Local Government Energy Audit:
Energy Audit Report

Keyport Central School

Keyport Board of Education

335 Broad Street
Keyport, NJ 07735

September 12, 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 saving are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

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

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

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

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1 EXECUTIVE SUMMARY

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

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey school districts in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Keyport Central School is a 96,185-square foot facility comprised of a three-story building and it includes a library, classrooms, offices, indoor gymnasium, locker rooms, kitchen and central dining area. Roughly 25% of the total electric energy usage of the building is coming from the rooftop solar array that the school owns.

Lighting at Keyport Central School consists of aging and inefficient lighting and a variety of HVAC equipment, some in need of replacement. Heating is supplied by natural gas fired hot water and steam boilers. Cooling in the building is limited to only a few areas, and is provided mostly by split system air conditioners and heat pumps. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 10 measures and recommends eight measures which together represent an opportunity for Keyport Central School to reduce annual energy costs by roughly $23,012 and annual greenhouse gas emissions by 177,542 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 5.4 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 Keyport Central School's annual energy use by 8%.

Figure 1 – Previous 12 Month Utility Costs

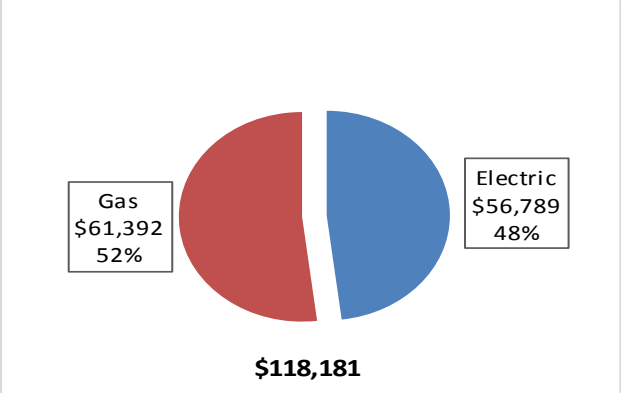
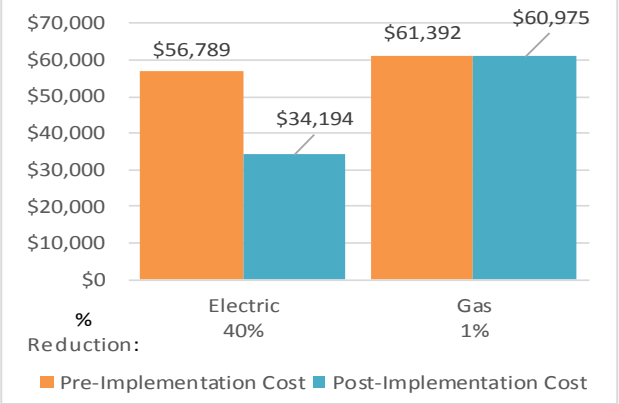


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**142,995**	**39.4**	**0.0**	**$18,785.06**	**$105,686.77**	**$16,405.00**	**$89,281.77**	**4.8**	**143,995**
ECM 1	Install LED Fixtures	Yes	33,542	6.3	0.0	$4,406.39	$40,115.81	$6,000.00	$34,115.81	7.7	33,777
ECM 2	Retrofit Fixtures with LED Lamps	Yes	109,453	33.2	0.0	$14,378.67	$65,570.96	$10,405.00	$55,165.96	3.8	110,218
Lighting Control Measures			**24,875**	**5.4**	**0.0**	**$3,267.76**	**$35,910.00**	**$3,325.00**	**$32,585.00**	**10.0**	**25,049**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	22,414	4.8	0.0	$2,944.55	$30,910.00	$3,325.00	$27,585.00	9.4	22,571
ECM 4	Install High/Low Lighitng Controls	Yes	2,460	0.5	0.0	$323.20	$5,000.00	$0.00	$5,000.00	15.5	2,477
Motor Upgrades			**2,681**	**0.7**	**0.0**	**$352.15**	**$21,109.68**	**$0.00**	**$21,109.68**	**59.9**	**2,699**
	Premium Efficiency Motors	No	2,681	0.7	0.0	$352.15	$21,109.68	$0.00	$21,109.68	59.9	2,699
Electric Unitary HVAC Measures			**1,551**	**0.9**	**0.0**	**$203.76**	**$5,984.88**	**$368.00**	**$5,616.88**	**27.6**	**1,562**
	Install High Efficiency Electric AC	No	1,551	0.9	0.0	$203.76	$5,984.88	$368.00	$5,616.88	27.6	1,562
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**58.1**	**$653.72**	**$50,466.44**	**$2,997.60**	**$47,468.84**	**72.6**	**6,804**
	Install High Efficiency Steam Boilers	No	0	0.0	58.1	$653.72	$50,466.44	$2,997.60	$47,468.84	72.6	6,804
Domestic Water Heating Upgrade			**0**	**0.0**	**37.1**	**$417.46**	**$172.08**	**$0.00**	**$172.08**	**0.4**	**4,345**
ECM 5	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	37.1	$417.46	$172.08	$0.00	$172.08	0.4	4,345
Food Service Equipment & Refrigeration Measures			**4,125**	**0.3**	**0.0**	**$541.89**	**$2,280.60**	**$155.00**	**$2,125.60**	**3.9**	**4,154**
ECM 6	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	1,966	0.2	0.0	$258.27	$606.60	$80.00	$526.60	2.0	1,980
ECM 7	Refrigeration Controls	Yes	2,159	0.1	0.0	$283.62	$1,674.00	$75.00	$1,599.00	5.6	2,174
TOTALS FOR HIGH PRIORITY MEASURES			**171,995**	**45.1**	**37.1**	**$23,012.17**	**$144,049.45**	**$19,885.00**	**$124,164.45**	**5.4**	**177,542**
TOTALS FOR ALL EVALUATED MEASURES			**176,226**	**46.8**	**95.2**	**$24,221.80**	**$221,610.45**	**$23,250.60**	**$198,359.85**	**8.2**	**188,608**

* - 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 measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

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

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.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

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.

Food Service Equipment & Refrigeration measures generally involve improvements in the efficiency of cooking, food service, dishwashing, and food storage equipment. These measures may include more efficient convection ovens, steamers, ice machines, or refrigeration. These measures save energy by reducing the energy usage with more energy efficient equipment.

Energy Efficient Practices

TRC also identified four 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 Keyport Central School include:

- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Keyport Central School. Based on the configuration of the site and its loads there is a low potential for installing any additional PV or combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)

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

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

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

Additional information on relevant incentive programs is located in Section 8 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Anthony Rapolla	Business Administrator	arapolla@kpsdschools.org	732-212-6100 ext. 1008
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On May 18, 2018, TRC performed an energy audit at Keyport Central School located in Keyport, New Jersey. TRC's auditor met with Anthony Rapolla to review the facility operations and help focus our investigation on specific energy-using systems.

Keyport Central School is a 96,185-square foot facility three-story building. It includes a library, classrooms, offices, indoor gymnasium, locker rooms, kitchen and central dining area.

The building was originally constructed in 1958 with additions in 1966 and 2001.

2.3 Building Occupancy

The school building is open Monday through Friday. The typical schedule is presented in the table below. Typical occupancy of the school is 681 students and 104 staff. The entire facility is operational for 11 months out of the year.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Keyport Central School	Weekday	6:00 AM - 11:00 PM
Keyport Central School	Weekend	Closed

2.4 Building Envelope

The building is constructed of concrete block, and structural steel with a brick facade. The building has flat roof sections covered with roofing membrane. The buildings have double pane (clear and opaque) windows with aluminum frames which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of metal and glass and are in good condition.

