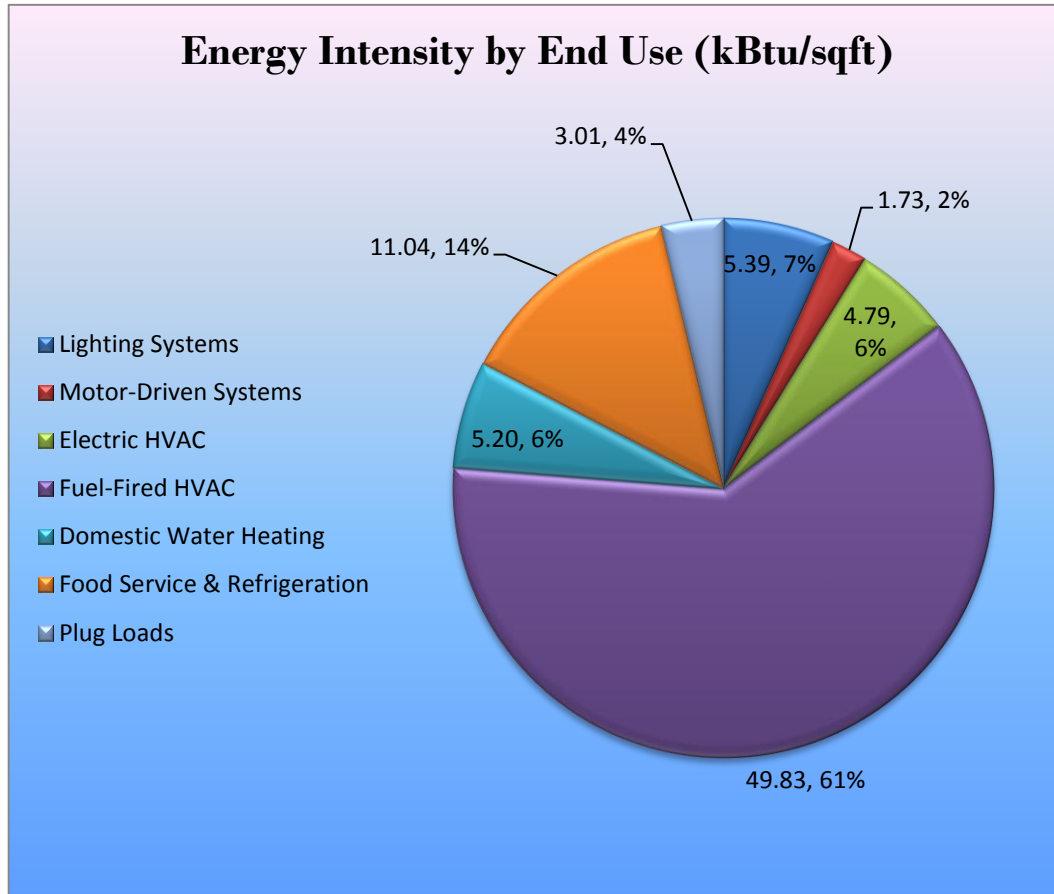
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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>.

3.6 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 White Rock Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated 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 7.

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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		70,160	28.0	0.0	\$7,641.05	\$68,254.33	\$12,020.00	\$56,234.33	7.4	70,651
ECM 1	Install LED Fixtures	11,659	6.4	0.0	\$1,269.80	\$16,276.87	\$3,150.00	\$13,126.87	10.3	11,741
ECM 2	Retrofit Fixtures with LED Lamps	57,594	21.5	0.0	\$6,272.50	\$50,364.13	\$8,870.00	\$41,494.13	6.6	57,997
ECM 3	Install LED Exit Signs	907	0.1	0.0	\$98.74	\$1,613.33	\$0.00	\$1,613.33	16.3	913
Lighting Control Measures		10,976	4.1	0.0	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053
ECM 4	Install Occupancy Sensor Lighting Controls	10,976	4.1	0.0	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053
Motor Upgrades		151	0.1	0.0	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152
ECM 5	Premium Efficiency Motors	151	0.1	0.0	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152
Electric Unitary HVAC Measures		31,126	26.1	0.0	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343
ECM 6	Install High Efficiency Electric AC	31,126	26.1	0.0	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343
HVAC System Improvements		12,452	2.8	0.0	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539
ECM 7	Install Dual Enthalpy Outside Economizer Control	12,452	2.8	0.0	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539
Domestic Water Heating Upgrade		8,241	0.0	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298
ECM 8	Install Low-Flow Domestic Hot Water Devices	8,241	0.0	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298
TOTALS		133,106	61.0	0.0	\$14,496.31	\$174,076.86	\$19,319.10	\$154,757.76	10.7	134,036

