Local Government Energy Audit Report

Robert L. Horbelt Elementary School

October 31, 2019

Prepared for:

Barnegat Township School District
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Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

TRC reviewed the energy conservation measures and estimates of energy savings were reviewed for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. TRC and the New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

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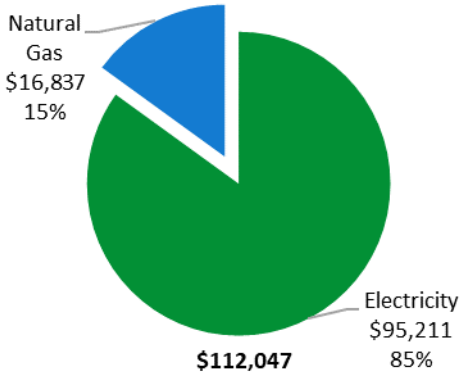
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Robert L. Horbelt Elementary School. This report provides you with information about the Elementary School's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in the Elementary School. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $112,047 Electricity: 786,130 kWh Natural Gas: 15,519 Therms	
ENERGY STAR® Benchmarking Score	53 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

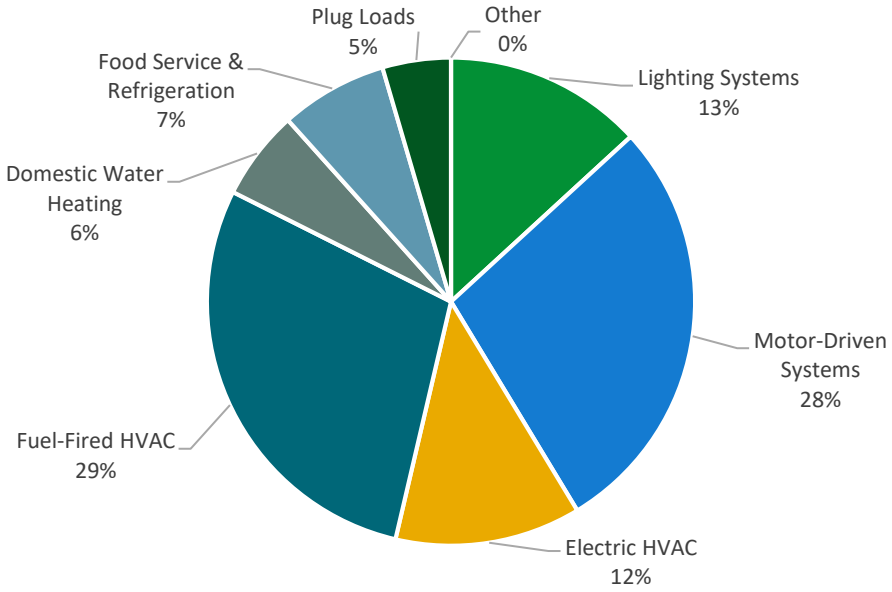


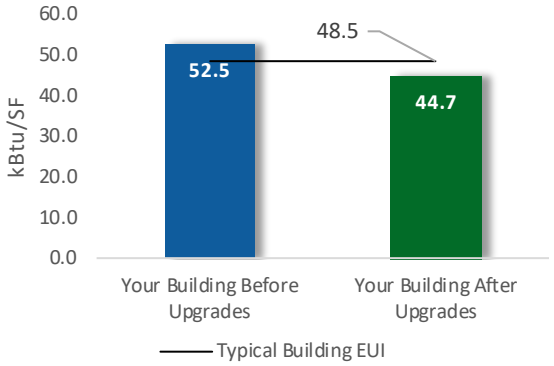
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

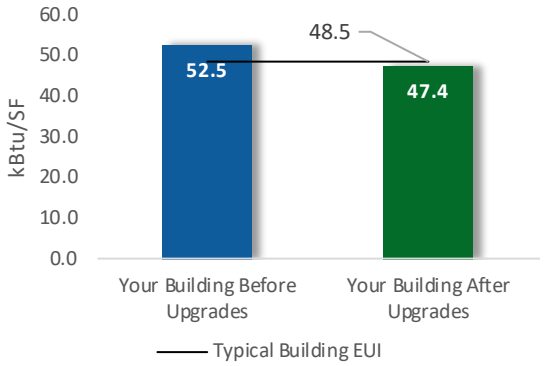
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$571,679
Potential Rebates & Incentives[1]	$42,688
Annual Cost Savings	$21,073
Annual Energy Savings	Electricity: 169,007 kWh Natural Gas: 557 Therms
Greenhouse Gas Emission Savings	88 Tons
Simple Payback	25.1 Years
Site Energy Savings (all utilities)	15%



Scenario 2: Cost Effective Package[2]

Installation Cost	$85,669
Potential Rebates & Incentives	$15,957
Annual Cost Savings	$15,160
Annual Energy Savings	Electricity: 126,744 kWh
Greenhouse Gas Emission Savings	63 Tons
Simple Payback	4.6 Years
Site Energy Savings (all utilities)	10%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	*Cost Effective?*	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			**86,371**	**28.7**	**-16**	**$10,290**	**$79,033**	**$14,532**	**$64,501**	**6.3**	**85,134**
ECM 1	Install LED Fixtures	No	10,534	1.0	0	$1,276	$28,954	$3,100	$25,854	20.3	10,608
ECM 2	Retrofit Fixtures with LED Lamps	Yes	75,837	27.7	-16	$9,014	$50,079	$11,432	$38,647	4.3	74,526
Lighting Control Measures			**8,757**	**2.6**	**-2**	**$1,041**	**$11,801**	**$875**	**$10,926**	**10.5**	**8,604**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	5,648	1.7	-1	$671	$7,178	$875	$6,303	9.4	5,549
ECM 4	Install High/Low Lighting Controls	Yes	3,110	0.9	-1	$370	$4,623	$0	$4,623	12.5	3,055
Variable Frequency Drive (VFD) Measures			**40,538**	**13.7**	**0**	**$4,910**	**$23,559**	**$3,600**	**$19,959**	**4.1**	**40,821**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	40,538	13.7	0	$4,910	$23,559	$3,600	$19,959	4.1	40,821
Electric Unitary HVAC Measures			**31,729**	**13.3**	**0**	**$3,843**	**$351,172**	**$12,251**	**$338,921**	**88.2**	**31,951**
ECM 6	Install High Efficiency Heat Pumps	No	31,729	13.3	0	$3,843	$351,172	$12,251	$338,921	88.2	31,951
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**73**	**$794**	**$105,885**	**$11,380**	**$94,505**	**119.0**	**8,574**
ECM 7	Install High Efficiency Hot Water Boilers	No	0	0.0	73	$794	$105,885	$11,380	$94,505	119.0	8,574
Food Service & Refrigeration Measures			**1,612**	**0.2**	**0**	**$195**	**$230**	**$50**	**$180**	**0.9**	**1,623**
ECM 8	Vending Machine Control	Yes	1,612	0.2	0	$195	$230	$50	$180	0.9	1,623
TOTALS (COST EFFECTIVE MEASURES)			**126,744**	**44.2**	**-18**	**$15,160**	**$85,669**	**$15,957**	**$69,712**	**4.6**	**125,574**
TOTALS (ALL MEASURES)			**169,007**	**58.5**	**56**	**$21,073**	**$571,679**	**$42,688**	**$528,991**	**25.1**	**176,708**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 2 – Evaluated Energy Improvements

For more detail on each evaluated energy improvement and a break out of cost-effective improvements, see **Section 4: Energy Conservation Measures**.

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey's Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
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 Lighting Controls		x	
ECM 5	Install VFDs on Constant Volume (CV) HVAC	x		
ECM 6	Install High Efficiency Heat Pumps	x	x	
ECM 7	Install High Efficiency Hot Water Boilers	x		
ECM 8	Vending Machine Control	x	x	

Figure 3 – Funding Options

New Jersey's Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility, and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Robert L. Horbelt Elementary School. This report provides information on how the Elementary School uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

For a detailed list of the locations and recommended energy conservation measures for all inventoried equipment, see **Appendix A: Equipment Inventory & Recommendations.**

2.1 Site Overview

On July 3, 2019, TRC performed an energy audit at Robert L. Horbelt Elementary School located in Barnegat, New Jersey. TRC met with Neil Piro to review the facility operations and help focus our investigation on specific energy-using systems.

