Local Government Energy Audit Report

Camden Middle School

August 26, 2019

Prepared for:

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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 Energy Services (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 is encouraged 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.

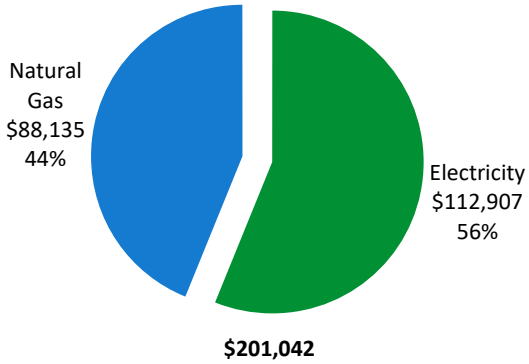
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Camden Middle School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (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 help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $201,042 Electricity: 981,568 kWh Natural Gas: 108,660 Therms	
ENERGY STAR® Benchmarking Score	7 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

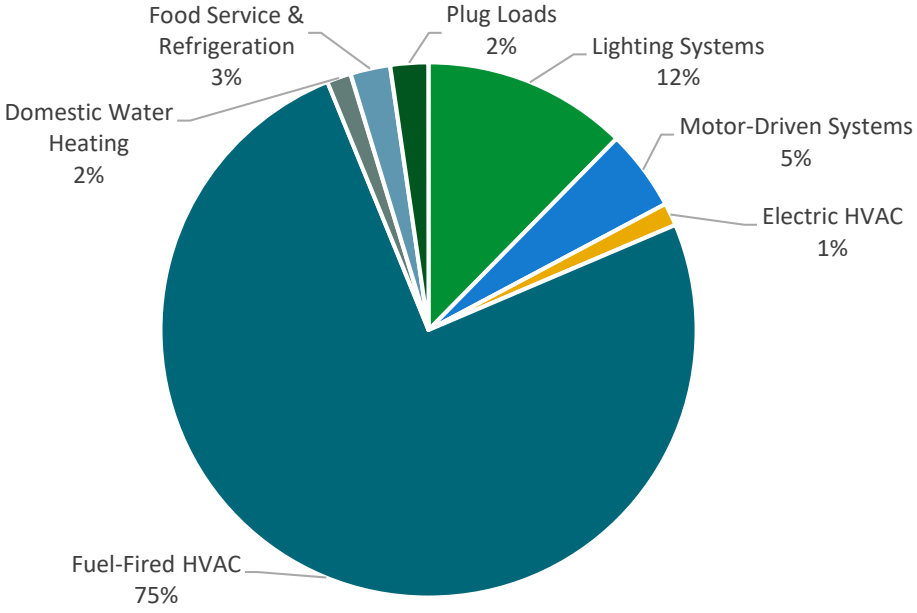


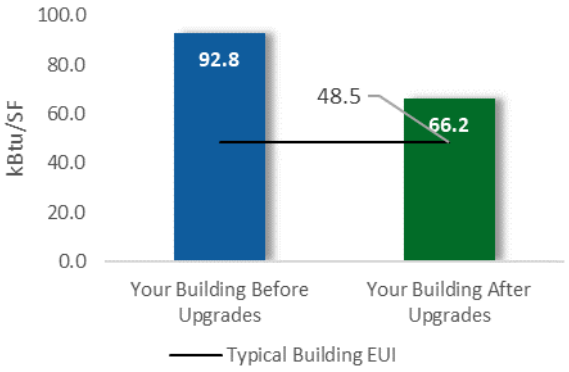
Figure 1 - Energy Use by System

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.

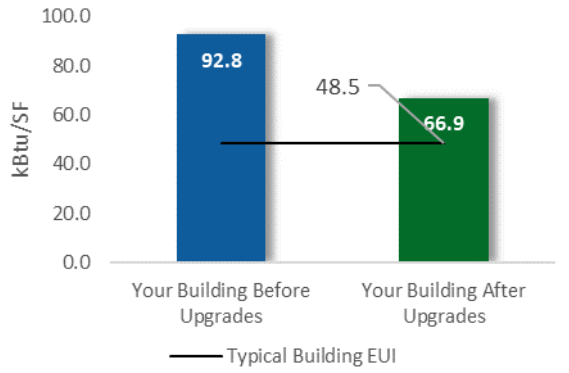
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$778,246
Potential Rebates & Incentives[1]	$55,929
Annual Cost Savings	$68,452
Annual Energy Savings	Electricity: 404,813 kWh Natural Gas: 26,985 Therms
Greenhouse Gas Emission Savings	362 Tons
Simple Payback	10.6 Years
Site Energy Savings (all utilities)	29%



Scenario 2: Cost Effective Package[2]

Installation Cost	$655,797
Potential Rebates & Incentives	$50,925
Annual Cost Savings	$64,559
Annual Energy Savings	Electricity: 370,974 kWh Natural Gas: 26,985 Therms
Greenhouse Gas Emission Savings	345 Tons
Simple Payback	9.4 Years
Site Energy Savings (all utilities)	28%



On-site Generation Potential

Photovoltaic	None
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	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**206,990**	**35.3**	**-60**	**$23,323**	**$349,850**	**$98,101**	**$18,221**	**$79,880**	**3.4**	**201,420**
ECM 1	Install LED Fixtures	21,982	2.7	0	$2,528	$37,927	$28,991	$1,425	$27,566	10.9	22,135
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	11,009	0.9	-4	$1,237	$18,561	$1,775	$300	$1,475	1.2	10,668
ECM 3	Retrofit Fixtures with LED Lamps	174,000	31.7	-56	$19,557	$293,362	$67,335	$16,496	$50,839	2.6	168,617
Lighting Control Measures		**47,370**	**7.5**	**-15**	**$5,324**	**$42,595**	**$49,116**	**$5,030**	**$44,086**	**8.3**	**45,904**
ECM 4	Install Occupancy Sensor Lighting Controls	22,201	5.5	-7	$2,495	$19,963	$41,116	$5,030	$36,086	14.5	21,514
ECM 5	Install High/Low Lighting Controls	25,169	2.0	-8	$2,829	$22,632	$8,000	$0	$8,000	2.8	24,391
Motor Upgrades		**2,117**	**0.6**	**0**	**$243**	**$3,652**	**$9,341**	**$0**	**$9,341**	**38.4**	**2,131**
ECM 6	Premium Efficiency Motors	2,117	0.6	0	$243	$3,652	$9,341	$0	$9,341	38.4	2,131
Variable Frequency Drive (VFD) Measures		**58,138**	**11.5**	**0**	**$6,687**	**$100,312**	**$24,560**	**$1,600**	**$22,960**	**3.4**	**58,545**
ECM 7	Install VFDs on Constant Volume (CV) Fans	21,198	5.7	0	$2,438	$36,576	$7,616	$1,600	$6,016	2.5	21,347
ECM 8	Install VFDs on Heating Water Pumps	36,940	5.8	0	$4,249	$63,736	$16,944	$0	$16,944	4.0	37,198
Electric Unitary HVAC Measures		**6,241**	**7.9**	**0**	**$718**	**$10,768**	**$49,347**	**$1,104**	**$48,243**	**67.2**	**6,285**
ECM 9	Install High Efficiency Air Conditioning Units	6,241	7.9	0	$718	$10,768	$49,347	$1,104	$48,243	67.2	6,285
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**1,550**	**$12,571**	**$251,424**	**$221,600**	**$25,526**	**$196,074**	**15.6**	**181,471**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	1,550	$12,571	$251,424	$221,600	$25,526	$196,074	15.6	181,471
HVAC System Improvements		**0**	**0.0**	**82**	**$669**	**$9,973**	**$5,455**	**$0**	**$5,455**	**8.2**	**9,660**
ECM 11	Implement Demand Control Ventilation (DCV)	0	0.0	81	$653	$9,796	$5,438	$0	$5,438	8.3	9,428
ECM 12	Install Pipe Insulation	0	0.0	2	$16	$177	$18	$0	$18	1.1	232
Domestic Water Heating Upgrade		**0**	**0.0**	**33**	**$270**	**$4,006**	**$11,543**	**$398**	**$11,145**	**41.3**	**3,899**
ECM 13	Install High Efficiency Gas-Fired Water Heater	0	0.0	32	$261	$3,913	$11,500	$398	$11,102	42.6	3,766
ECM 14	Install Low-Flow DHW Devices	0	0.0	1	$9	$92	$43	$0	$43	4.7	133
Food Service & Refrigeration Measures		**33,119**	**9.0**	**0**	**$3,810**	**$41,269**	**$74,252**	**$4,050**	**$70,202**	**18.4**	**33,350**
ECM 15	Food Service Equipment Replacement	25,558	8.2	0	$2,940	$35,278	$69,994	$3,900	$66,094	22.5	25,736
ECM 16	Replace Refrigeration Equipment	2,040	0.2	0	$235	$2,816	$3,108	$0	$3,108	13.2	2,055
ECM 17	Vending Machine Control	5,521	0.6	0	$635	$3,175	$1,150	$150	$1,000	1.6	5,559
Custom Measures		**50,838**	**0.0**	**1,108**	**$14,835**	**$208,889**	**$234,930**	**$0**	**$234,930**	**15.8**	**180,934**
ECM 18	Computer Power Management Software	11,860	0.0	0	$1,364	$6,821	$4,930	$0	$4,930	3.6	11,943
ECM 19	Installation of an Energy Management System	38,978	0.0	1,108	$13,471	$202,068	$230,000	$0	$230,000	17.1	168,991
TOTALS (COST EFFECTIVE MEASURES)		**370,974**	**55.6**	**2,698**	**$64,559**	**$973,875**	**$655,797**	**$50,925**	**$604,872**	**9.4**	**689,524**
TOTALS (ALL MEASURES)		**404,813**	**71.9**	**2,698**	**$68,452**	**$1,022,738**	**$778,246**	**$55,929**	**$722,318**	**10.6**	**723,600**

* - 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

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 Fluorescent Fixtures with LED Lamps and Drivers	x		x
ECM 3	Retrofit Fixtures with LED Lamps	x		x
ECM 4	Install Occupancy Sensor Lighting Controls	x		x
ECM 5	Install High/Low Lighting Controls			x
ECM 6	Premium Efficiency Motors			x
ECM 7	Install VFDs on Constant Volume (CV) HVAC	x		x
ECM 8	Install VFDs on Hot Water Pumps			x
ECM 9	Install High Efficiency Hot Water Boilers	x		x
ECM 10	Implement Demand Control Ventilation			x
ECM 11	Install Pipe Insulation			x
ECM 12	Install High Efficiency Gas Water Heater	x		x
ECM 13	Install Low-Flow Domestic Hot Water Devices			x
ECM 14	Vending Machine Control	x		x
ECM 15	Computer Power Management Software			x
ECM 16	Installation of an Energy Management System			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 their 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 Camden Middle School. This report provides information on how your facility 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.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

2.1 Site Overview

On November 28, 2019, TRC performed an energy audit at Camden Middle School located in Newark, New Jersey. TRC met with Mr. Williams and Micah Wydman to review the facility operations and help focus our investigation on specific energy-using systems.