Figure 6 - Aerial screenshot of the building

2.5 On-Site Generation

Keyport Central School has a 175 kW solar PV array system on the rooftop. The system provides roughly 30% of the electricity required by the facility. The school owns the PV array system.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL), LED lamps and high intensity discharge (HID) fixtures. Most of the fixtures are 1, 2 or 3-lamp, 4-foot long troffers with diffusers. The interior HID lighting is mostly in gymnasiums and stage areas.

Figure 7 - Pictures of various fluorescent & HID interior lighting throughout the building

Service spaces, including restrooms and storage spaces are primarily lit with CFL and LED lamps in recessed can ceiling fixtures. All exit signs in the building are LED.

Figure 8 - Picture of a CFL downlight

Lighting is controlled by wall switches in most spaces and is turned on during operating hours of the building.

The building's exterior lighting is minimal and consists mainly of wall mounted fixtures. Sources include high pressure sodium (HPS) fixtures, metal halide (MH) fixtures, LED wall packs and CFL screw-in lamps. All exterior lighting is controlled by timeclocks.

Figure 9 - Pictures of the various exterior HID lighting

Hot Water and Steam Heating System

There are two heating loops serving the building, a heating hot water loop that serves the central school except First Grade and Kindergarten, and a steam loop serving First Grade and Kindergarten.

The hot water system consists of two Fulton condensing hot water boilers with 1,918 MBh output. The boilers' nominal combustion efficiency is estimated to be 95%. Each boiler has a 2 hp forced draft fan. The boilers are configured in a constant flow primary distribution with two hot water supply pumps and two hot water return pumps. The boilers provide hot water to air handlers, unit ventilators and radiators the whole school except for the First Grade and Kindergarten areas.

The boilers operate in a lead/lag configuration. Both boilers may be required during cold weather. The boilers were installed in 2011 and are in fairly good condition and well maintained.

Figure 10 - Picture of the condensing boilers

The steam system that serves First Grade and Kindergarten consists of one old forced draft steam boiler rated at 2,498 kBtu/hr output. The steam boiler has a nominal combustion efficiency of 78.75%. The boiler has a 1 hp forced draft fan with discharge dampers to control the volume of combustion air. The boiler has two 3/4 hp feed water pumps, a control valve that maintains water level in the boiler, and two 1.5 hp condensate return pumps. Steam is supplied directly to unit ventilators and radiators.

Figure 11 - Picture of the steam boiler

The steam boiler is very old and at the end of its useful life.

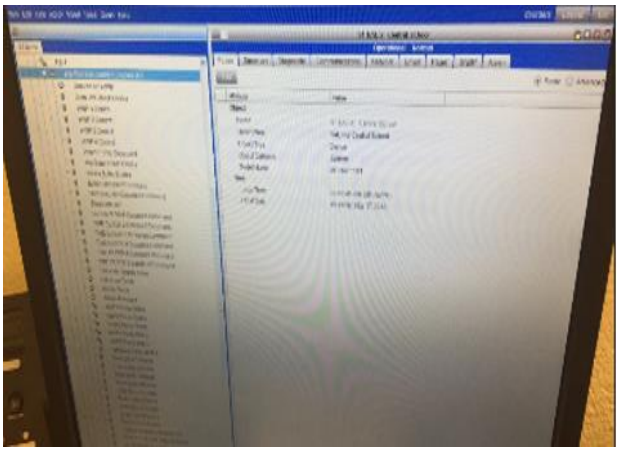
Direct Expansion Air Conditioning System (DX)

About only 20% of the building is mechanically cooled. Systems include direct-expansion (DX) cooling split-system ACs, split-system heat pumps, and window AC units. Most of the units are located on the roof and serve various building spaces: offices and a few rooms. There are 21 split-system air conditioner and heat pumps throughout the building. The size of the units range from 0.5 ton to 12 tons. There are also a few window air-conditioning units that serve rooms and the library which range between 0.5 to 2 tons in capacity.

Figure 12 - Pictures of some of the condensing units of heat pumps and air conditioning units

Most of the units are controlled by programmable thermostats located in the areas they are serving. The bigger units are connected to the Building Energy Management System (BEMS).

Building Energy Management System (BEMS)



The facility has a Johnson Controls Metasys Building Energy Management System (BEMS) that monitors and controls the boilers and the hot water loop as well as the bigger split-system heat pumps/air conditioners. The facility is interested in integrating all HVAC equipment into the BEMS so they have a fully centralized control system. This would help them achieve better energy management of the building, however, the incremental savings associated with adding control points for the smaller systems is not likely to be cost effective on the basis of energy savings alone.

Figure 13 - Metasys BEMS showing the Central School boiler room information

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of one PVI gas fired condensing hot water heater with an input rating of 265 MBh and a nominal efficiency of 94%. The water heater has a 125-gallon storage tank. One 1/3 hp recirculation pump and one 1/3 hp booster pump distribute 120°F water to the building. The pump operates continuously during the operating hours of the building.

Food Service Equipment

The facility has a full commercial kitchen that is used to prepare lunch for the school. Approximately 400 lunches are prepared every weekday. The ovens, range tops and warmers are all gas fired. The ovens and warmers are turned on when the kitchen staff arrive and turned off at 1:30 PM when lunch service stops.

Figure 14 - Pictures of the gas cooking line/ovens and warmers

Refrigeration

The kitchen has a walk-in freezer that is used to store food prepared for school lunches. The freezer has a single 1.2 (approx.) ton air cooled compressor. The walk-in space temperature is maintained at -10°F. The kitchen also has six free standing commercial size refrigerators.

Figure 15 - Pictures of the walk-in freezer and standing refrigerators

Building Plug Load

There are roughly 393 (estimated) computer work stations throughout the facility. There is no centralized PC power management software installed. The plug loads in the building also consist of refrigerators, microwaves, TV, copy machines, printers and an electric kiln. The facility has one refrigerated vending machine and one non-refrigerated vending machine.

2.7 Water-Using Systems

There are eight restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.5 gallons per minute (gpm) or higher. The school has girls' and boys' locker rooms with showers, however, they are non-operational.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

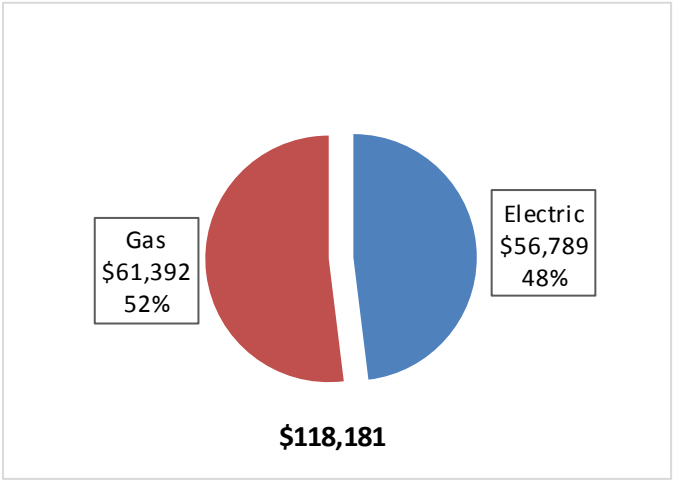
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. Electrical use includes power produced by the site's PV array. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 16 - Utility Summary

Utility Summary for Keyport Central School		
Fuel	**Usage**	**Cost**
Electricity	604,394 kWh	$56,789
Natural Gas	54,574 Therms	$61,392
Total		**$118,181**

The current annual energy cost for this facility is $118,181 as shown in the chart below.

