Local Government Energy Audit Report

General Charles G. Harker School

March 11, 2019

Prepared for:

Swedesboro-Woolwich School District
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Disclaimer

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

TRC 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.

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

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

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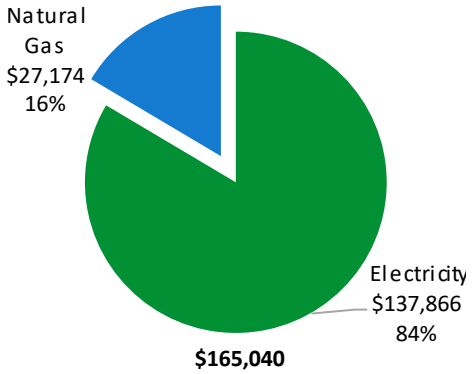
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for General Charles G. Harker 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: $165,040 Electricity: 839,136 kWh Natural Gas: 23,524 Therms	
ENERGY STAR® Benchmarking Score	81 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

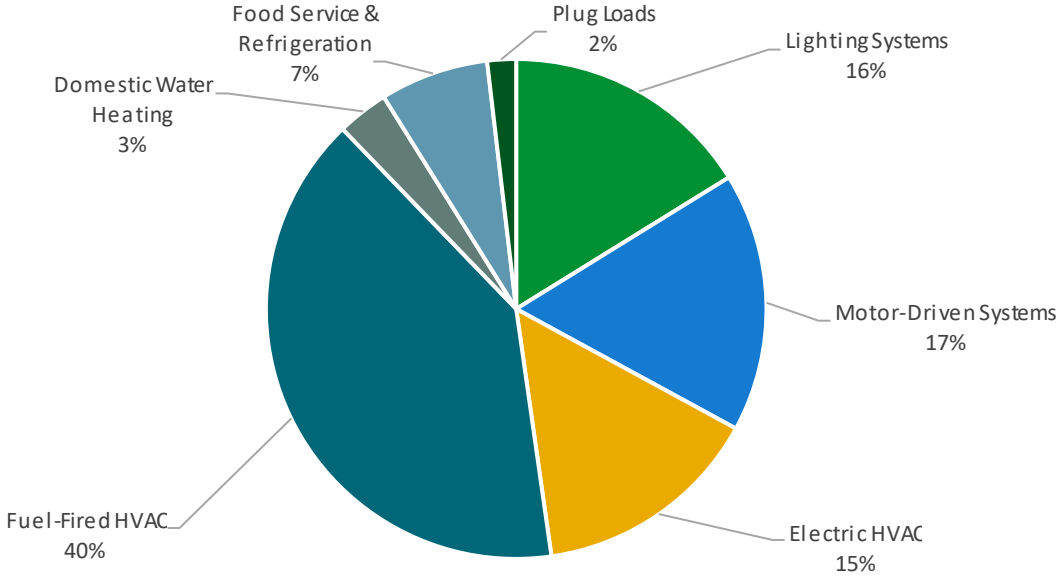


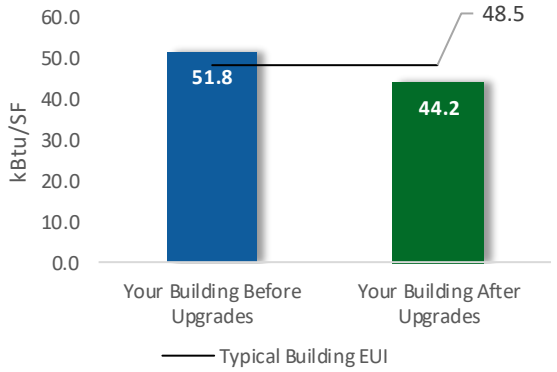
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

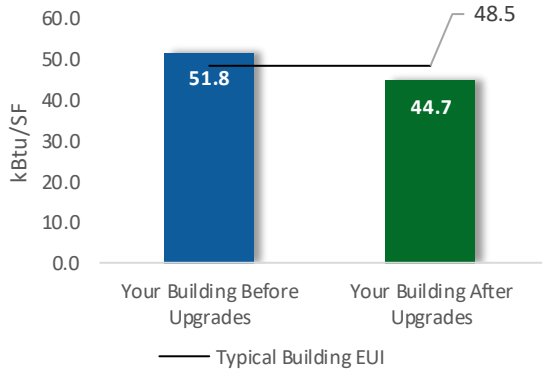
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$277,431
Potential Rebates & Incentives[1]	$38,940
Annual Cost Savings	$35,557
Annual Energy Savings	Electricity: 214,615 kWh Natural Gas: 257 Therms
Greenhouse Gas Emission Savings	110 Tons
Simple Payback	6.7 Years
Site Energy Savings (all utilities)	15%