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

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

4.1.1 Lighting Upgrades

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

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		70,160	28.0	0.0	\$7,641.05	\$68,254.33	\$12,020.00	\$56,234.33	7.4	70,651
ECM 1	Install LED Fixtures	11,659	6.4	0.0	\$1,269.80	\$16,276.87	\$3,150.00	\$13,126.87	10.3	11,741
ECM 2	Retrofit Fixtures with LED Lamps	57,594	21.5	0.0	\$6,272.50	\$50,364.13	\$8,870.00	\$41,494.13	6.6	57,997
ECM 3	Install LED Exit Signs	907	0.1	0.0	\$98.74	\$1,613.33	\$0.00	\$1,613.33	16.3	913

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 ₂ e Emissions Reduction (lbs)
Interior	6,397	3.2	0.0	\$696.70	\$5,473.99	\$430.00	\$5,043.99	7.2	6,442
Exterior	5,262	3.2	0.0	\$573.11	\$10,802.88	\$2,720.00	\$8,082.88	14.1	5,299

Measure Description

We recommend replacing existing fixtures containing fluorescent, HID, or incandescent 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 ₂ e Emissions Reduction (lbs)
Interior	57,594	21.5	0.0	\$6,272.50	\$50,364.13	\$8,870.00	\$41,494.13	6.6	57,997
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

We recommend retrofitting existing incandescent, HID or other 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.

ECM 3: Install LED Exit Signs

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 ₂ e Emissions Reduction (lbs)
Interior	907	0.1	0.0	\$98.74	\$1,613.33	\$0.00	\$1,613.33	16.3	913
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

We recommend replacing all fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

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 ₂ e Emissions Reduction (lbs)
Lighting Control Measures	10,976	4.1	0.0	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053
ECM 4 Install Occupancy Sensor Lighting Controls	10,976	4.1	0.0	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053

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 4: 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 ₂ e Emissions Reduction (lbs)
10,976	4.1	0.0	\$1,195.38	\$8,236.00	\$1,420.00	\$6,816.00	5.7	11,053

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms, 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 Motor Upgrades

Our recommendations for motor upgrades are summarized in Figure 19 below.

Figure 19 – Summary of Motor Upgrade ECMs

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Motor Upgrades	151	0.1	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152
ECM 5 Premium Efficiency Motors	151	0.1	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152

ECM 5: 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 ₂ e Emissions Reduction (lbs)
151	0.1	0.0	\$16.46	\$704.52	\$0.00	\$704.52	42.8	152

Measure Description

We recommend 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.

4.1.4 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 20 below.

Figure 20 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		31,126	26.1	0.0	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343
ECM 6	Install High Efficiency Electric AC	31,126	26.1	0.0	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343

ECM 6: 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 ₂ e Emissions Reduction (lbs)
31,126	26.1	0.0	\$3,389.84	\$93,038.42	\$4,379.10	\$88,659.32	26.2	31,343

Measure Description

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

4.1.5 HVAC System Upgrades

Our recommendations for HVAC system improvement are summarized in Figure 21 below.