Camden Middle School is a three-story, 153,168 square foot building built in 1973. Spaces include: classrooms, gymnasium, library, cafeteria, kitchen, corridors, stairwells, offices, and mechanical space. The facility is 100 percent heated and about 30 percent cooled. The space heating system includes gas fired hot water boilers. The building is partially cooled by a roof top unit, split air-conditioning (AC) systems, and window AC units.

Facility concerns include the lack of control over the HVAC systems and equipment. The boilers are in poor condition and in need of replacement. Two of the eight boilers are currently inoperable. It appears that many manual dial thermostats throughout the building in in poor condition. Based on conversations with facility personnel, an energy management system (EMS) that previously provided control of a portion of building systems is no longer accessible and, therefore, its functionality is unknown.

2.2 Building Occupancy

The facility is occupied from September through June. Typical weekday occupancy is 48 staff and 355 students. Summer occupancy includes continuing custodial and maintenance activities. The sites used by the Newark Public School District for summer school varies on an annual basis. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary based on changes to building use patterns.

Occupancy	Weekday/Weekend	Operating Schedule
Normal School Day	Weekday	8:00AM - 8:00PM
	Weekend (Saturday)	7:00AM - 6:00PM
After Hours Cleaning	Weekday	8:00PM - 11:00PM
	Weekend	6:00PM - 11:00PM
Summer School	Weekday	No Use
	Weekend	No Use

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a stone and brick facade. The roof is flat and covered with neutral toned membrane. The roof is in poor condition; however, the replacement would be a capital improvement with significant costs due to the existing mounted photovoltaic (PV) system. The walls are made of concrete masonry units (CMUs) with a painted CMU interior finish.

Most of the windows are double pane and operable with metal frames. The glass is clear, and most spaces have internal shading. The glass-to-frame and operable window seals are in fair condition. Most of the exterior doors are metal with metal frames and are in fair condition; however, they have worn and missing weather stripping. Degraded window and door seals increase drafts and outside air infiltration.

Weather-stripping in Poor Condition

Weather-stripping in Poor Condition

Roof in Poor Condition

Roof

Building Facade

Building Facade

2.4 Lighting Systems

The primary interior lighting system uses 2', 17-Watt and 4', 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures in the hallway areas. The gymnasium is lit by linear fluorescent T5 high-output, high-bay fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts, and T12 fluorescent lamps use magnetic ballasts. Fixtures throughout the building include surface mounted wrap fixtures, recessed troffer fixtures, and pendant mounted fixtures. Most fixtures are in fair to good condition; however, some fixtures were noted to have missing lamps, and some were missing lenses. The cafeteria also had surface mounted HID fixtures that were in poor condition and were not operating during the site visit, and they are assumed to have been abandoned in place. All exit signs throughout the building are LED. All interior lighting levels were generally sufficient. Interior light fixtures are manually controlled via wall switches.

Surface Mounted Linear T8 Fixtures

2x2 3-lamp T8 Troffer Fixture

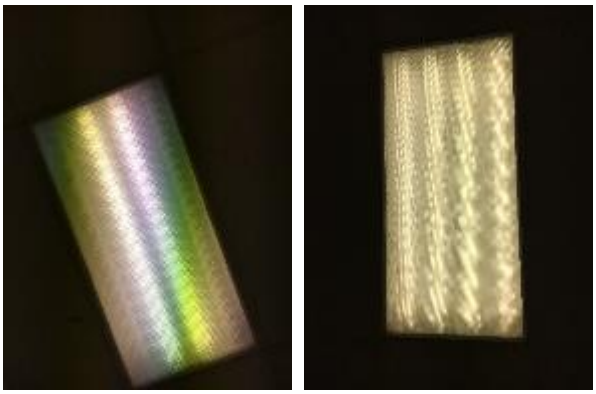
Linear T8 Troffer Fixtures and LED Exit Sign

Compact Fluorescent Fixtures

Pendant Mounted Indirect/Direct T8 Fixtures

Linear T8 Troffer Fixtures

Linear Fluorescent T5HO High Bay Fixtures



Linear Fluorescent T12 vs T8 Troffer Fixture

Wall Switches

Key Switch

Exterior lighting is provided by flood fixtures and pole-mounted area light fixtures with metal halide lamps and ballasts. Building mounted exterior lighting is provided by wall pack fixtures and surface mounted fixtures. Some fixtures incorporate metal halide lamps and others use compact fluorescent lamps. Exterior light fixtures are controlled by time clocks.

Wall Pack HID Fixtures

Surface Mounted HID Fixtures

Various HID Fixtures

Timeclocks

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators include supply fan motors that are manually controlled at the unit. Equipment is in good condition and have pneumatically controlled outside air dampers and fan coil valves.

Unit Ventilator

Manual Fan Speed Control

HVAC Systems and Equipment

There is a 12-ton packaged roof top unit (RTU) that serves a portion of the building. The RTU includes a DX coil for cooling. The unit provides space cooling and ventilation. This unit is equipped with an economizer of unknown condition and functionality.

Roof Top Unit

Roof Top Unit

There are a total of five air handling units (AHUs) that serve larger spaces in the building, including the gymnasium and cafeteria. The AHUs have hot water coils and supply fans and provide space heating and ventilation. All of this equipment was originally controlled by an EMS; however, this system's functionality is unknown.

AHU with Hot Water Coil

AHU serving the Cafeteria

Air-Conditioning Systems

Split AC systems condition some offices and server rooms. There are a total of four 3-ton systems in fair condition and of standard efficiency. Several classrooms and offices are cooled by window and/or portable AC. These vary in capacity between 5,000 btu/hr and 24,000 btu/hr. The units range from poor to good condition and range in efficiency between 8.5 EER to 11 EER, mainly due to equipment age.

Outdoor Condensing Units for Split AC Systems

Window AC Unit

2.6 Heating Hot Water System

There are a total of eight RBI 1657 MBh hot water boilers that serve the building heating load and domestic hot water needs. The burners are fully-modulating with a nominal efficiency of 85 percent. The boilers are in poor condition. Two of the eight boilers are currently inoperable. Based on apparent condition, boiler heating efficiency was de-rated to an estimated 78 percent for the purposes of this report. The boilers are configured in a manual control scheme. According to facility personnel, multiple boilers (four to five) are required under high load conditions. The boilers are over 25 years old and in need of replacement.

The hydronic distribution system is a two-pipe heating only system. The boilers are configured in a constant flow primary distribution with two 30 hp constant speed hot water pumps operating with a lead-lag control scheme. The boilers provide hot water to fin tube radiators, unit ventilators, and AHUs throughout the building, and they generate heat to meet domestic hot water needs of the building year round. Hydronic pipe insulation is in fair condition. There is a section of pipe insulation in a mechanical room that is in poor condition, exposing the hot water pipe. This insulation should be repaired or replaced.

The boilers have manual dial supply water temperature set points that varied. For various boilers, the high limit was set between 200°F and 210°F and an operator set low limit was set between 140°F and 180°F. The exact control logic is unknown. This variability noted on site coincides with the facility concerns about the lack of control over the HVAC systems and equipment.

Hot Water Boilers

Boiler Water Feed Pumps and Motors

Hot Water Pumps and Motors

Heat Timer Boiler Controls

Perimeter Radiators in Hallway

Hot Water Circulator Pump Motor for AHU

2.7 HVAC Controls

A Honeywell EMS was originally installed to provide basic control of the heating system. It is unclear if any other HVAC equipment was set up to be controlled by the EMS. It appears that many manual dial thermostats throughout the building are in poor condition and are set to higher than necessary space heating temperatures. Therefore, these HVAC controls are limited, and there is potential for upgrades. The EMS is no longer accessible and therefore its functionality is unknown. The site staff expressed a strong interest in replacing the EMS and expanding the level of control.

Manual Dial Thermostat in Poor Condition

Manual Dial Thermostats

2.8 Domestic Hot Water

Hot water is produced by a heat exchanger using hot water from a space heating boiler within the boiler plant. Hot water is stored in a storage tank of 85 gallons. The domestic water fractional horsepower circulation pump is broken. The domestic hot water pipes are insulated, and the insulation is in fair condition. The condition of the domestic hot water system is poor, and a separate gas fired water heater should be installed in its place.

Inoperable Storage Tank Water Heater and Broken Hot water Pump Motor

High Flow Sink Aerator

2.9 Food Service Equipment

The kitchen has all-electric equipment that is used to prepare meals for students. Most cooking is done using a convection and combination electric ovens. The steamer and griddle are also used frequently. Equipment is in good condition and standard efficiency. The kitchen does not use a dishwasher.

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

Cooking Equipment

Cooking Equipment

2.10 Refrigeration

The kitchen has several energy efficient stand-up refrigerators and freezers with solid doors. There are also refrigerator chests that are in fair condition and standard efficiency. The kitchen does not have any walk-in refrigeration equipment.

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

Stand up Refrigerators and Freezers

Refrigeration Chest

2.11 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 3 percent of total building energy use. This is lower than a typical building. You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are approximately 162 computer work stations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart boards, projectors, fans, and small printers.

There are several residential style refrigerators and mini-fridges throughout the building. These vary in condition and efficiency.

There are three refrigerated beverage vending machines and two snack machines. Vending machines are not equipped with occupancy-based controls.

Vending Machines

Computer Desktops

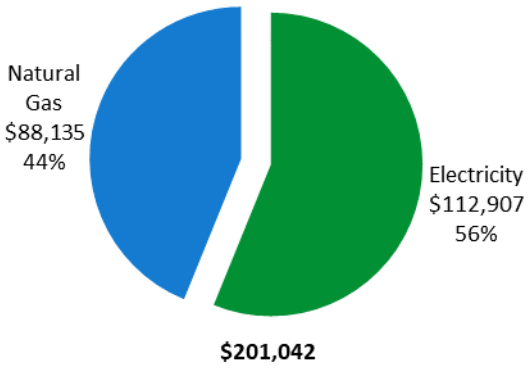
2.12 Water-Using Systems

There are restrooms with toilets, urinals, and sinks throughout the building. Faucet flow rates are low flow 0.5 gallons per minute (gpm) or higher flow at 2.2 gpm. Showers in the locker rooms are not used. Toilets and urinals vary in rated gallons per flush (gpf).