Figure 17 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.131/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. *It is to be noted that this blended rate is taken from just the energy consumption and charges that are supplied by the utility from the grid.* The monthly electricity consumption & peak demand for electricity purchased from the utility is shown in Figure 18, while the electrical energy generated by the solar array is provided in Figure 19.

Figure 18 - Electric Usage & Demand

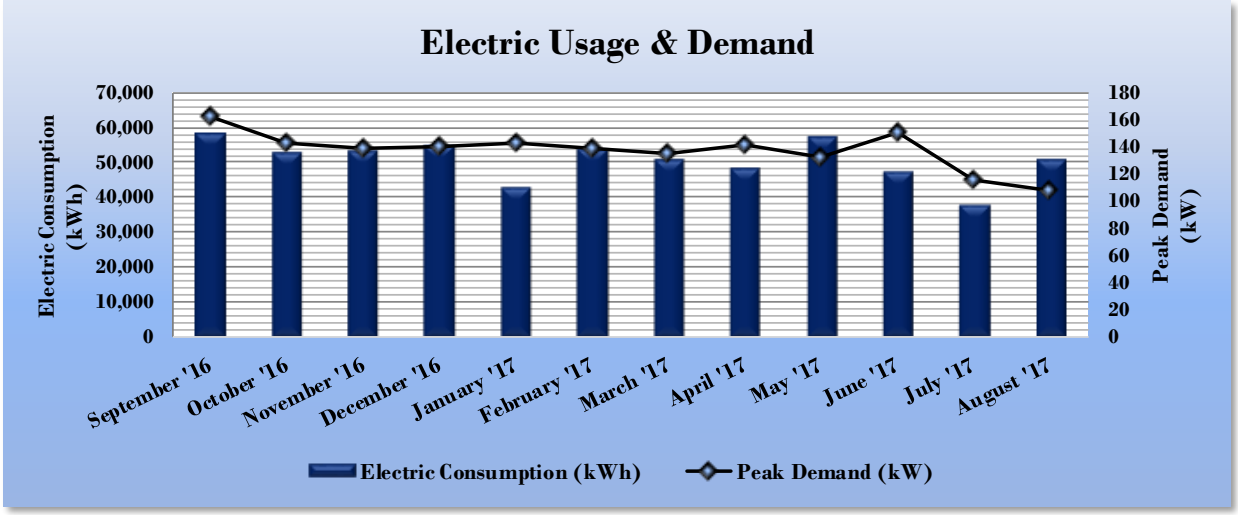
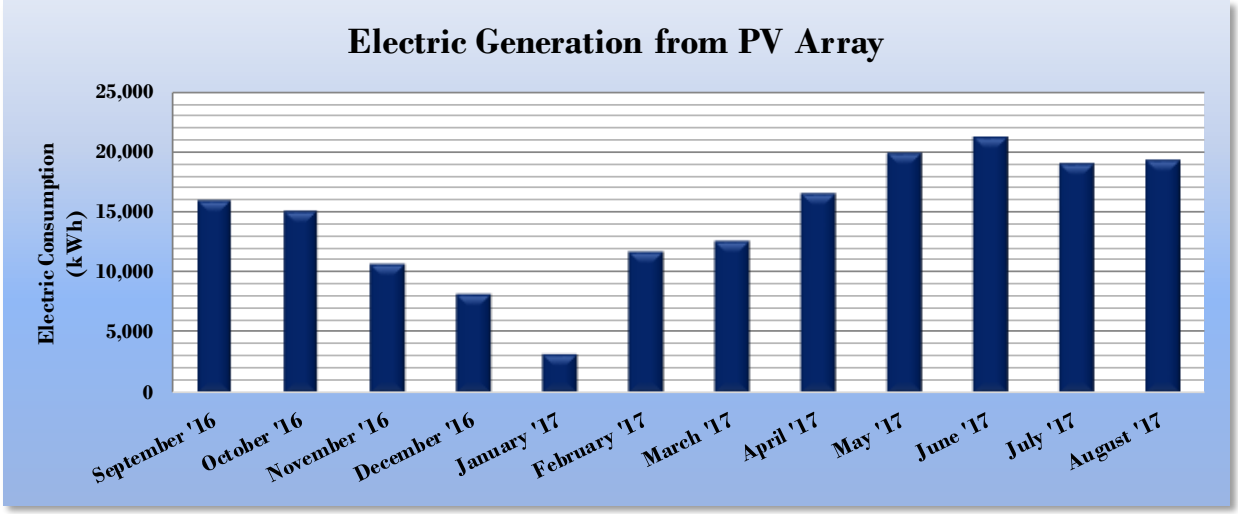


Figure 19 - Electric Generation from the PV Array



The table below indicates the total facility electric consumption.

Figure 20 - Electric Usage & Demand

Electric Billing Data for Keyport Central School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/26/16	32	58,329	163	$978	$5,450
10/24/16	28	53,185	142	$798	$4,829
11/23/16	30	53,603	139	$778	$5,308
12/23/16	30	54,896	140	$786	$5,718
1/26/17	34	42,843	143	$725	$6,414
2/24/17	29	54,172	139	$922	$5,478
3/24/17	28	50,881	135	$894	$5,016
4/21/17	28	48,230	141	$932	$4,358
5/26/17	35	57,347	132	$873	$4,909
6/27/17	32	47,249	151	$1,069	$3,528
7/27/17	30	37,710	116	$823	$2,577
8/28/17	32	50,917	108	$766	$3,671
Totals	**368**	**609,362**	**162.8**	**$10,343**	**$57,256**
Annual	**365**	**604,394**	**162.8**	**$10,259**	**$56,789**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.125/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 21 - Natural Gas Usage

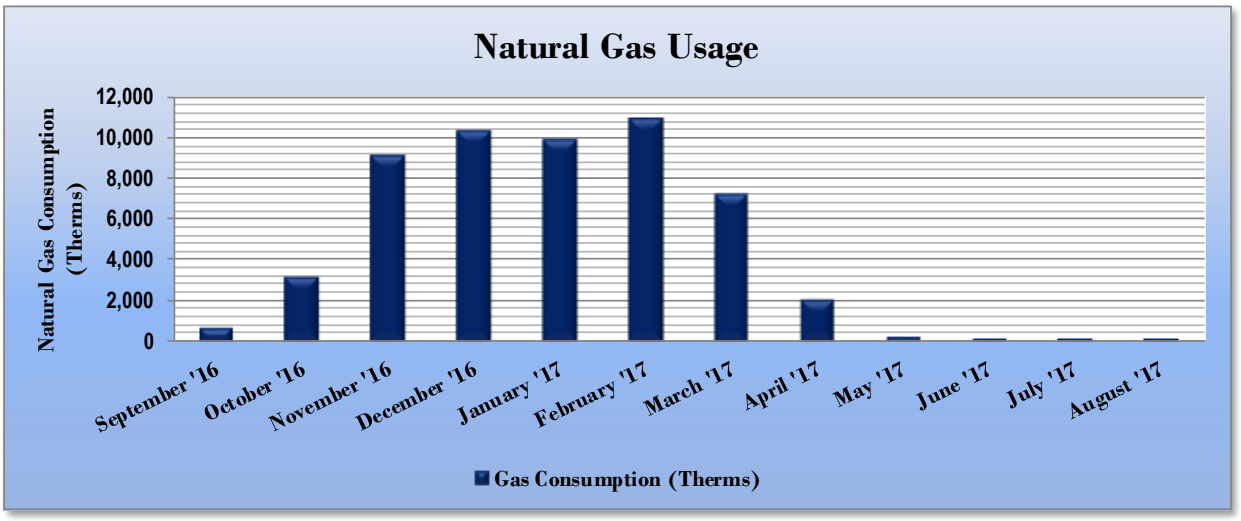


Figure 22 - Natural Gas Usage

Gas Billing Data for Keyport Central School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
10/14/16	29	729	$1,256
11/14/16	31	3,237	$3,673
12/19/16	35	9,143	$9,113
1/18/17	30	10,359	$11,329
2/15/17	28	9,955	$11,123
3/20/17	33	10,960	$11,403
4/18/17	29	7,274	$7,077
5/17/17	29	2,136	$2,622
6/16/17	30	264	$1,011
7/20/17	34	165	$925
8/16/17	27	155	$911
9/15/17	30	196	$948
Totals	**365**	**54,574**	**$61,392**
Annual	**365**	**54,574**	**$61,392**