Figure 21 - Summary of HVAC System Improvement 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 ₂ e Emissions Reduction (lbs)
HVAC System Improvements		12,452	2.8	0.0	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539
ECM 7	Install Dual Enthalpy Outside Economizer Control	12,452	2.8	0.0	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539

ECM 7: Install Dual-Enthalpy Economizers

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 ₂ e Emissions Reduction (lbs)
12,452	2.8	0.0	\$1,356.11	\$3,650.00	\$1,500.00	\$2,150.00	1.6	12,539

Measure Description

Dual enthalpy economizers are used to control a ventilation system’s outside air intake in order to reduce a facility’s total cooling load. A dual-enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling instead of running the air handling system’s compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

4.1.6 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 22 below.

Figure 22 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		8,241	0.0	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298
ECM 8	Install Low-Flow Domestic Hot Water Devices	8,241	0.0	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298

ECM 8: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
8,241	0.0	0.0	\$897.48	\$193.59	\$0.00	\$193.59	0.2	8,298

Measure Description

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

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.

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

Turn Off Unneeded Motors

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Reducing run hours for these motors can result in significant energy savings. Whenever possible, use automatic devices such as twist timers or occupancy sensors to ensure that motors are turned off when not needed.

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.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

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).

Refer to Section 4.1.6 for any low-flow ECM recommendations.

6 ON-SITE GENERATION MEASURES

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

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

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

6.1 Photovoltaic

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

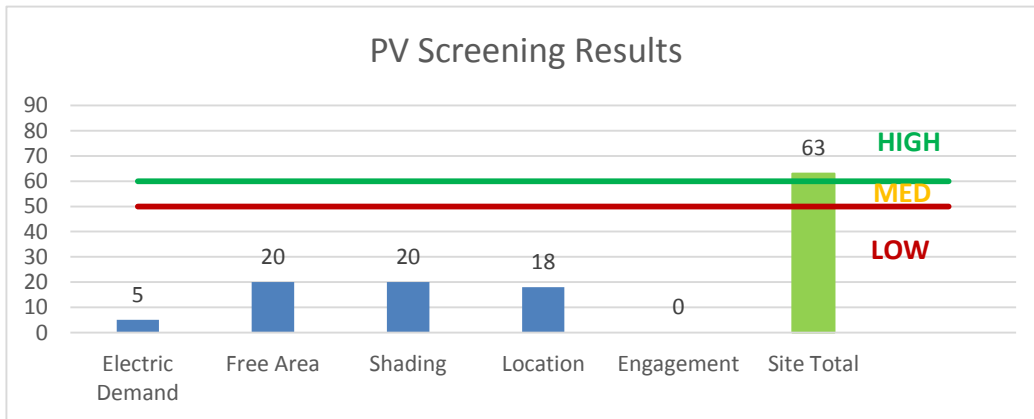


The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

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

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear to meet these minimum criteria for cost-effective PV installation.

Figure 23 - Photovoltaic Screening



Potential	High	
System Potential	125	kW DC STC
Electric Generation	148,921	kWh/yr
Displaced Cost	\$12,960	/yr
Installed Cost	\$325,000	

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 7.3 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.

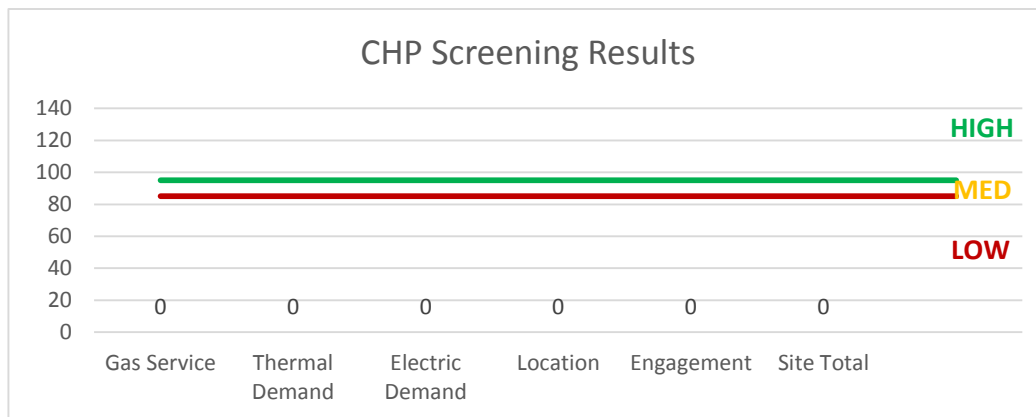
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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.