Robert L. Horbelt Elementary School is a single-story, 80,586 square foot building built in 2001. Spaces include: classrooms, a gymnasium, an auditorium, offices, a cafeteria, corridors, a commercial kitchen, and mechanical space. The Elementary School has onsite generation PV system and is a 100% heated and cooled.

2.2 Building Occupancy

The Elementary School is occupied from September through June. Typical weekday occupancy is approximately 60 staff and 494 students.

Building Name	Weekday/Weekend	Operating Schedule
Robert L. Horbelt Elementary School	Weekday	6:00 AM - 5:00 PM
	Weekend	Saturday: 10:00 AM - 4:00 PM Sunday: 8:30 AM - 11:30 PM (winter only)

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a concrete block facade. The dividing walls are made of concrete masonry units. The roof is mainly flat, covered with black membrane and in good condition. Some pitched portions of the roof are made of metal cladding panels.

Most of the windows are double-glazed that have aluminum frames with a thermal break. The glass-to-frame seals are in good condition. Exterior doors have metal fire proof doors and are in good condition.

Pitched Metal Roof

Flat Rubber Roof

Exterior Doors

Façade and Windows

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some 26-watt 4-pin compact fluorescent lamps (CFL). Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2-, 3-, or 4-lamp, 2- or 4-foot long troffers, and surface-mounted fixtures, 2-foot fixtures with linear tube lamps. Many fixtures are controlled using wall-or remote-mounted occupancy sensors. Most fixtures are in good condition.

All exit signs are LED units. Interior lighting levels were generally sufficient.

The exterior fixtures consist of 26-watt 4 pin CFL fixtures, 42- and 57-watt wall-mounted LED fixtures, and 70-watt metal halide fixtures. The exterior fixtures are controlled using photocells or timeclocks.

Lighting in the Classroom

Outdoor Wall-mounted Fixture

Pole-mounted Exterior Fixture

Multi-purpose Room High-ceiling Fixture

2.5 Air Handling Systems

Heat pump units

The building is mainly conditioned by distributed water source heat pumps with cooling capacities ranging from 1.5- to 5-tons and heating capacities ranging from 26 to 129 MBh. Ground water is distributed to the heat pumps by two variable speed 40 hp circulation pumps. The boiler provides supplemental hot water to the loop when needed. The heat pump units have supply fans of 1.5 hp and EER ratings that range from 10.5 to 12.4. There are several energy recovery units on the roof with supply and return fans of various capacities.

Space temperatures in the zones, as well as loop temperatures, are controlled using an EMS. All units have passed their useful life and been evaluated for replacements.

Energy Recovery Units

Water Source Heat Pump Unit

Water Source Heat Pump Unit

Heat Pump Supply Pumps

2.6 Heating Hot Water Systems

Two condensing hot water Aerco boilers and two non-condensing hot water De Dietrich boilers serve the heat pumps located in the new and older sections, respectively. The boilers have an output capacity of 1694 and 2845 MBH, respectively, and efficiencies of 85% and 83%.

Ground water is circulated to the boilers where it is heated as required, and then distributed using two variable speed 2 and 5 hp pumps to heat pumps located in the respective zones. The boilers also provide hot water to several convectors and unit heaters.

Space and loop temperatures are controlled using an EMS. A roof-mounted cooling tower with a variable speed 7.5 hp fan helps regulate the loop temperature.

The non-condensing boilers serving the older section were installed in the year 1999 and have been evaluated for replacement. The condensing boilers serving the newer section were installed in the year 2008 and are within the useful life of the equipment.

Non-condensing Hot Water Boilers

Condensing Hot Water Boilers

Heating Hot Water Pumps

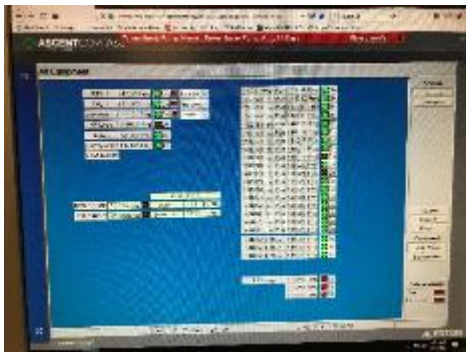
VFD

2.7 Building Energy Management Systems (EMS)

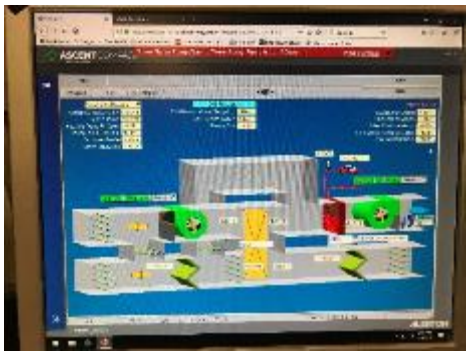
An Ascent Compass (by Allerton) EMS controls the HVAC equipment, boilers, water source heat pump units, air handlers, and heat recovery units (HRU). The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, and heating water loop temperatures.

The site staff expressed that the existing system in place is incapable of controlling and handling the load and might need an expansion in the level of control.

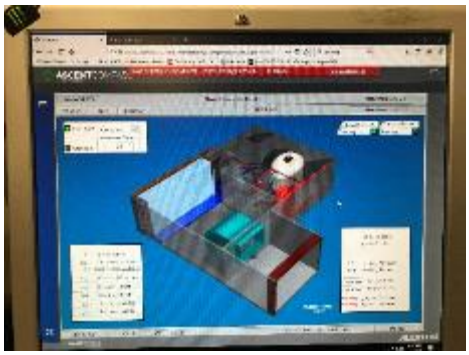
Floor 1–Spaces, Units, and Temperatures



EMS Shot Showing All Equipment Controlled



Heat Pump Unit



Main Office Heat Pump Unit

2.8 Domestic Hot Water

One gas-fired and one electric water heater serve the domestic hot water needs of the Elementary School. The Laars gas-fired unit has an input capacity of 250 MBh, a tank capacity of 100 gallons, and 80% efficiency. The unit was installed in 2015 and is in good condition and well-maintained. The AO Smith unit is electric and has an input capacity of 24kW and a tank capacity of 30 gallons. This unit has passed its useful life.

Hot water is distributed to the end uses using fractional horse power circulating pumps.

Laars Gas-fired Unit

AO Smith electric Unit

2.9 Food Service and Refrigeration Equipment

The kitchen has a mix of gas and electric equipment including gas convection oven, steamer, and a griddle that are used to prepare meals for students. Most cooking is done using a convection gas-fired oven. Bulk prepared foods are held in several electric holding cabinets. Equipment is high-efficiency and in good condition.

The kitchen has several stand-up solid door refrigerators. There are also refrigerator and freezer chests. All equipment is standard efficiency and appears to be in good condition.

The walk-in refrigerator has an estimated 0.75-ton compressor and a two-fan evaporator. The walk-in medium temperature freezer has an approximately 0.9-ton compressor and a two-fan evaporator with defrost controls.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high-efficiency food service equipment.

Convection Oven

Walk-in Refrigerator

Reach -in Refrigerator

Walk-in Evaporator Fan

2.10 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 5% percent of total building energy use. This is higher than a typical building.

You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area, as well as Energy Efficient Best Practices.

There are approximately 113 computer work stations throughout the Elementary School. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as Smart Boards, projectors, and fans. There are several residential-style refrigerators throughout the building that are used to store food for the staff. These vary in condition and efficiency.

There is one refrigerated beverage vending machines and one non-refrigerated vending machines. Vending machines are not equipped with occupancy-based controls.

2.11 Water-Using Systems

Faucet flow rates are at 1.5 gallons per minute (gpm) or higher. Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf.

2.12 On-Site Generation

Robert L. Horbelt Elementary School has approximately 170 panels and a 50 kW photovoltaic (PV) array that was installed in 2011. This system provides approximately 5.2% of the electricity used at the Elementary School and was financed by a Power Purchase Agreement (PPA).