3.4 Benchmarking

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

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

Figure 23 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Keyport Central School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	126.9	141.4
Site Energy Use Intensity (kBtu/ft^2)	78.2	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 24 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Keyport Central School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	107.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	71.7	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. Your building is one of the building categories that are eligible to receive a score. This facility has a current score of 58.

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

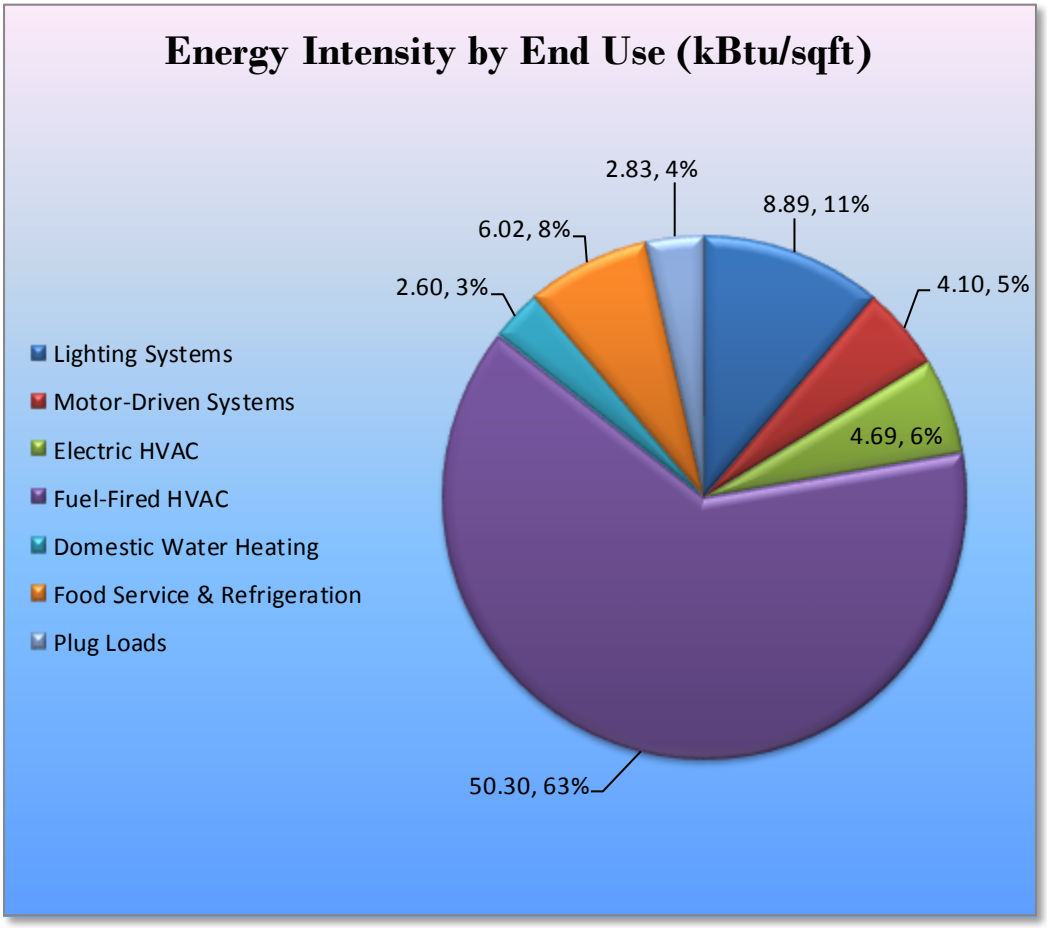
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 25 - 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 Keyport Central School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 26 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**142,995**	**39.4**	**0.0**	**$18,785.06**	**$105,686.77**	**$16,405.00**	**$89,281.77**	**4.8**	**143,995**
ECM 1	Install LED Fixtures	33,542	6.3	0.0	$4,406.39	$40,115.81	$6,000.00	$34,115.81	7.7	33,777
ECM 2	Retrofit Fixtures with LED Lamps	109,453	33.2	0.0	$14,378.67	$65,570.96	$10,405.00	$55,165.96	3.8	110,218
Lighting Control Measures		**24,875**	**5.4**	**0.0**	**$3,267.76**	**$35,910.00**	**$3,325.00**	**$32,585.00**	**10.0**	**25,049**
ECM 3	Install Occupancy Sensor Lighting Controls	22,414	4.8	0.0	$2,944.55	$30,910.00	$3,325.00	$27,585.00	9.4	22,571
ECM 4	Install High/Low Lighitng Controls	2,460	0.5	0.0	$323.20	$5,000.00	$0.00	$5,000.00	15.5	2,477
Domestic Water Heating Upgrade		**0**	**0.0**	**37.1**	**$417.46**	**$172.08**	**$0.00**	**$172.08**	**0.4**	**4,345**
ECM 5	Install Low-Flow Domestic Hot Water Devices	0	0.0	37.1	$417.46	$172.08	$0.00	$172.08	0.4	4,345
Food Service Equipment & Refrigeration Measures		**4,125**	**0.3**	**0.0**	**$541.89**	**$2,280.60**	**$155.00**	**$2,125.60**	**3.9**	**4,154**
ECM 6	Refrigerator/Freezer Case Electrically Commutated Motors	1,966	0.2	0.0	$258.27	$606.60	$80.00	$526.60	2.0	1,980
ECM 7	Refrigeration Controls	2,159	0.1	0.0	$283.62	$1,674.00	$75.00	$1,599.00	5.6	2,174
TOTALS		**171,995**	**45.1**	**37.1**	**$23,012.17**	**$144,049.45**	**$19,885.00**	**$124,164.45**	**5.4**	**177,542**

* - 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 27 below.

Figure 27 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**142,995**	**39.4**	**0.0**	**$18,785.06**	**$105,686.77**	**$16,405.00**	**$89,281.77**	**4.8**	**143,995**
ECM 1	Install LED Fixtures	33,542	6.3	0.0	$4,406.39	$40,115.81	$6,000.00	$34,115.81	7.7	33,777
ECM 2	Retrofit Fixtures with LED Lamps	109,453	33.2	0.0	$14,378.67	$65,570.96	$10,405.00	$55,165.96	3.8	110,218

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	17,182	3.7	0.0	$2,257.12	$28,395.50	$3,000.00	$25,395.50	11.3	17,302
Exterior	16,361	2.6	0.0	$2,149.27	$11,720.31	$3,000.00	$8,720.31	4.1	16,475

Measure Description

We recommend replacing fixtures containing high intensity discharge (HID) fixtures with new high-performance LED lamps and fixtures throughout the building. Replace the HPS and halogen wallpacks located along the building exterior, and the metal halide fixtures serving the gymnasium and multipurpose room. Consider specifying interior LED fixtures with on-board occupancy controls for additional savings 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 HID sources.