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

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

Figure 24 - Combined Heat and Power Screening



7 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 25 for a list of the eligible programs identified for each recommended ECM.

Figure 25 - 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 LED Exit Signs			x
ECM 4	Install Occupancy Sensor Lighting Controls	x		x
ECM 5	Premium Efficiency Motors			x
ECM 6	Install High Efficiency Electric AC	x		x
ECM 7	Install Dual Enthalpy Outside Economizer Control	x		x
ECM 8	Install Low-Flow Domestic Hot Water Devices			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.

7.1 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.

7.2 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 DI 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.

7.3 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.

7.4 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.

8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

8.1 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.

8.2 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

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,430	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,430	0.19	488	0.0	\$53.19	\$526.50	\$90.00	8.21
Boiler Room	2	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	121	0.0	\$13.17	\$215.11	\$0.00	16.34
Front Entrance	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,540	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,540	0.22	595	0.0	\$64.81	\$570.80	\$120.00	6.96
Front Entrance	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	\$6.58	\$107.56	\$0.00	16.34
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.33	1,076	0.0	\$117.20	\$818.00	\$140.00	5.79
Principal Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.16	443	0.0	\$48.26	\$467.00	\$80.00	8.02
Copy Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,430	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,001	0.08	206	0.0	\$22.41	\$291.50	\$50.00	10.78
Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,430	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,430	0.02	58	0.0	\$6.27	\$71.80	\$10.00	9.86
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,320	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,320	0.02	53	0.0	\$5.79	\$71.80	\$10.00	10.68
CST Office	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,540	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,078	0.34	910	0.0	\$99.10	\$781.93	\$160.00	6.28
Conference Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.16	443	0.0	\$48.26	\$467.00	\$80.00	8.02
Kitchen	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,540	0.35	935	0.0	\$101.84	\$936.00	\$160.00	7.62
Kitchen	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	\$6.58	\$107.56	\$0.00	16.34
Kitchen's Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,320	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	924	0.11	265	0.0	\$28.90	\$403.20	\$60.00	11.88
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.01	31	0.0	\$3.38	\$35.90	\$5.00	9.15
Restroom	1	Incandescent: 60W A Lamp	Wall Switch	60	1,540	Fixture Replacement	No	1	LED - Fixtures: Downlight Solid Slate Retrofit	Wall Switch	9	1,540	0.03	90	0.0	\$9.84	\$63.65	\$5.00	5.96
Closet	1	Incandescent: 150W Screen in	Wall Switch	150	1,100	Fixture Replacement	Yes	1	LED - Fixtures: Downlight Solid Slate Retrofit	Occupancy Sensor	9	770	0.09	182	0.0	\$19.80	\$179.65	\$25.00	7.81
Walk in Freezer	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,100	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,100	0.02	42	0.0	\$4.55	\$58.50	\$10.00	10.67
Walk in Freezer	1	Incandescent: 60W A Lamp	Wall Switch	60	1,100	Fixture Replacement	No	1	LED - Fixtures: Downlight Solid Slate Retrofit	Wall Switch	9	1,100	0.03	65	0.0	\$7.03	\$63.65	\$5.00	8.35
Corridor - A Wing	37	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	37	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.42	1,147	0.0	\$124.89	\$1,328.30	\$185.00	9.15
Corridor - A Wing	4	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	242	0.0	\$26.33	\$430.22	\$0.00	16.34
Corridor - A Wing	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,540	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,540	0.02	57	0.0	\$6.17	\$96.40	\$20.00	12.38
Corridor - A Wing	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,540	0.02	58	0.0	\$6.36	\$58.50	\$10.00	7.62
Corridor - A Wing	23	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	No	23	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,540	0.75	2,016	0.0	\$219.59	\$1,729.60	\$345.00	6.31
Corridor - A Wing	3	Exit Signs: LED - 2 W Lamp	None	6	1,540	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	1,540	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