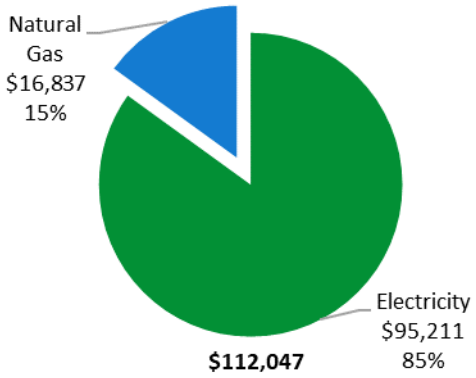
Solar Array

Solar Array

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	786,130 kWh	$95,211
Natural Gas	15,519 Therms	$16,837
Total		**$112,047**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

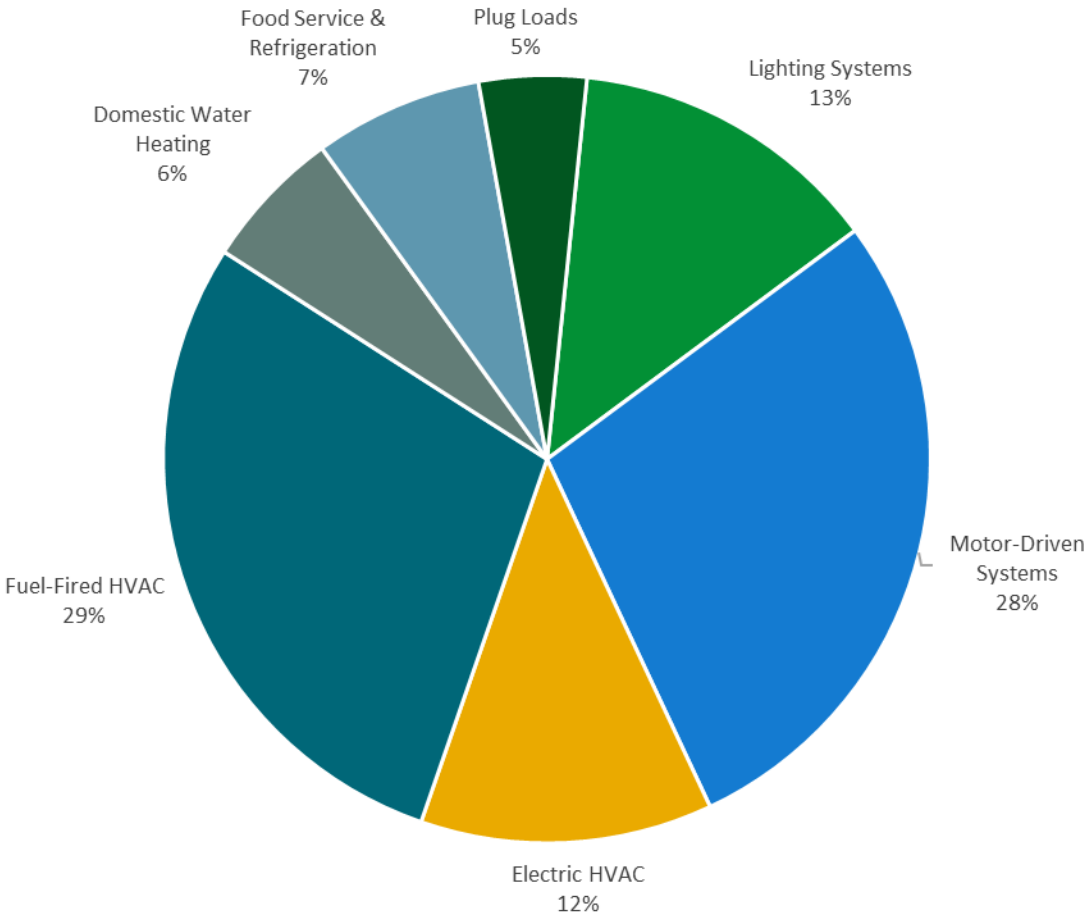
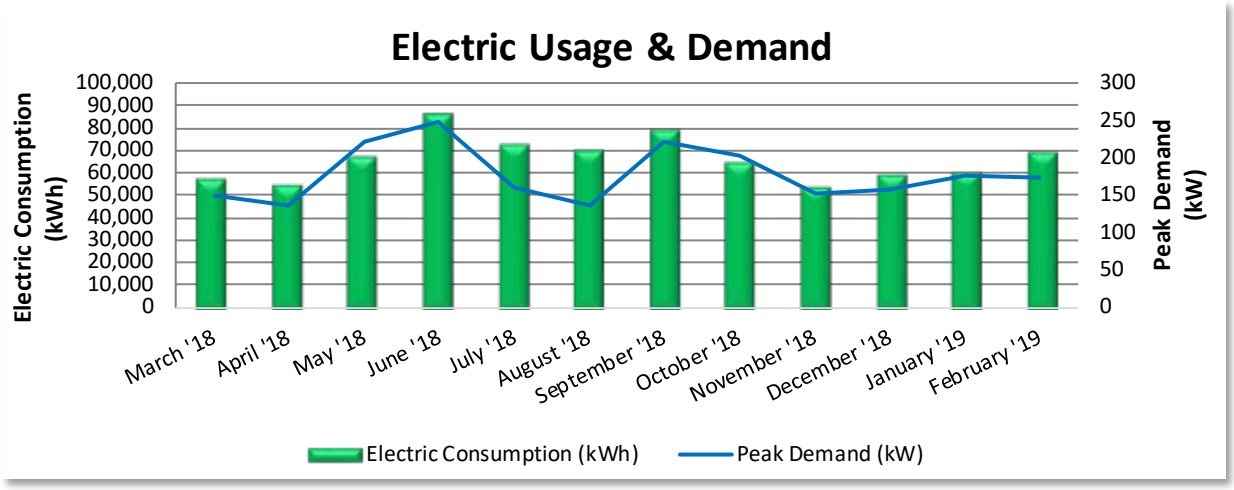


Figure 5 - Energy Balance

3.1 Electricity

JCP&L delivers electricity under rate class GSSS, with electric production provided by South Jersey Energy, a third-party supplier.



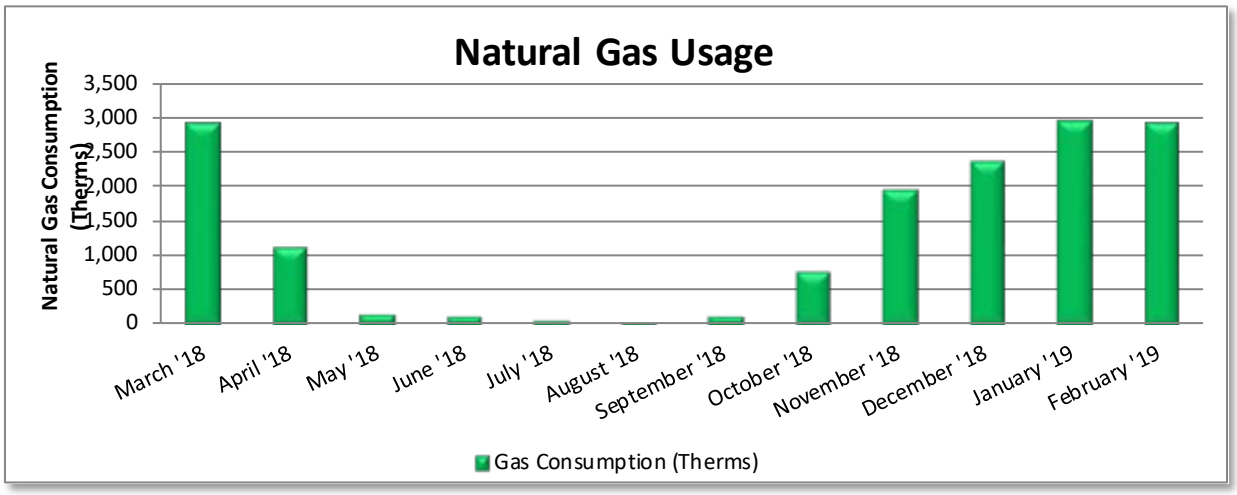
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
3/27/18	30	56,851	150	$921	$6,105
4/25/18	29	54,099	137	$803	$6,080
5/25/18	30	66,559	221	$1,320	$7,605
6/26/18	32	85,831	249	$1,609	$9,679
7/26/18	30	72,320	161	$1,016	$7,863
8/27/18	32	69,514	136	$849	$7,378
9/26/18	30	77,912	222	$1,423	$8,661
10/25/18	29	64,095	204	$1,218	$8,030
11/27/18	33	53,329	151	$885	$6,522
12/27/18	30	59,100	158	$929	$7,626
1/25/19	29	59,929	176	$1,042	$12,322
2/26/19	32	68,745	173	$1,025	$7,602
Totals	**366**	**788,284**	**249**	**$13,040**	**$95,471**
Annual	**365**	**786,130**	**249**	**$13,004**	**$95,211**