Scenario 2: Cost Effective Package[2]

Installation Cost	$207,523
Potential Rebates & Incentives	$33,515
Annual Cost Savings	$33,774
Annual Energy Savings	Electricity: 204,914 kWh Natural Gas: 93 Therms
Greenhouse Gas Emission Savings	104 Tons
Simple Payback	5.2 Years
Site Energy Savings (all utilities)	14%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	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		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Motor Upgrades		**397**	**0.2**	**0**	**$65**	**$979**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$979	$11,762	$0	$11,762	180.2	400
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$12,036	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$8,584	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

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

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

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X		X
ECM 2	Retrofit Fixtures with LED Lamps	X		X
ECM 3	Install Occupancy Sensor Lighting Controls	X		X
ECM 4	Install High/Low Lighting Controls			X
ECM 5	Install VFDs on Constant Volume (CV) HVAC	X		X
ECM 6	Install VFDs on Chilled Water Pumps			X
ECM 7	Install Low-Flow Domestic Hot Water Devices			X
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors			X
ECM 9	Vending Machine Control			X

Figure 3 – Funding Options

New Jersey 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. 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 General Charles G. Harker 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 Energy Services (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.

2.1 Site Overview

On August 22, 2018, TRC performed an energy audit at General Charles G. Harker School located in Woolwich Township, NJ. TRC met with Anthony Tobin, Facility Representative to review the facility operations and help focus our investigation on specific energy-using systems.

General Charles G. Harker School is a one-story, 100,748 square foot building built in 2008. Spaces include: classrooms, gymnasium, cafeteria/auditorium, main office, media center, corridors, staffrooms, nurses office, a commercial kitchen and mechanical room.

Facility concerns include: high energy use, heat load and high electric bills.

2.2 Building Occupancy

The school is occupied ten months a year from September through June, however, the facility operates year-round for maintenance and cleaning in summer. Typical weekday occupancy is 50 staff and 655 students. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
General Charles G. Harker School	Weekday	7:00 AM - 4:00 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are made of brick over structural steel and the entrance area is made of concrete blocks. The walls are made of concrete masonry units (CMUs) with a brick veneer and gypsum drywall interior finish.

The roof is flat and covered with a black membrane, and it is in good condition. The flat roof is supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of EPDM.

Most of the windows are double glazed with low-e glass and have aluminum thermal break frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals.

Image 1 Building exterior

Image 2 Building roof

Image 3 Building surroundings

Image 4 Black membrane on roof

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 28-Watt T5 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent and halogen general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffer mounted fixtures and 2-foot fixtures with U-bend and linear tube lamps. Most fixtures are in good condition.

Gymnasium fixtures have high bay 42-Watt CFL lamps and are manually controlled. Library fixtures have high output (HO) linear fluorescent 28-Watt T5 lamps and are controlled by occupancy sensors. All exit signs are LED.

Cafeteria fixtures have 2 and 4-foot long T8 surface mounted fixtures and controlled manually. Lighting fixtures in hallway consist of linear fluorescent, U-bend fluorescent and CFL lamps and are manually controlled. Interior lighting levels were generally sufficient.

Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

Exterior fixtures include wall packs with 150-Watt and 175-Watt metal halide lamps and canopy mounted CFL lamps. Exterior light fixtures are controlled by photocell.

Image 5 Sample CFL lamp

Image 6 Sample bulb

Image 7 Sample 65-Watt incandescent lamp

Image 8 Sample 60-Watt incandescent lamp

2.5 Air Handling Systems

Packaged Units

The school is served by six York packaged roof top units (RTUs) with cooling capacity ranging from 4 to 12.5-tons. There are six gas-fired furnace units ranging in size from 100 to 192 MBh. These units are not equipped with economizers. They are in good condition.

Two McQuay packaged units with cooling capacity of 25-ton and 40-ton are equipped with gas-fired furnaces which have a heating capacity of 75 and 100 MBh respectively. Both units are rated 10.30 EER.

Refer to Appendix A for detailed information about each unit.

Air Conditioners

Staff rooms use three Mitsubishi ductless mini-split air conditioning (AC) units. These vary in capacity between 1 and 3 tons. The units are in good condition. They have an efficiency of 11.90 EER. They are ENERGY STAR® labeled.