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
Multipurpose Room	12	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	1,430	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,430	0.72	1,796	0.0	\$195.58	\$702.00	\$120.00	2.98
Multipurpose Room	4	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	242	0.0	\$26.33	\$430.22	\$0.00	16.34
Stage	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,100	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,100	0.22	425	0.0	\$46.29	\$570.80	\$120.00	9.74
Stage	48	Incandescent: 90W Sreen in	Wall Switch	90	1,100	Fixture Replacement	No	48	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,100	2.55	4,918	0.0	\$535.65	\$3,055.25	\$240.00	5.26
Stage	1	Incandescent: 60W A Lamp	Wall Switch	60	1,100	Fixture Replacement	No	1	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,100	0.03	65	0.0	\$7.03	\$63.65	\$5.00	8.35
Stage	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	\$6.58	\$107.56	\$0.00	16.34
Custodian Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,100	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	770	0.08	158	0.0	\$17.23	\$291.50	\$50.00	14.01
Boys Restroom	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.10	271	0.0	\$29.50	\$367.30	\$55.00	10.59
Girls Restroom	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.09	232	0.0	\$25.29	\$331.40	\$50.00	11.13
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,100	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	770	0.08	158	0.0	\$17.23	\$266.40	\$50.00	12.56
Room A11	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.16	443	0.0	\$48.26	\$416.80	\$80.00	6.98
Room A9	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.25	665	0.0	\$72.39	\$567.20	\$110.00	6.32
Room A7	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.25	665	0.0	\$72.39	\$567.20	\$110.00	6.32
Room A5	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.37	997	0.0	\$108.58	\$792.80	\$155.00	5.87
Room A8	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.25	665	0.0	\$72.39	\$567.20	\$110.00	6.32
Room A1	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.49	1,329	0.0	\$144.77	\$1,018.40	\$200.00	5.65
Room A3	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.37	997	0.0	\$108.58	\$792.80	\$155.00	5.87
Room A4	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.37	997	0.0	\$108.58	\$792.80	\$155.00	5.87
Room A6	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.37	997	0.0	\$108.58	\$792.80	\$155.00	5.87
Mechanical Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,100	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	770	0.16	317	0.0	\$34.47	\$467.00	\$80.00	11.23
Girls Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,540	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,540	0.03	85	0.0	\$9.26	\$117.00	\$20.00	10.48
Girls Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.16	443	0.0	\$48.26	\$416.80	\$80.00	6.98
Boys Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,540	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,540	0.02	43	0.0	\$4.63	\$58.50	\$10.00	10.48
Boys Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.16	443	0.0	\$48.26	\$416.80	\$80.00	6.98
Library	21	Compact Fluorescent: 13W 2-pin	Wall Switch	13	1,540	Fixture Replacement	No	21	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	5	1,540	0.11	298	0.0	\$32.40	\$1,336.67	\$105.00	38.01

Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Library	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.86	2,326	0.0	\$253.35	\$1,695.20	\$335.00	5.37
Library	13	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	13	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,078	0.33	896	0.0	\$97.54	\$937.60	\$20.00	9.41
Library	2	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Library - Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.21	554	0.0	\$60.32	\$492.00	\$95.00	6.58
Room A10	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room A12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room A14	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Teacher Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.37	997	0.0	\$108.58	\$792.80	\$155.00	5.87
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.04	111	0.0	\$12.06	\$191.20	\$35.00	12.95
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,540	0.03	88	0.0	\$9.55	\$75.20	\$15.00	6.31
Nurse Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.01	31	0.0	\$3.38	\$35.90	\$5.00	9.15
Nurse Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.27	739	0.0	\$80.43	\$701.00	\$120.00	7.22
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.03	74	0.0	\$8.04	\$174.50	\$30.00	17.97
Server Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,100	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,100	0.04	83	0.0	\$9.09	\$117.00	\$20.00	10.67
Elevator Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,100	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,100	0.04	83	0.0	\$9.09	\$117.00	\$20.00	10.67
Corridor - B Wing	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,540	0.16	438	0.0	\$47.74	\$376.00	\$75.00	6.31
Corridor - B Wing	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,540	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,540	0.04	113	0.0	\$12.34	\$192.80	\$40.00	12.38
Corridor - B Wing	17	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	17	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.20	527	0.0	\$57.38	\$610.30	\$85.00	9.15
Corridor - B Wing	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Room B9	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B11	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B13	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B14	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B16	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B18	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83