Notes:

- Peak demand of 249 kW occurred in June '18.
- The average electric cost over the past 12 months was $0.121/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class GSL, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
4/6/18	30	2,905	$2,600
5/2/18	26	1,111	$1,165
6/1/18	30	160	$149
7/5/18	34	127	$402
8/2/18	28	60	$349
8/28/18	26	55	$347
10/1/18	34	118	$373
11/1/18	31	758	$866
12/4/18	33	1,953	$1,781
12/31/18	27	2,343	$2,793
2/1/19	32	2,929	$3,069
3/5/19	32	2,915	$2,850
Totals	**363**	**15,434**	**$16,744**
Annual	**365**	**15,519**	**$16,837**

Notes:

- The average gas cost for the past 12 months is $1.085/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

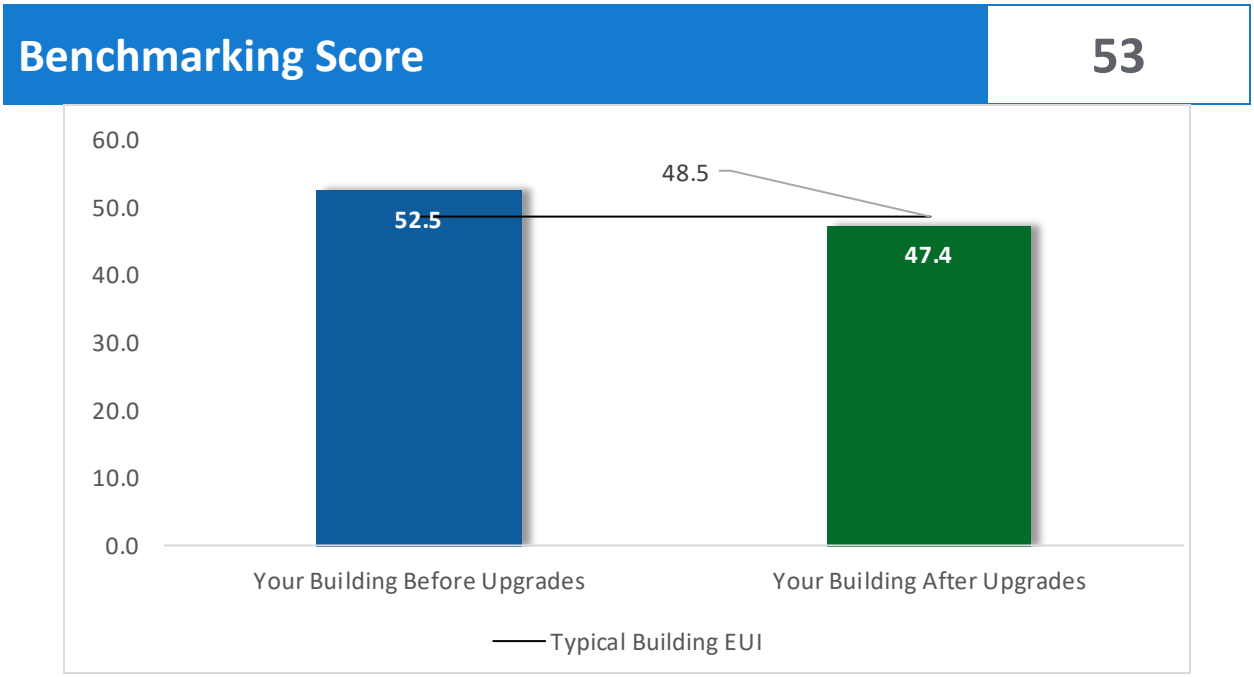


Figure 6 - Energy Use Intensity Comparison

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause as building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[3].

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

#	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		**86,371**	**28.7**	**-16**	**$10,290**	**$79,033**	**$14,532**	**$64,501**	**6.3**	**85,134**
ECM 1	Install LED Fixtures	10,534	1.0	0	$1,276	$28,954	$3,100	$25,854	20.3	10,608
ECM 2	Retrofit Fixtures with LED Lamps	75,837	27.7	-16	$9,014	$50,079	$11,432	$38,647	4.3	74,526
Lighting Control Measures		**8,757**	**2.6**	**-2**	**$1,041**	**$11,801**	**$875**	**$10,926**	**10.5**	**8,604**
ECM 3	Install Occupancy Sensor Lighting Controls	5,648	1.7	-1	$671	$7,178	$875	$6,303	9.4	5,549
ECM 4	Install High/Low Lighting Controls	3,110	0.9	-1	$370	$4,623	$0	$4,623	12.5	3,055
Variable Frequency Drive (VFD) Measures		**40,538**	**13.7**	**0**	**$4,910**	**$23,559**	**$3,600**	**$19,959**	**4.1**	**40,821**
ECM 5	Install VFDs on Constant Volume (CV) Fans	40,538	13.7	0	$4,910	$23,559	$3,600	$19,959	4.1	40,821
Electric Unitary HVAC Measures		**31,729**	**13.3**	**0**	**$3,843**	**$351,172**	**$12,251**	**$338,921**	**88.2**	**31,951**
ECM 6	Install High Efficiency Heat Pumps	31,729	13.3	0	$3,843	$351,172	$12,251	$338,921	88.2	31,951
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**73**	**$794**	**$105,885**	**$11,380**	**$94,505**	**119.0**	**8,574**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	73	$794	$105,885	$11,380	$94,505	119.0	8,574
Food Service & Refrigeration Measures		**1,612**	**0.2**	**0**	**$195**	**$230**	**$50**	**$180**	**0.9**	**1,623**
ECM 8	Vending Machine Control	1,612	0.2	0	$195	$230	$50	$180	0.9	1,623
TOTALS		**169,007**	**58.5**	**56**	**$21,073**	**$571,679**	**$42,688**	**$528,991**	**25.1**	**176,708**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance

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

Figure 7 – All Evaluated 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		**75,837**	**27.7**	**-16**	**$9,014**	**$50,079**	**$11,432**	**$38,647**	**4.3**	**74,526**
ECM 2	Retrofit Fixtures with LED Lamps	75,837	27.7	-16	$9,014	$50,079	$11,432	$38,647	4.3	74,526
Lighting Control Measures		**8,757**	**2.6**	**-2**	**$1,041**	**$11,801**	**$875**	**$10,926**	**10.5**	**8,604**
ECM 3	Install Occupancy Sensor Lighting Controls	5,648	1.7	-1	$671	$7,178	$875	$6,303	9.4	5,549
ECM 4	Install High/Low Lighting Controls	3,110	0.9	-1	$370	$4,623	$0	$4,623	12.5	3,055
Variable Frequency Drive (VFD) Measures		**40,538**	**13.7**	**0**	**$4,910**	**$23,559**	**$3,600**	**$19,959**	**4.1**	**40,821**
ECM 5	Install VFDs on Constant Volume (CV) Fans	40,538	13.7	0	$4,910	$23,559	$3,600	$19,959	4.1	40,821
Food Service & Refrigeration Measures		**1,612**	**0.2**	**0**	**$195**	**$230**	**$50**	**$180**	**0.9**	**1,623**
ECM 8	Vending Machine Control	1,612	0.2	0	$195	$230	$50	$180	0.9	1,623
TOTALS		**126,744**	**44.2**	**-18**	**$15,160**	**$85,669**	**$15,957**	**$69,712**	**4.6**	**125,574**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**86,371**	**28.7**	**-16**	**$10,290**	**$79,033**	**$14,532**	**$64,501**	**6.3**	**85,134**
ECM 1	Install LED Fixtures	10,534	1.0	0	$1,276	$28,954	$3,100	$25,854	20.3	10,608
ECM 2	Retrofit Fixtures with LED Lamps	75,837	27.7	-16	$9,014	$50,079	$11,432	$38,647	4.3	74,526

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all fixtures of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the Elementary School, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved, as LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent or CFL with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as direct replacements for most other lighting technologies.