The HVAC system is controlled by the energy management system (EMS) located in the maintenance office. HVAC System operates daily 6:00 AM to 4:00 PM from Monday to Friday only.

Image 9 AHUs on roof

Image 10 AHU controls

Image 11 Split system condensing unit

Image 12 RTU nameplate

2.6 Heating Hot Water Systems

Three Fulton 1800 MBh condensing hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 90%. The boilers are configured in a control scheme. Only one boiler is required under high load conditions. Installed in 2008, they are in good condition. There is a service contract in place.

The boilers are configured in a variable flow primary distribution with two 25 hp, VFD-controlled hot water pumps operating with a lead-lag control scheme. The boilers provide hot water to fan coil units throughout the building.

Hot water is supplied at 120°F when the outside air temperature is low, and the setpoint is adjusted linearly to 72°F when the outside air is above 50°F. The hot water return temperature is typically 86°F. The system is locked out at an outside temperature of 72°F.

Image 13 Heating hot water pumps

Image 14 VFDs for heating hot water pumps

Image 15 Boiler plant

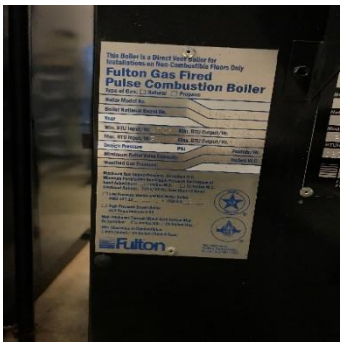


Image 16 Boiler nameplate

2.7 Chilled Water Systems

The chiller plant consists of a two 145-ton, McQuay, R-22, air-cooled screw chillers (CH1 and CH2). The chillers are configured in a primary- secondary distribution loop with three constant flow primary pumps (CHW-4, 5, and 6) and two 15-hp variable flow secondary pumps (CHW-1 and 2). Variable frequency drives control the secondary distribution pumps.

The chilled water supply temperature is reset based on outside air temperature. Chilled water is distributed at 42°F when the outside air temperature is above 60°F and the setpoint is reset to 50°F when the outside air is below 55°F. The chiller plant is locked out when the outside air temperature is below 45°F, and it is turned off from mid-December through February.

The chiller plant supplies chilled water to air handlers one to five (AHUs), and two energy recovery units (HRU-1 & 2). The chiller plant has a peak load of 300 tons. The chiller plant is ten years old but is well maintained and controlled by the building EMS.

Image 17 Chiller 1 on roof

Image 18 Chiller 2 on roof

Image 19 Primary chilled water pumps

Image 20 Secondary chilled water pumps

2.8 Building Energy Management Systems (EMS)

A Johnson Controls EMS controls the HVAC equipment, the boilers, the chillers, the air handlers and the package units. The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures and chilled water loop temperatures.

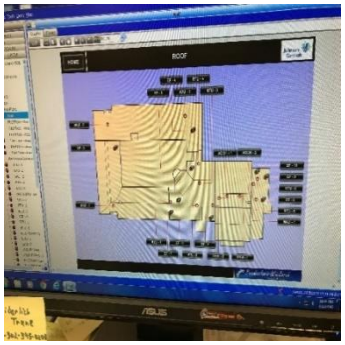


Image 21 Setpoints in EMS

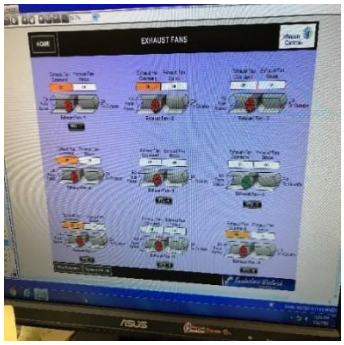


Image 22 Exhaust fan graphics

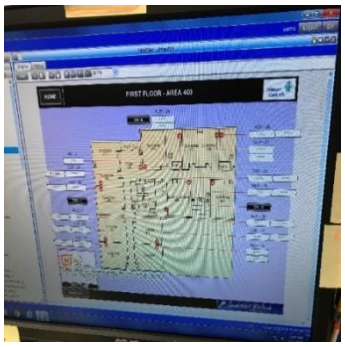


Image 23 School layout in EMS

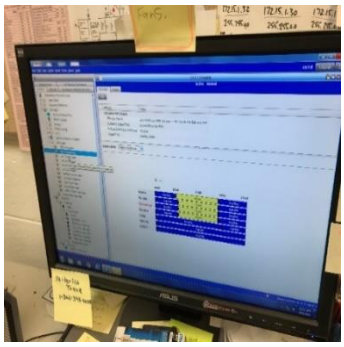


Image 24 Equipment schedule

2.9 Domestic Hot Water

Hot water is produced with a 500 MBH, gas-fired, tankless condensing water heater with a nominal thermal efficiency of 80%. At the time of the site visit, the domestic water heaters were set at 120°F.