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	981,568 kWh	$112,907
Natural Gas	108,660 Therms	$88,135
Total		**$201,042**



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.

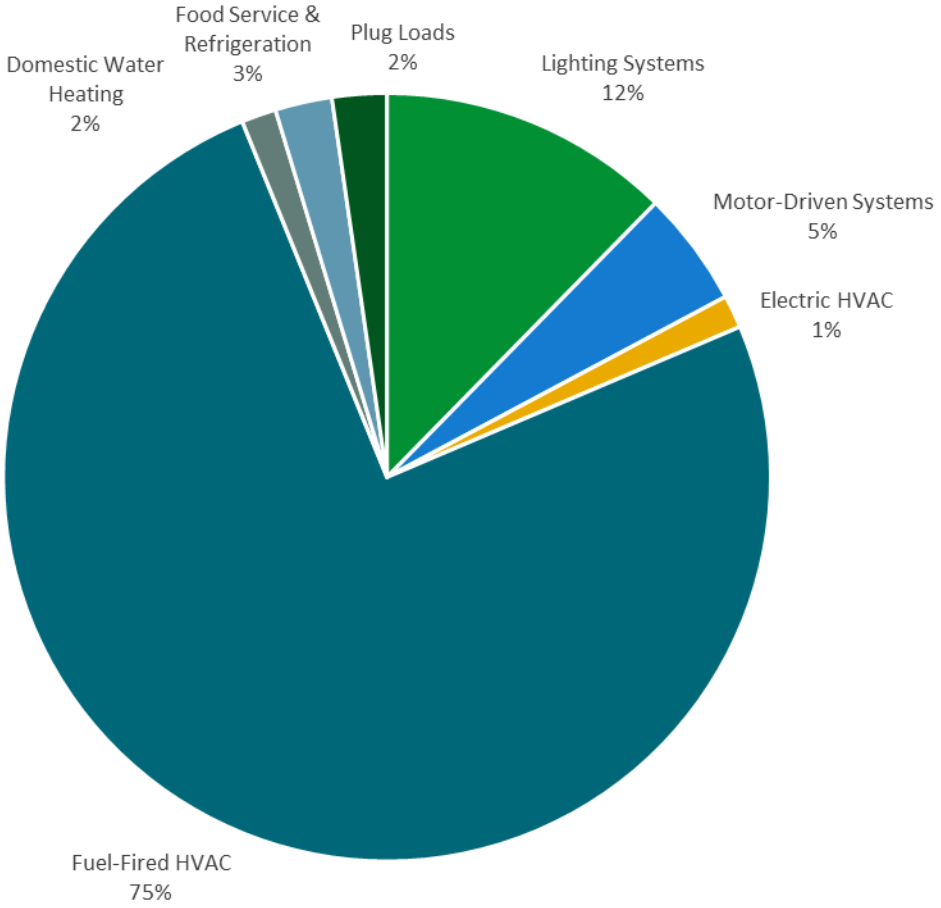
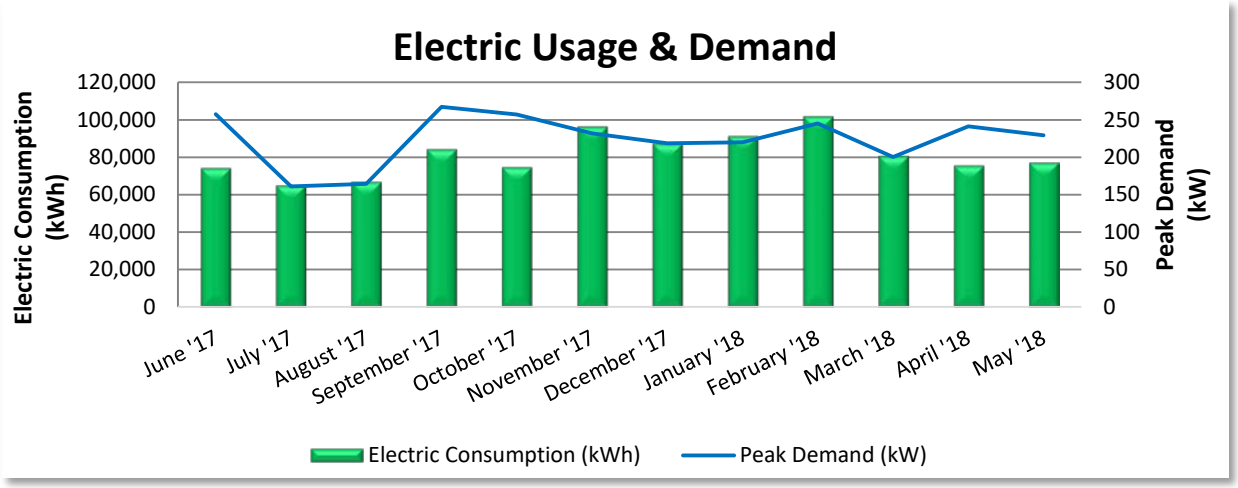


Figure 5 - Energy Balance

3.1 Electricity

PSE&G supplies and delivers electricity under rate class LPLS.



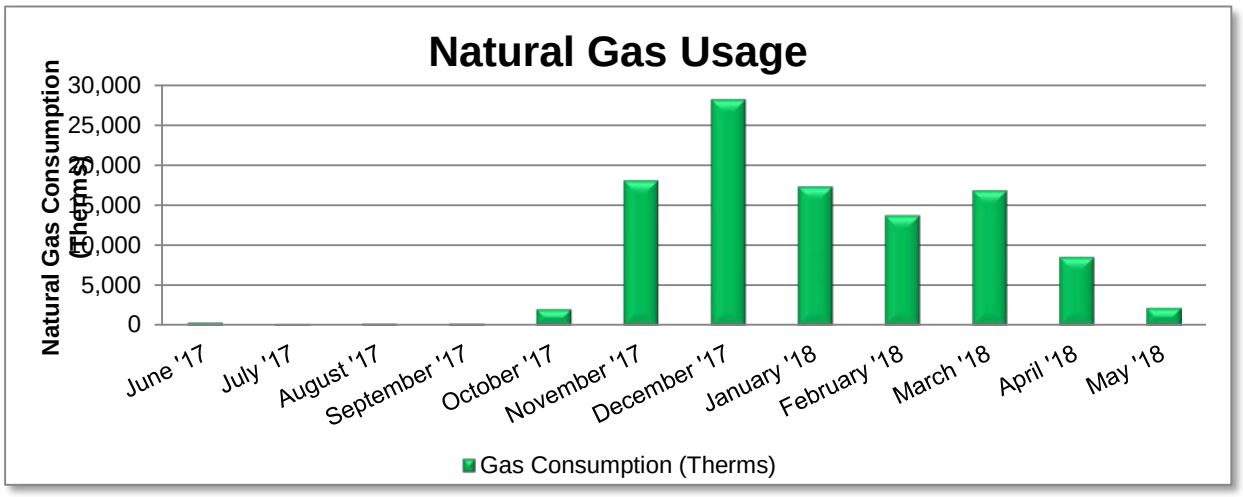
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/12/17	29	74,484	258	$970	$10,962
8/10/17	29	65,267	161	$606	$8,978
9/11/17	32	67,196	165	$620	$8,725
10/10/17	29	84,529	267	$1,007	$8,579
11/8/17	29	74,960	257	$968	$7,436
12/11/17	33	96,720	232	$873	$9,710
1/11/18	31	87,702	219	$824	$9,728
2/9/18	29	91,529	220	$828	$9,743
3/13/18	32	102,108	245	$924	$10,715
4/12/18	30	81,048	200	$755	$8,636
5/11/18	29	75,872	241	$909	$8,468
6/12/18	32	77,464	230	$865	$10,919
Totals	**364**	**978,879**	**267**	**$10,149**	**$112,597**
Annual	**365**	**981,568**	**267**	**$10,177**	**$112,907**

Notes:

- Peak demand of 267 kW occurred in October '17.
- The average electric cost over the past 12 months was $0.115/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.
- The average demand across these twelve months of data is 225 kW.
- PSE&G rents the roof space of this building for a PV System. The PV System is owned and maintained by PSE&G. All of the electrical generation is sent back to the grid. None of the electricity generated by this system is used to lower the building's demand or consumption.

3.2 Natural Gas

PSE&G supplies and delivers natural gas under rate class LVG.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
7/12/17	30	380	$355
8/10/17	29	141	$197
9/11/17	31	208	$237
10/10/17	29	230	$251
11/8/17	29	2,074	$4,269
12/11/17	33	18,164	$15,898
1/11/18	31	28,296	$23,441
2/9/18	29	17,406	$15,117
3/13/18	32	13,782	$11,288
4/12/18	30	16,904	$10,140
5/11/18	29	8,571	$5,243
6/12/18	32	2,206	$1,457
Totals	**364**	**108,362**	**$87,893**
Annual	**365**	**108,660**	**$88,135**

Notes:

- The average gas cost for the past 12 months is $0.811/therm, which is the blended rate used throughout the analysis.
- The minimum gas use of 141 therms in August represents excessive use of the hot water boiler system in order to supply domestic hot water.

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.