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	109,127	33.1	0.0	$14,335.86	$65,087.48	$10,405.00	$54,682.48	3.8	109,890
Exterior	326	0.0	0.0	$42.81	$483.48	$0.00	$483.48	11.3	328

Measure Description

We recommend retrofitting existing incandescent, halogen, 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 fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 28 below.

Figure 28 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**24,875**	**5.4**	**0.0**	**$3,267.76**	**$35,910.00**	**$3,325.00**	**$32,585.00**	**10.0**	**25,049**
ECM 3	Install Occupancy Sensor Lighting Controls	22,414	4.8	0.0	$2,944.55	$30,910.00	$3,325.00	$27,585.00	9.4	22,571
ECM 4	Install High/Low Lighitng Controls	2,460	0.5	0.0	$323.20	$5,000.00	$0.00	$5,000.00	15.5	2,477

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
22,414	4.8	0.0	$2,944.55	$30,910.00	$3,325.00	$27,585.00	9.4	22,571

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in many areas, including restrooms, storage rooms, classrooms and offices areas. As noted in ECM 1, consider on-board controls for new interior LED fixtures. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

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

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,460	0.5	0.0	$323.20	$5,000.00	$0.00	$5,000.00	15.5	2,477

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 29 below.

Figure 29 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**37.1**	**$417.46**	**$172.08**	**$0.00**	**$172.08**	**0.4**	**4,345**
ECM 5	Install Low-Flow Domestic Hot Water Devices	0	0.0	37.1	$417.46	$172.08	$0.00	$172.08	0.4	4,345

ECM 5: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	37.1	$417.46	$172.08	$0.00	$172.08	0.4	4,345

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 can reduce hot water usage, relative to standard aerators, which saves energy.

Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.4 Food Service Equipment & Refrigeration Measures

Our recommendations for food service and refrigeration measures are summarized in Figure 30 below.

Figure 30 - Summary of Food Service Equipment & Refrigeration ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Food Service Equipment & Refrigeration Measures		**4,125**	**0.3**	**0.0**	**$541.89**	**$2,280.60**	**$155.00**	**$2,125.60**	**3.9**	**4,154**
ECM 6	Refrigerator/Freezer Case Electrically Commutated Motors	1,966	0.2	0.0	$258.27	$606.60	$80.00	$526.60	2.0	1,980
ECM 7	Refrigeration Controls	2,159	0.1	0.0	$283.62	$1,674.00	$75.00	$1,599.00	5.6	2,174

ECM 6: Freezer Case Electrically Commutated Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,966	0.2	0.0	$258.27	$606.60	$80.00	$526.60	2.0	1,980

Measure Description

We recommend replacing shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in existing walk-in freezer evaporator fans. These fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By employing variable-speed technology, EC motors are able to optimize fan usage. Because these motors are brushless and utilize DC power, losses due to friction and phase shifting are eliminated. Savings for this measure take into account both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 7: Walk-In Freezer Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,159	0.1	0.0	$283.62	$1,674.00	$75.00	$1,599.00	5.6	2,174

Measure Description

We recommend the installation of additional controls to optimize the operation of the walk-in freezer.

Many walk-in freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is accomplished by measuring the ambient humidity and temperature of the store, comparing that to the dewpoint, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, reducing annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in freezers have evaporator fans which run continuously. The measure adds a control system feature to automatically shut off evaporator fans when the cooler's thermostat is not calling for cooling.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

4.2 ECMs Evaluated but Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility on the basis of energy savings alone. However, as the equipment have passed their useful service life and appear in poor condition, also taking into consideration the operation and maintenance costs, it is likely in the best interest of the school district to replace them prior to a catastrophic failure.

Figure 31 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades	**2,681**	**0.7**	**0.0**	**$352.15**	**$21,109.68**	**$0.00**	**$21,109.68**	**59.9**	**2,699**
Premium Efficiency Motors	2,681	0.7	0.0	$352.15	$21,109.68	$0.00	$21,109.68	59.9	2,699
Electric Unitary HVAC Measures	**1,551**	**0.9**	**0.0**	**$203.76**	**$5,984.88**	**$368.00**	**$5,616.88**	**27.6**	**1,562**
Install High Efficiency Electric AC	1,551	0.9	0.0	$203.76	$5,984.88	$368.00	$5,616.88	27.6	1,562
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**58.1**	**$653.72**	**$50,466.44**	**$2,997.60**	**$47,468.84**	**72.6**	**6,804**
Install High Efficiency Steam Boilers	0	0.0	58.1	$653.72	$50,466.44	$2,997.60	$47,468.84	72.6	6,804
TOTALS	**4,232**	**1.6**	**58.1**	**$1,209.63**	**$77,561.00**	**$3,365.60**	**$74,195.40**	**61.3**	**11,066**

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

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

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,681	0.7	0.0	$352.15	$21,109.68	$0.00	$21,109.68	59.9	2,699

Measure Description

We evaluated replacing most of the old unit ventilators at this site. The primary savings from replacing unit ventilators will be from improved fan motor efficiency, however, those savings are unlikely to justify replacing the unit ventilators. The next potential savings would be from installing unit ventilators that provide for more optimal use of outside air than the existing unit ventilators.

The potential savings from installing new unit ventilators with electronically commutated (EC) motors was evaluated. EC motors are generally more efficient than other fractional hp motors and have the capability of operating at variable speeds, therefore, the savings from installing a premium efficiency motor is taken as a proxy for replacing the entire unit.

Reasons for not Recommending

The measure is not cost effective based on the energy savings. However, taking into consideration the operation and maintenance costs, is likely in the best interest of the school to replace the motors. Also, replacing the unit ventilators should be considered a capital improvement measure that has the potential to provide energy savings and improve occupant comfort.

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,551	0.9	0.0	$203.76	$5,984.88	$368.00	$5,616.88	27.6	1,562

Measure Description

We evaluated replacing standard efficiency split-system air conditioning units with high efficiency split-system air conditioning units, specifically the units serving the main office area and the Vice Principal's offices, which are at their useful life. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Reasons for not Recommending

Although the school showed interest in implementing this measure, due to the long payback period, it is not recommended on the basis of energy savings alone. However, taking into consideration the operation and maintenance costs of the units, is likely in the best interest of the school to replace the split system air conditioners.

Install High Efficiency Steam Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	58.1	$653.72	$50,466.44	$2,997.60	$47,468.84	72.6	6,804

Measure Description

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your design team to select boilers that are sized appropriately for the heating load at this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

Reasons for not Recommending

Replacing the boiler has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the boiler has reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. Therefore, we recommend that the facility staff consider purchasing a boiler that exceeds the code required efficiency when the boiler is replaced. Also, taking into consideration the operation and maintenance costs of the boilers, is likely in the best interest of the school to replace them prior to a catastrophic failure.

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.

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.

Plug Load Controls

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

Water Conservation

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

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

Refer to Section 4.1.3 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.