The domestic hot water pipes are insulated, and the insulation is in good condition.

There are three 7.5 hp domestic cold-water (DCW) pumps used to provide cold water to the kitchen and restrooms.

Image 25 Tankless hot water heater

Image 26 DHW nameplate

2.10 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare lunches for students. Most cooking is done using three electric ovens. Bulk prepared foods are held in six electric holding cabinets. Equipment is not high efficiency and is in good condition. There is a gas steamer and gas griddle to grill vegetables and boiled food.

The dishwasher is an ENERGY STAR® high temperature, single tank conveyor type unit with electric booster heater.

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

Image 27 Electric convection ovens

Image 28 Food warmers

Image 29 Gas griddle

Image 30 Gas steamer

2.11 Refrigeration

The kitchen has two stand-up refrigerators with glass doors, two stand-up freezers with glass doors, two chest-type freezer units for ice cream storage and two chest-type refrigerator units. All equipment is standard efficiency and in good condition.

The walk-in refrigerator has an estimated 1-ton compressor located on roof and a fan evaporator with evaporator fan and electric defrost control.

The walk-in low temperature freezer has a 2-ton compressor located on roof and an evaporator fan with evaporator fan control.

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

Image 31 Walk in freezer

Image 32 Stand up refrigerator

Image 33 Condensing units on roof

Image 34 Stand up refrigerator

2.12 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 1.86% 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 115 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, and printers.

There are several residential-style refrigerators throughout the building that are used to store staff lunches and cold beverage for teachers' events. These vary in condition and efficiency.

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

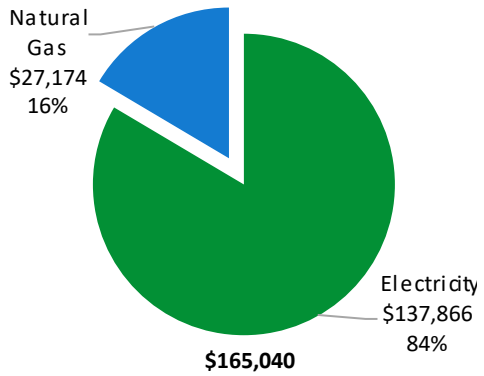
2.13 Water-Using Systems

There are 12 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.2 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	839,136 kWh	$137,866
Natural Gas	23,524 Therms	$27,174
Total		**$165,040**



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.