Benchmarking Score	7

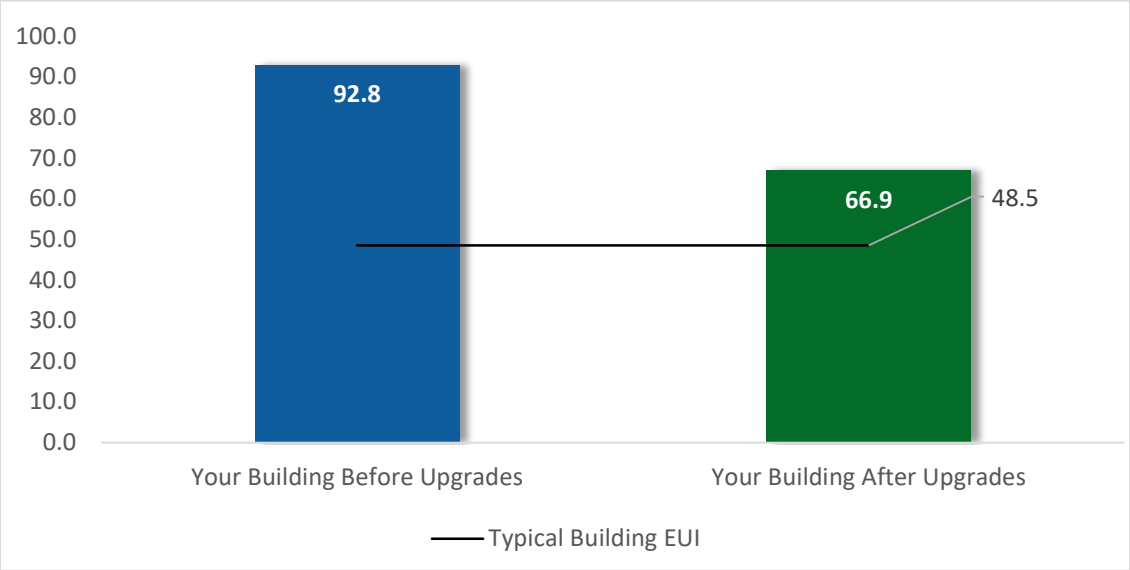


Figure 6 - Energy Use Intensity Comparison

This building performs at, or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

Energy use intensity (EUI) measures energy consumption per square foot and 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 New Jersey Board of Public Utilities. 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		**206,990**	**35.3**	**-60**	**$23,323**	**$98,101**	**$18,221**	**$79,880**	**3.4**	**201,420**
ECM 1	Install LED Fixtures	21,982	2.7	0	$2,528	$28,991	$1,425	$27,566	10.9	22,135
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	11,009	0.9	-4	$1,237	$1,775	$300	$1,475	1.2	10,668
ECM 3	Retrofit Fixtures with LED Lamps	174,000	31.7	-56	$19,557	$67,335	$16,496	$50,839	2.6	168,617
Lighting Control Measures		**47,370**	**7.5**	**-15**	**$5,324**	**$49,116**	**$5,030**	**$44,086**	**8.3**	**45,904**
ECM 4	Install Occupancy Sensor Lighting Controls	22,201	5.5	-7	$2,495	$41,116	$5,030	$36,086	14.5	21,514
ECM 5	Install High/Low Lighting Controls	25,169	2.0	-8	$2,829	$8,000	$0	$8,000	2.8	24,391
Motor Upgrades		**2,117**	**0.6**	**0**	**$243**	**$9,341**	**$0**	**$9,341**	**38.4**	**2,131**
ECM 6	Premium Efficiency Motors	2,117	0.6	0	$243	$9,341	$0	$9,341	38.4	2,131
Variable Frequency Drive (VFD) Measures		**58,138**	**11.5**	**0**	**$6,687**	**$24,560**	**$1,600**	**$22,960**	**3.4**	**58,545**
ECM 7	Install VFDs on Constant Volume (CV) Fans	21,198	5.7	0	$2,438	$7,616	$1,600	$6,016	2.5	21,347
ECM 8	Install VFDs on Heating Water Pumps	36,940	5.8	0	$4,249	$16,944	$0	$16,944	4.0	37,198
Electric Unitary HVAC Measures		**6,241**	**7.9**	**0**	**$718**	**$49,347**	**$1,104**	**$48,243**	**67.2**	**6,285**
ECM 9	Install High Efficiency Air Conditioning Units	6,241	7.9	0	$718	$49,347	$1,104	$48,243	67.2	6,285
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**1,550**	**$12,571**	**$221,600**	**$25,526**	**$196,074**	**15.6**	**181,471**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	1,550	$12,571	$221,600	$25,526	$196,074	15.6	181,471
HVAC System Improvements		**0**	**0.0**	**82**	**$669**	**$5,455**	**$0**	**$5,455**	**8.2**	**9,660**
ECM 11	Implement Demand Control Ventilation (DCV)	0	0.0	81	$653	$5,438	$0	$5,438	8.3	9,428
ECM 12	Install Pipe Insulation	0	0.0	2	$16	$18	$0	$18	1.1	232
Domestic Water Heating Upgrade		**0**	**0.0**	**33**	**$270**	**$11,543**	**$398**	**$11,145**	**41.3**	**3,899**
ECM 13	Install High Efficiency Gas-Fired Water Heater	0	0.0	32	$261	$11,500	$398	$11,102	42.6	3,766
ECM 14	Install Low-Flow DHW Devices	0	0.0	1	$9	$43	$0	$43	4.7	133
Food Service & Refrigeration Measures		**33,119**	**9.0**	**0**	**$3,810**	**$74,252**	**$4,050**	**$70,202**	**18.4**	**33,350**
ECM 15	Food Service Equipment Replacement	25,558	8.2	0	$2,940	$69,994	$3,900	$66,094	22.5	25,736
ECM 16	Replace Refrigeration Equipment	2,040	0.2	0	$235	$3,108	$0	$3,108	13.2	2,055
ECM 17	Vending Machine Control	5,521	0.6	0	$635	$1,150	$150	$1,000	1.6	5,559
Custom Measures		**50,838**	**0.0**	**1,108**	**$14,835**	**$234,930**	**$0**	**$234,930**	**15.8**	**180,934**
ECM 18	Computer Power Management Software	11,860	0.0	0	$1,364	$4,930	$0	$4,930	3.6	11,943
ECM 19	Installation of an Energy Management System	38,978	0.0	1,108	$13,471	$230,000	$0	$230,000	17.1	168,991
TOTALS		**404,813**	**71.9**	**2,698**	**$68,452**	**$778,246**	**$55,929**	**$722,318**	**10.6**	**723,600**

* - 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 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		**206,990**	**35.3**	**-60**	**$23,323**	**$98,101**	**$18,221**	**$79,880**	**3.4**	**201,420**
ECM 1	Install LED Fixtures	21,982	2.7	0	$2,528	$28,991	$1,425	$27,566	10.9	22,135
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	11,009	0.9	-4	$1,237	$1,775	$300	$1,475	1.2	10,668
ECM 3	Retrofit Fixtures with LED Lamps	174,000	31.7	-56	$19,557	$67,335	$16,496	$50,839	2.6	168,617
Lighting Control Measures		**47,370**	**7.5**	**-15**	**$5,324**	**$49,116**	**$5,030**	**$44,086**	**8.3**	**45,904**
ECM 4	Install Occupancy Sensor Lighting Controls	22,201	5.5	-7	$2,495	$41,116	$5,030	$36,086	14.5	21,514
ECM 5	Install High/Low Lighting Controls	25,169	2.0	-8	$2,829	$8,000	$0	$8,000	2.8	24,391
Motor Upgrades		**2,117**	**0.6**	**0**	**$243**	**$9,341**	**$0**	**$9,341**	**38.4**	**2,131**
ECM 6	Premium Efficiency Motors	2,117	0.6	0	$243	$9,341	$0	$9,341	38.4	2,131
Variable Frequency Drive (VFD) Measures		**58,138**	**11.5**	**0**	**$6,687**	**$24,560**	**$1,600**	**$22,960**	**3.4**	**58,545**
ECM 7	Install VFDs on Constant Volume (CV) Fans	21,198	5.7	0	$2,438	$7,616	$1,600	$6,016	2.5	21,347
ECM 8	Install VFDs on Heating Water Pumps	36,940	5.8	0	$4,249	$16,944	$0	$16,944	4.0	37,198
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**1,550**	**$12,571**	**$221,600**	**$25,526**	**$196,074**	**15.6**	**181,471**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	1,550	$12,571	$221,600	$25,526	$196,074	15.6	181,471
HVAC System Improvements		**0**	**0.0**	**82**	**$669**	**$5,455**	**$0**	**$5,455**	**8.2**	**9,660**
ECM 11	Implement Demand Control Ventilation (DCV)	0	0.0	81	$653	$5,438	$0	$5,438	8.3	9,428
ECM 12	Install Pipe Insulation	0	0.0	2	$16	$18	$0	$18	1.1	232
Domestic Water Heating Upgrade		**0**	**0.0**	**33**	**$270**	**$11,543**	**$398**	**$11,145**	**41.3**	**3,899**
ECM 13	Install High Efficiency Gas-Fired Water Heater	0	0.0	32	$261	$11,500	$398	$11,102	42.6	3,766
ECM 14	Install Low-Flow DHW Devices	0	0.0	1	$9	$43	$0	$43	4.7	133
Food Service & Refrigeration Measures		**5,521**	**0.6**	**0**	**$635**	**$1,150**	**$150**	**$1,000**	**1.6**	**5,559**
ECM 17	Vending Machine Control	5,521	0.6	0	$635	$1,150	$150	$1,000	1.6	5,559
Custom Measures		**50,838**	**0.0**	**1,108**	**$14,835**	**$234,930**	**$0**	**$234,930**	**15.8**	**180,934**
ECM 18	Computer Power Management Software	11,860	0.0	0	$1,364	$4,930	$0	$4,930	3.6	11,943
ECM 19	Installation of an Energy Management System	38,978	0.0	1,108	$13,471	$230,000	$0	$230,000	17.1	168,991
TOTALS		**370,974**	**55.6**	**2,698**	**$64,559**	**$655,797**	**$50,925**	**$604,872**	**9.4**	**689,524**

* - 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 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		**206,990**	**35.3**	**-60**	**$23,323**	**$98,101**	**$18,221**	**$79,880**	**3.4**	**201,420**
ECM 1	Install LED Fixtures	21,982	2.7	0	$2,528	$28,991	$1,425	$27,566	10.9	22,135
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	11,009	0.9	-4	$1,237	$1,775	$300	$1,475	1.2	10,668
ECM 3	Retrofit Fixtures with LED Lamps	174,000	31.7	-56	$19,557	$67,335	$16,496	$50,839	2.6	168,617

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 are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing exterior fixtures containing HID and compact fluorescent 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 since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior fixtures and parking garage.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

The measure uses the existing fixture housing but replaces the electric components with more efficient lighting technology which use less power than other lighting technologies but provides equivalent lighting output. Maintenance savings may also be achieved since LED tubes last longer than fluorescent tubes and therefore do not need to be replaced as often.

Affected building areas: all fixtures with fluorescent fixtures with T12 tubes in the hallways.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent T8, incandescent and compact fluorescent lamps with LED lamps. Replace fluorescent T5HO lamp high bay fixtures with reduced wattage 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 a direct replacement for most other lighting technologies.

This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. 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, general purpose compact fluorescent lamps, T5HO lamp fixtures in the gymnasium and cafeteria.