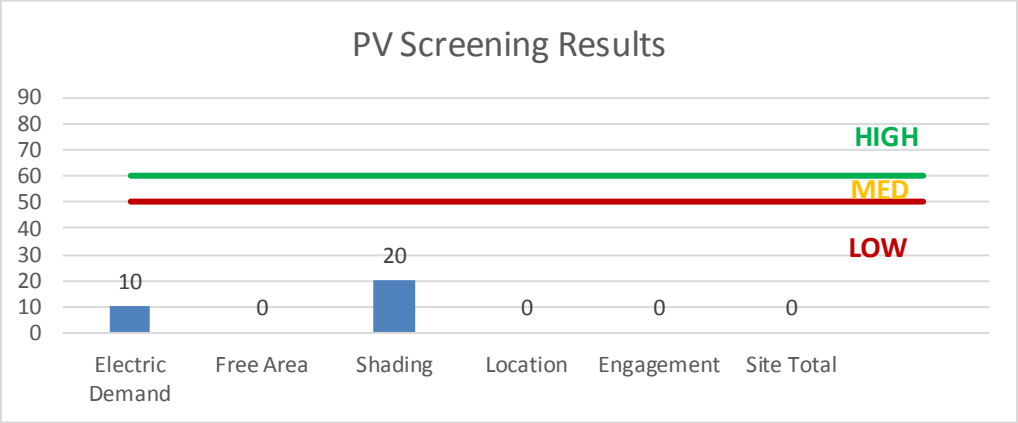
6.1 Photovoltaic

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.

This site has existing PV system that takes up much of the roof area and supplies about 30% of the facility electrical needs. 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 **Low** potential for installing additional PV arrays.

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 not meet these minimum criteria for cost-effective PV installation.

Figure 32 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

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

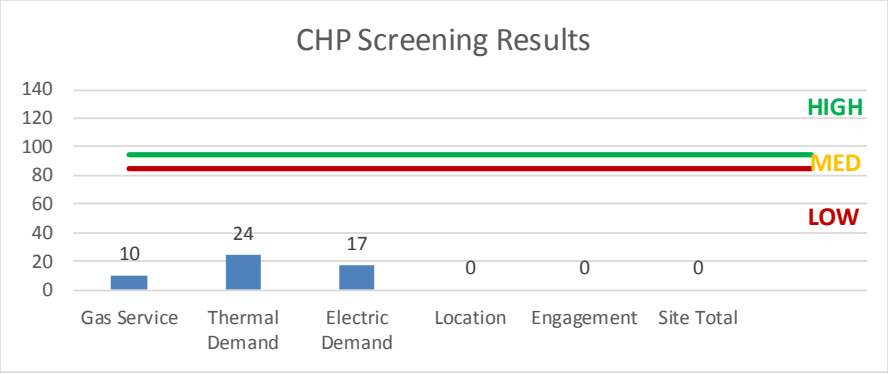
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 33 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion, the facility has limited DR potential.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 34 for a list of the eligible programs identified for each recommended ECM.

Figure 34 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x		x			
ECM 2	Retrofit Fixtures with LED Lamps	x		x			
ECM 3	Install Occupancy Sensor Lighting Controls	x		x			
ECM 4	Install High/Low Lighitng Controls			x			
ECM 5	Install Low-Flow Domestic Hot Water Devices			x			
ECM 6	Refrigerator/Freezer Case Electrically Commutated Motors			x			
ECM 7	Refrigeration Controls	x		x			

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

The program pays up to **70%** of the total installed cost of eligible measures, up to $125,000 per project. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Front Entrance	2	LED Screw-In Lamps: (1) 60W LED Screw-In	None	60	4,380	None	No	2	LED Screw-In Lamps: (1) 60W LED Screw-In	None	60	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wallpack	24	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	24	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	56	4,380	2.07	15,909	0.0	$2,089.93	$9,376.25	$2,400.00	3.34
Wallpack	6	LED Screw-In Lamps: (1) 60W LED Screw-In	None	60	4,380	None	No	6	LED Screw-In Lamps: (1) 60W LED Screw-In	None	60	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wallpack	5	Compact Fluorescent: (1) 34W CFL Screw-In	None	34	4,380	Relamp	No	5	LED Screw-In Lamps: LED Screw-in Lamps	None	24	4,380	0.03	257	0.0	$33.75	$219.77	$0.00	6.51
Wallpack	3	Compact Fluorescent: (2) 13W CFL 2-Pin	None	26	4,380	Relamp	No	3	LED Screw-In Lamps: LED Screw-in Lamps	None	18	4,380	0.02	118	0.0	$15.48	$263.72	$0.00	17.03
Wallpack	2	Halogen Incandescent: 90W Halogen Floodlight	None	90	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	27	4,380	0.08	635	0.0	$83.37	$781.35	$200.00	6.97
Wallpack	2	LED - Fixtures: 10W LED Wallpack	None	15	4,380	None	No	2	LED - Fixtures: 10W LED Wallpack	None	15	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wallpack	4	Metal Halide: (1) 400W Lamp	Daylight Dimming	458	1,540	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	137	1,540	0.84	2,271	0.0	$298.36	$1,562.71	$400.00	3.90
Boiler Room	8	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	8	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1st Grade Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,876	0.26	1,212	0.0	$159.21	$1,246.20	$90.00	7.26
1st Grade Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kindrellar Hall	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,876	0.14	673	0.0	$88.45	$759.00	$50.00	8.02
Kindrellar Hall	2	Compact Fluorescent: (1) 26W CFL 4-Pin	Wall Switch	26	2,680	Relamp	No	2	LED Screw-In Lamps: LED Relamp Retrofit	Wall Switch	18	2,680	0.01	48	0.0	$6.32	$87.91	$0.00	13.92
Kindrellar Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Kindrellar Hall	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Lobby	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,876	0.08	360	0.0	$47.24	$389.60	$0.00	8.25
Main Lobby	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,876	0.20	943	0.0	$123.83	$902.60	$70.00	6.72
Main Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Back Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,680	0.01	54	0.0	$7.08	$35.90	$5.00	4.36
Back Entrance	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Grade Hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,876	0.14	673	0.0	$88.45	$759.00	$50.00	8.02
2nd Grade Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
2nd Grade Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	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
Union Street Lobby	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,876	0.11	514	0.0	$67.52	$434.00	$40.00	5.83
Union Street Lobby	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,680	None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
3rd,4th,5th Grades Hallway	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	23	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,876	0.63	2,956	0.0	$388.26	$2,145.50	$230.00	4.93
3rd,4th,5th Grades Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Pre-K Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,876	0.16	771	0.0	$101.29	$551.00	$60.00	4.85
Pre-K Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
SGI 1 Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.22	1,028	0.0	$135.05	$738.00	$115.00	4.61
Pre-K Hallway	4	Compact Fluorescent: (1) 26W CFL 4-Pin	Wall Switch	26	2,680	Relamp	Yes	4	LED Screw-In Lamps: LED Relamp Retrofit	High/Low Control	18	1,876	0.03	163	0.0	$21.47	$375.81	$0.00	17.50
Pre-K Room 1	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.57	2,699	0.0	$354.50	$1,322.80	$245.00	3.04
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Pre-K Room 2	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.57	2,699	0.0	$354.50	$1,322.80	$245.00	3.04
Pre-K Room 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Room 19	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.33	1,542	0.0	$202.57	$972.00	$155.00	4.03
Room 18	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.33	1,542	0.0	$202.57	$972.00	$155.00	4.03
Room 18 Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
Acad Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
Room 20	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.09	407	0.0	$53.44	$234.00	$40.00	3.63
Room 17	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 21	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 16	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 22	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 15	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 23	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27