This measure saves energy by installing LEDs, which use less power than other lighting technologies while providing equivalent lighting output for the space. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: all areas with fluorescent fixtures with T8 tubes and CFL.

4.2 Lighting Controls

#	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		**8,757**	**2.6**	**-2**	**$1,041**	**$11,801**	**$875**	**$10,926**	**10.5**	**8,604**
ECM 3	Install Occupancy Sensor Lighting Controls	5,648	1.7	-1	$671	$7,178	$875	$6,303	9.4	5,549
ECM 4	Install High/Low Lighting Controls	3,110	0.9	-1	$370	$4,623	$0	$4,623	12.5	3,055

Lighting controls reduce energy use by turning off or lowering lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote-mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms.

ECM 4: Install High/Low Lighting Controls

Install 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.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low levels after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

The control lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be taken into account when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**40,538**	**13.7**	**0**	**$4,910**	**$23,559**	**$3,600**	**$19,959**	**4.1**	**40,821**
ECM 5	Install VFDs on Constant Volume (CV) Fans	40,538	13.7	0	$4,910	$23,559	$3,600	$19,959	4.1	40,821

Variable frequency drives (VFDs) control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor to conservatively account for the cost of an inverter duty rated motor.

Premium efficiency motors have been proposed to be installed only in conjunction with proposed VFD motor measures. Non-inverter duty rated motors will need to be replaced when the VFD measure is implemented.

ECM 5: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one.

Zone thermostats signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone while maintaining a constant supply air temperature.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

Affected air handlers: supply and the return fans of the RTU and the AHU (15 hp and 7.5 hp).

4.4 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**31,729**	**13.3**	**0**	**$3,843**	**$351,172**	**$12,251**	**$338,921**	**88.2**	**31,951**
ECM 6	Install High Efficiency Heat Pumps	31,729	13.3	0	$3,843	$351,172	$12,251	$338,921	88.2	31,951

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at the Elementary School are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high-efficiency unit can be justified by the marginal savings from the improved efficiency. When the heat pump units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 6: Install High-Efficiency Heat Pumps

Replace standard efficiency heat pumps with high-efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high-efficiency unit, average heating and cooling loads, and estimated annual operating hours.

4.5 Gas-Fired Heating

#	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)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**73**	**$794**	**$105,885**	**$11,380**	**$94,505**	**119.0**	**8,574**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	73	$794	$105,885	$11,380	$94,505	119.0	8,574

ECM 7: Install High-Efficiency Hot Water Boilers

Replace older inefficient hot water boilers with high-efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers, which can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high-efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are evaluated when the return water temperature is less than 130°F during most of the operating hours.

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 mechanical design team to select boilers that are sized appropriately for the heating load at the Elementary School. 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.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers are nearing 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. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

4.6 Food Service & Refrigeration Measures

#	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 & Refrigeration Measures		**1,612**	**0.2**	**0**	**$195**	**$230**	**$50**	**$180**	**0.9**	**1,623**
ECM 8	Vending Machine Control	1,612	0.2	0	$195	$230	$50	$180	0.9	1,623

ECM 8: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time and power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

5 ENERGY EFFICIENT BEST PRACTICES

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[4]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan, and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

Furnace Maintenance

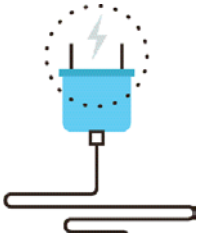
Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[5]. Your local utility may offer incentives or rebates for this equipment.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the Elementary School is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

[6] https://www.epa.gov/watersense

[7] https://www.epa.gov/watersense/watersense-work-0

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the Elementary School's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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.

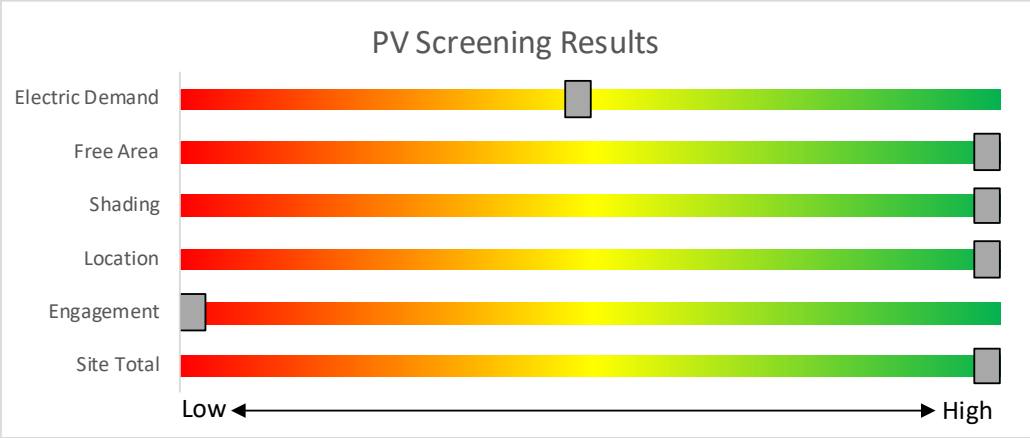
6.1 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in expanding the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the expansion PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.



Potential	High	
System Potential	178	kW DC STC
Electric Generation	212,064	kWh/yr
Displaced Cost	$25,680	/yr
Installed Cost	$462,800	

Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in New Jersey**: www.njcleanenergy.com/whysolar
- **New Jersey Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the New Jersey Market**: 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) generate electricity at the Elementary School and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

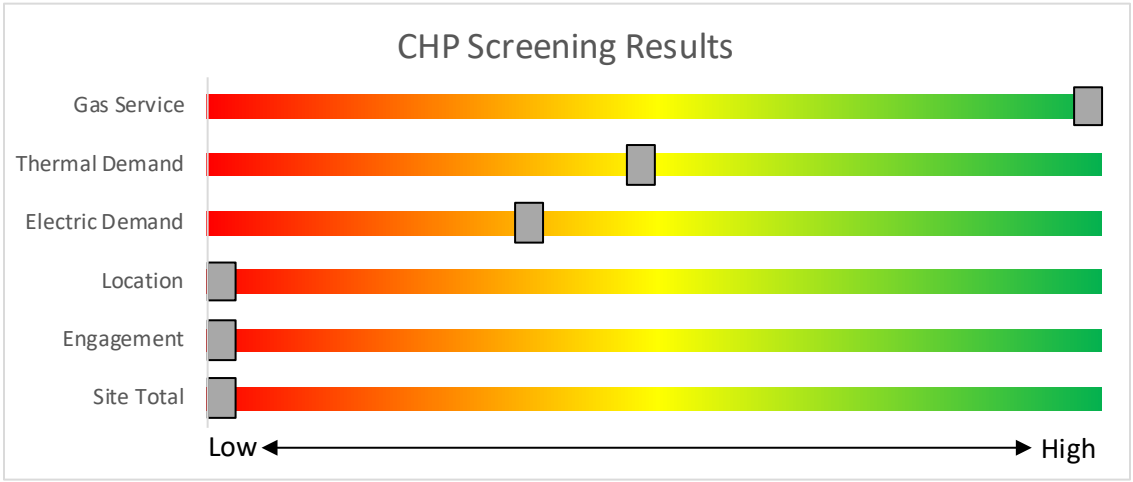
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 **no** potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.



Potential	None	
System Type	None	
System Potential	100	kW
Electric Generation	214,600	kWh/yr
Thermal Generation	1,255,410	MBtu/yr
Displaced Cost	$14,104	/yr
Installed Cost	$365,000	

Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available New Jersey's Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.
Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.			