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		**47,370**	**7.5**	**-15**	**$5,324**	**$49,116**	**$5,030**	**$44,086**	**8.3**	**45,904**
ECM 4	Install Occupancy Sensor Lighting Controls	22,201	5.5	-7	$2,495	$41,116	$5,030	$36,086	14.5	21,514
ECM 5	Install High/Low Lighting Controls	25,169	2.0	-8	$2,829	$8,000	$0	$8,000	2.8	24,391

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 4: 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 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, mounted 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: cafeteria, gymnasium, offices, conference rooms, classrooms, library, restrooms, and storage rooms.

ECM 5: 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 level after a predefined period of vacancy.

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

Affected building areas: hallways.

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

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**2,117**	**0.6**	**0**	**$243**	**$9,341**	**$0**	**$9,341**	**38.4**	**2,131**
ECM 6	Premium Efficiency Motors	2,117	0.6	0	$243	$9,341	$0	$9,341	38.4	2,131

ECM 6: Premium Efficiency Motors

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

This measure is recommended as it is coupled with the variable frequency drive (VFD) measures that follow.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Boiler Room	Hot Water Pumps	1	Heating Hot Water Pump	30.0
Boiler Room	Hot Water Pumps	1	Heating Hot Water Pump	30.0
Mechanical Penthouse	AHU-4 Cafeteria	1	Supply Fan	10.0
Mechanical Penthouse	AHU-5 Gymnasium	1	Supply Fan	10.0

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 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		**58,138**	**11.5**	**0**	**$6,687**	**$24,560**	**$1,600**	**$22,960**	**3.4**	**58,545**
ECM 7	Install VFDs on Constant Volume (CV) Fans	21,198	5.7	0	$2,438	$7,616	$1,600	$6,016	2.5	21,347
ECM 8	Install VFDs on Heating Water Pumps	36,940	5.8	0	$4,249	$16,944	$0	$16,944	4.0	37,198

Variable frequency drives 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 —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

ECM 7: 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. Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

ECM 8: Install VFDs on Heating Water Pumps

Install variable frequency drives (VFD) to control heating water pumps. Two-way valves must serve the hot water coils and the hot water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the hot water distribution they will need to be modified when this measure is implemented. As the hot water valves close, the differential pressure increases and the VFD modulates the pump speed to maintain a differential pressure setpoint.

Energy savings result from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.5 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		**6,241**	**7.9**	**0**	**$718**	**$49,347**	**$1,104**	**$48,243**	**67.2**	**6,285**
ECM 9	Install High Efficiency Air Conditioning Units	6,241	7.9	0	$718	$49,347	$1,104	$48,243	67.2	6,285

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 this facility 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 split AC systems and window AC units eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

We evaluated replacement of standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

4.6 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**	**1,550**	**$12,571**	**$221,600**	**$25,526**	**$196,074**	**15.6**	**181,471**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	1,550	$12,571	$221,600	$25,526	$196,074	15.6	181,471

ECM 10: 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 this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. 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.

As the existing boilers are at the end of their useful life it is the recommended that reconfiguring the boiler plant be further evaluated. This is not an investment grade analysis, nor should be used as a basis for design and construction. This measure is linked to a measure to replace the domestic hot water system, which is fed from a heat exchanger from the boiler system. As such, this measure must be considered in combination with that measure (ECM 12).

4.7 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)
HVAC System Improvements		**0**	**0.0**	**82**	**$669**	**$5,455**	**$0**	**$5,455**	**8.2**	**9,660**
ECM 11	Implement Demand Control Ventilation (DCV)	0	0.0	81	$653	$5,438	$0	$5,438	8.3	9,428
ECM 12	Install Pipe Insulation	0	0.0	2	$16	$18	$0	$18	1.1	232

ECM 11: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) monitors the indoor air's carbon dioxide (CO_2) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through excessive fan motor usage as well as heating and cooling the excess outside air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels. DCV is most suited for facilities where occupancy levels vary significantly from hour to hour and day to day.

Energy savings associated with DCV are based on hours of operation, space occupancy, system air flow, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

Affected building areas: gymnasium and cafeteria

ECM 12: Install Pipe Insulation

Install insulation on heating water system piping. Distribution system losses are dependent on water system temperature, the size of the distribution system, and the level of insulation of the piping. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is exposed to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Affected building areas: mechanical room

4.8 Domestic Water 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)
Domestic Water Heating Upgrade		**0**	**0.0**	**33**	**$270**	**$11,543**	**$398**	**$11,145**	**41.3**	**3,899**
ECM 13	Install High Efficiency Gas-Fired Water Heater	0	0.0	32	$261	$11,500	$398	$11,102	42.6	3,766
ECM 14	Install Low-Flow DHW Devices	0	0.0	1	$9	$43	$0	$43	4.7	133

ECM 13: Install High Efficiency Gas-Fired Water Heater

Replace the existing boiler-heat exchanger system with a high efficiency, standalone gas fired storage tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

Showers in the locker rooms are not used. There may be an opportunity to reduce the capacity for the domestic water heating equipment, sized for current domestic hot water needs of the building. As the existing boiler is approaching the end of their useful life, it is the recommended that resizing the domestic hot water system also be evaluated.

This measure is part of a measure to replace the boiler at this site and as such must be considered in combination with ECM 9.

ECM 14: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following are low flow rates for devices. We are recommended to reduce hot water usage by replacing faucet aerators in restrooms.

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Additional cost savings may result from reduced water usage.

4.9 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		**33,119**	**9.0**	**0**	**$3,810**	**$74,252**	**$4,050**	**$70,202**	**18.4**	**33,350**
ECM 15	Food Service Equipment Replacement	25,558	8.2	0	$2,940	$69,994	$3,900	$66,094	22.5	25,736
ECM 16	Replace Refrigeration Equipment	2,040	0.2	0	$235	$3,108	$0	$3,108	13.2	2,055
ECM 17	Vending Machine Control	5,521	0.6	0	$635	$1,150	$150	$1,000	1.6	5,559

Replacing the food service and refrigeration equipment has a long payback period and may not be justifiable based solely on energy considerations. When equipment reaches the end of their normal useful life and eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

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

ECM 15: Food Service Equipment Replacement

Buildings that use a lot of food service equipment are often among the most energy intensive commercial buildings. We evaluated replacement of existing food service equipment with new high efficiency equipment, however, the estimated project payback exceeds the life of the replacement equipment.

Consider replacing the following equipment with high efficiency or ENERGY STAR® labeled versions:

Location	Quantity	Equipment Type	Manufacturer	Model
Kitchen	2	Electric Combination Oven/Steam Cooker (15 - 28 Pans)	Metro	HM2000
Kitchen	1	Electric Convection Oven (Full Size)	Vulcan	
Kitchen	1	Electric Steamer	Vulcan	
Kitchen	1	Electric Griddle (3 Feet Width)	Vulcan	

ECM 16: Replace Refrigeration Equipment

We evaluated replacement of existing refrigerator chests with new ENERGY STAR® rated equipment, however, the estimated project payback exceeds the life of the replacement equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

ECM 17: 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, they 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.

4.10 Custom 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)
Custom Measures		**50,838**	**0.0**	**1,108**	**$14,835**	**$234,930**	**$0**	**$234,930**	**15.8**	**180,934**
ECM 18	Computer Power Management Software	11,860	0.0	0	$1,364	$4,930	$0	$4,930	3.6	11,943
ECM 19	Installation of an Energy Management System	38,978	0.0	1,108	$13,471	$230,000	$0	$230,000	17.1	168,991

ECM 18: Computer Power Management Software

We evaluated the implementation of computer power management software at a high level. The computing environment in most school and office facilities includes desktops, which are typically left on over nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to excessive electrical energy consumption, which may be avoided by proper management. There are innovative software packages available in the market today that are designed to deliver significant energy saving and provide ongoing tracking measurements.

Operational and maintenance benefits are captured through the use of a central power management platform where issues may be diagnosed, and problematic devices may be isolated. Energy savings policies may be enforced as well as identifying and eliminating underutilized devices. This measure investigates the potential benefits to implementing computer power management software to better match the energy use to user needs.

This measure in effort to increase the plug load management of the school district was of interest for facility personnel. Further analysis should be conducted for the feasibility of this measure. An entire baseline tracking of existing computing fleet energy use would need to be performed to optimize proposed software strategies. This would need to be implemented in conjunction with the IT department. This is not an investment grade analysis nor should be used as a basis for design and construction.

ECM 19: Installation of an Energy Management System

The replacement of the existing Energy Management System (EMS) would increase the efficiency of the building HVAC system operation. This evaluation is provided at a high level as it is of great interest for facility personnel.

Upgrade of controls to optimize the start/stop of all key HVAC equipment and tying in all space temperature controls will minimize the amount of wasted energy. Schedules may be put in place to limit system operation when the building is closed. Temperature set back controls may be applied to operate systems only to the point necessary. Ventilation and economizer controls and programming would allow air handling units to operate according to room schedules, occupancy, and availability for "free cooling" or "free heating".

This measure is not recommended based solely on basis of energy and economic results. It should be considered as a capital improvement measure for future implementation. As such, it is recommended that an HVAC engineer or contractor who specializes in energy management systems be contacted for a detailed evaluation and implementation costs. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

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.

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single pane windows and east or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

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

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.

Fans to Reduce Cooling Load

Install ceiling fans to supplement your cooling system. Thermostat settings can typically be increased by 4°F with no change in overall occupant comfort due to the wind chill effect of moving air.

Destratification Fans

For areas with high ceilings, destratification fans f air balance the air temperature from floor to ceiling. They help reduce the recovery time needed to warm the space after nightly temperature setbacks and will increase occupants' the comfort level.

Areas with high ceilings require the heating system to heat a larger volume of space than that which is occupied. As the warm air rises, the warmest space is at the ceiling level, rather than floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, which requires additional energy consumption by the heating equipment to compensate for this accelerated heat transfer.

Economizer Maintenance

Economizers can significantly reduce cooling system load. A malfunctioning economizer can increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air. Common economizer malfunctions include broken outdoor thermostat or enthalpy control, or dampers that are stuck or improperly adjusted.

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position.

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.

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

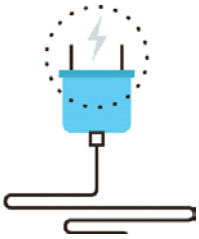
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is 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.

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.

[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

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 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 facility 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.

[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 facility'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 reduction, 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 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 no additional potential for installing a PV array.

This facility already has a PV system installed in all of the available roof space of the building and therefore does not meet the minimum criteria for a cost-effective solar PV installation to be utilized by the school.