	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
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.21	964	0.0	$126.61	$646.00	$75.00	4.51
Custodian	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.21	964	0.0	$126.61	$646.00	$75.00	4.51
Room 24	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 25	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 14	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Conference Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,680	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,680	0.07	345	0.0	$45.34	$190.27	$40.00	3.31
Offices	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.38	1,799	0.0	$236.33	$1,629.00	$245.00	5.86
Room 26	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 27	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Men's Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	Yes	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Occupancy Sensor	10	1,876	0.00	18	0.0	$2.43	$270.00	$0.00	111.16
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Women's Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Tech Room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.66	3,084	0.0	$405.14	$1,944.00	$310.00	4.03
Tech Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.14	643	0.0	$84.40	$562.50	$85.00	5.66
Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	Yes	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Occupancy Sensor	10	1,876	0.00	18	0.0	$2.43	$270.00	$0.00	111.16
Expo Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
Teacher Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.25	1,157	0.0	$151.93	$796.50	$125.00	4.42
Teacher Room	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gymnasium	12	Metal Halide: (1) 400W Lamp	Wall Switch	458	2,680	Fixture Replacement	Yes	12	LED - Fixtures: Low-Bay	Occupancy Sensor	137	1,876	2.85	13,380	0.0	$1,757.65	$20,277.30	$2,220.00	10.27
Gymnasium	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gymnasium Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Boys Locker Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.22	1,028	0.0	$135.05	$1,008.00	$80.00	6.87

	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
Boys Shower Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.22	1,028	0.0	$135.05	$1,008.00	$80.00	6.87
Boys Shower Room	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.05	257	0.0	$33.76	$387.00	$20.00	10.87
Girls Locker Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.22	1,028	0.0	$135.05	$1,008.00	$80.00	6.87
Girls Shower Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.22	1,028	0.0	$135.05	$1,008.00	$80.00	6.87
Girls Locker Room	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys Gym Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.02	102	0.0	$13.36	$58.50	$10.00	3.63
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
Room 13	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 12	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 11	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Eloe Room	1	Compact Fluorescent: (1) 14W CFL Screw-in	Wall Switch	14	2,680	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamp	Wall Switch	10	2,680	0.00	13	0.0	$1.70	$43.95	$0.00	25.85
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.14	643	0.0	$84.40	$562.50	$50.00	6.07
Closet	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.14	643	0.0	$84.40	$562.50	$50.00	6.07
Girls Restroom	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Music Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.36	1,671	0.0	$219.45	$1,030.50	$165.00	3.94
Room 10	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 9	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Custodian Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.09	407	0.0	$53.44	$234.00	$40.00	3.63
Custodian Storage	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	None	No	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Women Faculty	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,680	0.02	89	0.0	$11.74	$63.20	$0.00	5.38
Vice Principal's Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.06	305	0.0	$40.08	$175.50	$30.00	3.63
Main Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Nurse Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.06	305	0.0	$40.08	$175.50	$30.00	3.63
Restroom	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 8	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.38	1,799	0.0	$236.33	$1,089.00	$175.00	3.87
Room 3	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.33	1,542	0.0	$202.57	$972.00	$155.00	4.03
Restroom	2	Compact Fluorescent: (1) 14W CFL Screw-in	Wall Switch	14	2,680	Relamp	Yes	2	LED Screw-In Lamps: LED Screw-In Lamp	Occupancy Sensor	10	1,876	0.01	44	0.0	$5.78	$357.91	$0.00	61.91
Room 7	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.33	1,542	0.0	$202.57	$972.00	$155.00	4.03
Room 4	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.36	1,671	0.0	$219.45	$1,030.50	$165.00	3.94
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,680	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,680	0.01	49	0.0	$6.48	$48.20	$10.00	5.90
Janitorial	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.16	771	0.0	$101.29	$570.80	$60.00	5.04
Girls Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.16	771	0.0	$101.29	$570.80	$60.00	5.04
Room 5A	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.09	407	0.0	$53.44	$234.00	$40.00	3.63
Room 5	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.38	1,799	0.0	$236.33	$1,089.00	$175.00	3.87
Faculty Lunch	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.11	514	0.0	$67.52	$504.00	$40.00	6.87
Room 6	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.38	1,799	0.0	$236.33	$1,089.00	$175.00	3.87
Kindergarten 1	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.46	2,185	0.0	$286.98	$1,534.50	$240.00	4.51
Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	Yes	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Occupancy Sensor	10	1,876	0.00	18	0.0	$2.43	$270.00	$0.00	111.16
Room 2	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.41	1,928	0.0	$253.21	$1,417.50	$220.00	4.73
Room 2 Restroom	2	Compact Fluorescent: (1) 14W CFL Screw-in	Wall Switch	14	2,680	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamp	Wall Switch	10	2,680	0.01	26	0.0	$3.40	$87.91	$0.00	25.85
Room 2 Restroom	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	1	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kindergarten 2	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.46	2,185	0.0	$286.98	$1,534.50	$240.00	4.51
Kindergarten 2 Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 1	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.41	1,928	0.0	$253.21	$1,417.50	$220.00	4.73
Room H 3	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.37	1,735	0.0	$227.89	$946.80	$170.00	3.41
Room H 3	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,680	0.04	179	0.0	$23.48	$126.40	$0.00	5.38

	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
Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	Yes	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Occupancy Sensor	10	1,876	0.00	18	0.0	$2.43	$270.00	$0.00	111.16
Stairwells	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
2nd Floor Hallway	29	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	29	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,876	0.79	3,727	0.0	$489.55	$2,496.50	$290.00	4.51
2nd Floor Hallway	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor Hallway	6	Compact Fluorescent: (1) 26W CFL 4-Pin	Wall Switch	26	2,680	Relamp	Yes	6	LED Screw-In Lamps: LED Relamp Retrofit	High/Low Control	18	1,876	0.05	245	0.0	$32.21	$463.72	$0.00	14.40
Custodian Closet	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,680	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,680	0.01	49	0.0	$6.48	$48.20	$10.00	5.90
Girls Restroom	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,876	0.08	360	0.0	$47.24	$459.60	$0.00	9.73
Stairwell 2	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,680	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,876	0.06	260	0.0	$34.17	$392.80	$40.00	10.33
Stairwell 2	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room SGI 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.25	1,157	0.0	$151.93	$721.20	$125.00	3.92
Room SG 7	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.25	1,157	0.0	$151.93	$721.20	$125.00	3.92
Room SG 6-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.49	2,313	0.0	$303.86	$1,172.40	$215.00	3.15
Room SGI 3-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.49	2,313	0.0	$303.86	$1,172.40	$215.00	3.15
Room 35-36	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.66	3,084	0.0	$405.14	$1,944.00	$310.00	4.03
Room 34	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.36	1,671	0.0	$219.45	$1,030.50	$165.00	3.94
Aead Storage 4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.06	305	0.0	$40.08	$175.50	$30.00	3.63
Room 33	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 37	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 32	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 38	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 31	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 39	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Womens Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Men's Restroom	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	Yes	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Occupancy Sensor	10	1,876	0.00	18	0.0	$2.43	$270.00	$0.00	111.16
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.21	964	0.0	$126.61	$646.00	$75.00	4.51