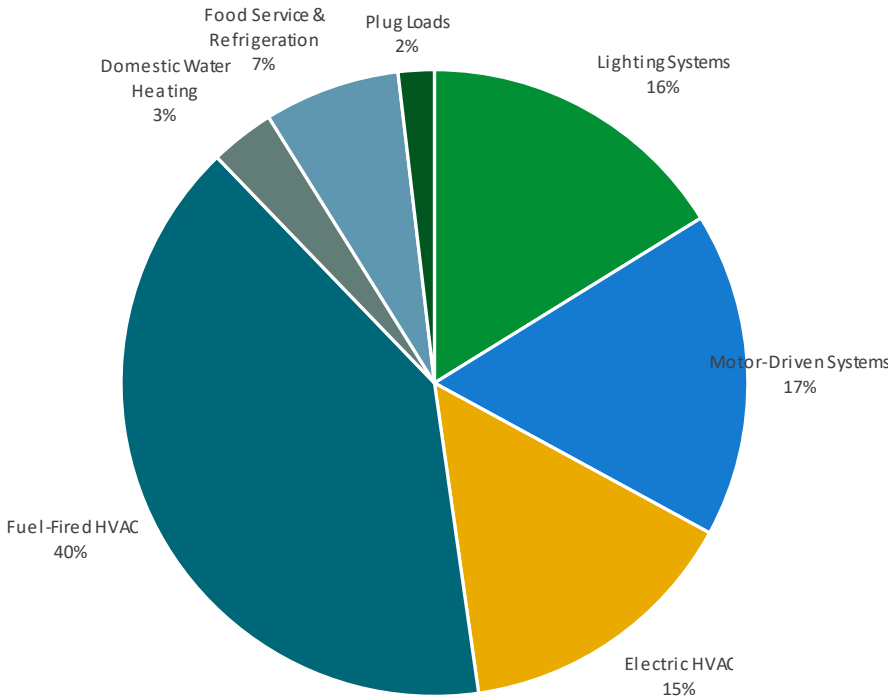
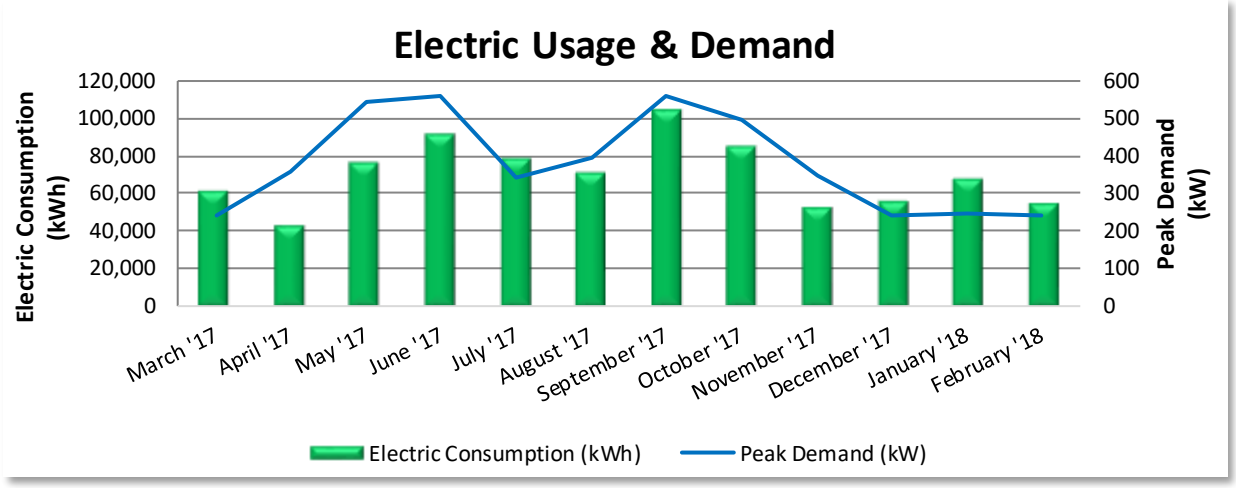


Figure 5 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class annual general service secondary.



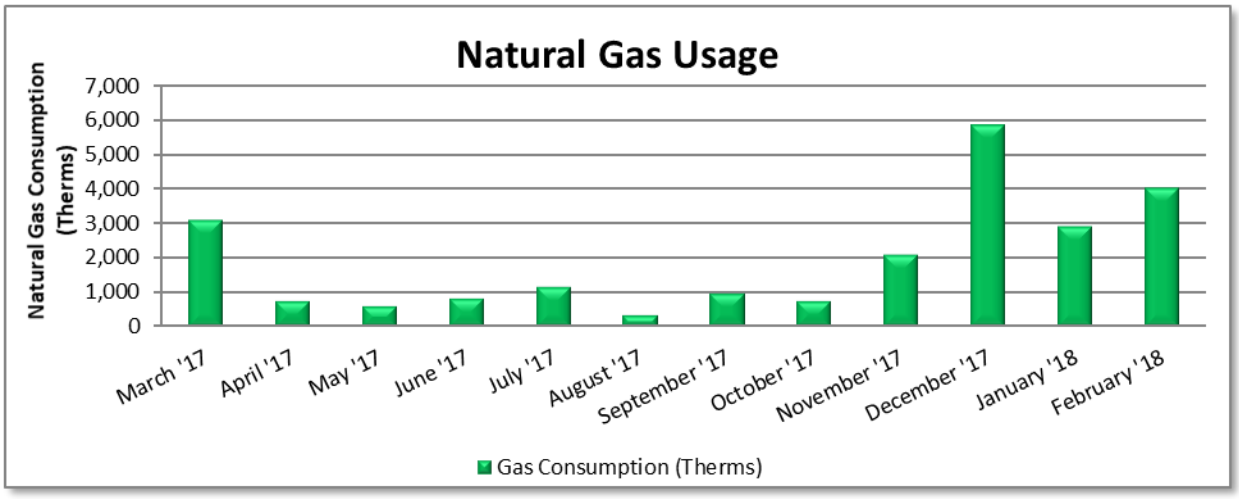
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
3/30/17	30	60,912	239	$4,131	$11,288
4/27/17	28	42,557	359	$3,732	$8,842
5/30/17	33	75,857	544	$5,281	$14,199
6/29/17	30	90,911	558	$4,923	$13,450
7/30/17	31	78,391	341	$4,131	$11,520
8/30/17	31	70,589	394	$4,131	$10,712
9/28/17	29	103,529	558	$4,759	$14,847
10/30/17	32	84,371	496	$5,137	$13,091
11/29/17	30	52,420	347	$4,363	$9,208
12/28/17	29	55,204	240	$4,217	$9,294
1/30/18	33	67,582	244	$4,790	$11,513
2/27/18	28	54,514	241	$4,064	$9,525
Totals	**364**	**836,837**	**558**	**$53,659**	**$137,489**
Annual	**365**	**839,136**	**558**	**$53,807**	**$137,866**