The graphic below displays the results of the 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.

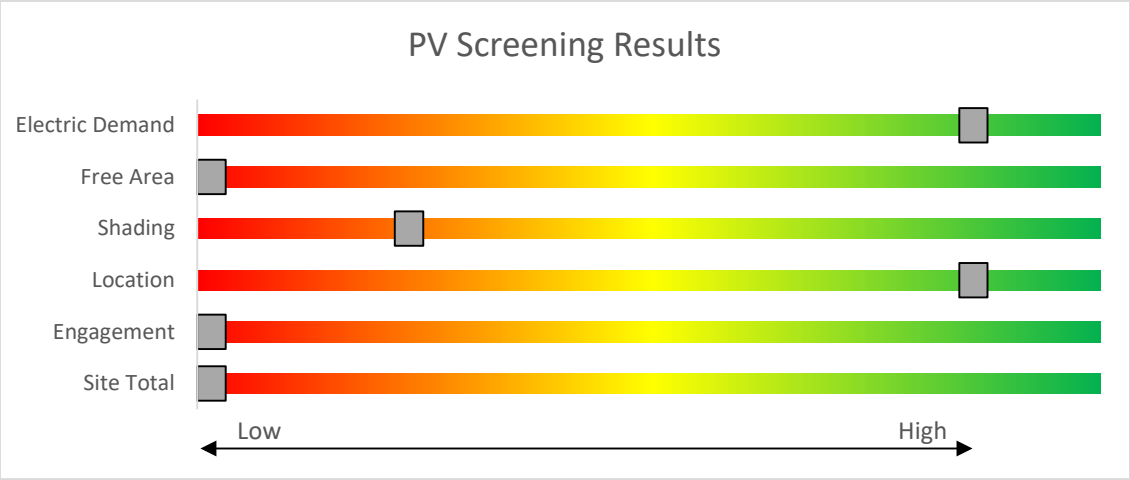


Figure 9 - Photovoltaic Screening

6.2 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility 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.

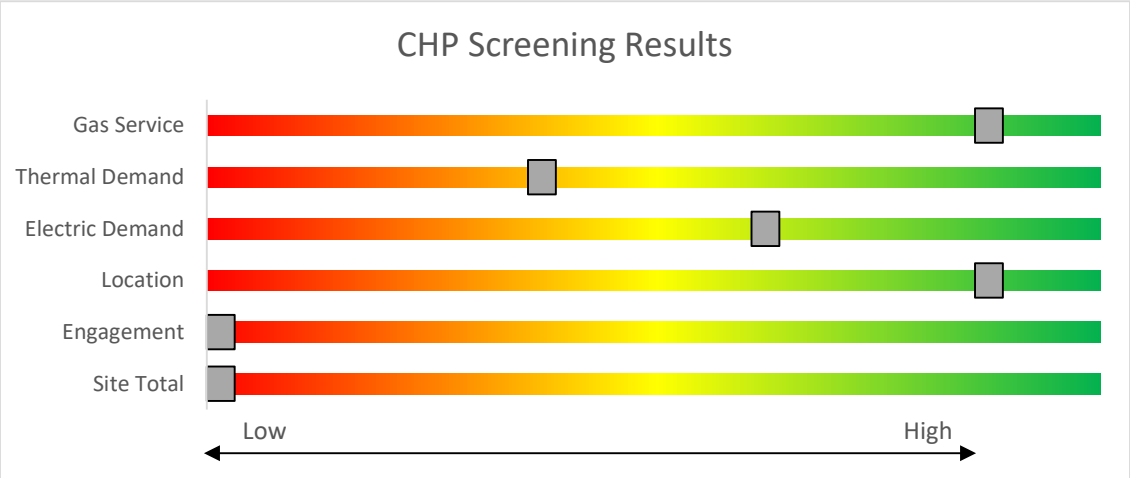


Figure 10 - Combined Heat and Power Screening

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey's Clean Energy Programs can help. 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 your facility. 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 efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

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

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 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.

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.

7.3 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.

7.4 SREC Registration Program

The SREC 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 your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility 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
Old Mechanical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	781	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	781	0.0	55	0	$6	$110	$30	12.9
Garage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,124	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,124	0.0	220	0	$25	$110	$30	3.2
Kitchen	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,124	3	Relamp	No	42	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,124	0.7	3,074	-1	$346	$1,534	$420	3.2
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,124	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,124	0.0	73	0	$8	$37	$10	3.2
Locker Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	39	0	$4	$18	$5	3.0
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,562	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,562	0.0	37	0	$4	$37	$10	6.4
Pantry Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	781	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	781	0.1	124	0	$14	$292	$80	15.2
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	3,124	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,156	0.1	559	0	$63	$419	$60	5.7
Boiler Room	11	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	11	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.1	427	0	$48	$201	$55	3.0
Boiler Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,124	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,124	0.0	220	0	$25	$110	$30	3.2
Storage Room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	781	3	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	781	0.2	183	0	$21	$365	$100	12.9
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	781	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	781	0.0	37	0	$4	$73	$20	12.9
Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,562	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,562	0.0	37	0	$4	$37	$10	6.4
Stairwell	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3	Relamp	No	12	LED - Linear Tubes: (1) 4' Lamp	None	15	8,760	0.1	1,306	0	$147	$219	$60	1.1
Auditorium Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	521	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	521	0.0	26	0	$3	$73	$20	18.2
Auditorium Stage	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,562	3	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,562	0.0	106	0	$12	$195	$36	13.3
Auditorium Stage	96	Incandescent: Screw in Lamps	Wall Switch	S	60	521	3	Relamp	No	96	LED Screw-In Lamps: Screw in Lamps	Wall Switch	15	521	2.2	1,597	-1	$180	$1,654	$96	8.7
Stage Stairs	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,124	3	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,124	0.0	71	0	$8	$65	$12	6.6
Cafeteria	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,124	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,156	0.3	1,313	0	$148	$854	$195	4.5
Cafeteria	8	Linear Fluorescent - T8: 4' T8 (32W) - 6L	Wall Switch	S	176	3,124	3, 4	Relamp	Yes	8	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	2,156	0.5	2,058	-1	$231	$1,146	$275	3.8
Cafeteria	15	Compact Fluorescent: Box Fixtures	Wall Switch	S	168	3,124	3, 4	Relamp	Yes	15	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	118	2,156	0.7	2,890	-1	$325	$1,304	$95	3.7
Cafeteria	3	Compact Fluorescent: Box Fixtures	Wall Switch	S	84	3,124	3, 4	Relamp	Yes	3	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	59	2,156	0.1	289	0	$32	$373	$41	10.2
Cafeteria	18	Compact Fluorescent: Box Fixtures	Wall Switch	S	42	3,124	3, 4	Relamp	Yes	18	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	29	2,156	0.2	867	0	$97	$580	$53	5.4
Cafeteria	18	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	0		None	No	18	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	0	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
Cafeteria Entrance	4	Compact Fluorescent: Screw in Lamps	Wall Switch	S	13	3,124	3	Relamp	No	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	3,124	0.0	35	0	$4	$69	$4	16.7
Cafeteria Entrance	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	S	9	3,124		None	No	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	3,124	0.0	0	0	$0	$0	$0	0.0
Gymnasium	24	Linear Fluorescent - T5HO: 4' T5HO (54W) - 6L	Wall Switch	S	358	3,124	3, 4	Relamp	Yes	24	LED - Linear Tubes: (6) 4' T5HO (25W) Lamps	Occupancy Sensor	153	2,156	3.0	13,438	-4	$1,510	$9,154	$840	5.5
Locker Room	28	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	1,562	3, 4	Relamp	Yes	28	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.3	683	0	$77	$1,051	$210	11.0
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	None	15	1,562	0.0	39	0	$4	$37	$10	6.1
Offices - Locked	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	195	0	$22	$262	$60	9.2
Storage Rooms - Locked	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3, 4	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	539	0.1	98	0	$11	$262	$40	20.2
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	None	15	1,562	0.0	39	0	$4	$37	$10	6.1
Locker Room	28	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	1,562	3, 4	Relamp	Yes	28	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.3	683	0	$77	$1,051	$210	11.0
Hallway	32	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	8,760	3, 5	Relamp	Yes	32	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	6,044	1.2	14,724	-5	$1,655	$3,537	$640	1.8
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 6L	None	S	176	8,760	3, 5	Relamp	Yes	8	LED - Linear Tubes: (6) 4' Lamps	High/Low Control	87	6,044	0.5	5,770	-2	$649	$1,276	$240	1.6
Hallway	45	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	8,760	3, 5	Relamp	Yes	45	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	6,044	1.7	20,706	-7	$2,327	$4,886	$900	1.7
Hallway	15	Linear Fluorescent - T12: 4' T12 (40W) - 4L	None	S	176	8,760	2, 5	Relamp & Reballast	Yes	15	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	6,044	1.0	12,686	-4	$1,426	$2,375	$300	1.5
Main Offiice	36	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	O	32	3,124	3, 4	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.4	1,756	-1	$197	$1,197	$250	4.8
Conference Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,124	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,156	0.1	328	0	$37	$262	$60	5.5
Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Office Room 101	19	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,124	3, 4	Relamp	Yes	19	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,156	0.7	3,118	-1	$350	$1,928	$450	4.2
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,562	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,078	0.1	164	0	$18	$262	$60	11.0
Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,562	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,078	0.1	246	0	$28	$335	$80	9.2
Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,562	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,078	0.1	246	0	$28	$335	$80	9.2
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Slop Sink	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	781	3	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	781	0.0	15	0	$2	$33	$6	15.8
Nurse's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,124	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,124	0.1	497	0	$56	$292	$80	3.8

	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
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.1	684	0	$77	$361	$25	4.4
Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.1	684	0	$77	$361	$25	4.4
Art Classroom	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.2	1,025	0	$115	$653	$140	4.5
Closets	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	39	0	$4	$73	$20	12.2
Storage - Locked	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	39	0	$4	$73	$20	12.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	39	0	$4	$18	$5	3.0
Nurse's Office	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	3,124	3	Relamp	No	4	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	3,124	0.1	244	0	$27	$195	$36	5.8
Conference Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	78	0	$9	$37	$10	3.0
Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.1	293	0	$33	$226	$50	5.3
Resting Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	521	3	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	521	0.1	39	0	$4	$110	$30	18.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,124	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,124	0.0	73	0	$8	$37	$10	3.2
Main Office #2	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,124	3, 4	Relamp	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,156	0.6	2,625	-1	$295	$1,438	$355	3.7
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	39	0	$4	$18	$5	3.0
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	39	0	$4	$73	$20	12.2
Art Classroom 104	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.2	732	0	$82	$544	$110	5.3
Music Room	18	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	3,124	3, 4	Relamp	Yes	18	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	2,156	0.3	1,414	0	$159	$1,148	$197	6.0
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	547	0	$62	$343	$20	5.3
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	547	0	$62	$343	$20	5.3
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Social Worker Offices	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,562	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,078	0.1	157	0	$18	$311	$56	14.4
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1