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at the Elementary School. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely adds, removes, or modifies incentives from year-to-year for various energy efficient 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Direct Install

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

Incentives

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

How to Participate

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

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

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

The scope of work presented in this audit report does not quite meet the requirements of the current P4P program. However, due to the size of the facility and existing conditions, should additional measures be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process, this facility could potentially meet the requirements necessary to participate in the P4P program.

Incentives

Incentives are based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

Contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan, assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

7.4 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine Fuel Cells with Heat Recovery	>3 MW	$350		
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

7.5 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.6 SREC Registration Program

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

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

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

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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 the Elementary School'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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[8].

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[9].

[8] www.state.nj.us/bpu/commercial/shopping.html

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.3	909	0	$108	$402	$110	2.7
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	0.0	0	0	$0	$0	$0	0.0
Custodian lounge	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	526	0	$62	$453	$85	5.9
Kitchen office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	210	0	$25	$189	$40	6.0
Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,277	0.1	248	0	$29	$110	$30	2.7
Kitchen	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.3	909	0	$108	$402	$110	2.7
Kitchen restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
Serving line	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	631	0	$75	$489	$95	5.3
Custodian sink	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
Cafeteria	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	165	0	$20	$73	$20	2.7
Cafeteria	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.1	413	0	$49	$183	$50	2.7
Cafeteria	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Café mech room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.1	331	0	$39	$146	$40	2.7
MPR	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,571	2	Relamp	No	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	1.0	2,323	0	$276	$1,753	$480	4.6
MPR	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
MPR stage	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,277	2, 3	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.6	2,224	0	$264	$1,146	$275	3.3
Music room stage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	827	0	$98	$365	$100	2.7
Music room stage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	827	0	$98	$365	$100	2.7
Music room stage	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Music storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	276	0.1	37	0	$4	$189	$20	38.5
MPR storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	276	0.1	37	0	$4	$189	$20	38.5
MPR office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	210	0	$25	$189	$40	6.0
MPR storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	400	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	276	0.1	83	0	$10	$280	$45	23.8
Hall by cafeteria	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	165	0	$20	$73	$20	2.7
Hall by cafeteria	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Hall by gym	15	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	15	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.3	1,010	0	$120	$1,265	$30	10.3
Music Room 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	342	0	$41	$219	$60	3.9
Music Room 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	473	0	$56	$280	$65	3.8
Tech office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,277	0.0	124	0	$15	$55	$15	2.7
Book storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	276	0.1	55	0	$7	$226	$30	29.7
Boys restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	421	0	$50	$416	$75	6.8
Girls restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	421	0	$50	$416	$75	6.8
Hall by restroom	8	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	8	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.2	539	0	$64	$660	$16	10.1
Main entrance	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	165	0	$20	$73	$20	2.7
Main 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	0.0	0	0	$0	$0	$0	0.0
Main lobby	18	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 3	Relamp	Yes	18	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.3	1,212	0	$144	$1,518	$106	9.8
Main lobby	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main office	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	941	0	$112	$602	$165	3.9
Conference room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	171	0	$20	$110	$30	3.9
Work room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	171	0	$20	$110	$30	3.9
Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	171	0	$20	$110	$30	3.9
Principal office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	171	0	$20	$110	$30	3.9
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	400	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	400	0.0	29	0	$3	$73	$20	15.4
MO restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.0	57	0	$7	$37	$10	3.9
Teachers lounge	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.2	513	0	$61	$329	$90	3.9
Teachers lounge	5	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	5	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.1	135	0	$16	$272	$10	16.3
Men's faculty	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.0	57	0	$7	$37	$10	3.9
Women's faculty	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.0	57	0	$7	$37	$10	3.9
Nurse's office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	285	0	$34	$183	$50	3.9
Nurse's office	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	1,571	2	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,571	0.0	111	0	$13	$130	$24	8.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.0	57	0	$7	$37	$10	3.9
Nurse Exam room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.0	114	0	$14	$73	$20	3.9
Nurse storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	400	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	400	0.0	15	0	$2	$37	$10	15.4
Elevator machine room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	400	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	400	0.0	15	0	$2	$37	$10	15.4
Elevator machine room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	400	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	None	29	400	0.0	29	0	$3	$73	$20	15.4
Hall by Nurse office	14	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	14	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.3	943	0	$112	$993	$28	8.6
Network room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	316	0	$37	$226	$50	4.7
500 A SGI	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.2	428	0	$51	$274	$75	3.9
Girls restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	526	0	$62	$453	$85	5.9
Custodian closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.0	15	0	$2	$37	$10	15.4
Boys restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	526	0	$62	$453	$85	5.9
500 B SGI	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.2	428	0	$51	$274	$75	3.9
Behaviour room 5000	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	171	0	$20	$110	$30	3.9
Hall by 500/502	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.1	421	0	$50	$371	$40	6.6
Hall by 500/502	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,277	2, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,571	0.1	331	0	$39	$335	$30	7.8
502 Pre-K room	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.5	1,112	0	$132	$712	$195	3.9
502 Pre-K room	7	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	7	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.1	189	0	$22	$381	$14	16.3
502 Pre-K 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	0.0	0	0	$0	$0	$0	0.0
502 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
501 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
501 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
504 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
504 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
503 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
503 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
503 CR	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
503 Kiln room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,277	0.0	124	0	$15	$55	$15	2.7
503 A storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	276	0.1	37	0	$4	$189	$20	38.5
505 A class	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	316	0	$37	$226	$50	4.7
Hall by 505A	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.1	316	0	$37	$226	$30	5.2
506 Pre-K room	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.5	1,112	0	$132	$712	$195	3.9
506 Pre-K room	7	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	7	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.1	189	0	$22	$381	$14	16.3
506 Pre-K 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	0.0	0	0	$0	$0	$0	0.0
506 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
508 Pre-K room	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.5	1,112	0	$132	$712	$195	3.9
508 Pre-K room	7	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	7	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.1	189	0	$22	$381	$14	16.3
508 Pre-K 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	0.0	0	0	$0	$0	$0	0.0
508 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
505 CR	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.9	2,053	0	$244	$1,315	$360	3.9
505 CR	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
507 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
507 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
510 A split room	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
509 A split room	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
Hall by 509/510	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.2	526	0	$62	$408	$50	5.7
Hall by 509/510	8	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	8	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.2	539	0	$64	$660	$16	10.1
Hall by 509/510	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,277	2, 4	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,571	0.1	441	0	$52	$371	$40	6.3
512 Pre-K	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.3	741	0	$88	$475	$130	3.9
512 Pre-K	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	1,571	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,571	0.0	28	0	$3	$33	$6	8.1
512 restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
511 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
514 Pre-K	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
514 Pre-K	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
513 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
Women's restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	316	0	$37	$380	$65	8.4
Women restroom	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2	Relamp	No	1	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	39	0	$5	$54	$2	11.3
DHW room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.0	15	0	$2	$37	$10	15.4
Electric room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.0	15	0	$2	$37	$10	15.4
Men's restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	316	0	$37	$380	$65	8.4
515 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
516 CR	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	513	0	$61	$329	$90	3.9
Hall by electrical closet	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.2	736	0	$87	$481	$70	4.7
Hall by electrical closet	6	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	6	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.1	404	0	$48	$551	$12	11.2
Hall by electrical closet	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Back stair	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	661	0	$79	$292	$80	2.7
Back stair	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 3	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	579	0	$69	$256	$70	2.7
Stairwell 3	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2	Relamp	No	2	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	78	0	$9	$109	$4	11.3
Stairwell 3	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 2	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	579	0	$69	$256	$70	2.7
Stairwell 2	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2	Relamp	No	2	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	78	0	$9	$109	$4	11.3
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	0.0	0	0	$0	$0	$0	0.0
10 Vestibule	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2	Relamp	No	2	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	78	0	$9	$109	$4	11.3
Stairwell 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.2	579	0	$69	$256	$70	2.7
Stairwell 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Library men room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.3	1,157	0	$137	$672	$145	3.8
Library	40	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,277	2, 3	Relamp	Yes	40	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	2.1	7,412	-2	$881	$3,461	$870	2.9
Library	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2	Relamp	No	1	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	39	0	$5	$54	$2	11.3
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	0.0	0	0	$0	$0	$0	0.0
Library computer lab	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	210	0	$25	$189	$40	6.0
Library computer lab	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.1	316	0	$37	$226	$50	4.7
Library office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.2	513	0	$61	$329	$90	3.9
Library vestibule	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.1	248	0	$29	$110	$30	2.7
Mech room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.2	131	0	$16	$329	$90	15.4
Men's faculty	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
Women's faculty	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
600 A class	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,277	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,420	0	$169	$763	$170	3.5
600B storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	276	0.1	37	0	$4	$189	$20	38.5
600 CR	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.3	770	0	$92	$493	$135	3.9
600 CR	1	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	1	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	27	0	$3	$54	$2	16.3
Hall by library	8	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	8	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.2	539	0	$64	$660	$16	10.1
Hall by library	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.2	526	0	$62	$408	$50	5.7
Hall by 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	0.0	0	0	$0	$0	$0	0.0
601 A CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
Electrical closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.1	44	0	$5	$110	$30	15.4
Girls 2nd floor	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	526	0	$62	$453	$85	5.9
Custodian 2nd floor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,277	0.0	83	0	$10	$37	$10	2.7
Boys 2nd floor	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.2	526	0	$62	$453	$85	5.9
602 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
602 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
603 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
603 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
604 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
604 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
605 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
605 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
Hall by 602	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,277	2, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,571	0.1	331	0	$39	$335	$30	7.8
Hall by 602	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.1	421	0	$50	$371	$40	6.6
606 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
606 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
607 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
607 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
608 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
608 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
609 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
609 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
610 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
610 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
611 CR	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,571	2	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,571	0.4	1,027	0	$122	$657	$180	3.9
611 CR	3	Compact Fluorescent: 4 pin - 2 lamps	Occupancy Sensor	S	52	1,571	2	Relamp	No	3	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	81	0	$10	$163	$6	16.3
Hall by 610	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.2	526	0	$62	$408	$50	5.7
Hall by 610	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	2	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.0	135	0	$16	$334	$4	20.6
Hall by 610	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,277	2, 4	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,571	0.1	441	0	$52	$371	$40	6.3
Hall by 610	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
612 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
613 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
CR 614	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
CR 615	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,571	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.4	855	0	$102	$548	$150	3.9
Women 2nd floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	316	0	$37	$380	$65	8.4
Women 2nd floor	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 3	Relamp	Yes	1	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	67	0	$8	$54	$2	6.5
Electrical room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	400	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.0	29	0	$3	$73	$20	15.4
Men 2nd floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.1	316	0	$37	$380	$65	8.4
Men 2nd floor	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 3	Relamp	Yes	1	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	1,571	0.0	67	0	$8	$54	$2	6.5
617 CR	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.5	1,578	0	$187	$818	$185	3.4
616 SGI	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.3	947	0	$112	$599	$125	4.2
Hall by 614	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,277	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,571	0.2	736	0	$87	$481	$70	4.7
Hall by 614	6	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,277	2, 4	Relamp	Yes	6	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	1,571	0.1	404	0	$48	$551	$12	11.2
Hall by 614	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Front door canopy	6	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch		52	2,277	2	Relamp	No	6	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,277	0.0	213	0	$26	$326	$12	12.2
Front door canopy	5	Compact Fluorescent: Circular fluorescent	Timeclock		52	5,110	2	Relamp	No	5	LED Lamps: 4 pin - 2 lamps	Timeclock	36	5,110	0.0	399	0	$48	$272	$10	5.4
Wall pack	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		42	5,110		None	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	42	5,110	0.0	0	0	$0	$0	$0	0.0
Wall mounted	3	Metal Halide: (1) 70W Lamp	Timeclock		95	5,110	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	29	5,110	0.1	1,019	0	$123	$2,898	$300	21.0
Wall mounted	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		57	5,110		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	57	5,110	0.0	0	0	$0	$0	$0	0.0
Wall pack	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		42	4,380		None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	42	4,380	0.0	0	0	$0	$0	$0	0.0
Wall mounted	1	Compact Fluorescent: 4 pin - 1 lamp	Other		26	2,000	2	Relamp	No	1	LED Lamps: 4 pin - 2 lamps	Other	18	2,000	0.0	16	0	$2	$54	$2	27.7
Parking pole	28	Metal Halide: (1) 70W Lamp	Timeclock		95	5,110	1	Fixture Replacement	No	28	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	29	5,110	0.9	9,515	0	$1,152	$26,056	$2,800	20.2