Notes:

- Peak demand of 558 kW occurred in September 2017.
- The average electric cost over the past 12 months was $0.164/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

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



Gas Billing Data				
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**	**TRC Estimated Usage?**
4/5/17	30	3,106	$3,114	No
5/4/17	29	744	$827	No
6/5/17	32	598	$680	No
7/6/17	31	840	$901	Yes
8/4/17	29	1,180	$1,292	No
9/7/17	34	343	$421	No
10/4/17	27	973	$1,063	No
11/6/17	33	765	$885	Yes
12/5/17	29	2,095	$2,521	Yes
1/8/18	34	5,874	$7,010	No
2/7/18	30	2,947	$3,543	No
3/6/18	27	4,060	$4,917	No
Totals	**365**	**23,524**	**$27,174**	
Annual	**365**	**23,524**	**$27,174**	

Notes:

- The average gas cost for the past 12 months is $1.155/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, 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	81

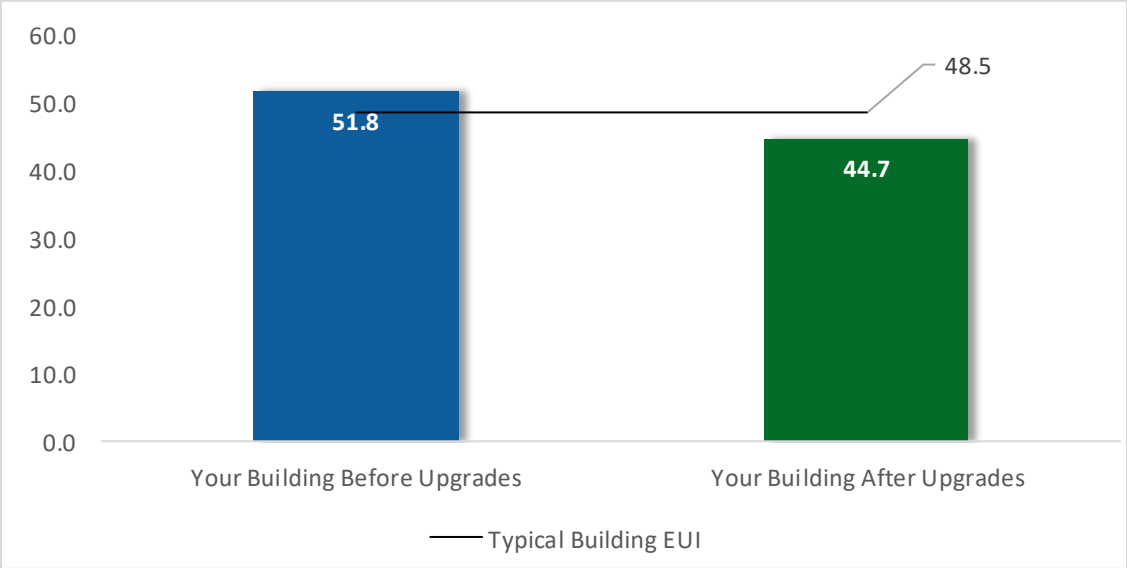


Figure 6 - Energy Use Intensity Comparison

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

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

Tracking Your Energy Performance

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

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

Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	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		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Motor Upgrades		**397**	**0.2**	**0**	**$65**	**$979**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$979	$11,762	$0	$11,762	180.2	400
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$12,036	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$8,584	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

* - 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 ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

* - 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		**140,239**	**41.7**	**-23**	**$22,773**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$58,962	$14,010	$44,952	2.7	100,547

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 fixtures containing halogen, incandescent and metal halide 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 retrofitted 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

ECM 2: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, CFL, or incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as 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: classrooms, staff rooms, library, hallways, main office, nurses' room, auditorium and restrooms

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		**35,446**	**11.8**	**-7**	**$5,738**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$8,800	$8,535	$265	0.3	5,159

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

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend 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: offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms

ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

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

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		**397**	**0.2**	**0**	**$65**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$11,762	$0	$11,762	180.2	400

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.