	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
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Lounge Room 119	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.3	732	0	$82	$1,088	$220	10.5
Classroom 112	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.3	1,464	0	$165	$1,088	$220	5.3
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	547	0	$62	$343	$20	5.3
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	547	0	$62	$343	$20	5.3
Custodial Office 113	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	812	0	$91	$905	$170	8.1
Classroom 114	27	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	27	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	1,096	0	$123	$1,033	$205	6.7
Classroom 116	27	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	27	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	1,096	0	$123	$1,033	$205	6.7
Classroom 117	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	974	0	$110	$978	$190	7.2
Classroom 118	27	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	27	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	1,096	0	$123	$1,033	$205	6.7
Security Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	78	0	$9	$37	$10	3.0
Security Offices - Locked	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	78	0	$9	$73	$20	6.1
Dance Studio	32	LED Screw-In Lamps: Screw in Lamps	Wall Switch	S	7	3,124	4	None	Yes	32	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	7	2,156	0.0	154	0	$17	$540	$70	27.1
Stairwells	90	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3	Relamp	No	90	LED - Linear Tubes: (1) 4' Lamp	None	15	8,760	0.8	9,796	-3	$1,101	$1,643	$450	1.1
Hallway	60	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	8,760	3, 5	Relamp	Yes	60	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	6,044	2.2	27,608	-9	$3,103	$6,382	$1,200	1.7
Slop Sink	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	781	3	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	781	0.0	15	0	$2	$33	$6	15.8
Office	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	220	0	$25	$280	$65	8.7
Classroom 201	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 202	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 203	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 204	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	974	0	$110	$708	$155	5.1
Classroom 205	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	812	0	$91	$635	$135	5.5
Classroom 206	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3

	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
Classroom 207	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 208	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 209	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 210	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Office Work Room 211	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.2	366	0	$41	$544	$110	10.5
Classroom 212	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 213	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 214	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 215	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Teacher Work Room 216	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	220	0	$25	$434	$80	14.4
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	39	0	$4	$18	$5	3.0
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	3,124	0.0	30	0	$3	$16	$3	3.9
Faculty Lounge 217	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	146	0	$16	$226	$50	10.7
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Science Classroom 218	36	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.4	1,756	-1	$197	$1,197	$250	4.8
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Storage Room	2	Incandescent: Screw in Lamps	Wall Switch	S	60	781	3	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	781	0.1	57	0	$6	$34	$2	5.1
Home Economics 219	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.3	732	0	$82	$1,088	$220	10.5
Science Classroom 220	33	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	33	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.4	1,610	-1	$181	$1,142	$235	5.0
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2

	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
Storage Room	2	Incandescent: Screw in Lamps	Wall Switch	S	60	781	3	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	781	0.1	57	0	$6	$34	$2	5.1
Lounge Room 233	27	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	27	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.3	1,317	0	$148	$1,033	$205	5.6
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	10	0	$1	$18	$5	12.2
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	10	0	$1	$18	$5	12.2
Art Classroom 232	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.3	1,464	0	$165	$1,088	$220	5.3
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	19	0	$2	$37	$10	12.2
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Book Room 221	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.2	342	0	$38	$526	$105	11.0
Classroom 231	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	853	0	$96	$653	$140	5.4
Classroom 230	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	812	0	$91	$635	$135	5.5
Classroom 229	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 228	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 227	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 226	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 225	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Office Room 224	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	220	0	$25	$434	$80	14.4
Classroom 223	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Library Room 222	53	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	53	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.6	2,586	-1	$291	$2,048	$405	5.7
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	78	0	$9	$73	$20	6.1
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	39	0	$4	$73	$20	12.2
Hallway	60	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	8,760	3, 5	Relamp	Yes	60	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	6,044	2.2	27,608	-9	$3,103	$6,382	$1,200	1.7

	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
Slop Sink	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	781	3	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	781	0.0	15	0	$2	$33	$6	15.8
Classroom 301	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 302	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 303	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 304	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	974	0	$110	$708	$155	5.1
Classroom 305	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	812	0	$91	$635	$135	5.5
Classroom 306	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 307	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 308	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 309	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,600	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,794	0.3	1,046	0	$118	$763	$170	5.0
Childs Study Team 310	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,078	0.3	629	0	$71	$763	$170	8.4
Office Work Room 311	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	220	0	$25	$434	$80	14.4
Classroom 312	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,600	3, 4	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,794	0.4	1,512	0	$170	$982	$230	4.4
Classroom 312	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,600	0.0	30	0	$3	$33	$6	8.0
Classroom 313	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Office Room 314	36	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.4	878	0	$99	$1,197	$250	9.6
Classroom 315	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.2	732	0	$82	$544	$110	5.3
Office Room 316	9	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,078	0.1	212	0	$24	$563	$89	19.8
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	39	0	$4	$37	$10	6.1
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,124	0.0	39	0	$4	$18	$5	3.0
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	3,124	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	3,124	0.0	30	0	$3	$16	$3	3.9
Faculty Lounge	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,124	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,156	0.1	293	0	$33	$226	$50	5.3
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3

	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
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Classroom 317	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 318	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Closet	2	Incandescent: Screw in Lamps	Wall Switch	S	60	781	3	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	781	0.1	57	0	$6	$34	$2	5.1
Classroom 319	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.3	1,218	0	$137	$1,088	$220	6.3
Classroom 320	36	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.4	1,462	0	$164	$1,197	$250	5.8
Classroom 321	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 338	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 337	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 336	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	410	0	$46	$255	$15	5.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	8,760	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.0	261	0	$29	$107	$10	3.3
Classroom 334	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 333	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	812	0	$91	$635	$135	5.5
Classroom 332	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 331	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 330	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 329	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 328	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Office Room 327	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,078	0.1	220	0	$25	$434	$80	14.4
Classroom 326	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.1	365	0	$41	$434	$80	8.6
Computer Lab 325	36	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.4	1,462	0	$164	$1,197	$250	5.8

	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
Classroom 324	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 323	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Classroom 322	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.2	609	0	$68	$544	$110	6.3
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,562	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,562	0.0	78	0	$9	$73	$20	6.1
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	781	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	781	0.0	39	0	$4	$73	$20	12.2
Exterior	13	Compact Fluorescent: Plug in Lamp / Wall Pack Fixture	Timeclock	S	26	4,015	1	Fixture Replacement	No	13	LED - Fixtures: Other	Timeclock	8	4,015	0.1	940	0	$108	$2,583	$65	23.3
Exterior	8	Metal Halide: (1) 50W Lamp	Timeclock	S	72	4,015	1	Fixture Replacement	No	8	LED - Fixtures: Under Canopy	Timeclock	22	4,015	0.2	1,619	0	$186	$1,943	$0	10.4
Exterior	5	Metal Halide: (1) 100W Lamp	Timeclock	S	128	4,015	1	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	38	4,015	0.2	1,799	0	$207	$2,120	$500	7.8
Exterior	8	Metal Halide: (1) 250W Lamp	Timeclock	S	295	4,015	1	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	89	4,015	0.8	6,633	0	$763	$7,728	$800	9.1
Parking Garage	25	Metal Halide: (1) 70W Lamp	Timeclock	S	95	4,015	1	Fixture Replacement	No	25	LED - Fixtures: Under Canopy	Timeclock	29	4,015	0.8	6,675	0	$768	$8,004	$0	10.4
Parking Lot	12	Metal Halide: (1) 100W Lamp	Timeclock	S	128	4,015	1	Fixture Replacement	No	12	LED - Fixtures: Other	Timeclock	38	4,015	0.5	4,317	0	$497	$6,613	$60	13.2
Transition Spaces	49	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	49	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

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
Boiler Room	Hot Water Pumps	1	Heating Hot Water Pump	30.0	92.4%	No	W	2,034	6, 8	Yes	94.1%	Yes	1	3.1	19,070	0	$2,194	$11,576	$0	5.3
Boiler Room	Hot Water Pumps	1	Heating Hot Water Pump	30.0	92.4%	No	W	2,034	6, 8	Yes	94.1%	Yes	1	3.1	19,070	0	$2,194	$11,576	$0	5.3
Boiler Room	Boiler Feed Pumps	5	Boiler Feed Water Pump	1.0	86.0%	No	W	1,373		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boiler Feed Pumps	2	Boiler Feed Water Pump	1.0	86.0%	No	W	1,373		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boiler Feed Pumps	1	Boiler Feed Water Pump	1.0	86.0%	No	W	1,373		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boiler Exhaust	8	Combustion Air Fan	0.3	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust	3	Exhaust Fan	1.0	86.0%	No	W	2,745		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust	10	Exhaust Fan	0.8	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust	3	Exhaust Fan	0.3	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Unitary HVAC	80	Supply Fan	0.3	74.0%	No	W	3,391		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Penthouse	AHU-4 Cafeteria	1	Supply Fan	10.0	89.5%	No	W	3,391	6, 7	Yes	91.7%	Yes	1	3.0	11,057	0	$1,272	$5,375	$800	3.6
Mechanical Penthouse	AHU-5 Gymnasium	1	Supply Fan	10.0	89.5%	No	W	3,391	6, 7	Yes	91.7%	Yes	1	3.0	11,057	0	$1,272	$5,375	$800	3.6
Boiler Room	AHU-1	1	Supply Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	AHU-2	1	Supply Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3	1	Supply Fan	2.0	86.5%	No	W	2,745		No	86.5%	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 & Offices	Classrooms & Offices	3	Window AC	2.00		B	NR	Yes	3	Window AC	2.00		12.00		1.2	973	0	$112	$6,533	$0	58.3
Classrooms & Offices	Classrooms & Offices	6	Window AC	2.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms & Offices	Classrooms & Offices	2	Window AC	0.42		B	NR	Yes	2	Window AC	0.42		12.00		0.1	109	0	$13	$907	$0	72.1
Classrooms & Offices	Classrooms & Offices	3	Window AC	0.83		B	NR	Yes	3	Window AC	0.83		12.00		0.5	374	0	$43	$2,722	$0	63.3
Classrooms & Offices	Classrooms & Offices	6	Window AC	1.17		N		No							0.0	0	0	$0	$0	$0	0.0
Roof	Outdoor Condensing Units	2	Split-System AC	3.00		B	NR	Yes	2	Split-System AC	3.00		14.00		1.0	811	0	$93	$8,977	$552	90.4
Roof	Outdoor Condensing Units	2	Split-System AC	3.00		B	NR	Yes	2	Split-System AC	3.00		14.00		1.0	811	0	$93	$8,977	$552	90.4
Classrooms & Offices	Portable Units	9	Window AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms & Offices	Old Classroom Units	13	Window AC	1.50		B	NR	Yes	13	Window AC	1.50		12.00		4.0	3,164	0	$364	$21,231	$0	58.3
Classrooms & Offices	New Classroom Units	29	Window AC	1.50		W		No							0.0	0	0	$0	$0	$0	0.0
Lounge	Lounge	2	Window AC	0.88		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU	1	Packaged AC	12.00		W		No							0.0	0	0	$0	$0	$0	0.0