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
Room B12	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.16	443	0.0	\$48.26	\$467.00	\$80.00	8.02
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.07	193	0.0	\$21.07	\$295.50	\$45.00	11.89
Janitor Closet	2	Incandescent: 150W Screen in	Wall Switch	150	1,100	Fixture Replacement	No	2	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,100	0.18	357	0.0	\$38.85	\$127.30	\$10.00	3.02
Men Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.03	74	0.0	\$8.04	\$174.50	\$30.00	17.97
Women Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.03	74	0.0	\$8.04	\$174.50	\$30.00	17.97
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.07	193	0.0	\$21.07	\$295.50	\$45.00	11.89
Room B10	15	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	110	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.88	2,383	0.0	\$259.52	\$993.50	\$170.00	3.17
Room B8	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B6	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room B7	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.21	580	0.0	\$63.22	\$654.50	\$95.00	8.85
Room B5	15	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	110	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.88	2,383	0.0	\$259.52	\$993.50	\$170.00	3.17
Room B3	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.49	1,329	0.0	\$144.77	\$1,018.40	\$200.00	5.65
Room B4/B2	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.49	1,329	0.0	\$144.77	\$1,018.40	\$200.00	5.65
Stairwell	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.07	186	0.0	\$20.25	\$215.40	\$30.00	9.15
Stairwell	1	Exit Signs: LED - 2 W Lamp	None	6	1,540	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	1,540	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Corridor - C Wing (Slab Basement)	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,540	0.23	614	0.0	\$66.83	\$526.40	\$105.00	6.31
Corridor - C Wing (Slab Basement)	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,540	Relamp	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,540	0.03	85	0.0	\$9.26	\$144.60	\$30.00	12.38
Corridor - C Wing (Slab Basement)	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Corridor - C Wing (Slab Basement)	17	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	17	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.20	527	0.0	\$57.38	\$610.30	\$85.00	9.15
Corridor - C Wing (Slab Basement)	2	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	121	0.0	\$13.17	\$215.11	\$0.00	16.34
Room S4 - Storage	8	Incandescent: 60W A Lamp	Wall Switch	16	1,540	Fixture Replacement	No	8	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	5	1,540	0.06	156	0.0	\$16.97	\$509.21	\$40.00	27.64
Room S4 - Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,540	0.17	468	0.0	\$50.92	\$468.00	\$80.00	7.62
Room C14	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room C15	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room C16	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83