Replacing standard efficiency motors with NEMA Premium® efficiency motors has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency motor can be justified by the marginal savings from the improved efficiency. When the motors are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Mechanical Room	CHW-4	1	Chilled Water Pump	15.0	CHW Supply Pump
Mechanical Room	CHW-5	1	Chilled Water Pump	15.0	CHW Supply Pump
Mechanical Room	CHW-6	1	Chilled Water Pump	15.0	CHW Supply Pump

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Roof	RTU-1	1	Supply Fan	3.0	Supply Fan
Roof	RTU-2	1	Supply Fan	3.0	Supply Fan
Roof	RTU-3	1	Supply Fan	5.0	Supply Fan
Roof	RTU-4	1	Supply Fan	1.5	Supply Fan
Roof	RTU-5	1	Supply Fan	3.0	Supply Fan
Roof	RTU-6	1	Supply Fan	2.0	Supply Fan

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		**26,358**	**11.1**	**0**	**$4,331**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$15,583	$0	$15,583	5.1	18,715

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 5: Install VFDs on Constant Volume (CV) Fans

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

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

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating.

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

Affected air handlers: RTU-1 through 6

ECM 6: Install VFDs on Chilled Water Pumps

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

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will need to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

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

Affected pumps: CHW-4, 5 & 6

4.5 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**	**40**	**$460**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$201	$0	$201	0.4	4,667

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

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.

Affected areas: restroom and kitchen sinks

4.6 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$460	$0	$460	1.4	1,968

Food Service Equipment Replacement

Buildings that use a lot of food service equipment are often among the most energy intensive commercial buildings. Replace existing food service equipment with new high efficiency equipment. Consider replacing the following equipment with high efficiency or ENERGY STAR® labeled versions:

Location	Quantity	Equipment Type	Manufacturer	Model
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	True	TR1HPT-2HS-2HS
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	Wells	MOO400DM
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	APW Wyott	CW-4
Kitchen	1	Electric Convection Oven (Full Size)	Blodgett	Zephaire-100-G
Kitchen	2	Electric Convection Oven (Full Size)	Vulcan	VC4GD-10
Kitchen	1	Gas Steamer	Vulcan	VSX24G5
Kitchen	1	Gas Griddle (≤2 Feet Width)	Vulcan	24S-4BN

Replacing food service equipment with ENERGY STAR® labeled equipment has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency equipment can be justified by the marginal savings from the improved efficiency. When the equipment is 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 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in [walk-in coolers and freezers]. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

Replace Refrigeration Equipment

Replace existing commercial refrigerators and freezers with new ENERGY STAR® rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

Replacing refrigeration equipment with ENERGY STAR® labeled equipment has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency equipment can be justified by the marginal savings from the improved efficiency. When the equipment will eventually replace, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: 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.

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.

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.

Lighting Controls

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

Motor Maintenance

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

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

Thermostat Schedules and Temperature Resets

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

Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save five to ten percent of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

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.

Furnace Maintenance

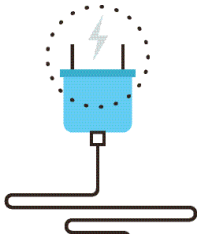
Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas/carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or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

Water Heater Maintenance

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

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

Plug Load Controls



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

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

[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 is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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

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

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.