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
Boiler Room	Space Heating System	3	Non-Condensing Hot Water Boiler	######	B	9	Yes	3	Condensing Hot Water Boiler	######	91.00%	Et	0.0	0	1,130	$9,163	$94,971	$10,940	9.2
Boiler Room	Space Heating System	2	Non-Condensing Hot Water Boiler	######	B	9	Yes	2	Condensing Hot Water Boiler	######	91.00%	Et	0.0	0	378	$3,067	$63,314	$7,293	18.3
Boiler Room	Space Heating System	2	Non-Condensing Hot Water Boiler	######	B	9	Yes	2	Condensing Hot Water Boiler	######	91.00%	Et	0.0	0	42	$341	$63,314	$7,293	164.4

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Penthouse	AHU-4 Cafeteria	10	2.00	0.00	0.00	580.13	0.0	0	40	$327	$2,719	$0	8.3
Mechanical Penthouse	AHU-5 Gymnasium	10	2.00	0.00	0.00	580.13	0.0	0	40	$327	$2,719	$0	8.3

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Space Heating Sysem	11	2	2.50	0.0	0	2	$16	$18	$0	1.1

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	Domestic Hot Water System	1	Indirect System	B	12	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	92.00%	Et	0.0	0	32	$261	$11,500	$398	42.6

Low-Flow Device Recommendations

	Recommendation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	13	6	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	1	$9	$43	$0	4.7

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	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Cafeteria	1	Refrigerator Chest	No	NR	Yes	0.1	1,020	0	$117	$1,554	$0	13.2
Cafeteria	1	Refrigerator Chest	No	NR	Yes	0.1	1,020	0	$117	$1,554	$0	13.2

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	Electric Combination Oven/Steam Cooker (15 - 28 Pans)	No	NR	Yes	6.7	20,984	0	$2,414	$53,367	$2,000	21.3
Kitchen	1	Electric Convection Oven (Full Size)	No	NR	Yes	0.4	1,329	0	$153	$7,441	$350	46.4
Kitchen	1	Electric Steamer	No	NR	Yes	0.5	1,465	0	$169	$7,423	$1,250	36.6
Kitchen	1	Electric Griddle (3 Feet Width)	No	NR	Yes	0.6	1,780	0	$205	$1,764	$300	7.1

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
School	162	Computers	120.0	
School	6	Laptops	90.0	
School	67	Fan	100.0	
School	33	TV	150.0	
School	75	Smart Board / Projector	300.0	
School	79	Small Office Printers	50.0	
School	8	Large Xerox- Type Printers	515.0	
School	3	Coffee Maker	400.0	
School	7	Microwave	1,100.0	
School	2	Residential Refrigerator	690.0	
School	4	Large Speakers	500.0	
School	7	Mini Fridge	260.0	
School	6	Large Floor Fans	185.0	
School	4	Large Speakers	500.0	
School	1	Misc. Sound Equipment	3,500.0	
School	1	Misc. IT Equipment	4,500.0	
School	1	Misc Kitchen Equipment	5,500.0	
School	1	Electric Stove	1,500.0	

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
Cafeteria	2	Non-Refrigerated	14	Yes	0.1	685	0	$79	$460	$0	5.8
Cafeteria	2	Refrigerated	14	Yes	0.4	3,224	0	$371	$460	$100	1.0
Lounge	1	Refrigerated	14	Yes	0.2	1,612	0	$185	$230	$50	1.0

Custom Recommendations (Preliminary Screening)

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
162	*Mon - Fri 8AM-5PM*	*Mon - Fri 5PM-8AM*	*Weekends & Holidays*	Energy Rate (W)*	Weekly Run Hours	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	*Weekends & Holidays*	*Energy Rate (W)**	*Weekly Run Hours*	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	Weekends & Holidays	Energy Rate (W)*	*Weekly Run Hours*
Existing Conditions	50%	25%	5%	120	44	20%	15%	5%	80	23	30%	60%	90%	5	102
Proposed Conditions	50%	15%	0%	120	34	10%	5%	0%	80	8	40%	80%	100%	5	126

	Usage per Device			Energy Impact & Financial Analysis					
	Weeks of Use	Annual kWh Usage	*Diversity Factor***	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Desktop*	*Add'l Hardware Cost*	Total Installation Cost	Simple Payback Period (Years)
Existing Conditions	44	333	75%	11,860	$1,364	$15.00	$2,500	$4,930	3.6
Proposed Conditions	44	259							

Note: Diversity Factor is a conservative estimate of how many devices will operate with power management software and will not be manually overridden by users

Installation of an Energy Management System

Existing Conditions				Proposed Conditions			Energy Impact & Financial Analysis					
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Gas Use (mmBtu)*	*Annual Heating Oil Use (mmBtu)*	*Annual Motor HVAC Energy Use (kWh)*	Assumed % Cooling Savings	Assumed % Heating Savings	Assumed % Motor Savings	Total Annual kWh Savings	Total Annual Gas mmBtu Savings	Total Annual Fuel mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
59,754	11,080.7	0.0	209,906	2%	10%	18%	38,978	1,108	0	$13,471	$230,000	17.1

Equations: (Based on Industry Standards)

Average Cost for EMS installation is $1.50/sqft

Based on a comprehensive study by the Environmental Protection Agency, Energy savings range between 10% and 30%.

The HVAC systems should have proper temperature set backs and operate according to occupancy schedules.

Air-handling units should be equipped with outdoor air damper controls and CO2 sensors to provide demand control ventilation.

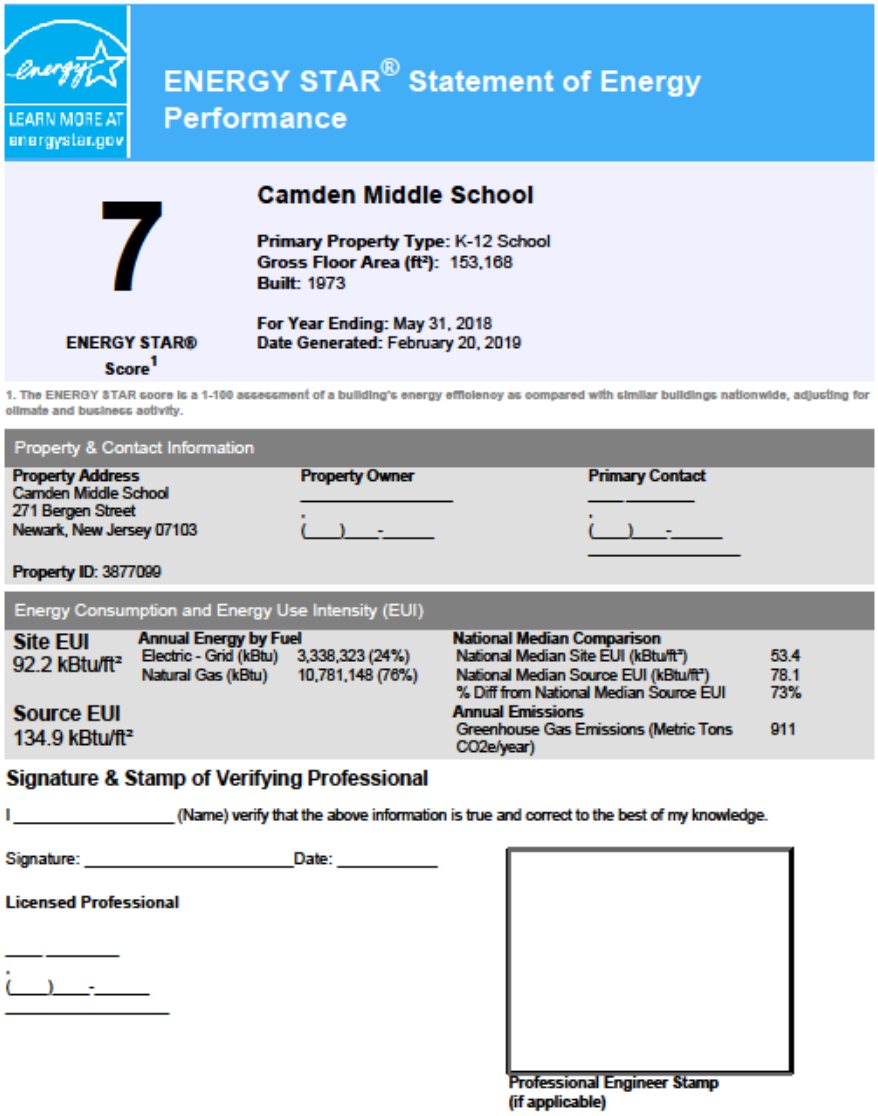
HVAC Improvements revealed through a RCx study should be included within this measure.

Examples are as follows: Check Valve and Damper Operation, Economizer Controls, Temperature and Humidity Sensors, CO2 Sensors, etc.

The building currently has little to no functional control for HVAC equipment and systems. This is a critical maintenance and facility concern.

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.



ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

7

ENERGY STAR® Score[1]

Camden Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 153,168
Built: 1973

For Year Ending: May 31, 2018
Date Generated: February 20, 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
Camden Middle School 271 Bergen Street Newark, New Jersey 07103	_____ . (___)___-_____	___ _____ . (___)___-_____ _____

Property ID: 3877099

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
92.2 kBtu/ft²

Source EUI
134.9 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	3,338,323 (24%)
Natural Gas (kBtu)	10,781,148 (76%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	53.4
National Median Source EUI (kBtu/ft²)	78.1
% Diff from National Median Source EUI	73%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	911

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 alternating current 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.