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
Room C12	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.16	443	0.0	\$48.26	\$467.00	\$80.00	8.02
Custodian Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.05	148	0.0	\$16.09	\$233.00	\$40.00	12.00
Room C13	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,540	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.74	1,991	0.0	\$216.87	\$818.00	\$140.00	3.13
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.07	193	0.0	\$21.07	\$295.50	\$45.00	11.89
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.07	193	0.0	\$21.07	\$295.50	\$45.00	11.89
Room C10	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.41	1,108	0.0	\$120.64	\$868.00	\$170.00	5.79
Room C11	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room C9	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room C7	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.41	1,108	0.0	\$120.64	\$993.50	\$170.00	6.83
Room C8	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.25	665	0.0	\$72.39	\$567.20	\$110.00	6.32
Room C6	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.08	222	0.0	\$24.13	\$266.40	\$50.00	8.97
Room C4	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.49	1,329	0.0	\$144.77	\$1,018.40	\$200.00	5.65
Closet	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.25	665	0.0	\$72.39	\$567.20	\$110.00	6.32
Room C2	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.49	1,329	0.0	\$144.77	\$1,018.40	\$200.00	5.65
Room C2	3	Incandescent: 60W A Lamp	Wall Switch	60	1,540	Fixture Replacement	No	3	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,540	0.10	271	0.0	\$29.51	\$190.95	\$15.00	5.96
Gymnasium	11	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	1,540	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.72	1,942	0.0	\$211.53	\$759.50	\$130.00	2.98
Gymnasium	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Gymn Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,540	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,078	0.03	74	0.0	\$8.04	\$174.50	\$30.00	17.97
Gymn Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,540	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.08	222	0.0	\$24.13	\$266.40	\$50.00	8.97
Stairwell2	11	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,540	Relamp	No	11	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,540	0.13	341	0.0	\$37.13	\$394.90	\$55.00	9.15
Exterior Front Entrance	9	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	9	935	None	No	9	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	9	935	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Exterior Front Entrance	10	Metal Halide: 125W Screen in	Daylight Dimming	125	935	Fixture Replacement	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	0.66	1,075	0.0	\$117.10	\$3,906.77	\$1,000.00	24.82
Exterior Front Entrance	6	Metal Halide: (1) 175W Lamp	Daylight Dimming	215	935	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	0.75	1,226	0.0	\$133.50	\$2,344.06	\$600.00	13.06
Exterior Front Entrance	4	Metal Halide: (1) 150W Lamp	Daylight Dimming	190	935	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	0.43	710	0.0	\$77.29	\$1,562.71	\$400.00	15.04
Exterior Front Entrance	7	Metal Halide: (1) 250W Lamp	Daylight Dimming	295	935	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	1.24	2,032	0.0	\$221.33	\$2,734.74	\$700.00	9.19

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
Exterior Front Entrance	4	Incandescent 60W A Lamp	Daylight Dimming	60	935	Fixture Replacement	No	4	LED - Fixtures: Downlight Solid Slate Retrofit	Daylight Dimming	9	935	0.13	219	0.0	\$23.89	\$254.60	\$20.00	9.82

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Boiler	2	Combustion Air Fan	0.8	75.0%	No	1,040	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	School Building	2	Heating Hot Water Pump	10.0	85.5%	Yes	1,040	No	85.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	Boiler	2	Other	0.5	65.0%	No	1,040	Yes	78.2%	No		0.11	151	0.0	\$16.46	\$704.52	\$0.00	42.81
Boiler Room	Air Compressor	1	Air Compressor	0.8	81.5%	No	520	No	81.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	Boiler	1	Heating Hot Water Pump	1.5	84.0%	No	1,040	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	School Building	1	Other	0.3	69.0%	No	1,040	No	69.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Elevator Room	Elevator Room	1	Other	20.0	85.0%	No	780	No	85.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Gymnasium	2	Supply Fan	2.0	84.0%	No	1,040	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Media Center	1	Makeup Air Fan	5.0	84.0%	No	780	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Corridor A	1	Exhaust Fan	0.3	69.0%	No	1,040	No	69.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Kitchen	2	Exhaust Fan	0.8	78.0%	No	1,040	No	78.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Corridor B/C Wing	2	Exhaust Fan	0.3	69.0%	No	1,040	No	69.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Restroom	2	Exhaust Fan	0.5	75.0%	No	1,040	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Corridor B	1	Exhaust Fan	0.5	75.0%	No	1,040	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	School Building	2	Heating Hot Water Pump	10.0	85.5%	Yes	0	No	85.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	Boiler	2	Heating Hot Water Pump	1.5	84.0%	No	0	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
School	School Building	37	Other	0.3	77.0%	No	1,040	No	77.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions									Energy Impact & Financial Analysis							
		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
Room B18	Room B18	1	Window AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Room B13	Room B13	1	Window AC	0.95		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	Main Office	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		Yes	2.23	3,853	0.0	\$419.60	\$11,844.80	\$710.00	26.54
Roof Top	A Wing Classrooms	5	Split-System AC	3.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	A Wing Classrooms	1	Split-System AC	1.80		Yes	1	Split-System AC	1.80		14.00		No	0.67	799	0.0	\$86.98	\$2,693.20	\$165.60	29.06
Roof Top	A Wing Classrooms	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.37	444	0.0	\$48.32	\$1,496.22	\$92.00	29.06
Roof Top	A Wing Classrooms	1	Split-System AC	0.75		Yes	1	Split-System AC	0.75		14.00		No	0.28	333	0.0	\$36.24	\$1,122.17	\$69.00	29.06
Roof Top	Library	1	Packaged AC	12.00		Yes	1	Packaged AC	12.00		11.50		Yes	5.25	8,805	0.0	\$958.92	\$17,626.20	\$1,198.00	17.13
Roof Top	Library	1	Packaged AC	8.50		Yes	1	Packaged AC	8.50		11.50		Yes	3.72	6,237	0.0	\$679.24	\$15,897.90	\$870.50	22.12
Roof Top	Computer Room	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		Yes	2.86	4,606	0.0	\$501.60	\$11,844.80	\$710.00	22.20
Roof Top	B/C Wing Classrooms	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		Yes	2.86	4,606	0.0	\$501.60	\$11,844.80	\$710.00	22.20
Roof Top	B/C Wing Classrooms	2	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		Yes	8.22	11,006	0.0	\$1,198.61	\$11,844.80	\$710.00	9.29
Roof Top	B/C Wing Classrooms	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.19	229	0.0	\$24.89	\$1,496.22	\$92.00	56.41
Roof Top	B/C Wing Classrooms	4	Split-System AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Top	B/C Wing Classrooms	3	Split-System AC	2.00		Yes	3	Split-System AC	2.00		14.00		No	2.23	2,662	0.0	\$289.93	\$8,977.32	\$552.00	29.06