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?	Remaining Useful Life	Annual Operating Hours	ECM #	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	AHU-1 Classrooms	1	Supply Fan	15.0	90.0%	No	W	2,745	5	No	93.0%	Yes	1	4.5	13,542	0	$1,640	$7,041	$1,200	3.6
Roof	RTU-1 toilet rooms	1	Supply Fan	7.5	89.0%	No	W	2,745	5	No	91.0%	Yes	1	2.2	6,727	0	$815	$4,738	$600	5.1
Roof	AHU-1 classrooms	1	Exhaust Fan	15.0	90.0%	No	W	2,745	5	No	93.0%	Yes	1	4.7	13,542	0	$1,640	$7,041	$1,200	3.6
Roof	RTU-1 toilet rooms	1	Exhaust Fan	7.5	89.0%	No	W	2,745	5	No	91.0%	Yes	1	2.3	6,727	0	$815	$4,738	$600	5.1
Roof	Pre-1	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-1	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-2	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-3	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-4	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-5	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-6	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-7	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-8	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pre-9	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-1	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-2	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-3	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-4	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-5	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-6	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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	RTH-7	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-8	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-9	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTH-10	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	UH-1	1	Supply Fan	0.1	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Vestibule 100	UH-2	1	Supply Fan	0.1	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	P-3,4	2	Heating Hot Water Pump	5.0	90.2%	Yes	W	2,745		No	90.2%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	OCW boosters	2	Water Supply Pump	1.5	80.0%	No	W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	DHW boosters	3	Water Supply Pump	0.0	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Outdoor	Cooling tower	1	Cooling Tower Fan	7.5	89.5%	Yes	W	3,391		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Exhaust Fan	2.0	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Supply Fan	1.5	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Exhaust Fan	2.0	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Supply Fan	1.5	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Lower roof	HRU-3	1	Exhaust Fan	0.8	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Lower roof	HRU-3	1	Supply Fan	0.8	86.5%	Yes	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Elevator machine	Hydraulic pump	1	Process Pump	30.0	74.0%	No	W	200		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
DHW water room	DHW boosters	1	Water Supply Pump	0.1	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	Boiler combustion fan	2	Combustion Air Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mech room 103	P-5,6	2	Water-Source Heat Pump Circulation Pump	40.0	94.5%	Yes	W	1,750		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Mech room 103	P-1,2	2	Heating Hot Water Pump	2.0	82.0%	Yes	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Ceiling	WSHP	46	Supply Fan	1.5	86.0%	No	B	2,745		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	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
Classrooms/Office Ceilings	Corridor 101	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	Corridor 102 area A	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Corridor 102 area B	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Cafeteria	1	Water Source HP	8.92	129.00	B	6	Yes	1	Water Source HP	8.92	129.00	14.00	4.50	0.7	1,682	0	$204	$11,018	$722	50.5
Classrooms/Office Ceilings	Faculty 108	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	Kitchen 107	1	Water Source HP	4.57	66.20	B	6	Yes	1	Water Source HP	4.57	66.20	14.00	4.80	0.5	1,259	0	$152	$12,694	$370	80.8
Classrooms/Office Ceilings	Multipurpose 109B	1	Water Source HP	13.50	21.40	B	6	Yes	1	Water Source HP	13.50	21.40	14.00	4.50	1.9	2,335	0	$283	$16,681	$1,094	55.1
Classrooms/Office Ceilings	Multipurpose	1	Water Source HP	13.50	21.40	B	6	Yes	1	Water Source HP	13.50	21.40	14.00	4.50	1.9	2,335	0	$283	$16,681	$1,094	55.1
Classrooms/Office Ceilings	EC112	1	Water Source HP	1.46	21.60	B	6	Yes	1	Water Source HP	1.46	21.60	14.00	4.80	0.2	422	0	$51	$4,054	$118	77.1
Classrooms/Office Ceilings	Platform 109C	1	Water Source HP	2.68	39.10	B	6	Yes	1	Water Source HP	2.68	39.10	14.00	4.80	0.2	593	0	$72	$7,435	$217	100.5
Classrooms/Office Ceilings	117	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	11B, 117C, 117D, 117F	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 120	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Kindergarten 120	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	Classroom 122	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	Nurse 123	1	Water Source HP	2.29	31.20	B	6	Yes	1	Water Source HP	2.29	31.20	14.00	4.80	0.1	412	0	$50	$6,370	$186	124.1
Classrooms/Office Ceilings	Kindergarten 124	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	Classroom 126	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Kindergarten 126	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	BDI,SGI, 128	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9