	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
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,680	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,876	0.21	964	0.0	$126.61	$646.00	$75.00	4.51
Room 40	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Stairwell 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,876	0.08	386	0.0	$50.64	$375.50	$30.00	6.82
Stairwell 3	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,876	0.07	337	0.0	$44.23	$379.50	$25.00	8.02
Room 30	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 41	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 42	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.04	203	0.0	$26.72	$117.00	$20.00	3.63
Room 29	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 49	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Room 28	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.27	1,285	0.0	$168.81	$855.00	$135.00	4.27
Storage Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,680	0.06	305	0.0	$40.08	$175.50	$30.00	3.63
Library	58	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	58	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	1.59	7,453	0.0	$979.09	$4,743.00	$755.00	4.07
Library	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Offices	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,680	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,876	0.19	900	0.0	$118.17	$949.50	$140.00	6.85
Multipurpose Room	8	Metal Halide: (1) 400W Lamp	Wall Switch	458	2,680	Fixture Replacement	Yes	8	LED - Fixtures: Low-Bay	Occupancy Sensor	137	1,876	1.90	8,920	0.0	$1,171.77	$11,758.20	$1,480.00	8.77
Multipurpose Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,680	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,876	0.06	269	0.0	$35.38	$413.60	$20.00	11.12
Stage	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	2,680	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Stage	5	Halogen Incandescent: 90W Halogen Floodlight	Wall Switch	90	2,680	Relamp	No	5	LED Screw-In Lamps: LED Screw-in Lamps (Floodlights)	Wall Switch	27	2,680	0.21	971	0.0	$127.52	$318.26	$25.00	2.30
Stage	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	250	2,680	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,680	0.15	726	0.0	$95.33	$35.90	$5.00	0.32
Stage	44	Halogen Incandescent: (1) 750W Halogen Theatre Light	Wall Switch	750	748	Relamp	No	44	LED Screw-In Lamps: LED Screw-in Lamps (Floodlights)	Wall Switch	225	748	15.14	19,871	0.0	$2,610.38	$4,736.73	$220.00	1.73
Kitchen	4	Incandescent: (1) 250W Incandescent Lamp	Wall Switch	250	748	Relamp	Yes	4	LED Screw-In Lamps: LED Screw-in Lamps	Occupancy Sensor	75	524	0.52	680	0.0	$89.27	$445.81	$55.00	4.38
Kitchen	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	748	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	524	0.27	359	0.0	$47.12	$855.00	$135.00	15.28
Kitchen	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	3,080	None	No	2	LED Screw-In Lamps: (1) 10W LED Screw-In	Wall Switch	10	3,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Walk-In Freezer	1	Compact Fluorescent: (1) 23W CFL Screw-In	Wall Switch	23	748	Relamp	No	1	LED Screw-In Lamps: LED Screw-in Lamp	Wall Switch	16	748	0.00	6	0.0	$0.78	$43.95	$0.00	56.37

	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
Kitchen Storage Room	3	Compact Fluorescent: (1) 23W CFL Screw-In	Wall Switch	23	748	Relamp	No	3	LED Screw-In Lamps: LED Screw-in Lamp	Wall Switch	16	748	0.01	18	0.0	$2.34	$131.86	$0.00	56.37

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
Roof	Elementary School	9	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Pre-K Section	8	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Air Compressor	2	Air Compressor	3.0	82.3%	No	4,957	No	82.3%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	HW Booster Pump	1	Process Pump	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Recirculating Pump	1	Process Pump	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Steam Boiler Combustion Air	1	Combustion Air Fan	1.0	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Boiler Combustion Air	2	Combustion Air Fan	2.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Condensate Pump	2	Process Pump	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Feedwater Pump	2	Boiler Feed Water Pump	0.8	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Loop (Supply)	3	Heating Hot Water Pump	3.0	89.5%	No	1,922	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Loop (Return)	3	Heating Hot Water Pump	3.0	89.5%	No	1,922	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Sump Pump	1	Other	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Elevator Room	Elevator	1	Process Pump	30.0	74.0%	No	720	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen Exhaust Fan	1	Exhaust Fan	0.8	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Central School	10	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	1st Grade Hallways	2	Exhaust Fan	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Restrooms	2	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Restrooms	1	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Kindergarten Hallways	1	Exhaust Fan	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Restroom	1	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		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
Roof	Kitchen	1	Exhaust Fan	0.3	78.0%	No	1,080	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Kitchen	1	Exhaust Fan	0.3	78.0%	No	1,080	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Multipurpose Room	5	Exhaust Fan	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Middle School	10	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Restroom	1	Exhaust Fan	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gymnasium	Air Handling Unit	1	Supply Fan	5.0	89.5%	No	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Interior (Rooms)	Univents	58	Supply Fan	0.1	60.0%	No	2,745	Yes	80.0%	No		0.72	2,681	0.0	$352.15	$21,109.68	$0.00	59.95

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Vice Pricncipal's Office	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.46	776	0.0	$101.88	$2,992.44	$184.00	27.57
Roof	Main Office	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.46	776	0.0	$101.88	$2,992.44	$184.00	27.57
Roof	Nurse Office	1	Split-System AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Small Teacher Room	1	Split-System Air-Source HP	0.75	9.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Curriculum Offices	1	Split-System AC	2.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Curriculum Offices	1	Split-System AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Room 14	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Room 14	1	Split-System AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Multipurpose Room	1	Split-System Air-Source HP	12.00	144.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Multipurpose Room	1	Split-System Air-Source HP	10.00	120.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Hallways & Classrooms	1	Split-System Air-Source HP	10.00	120.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Hallways & Classrooms	1	Split-System Air-Source HP	8.00	96.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Room 40	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Room 40	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Room 15	1	Split-System Air-Source HP	2.00	24.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Pre-K 1	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ted's Office	Ted's Office	1	Split-System AC	3.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wall Mounted	Kindergarten Room 3	2	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wall Mounted	Room PP1	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wall Mounted	Room 2	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 18	Room 18	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Tech Office	Tech Office	1	Packaged Terminal AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 5A	Room 5A	1	Window AC	0.53		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 2	Room 2	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library	Library	2	Window AC	2.08		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Centrral School Except 1st Grade & Kindergarten	2	Condensing Hot Water Boiler	1,918.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	1st Grade & Kindergarten	1	Forced Draft Steam Boiler	2,498.00	Yes	1	Forced Draft Steam Boiler	2,498.00	81.00%	Et	0.00	0	58.1	$653.72	$50,466.44	$2,997.60	72.61

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Central 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

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	24	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	37.1	$417.46	$172.08	$0.00	0.41

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	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	Low Temp Freezer (-35F to -5F)	Yes	No	Yes	0.33	4,125	0.0	$541.89	$2,280.60	$155.00	3.92

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (>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 (31 - 50 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	2	Stand-Up Refrigerator, 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

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Rack Oven (Double)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (3/4 Size)	No	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?
Central School	18	TV's	71.0	Yes
Central School	23	Microwaves	1,000.0	Yes
Central School	21	Small Freezer	207.0	Yes
Central School	25	Printer	20.0	Yes
Central School	7	Copy Machine	600.0	Yes
Central School	8	Coffee Machine	900.0	Yes
Central School	4	Refrigerator	172.0	Yes
Central School	4	Toaster	850.0	Yes
Room 34	1	Kiln	4,440.0	Yes
Central School	393	Computer + LED Monitors	120.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Lunch	1	Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Faculty Lunch	1	Non-Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Keyport Central School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 96,185
Built: 1958

For Year Ending: July 31, 2017
Date Generated: June 08, 2018

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Keyport Central School 335 Broad Street Keyport, New Jersey 07735	Keyport Board of Education 370 Broad Street Keyport, NJ 07735 732-212-6100	Anthony Rapolla 370 Broad Street Keyport, NJ 07735 732-212-6100 Ext. 1008 arapolla@kpsdschools.org

Property ID: 6377918

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
78.2 kBtu/ft²

Source EUI
113.8 kBtu/ft²

Annual Energy by Fuel	
Electric - Solar (kBtu)	598,771 (8%)
Electric - Grid (kBtu)	1,470,240 (20%)
Natural Gas (kBtu)	5,457,452 (72%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	84.3
National Median Source EUI (kBtu/ft²)	122.6
% Diff from National Median Source EUI	-7%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	453

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)