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis							
		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	School	1	Non-Condensing Hot Water Boiler	2,532.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	School	1	Non-Condensing Hot Water Boiler	2,532.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		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	School	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Low-Flow Device Recommendations

Location	Recommendation Inputs				Energy Impact & Financial Analysis						
	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
School	27	Faucet Aerator (Lavatory)	2.20	1.00	0.00	8,241	0.0	\$897.48	\$193.59	\$0.00	0.22

Walk-In Cooler/Freezer Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
	Cooler/Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	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	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

Location	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
	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	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	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00


Cooking Equipment Inventory & Recommendations

Location	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Equipment Type	High Efficiency Equipment?	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	Propane Convection Oven (Half Size)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Propane Convection Oven (Full 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?
School	73	Desktop LCD Computer	110.0	Yes
School	112	Desktop Non LCD Computer	155.0	No
School	2	Small Freezer	85.0	Yes
School	6	Microwave	1,000.0	No
School	32	Small Printer	46.0	Yes
School	2	Copy Machine	600.0	Yes
School	5	Printer	125.0	Yes
School	2	Refrigerator	185.0	Yes
Kitchen	1	Food Warmer	1,250.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance



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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR®
Score¹

White Rock Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 65,684
Built: 1969

For Year Ending: August 31, 2016
Date Generated: April 25, 2017

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

Property & Contact Information

Property Address White Rock Elementary School 2 Francine Place Oak Ridge, New Jersey 07438	Property Owner Jefferson Township Public Schools 31 Route 181 Lake Hopatcong, NJ 07849 () -	Primary Contact Rita Giacchi 31 Route 181 Lake Hopatcong, NJ 07849 (973) 863-3387 rgiacchi@jefftp.org
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Property ID: 5864193

Energy Consumption and Energy Use Intensity (EUI)

Site EUI 67.7 kBtu/ft ²	Annual Energy by Fuel Propane (kBtu) 16,726 (0%) Fuel Oil (No. 2) (kBtu) 3,043,452 (88%) Electric - Grid (kBtu) 1,383,818 (31%)	National Median Comparison National Median Site EUI (kBtu/ft ²) 86.4 National Median Source EUI (kBtu/ft ²) 144.5 % Diff from National Median Source EUI -22%
Source EUI 113.2 kBtu/ft ²	Annual Emissions Greenhouse Gas Emissions (Metric Tons CO ₂ e/year) 386	

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)