		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)	Remaining Useful Life	ECM #	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)	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
Classrooms/Office Ceilings	Guidance	1	Water Source HP	0.90	129.00	B	6	Yes	1	Water Source HP	0.90	129.00	14.00	4.80	0.1	1,232	0	$149	$2,502	$73	16.3
Classrooms/Office Ceilings	CSTI 31, Conference 131A	1	Water Source HP	1.46	21.60	B	6	Yes	1	Water Source HP	1.46	21.60	14.00	4.80	0.2	422	0	$51	$4,054	$118	77.1
Classrooms/Office Ceilings	Classroom 133	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Art room 135	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	Network 137	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	Technology 139	1	Water Source HP	3.55	49.10	B	6	Yes	1	Water Source HP	3.55	49.10	14.00	4.80	0.2	588	0	$71	$9,868	$288	134.5
Classrooms/Office Ceilings	Classroom 141,143A	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Research 143	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Corridor 200 area A	1	Water Source HP	2.29	31.20	B	6	Yes	1	Water Source HP	2.29	31.20	14.00	4.80	0.1	412	0	$50	$6,370	$186	124.1
Classrooms/Office Ceilings	Corridor 200 area B	1	Water Source HP	2.29	31.20	B	6	Yes	1	Water Source HP	2.29	31.20	14.00	4.80	0.1	412	0	$50	$6,370	$186	124.1
Classrooms/Office Ceilings	Media center 201	1	Water Source HP	8.92	129.00	B	6	Yes	1	Water Source HP	8.92	129.00	14.00	4.50	0.7	1,682	0	$204	$11,018	$722	50.5
Classrooms/Office Ceilings	Workroom	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	SE 204	1	Water Source HP	2.29	31.20	B	6	Yes	1	Water Source HP	2.29	31.20	14.00	4.80	0.1	412	0	$50	$6,370	$186	124.1
Classrooms/Office Ceilings	EC 208	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	SGI 209	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	BSI 209A	1	Water Source HP	1.82	26.80	B	6	Yes	1	Water Source HP	1.82	26.80	14.00	4.80	0.2	421	0	$51	$5,050	$147	96.1
Classrooms/Office Ceilings	Classroom 211	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 213	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 215	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 216	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9

		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)	Remaining Useful Life	ECM #	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)	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
Classrooms/Office Ceilings	Classroom 217	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 218	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 219	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 220	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 222	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9
Classrooms/Office Ceilings	Classroom 224	1	Water Source HP	2.65	39.10	B	6	Yes	1	Water Source HP	2.65	39.10	14.00	4.80	0.2	591	0	$72	$7,366	$215	99.9

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)	Remaining Useful Life	ECM #	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
Mech 103	Boilers - 1,2 - Old section	2	Non-Condensing Hot Water Boiler	2,845.00	B	7	Yes	2	Condensing Hot Water Boiler	2,845.00	93.00%	Ec	0.0	0	73	$794	$105,885	$11,380	119.0
Mech 103	Boilers - 3,4 New section	2	Condensing Hot Water Boiler	1,694.00	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	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	Old section	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
DHW closet	New section	1	Storage Tank Water Heater (≤ 50 Gal)			No						0.0	0	0	$0	$0	$0	0.0

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)		No	No	No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Medium Temp Freezer (0F to 30F)		No	No	No	0.0	0	0	$0	$0	$0	0.0

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	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	2	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Refrigerator Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Refrigerator Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Freezer Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	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	2	Gas Convection Oven (Half Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Steamer	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (≤2 Feet Width)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	3	Insulated Food Holding Cabinet (1/2 Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Robert LHES	113	Desktop	145.0	Yes
Robert LHES	21	Chrome book cart	40.0	Yes
Robert LHES	2	Server	1,200.0	Yes
Robert LHES	34	Printer - small	60.0	Yes
Robert LHES	3	Printer - medium	80.0	Yes
Robert LHES	6	Printer - large	200.0	Yes
Robert LHES	27	Projector	400.0	Yes
Robert LHES	5	Microwave	900.0	Yes
Robert LHES	1	Refrigerator - small	70.0	Yes
Robert LHES	1	Refrigerator - medium	90.0	Yes
Robert LHES	2	Refrigerator - large	220.0	Yes
Robert LHES	2	Coffee machine	400.0	Yes
Robert LHES	2	Television - Plasma	130.0	Yes
Robert LHES	1	Television - LED	100.0	Yes
Robert LHES	27	Smart boards	5.0	Yes
Robert LHES	1	Kiln	11,520.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	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 lounge	1	Refrigerated	8	Yes	0.2	1,612	0	$195	$230	$50	0.9

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Robert L Horbelt Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 80,586
Built: 2001

For Year Ending: January 31, 2019
Date Generated: July 13, 2019

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
Robert L Horbelt Elementary School 104 Burr Street Barnegat, New Jersey 08005	Barnegat Township School District 550 BARENGAT BLVD. NORTH Barnegat, NJ 08005 (____)____-_____	Stephen Brennan 550 BARENGAT BLVD. NORTH Barnegat, NJ 08005 609-698-5800 SBRENNAN@BARNEGATSCHOOLS.CO

Property ID: 7071878

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
51.8 kBtu/ft²

Source EUI
112.4 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	1,507,863 (36%)
Electric - Grid (kBtu)	2,669,190 (64%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	53.8
National Median Source EUI (kBtu/ft²)	116.5
% Diff from National Median Source EUI	-4%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	350

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)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
Btu	*British thermal unit*: a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit.
CHP	*Combined heat and power*. Also referred to as cogeneration.
COP	*Coefficient of performance*: a measure of efficiency in terms of useful energy delivered divided by total energy input.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
DCV	*Demand control ventilation*: a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
US DOE	*United States Department of Energy*
EC Motor	*Electronically commutated motor*
ECM	*Energy conservation measure*
EER	*Energy efficiency ratio*: a measure of efficiency in terms of cooling energy provided divided by electric input.
EUI	*Energy Use Intensity:* measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service.
ENERGY STAR®	ENERGY STAR® is the government-backed symbol for energy efficiency. The ENERGY STAR® program is managed by the EPA.
EPA	*United States Environmental Protection Agency*
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	*Greenhouse gas* gases that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.
gpf	*Gallons per flush*

gpm	*Gallon per minute*
HID	*High intensity discharge:* high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor.
hp	*Horsepower*
HPS	*High-pressure sodium*: a type of HID lamp.
HSPF	*Heating seasonal performance factor:* a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input.
HVAC	*Heating, ventilating, and air conditioning*
IHP 2014	US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency.
IPLV	*Integrated part load value:* a measure of the part load efficiency usually applied to chillers.
kBtu	One thousand British thermal units.
kW	*Kilowatt*: equal to 1,000 Watts.
kWh	*Kilowatt-hour*: 1,000 Watts of power expended over one hour.
LED	*Light emitting diode*: a high-efficiency source of light with a long lamp life.
LGEA	*Local Government Energy Audit*
Load	The total power a building or system is using at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MH	*Metal halide*: a type of HID lamp.
MBh	*Thousand Btu per hour*
MBtu	*One thousand British thermal units*
MMBtu	*One million British thermal units*
MV	*Mercury Vapor:* a type of HID lamp.
NJBPU	*New Jersey Board of Public Utilities*
NJCEP	*New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money and the environment.
psig	Pounds per square inch gauge.
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PV	*Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current).

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR® Portfolio Manager®.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of 1/8th of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense™	The symbol for water efficiency. The WaterSense™ program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.