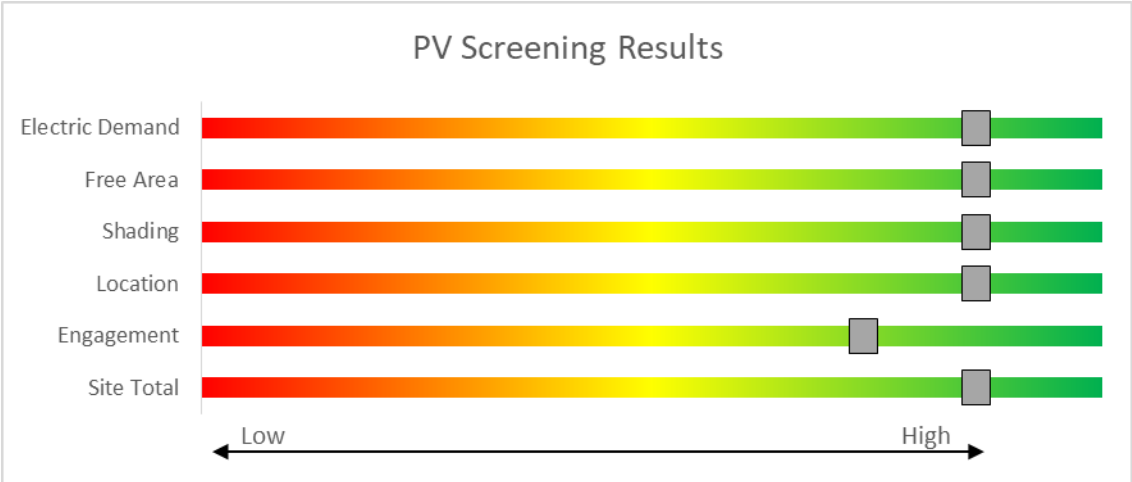


Figure 9 - Photovoltaic Screening

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

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

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

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

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

6.2 Combined Heat and Power

Combined heat and power (CHP) 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.

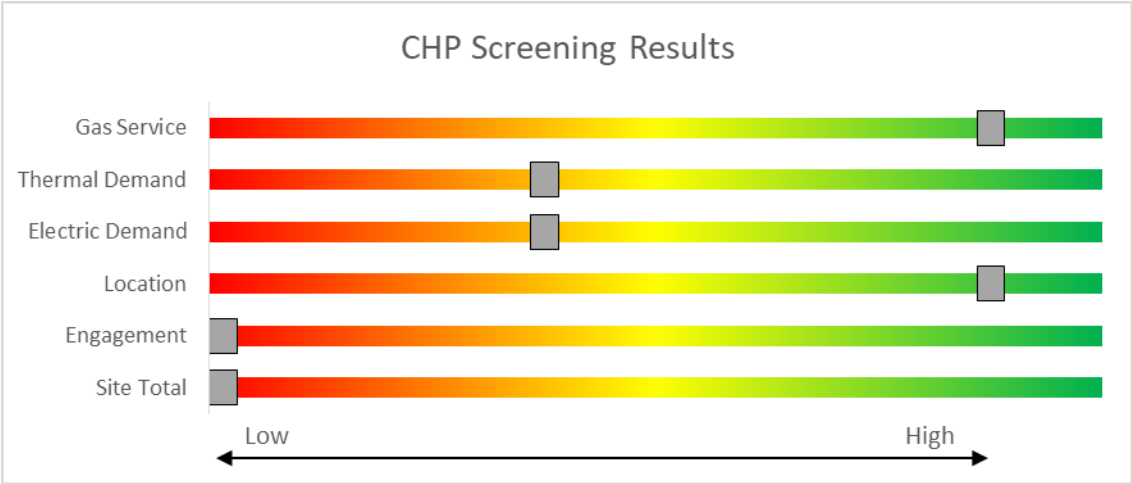


Figure 10 - Combined Heat and Power Screening

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

7 Project Funding and Incentives

Ready to improve your building's performance? New Jersey 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 in New Jersey 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.

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

Incentives

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

How to Participate

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

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

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

7.3 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

7.4 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.

7.5 SREC Registration Program

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

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. SRECs 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 SRECs 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
Room 509	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$178	$978	$190	4.4
Room 508	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 507	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$178	$978	$190	4.4
Room 506	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 505	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 504	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 503	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 502	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 501	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 421	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 420	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 418	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 417	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 416	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 415	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Room 414	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 413	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 411	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 410	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 409	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 405	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 404	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 403	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 402	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 401	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6

	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
Room 316	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 315	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 314	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 313	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 311	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 311	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 310	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 309	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 308	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 306	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,366	2	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	595	0	$96	$438	$120	3.3
Room 306	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,366	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.0	50	0	$8	$37	$10	3.3
Room 306	1	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Occupancy Sensor	S	84	1,366	2	Relamp	No	1	LED - Fixtures: Other	Occupancy Sensor	59	1,366	0.0	38	0	$6	$49	$0	8.0
Room 305	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 304	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 303	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 302	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 301	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 218	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
Room 217	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$89	$489	$95	4.4
Room 215	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 214	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 213	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 212	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 211	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 210	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 125	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$59	$416	$75	5.8
Room 116	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 111	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 110	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
Room 109	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
Restroom 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$20	5.7
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,980	0.0	35	0	$6	$33	$6	4.7
Refrigerator	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	30	0	$5	$73	$20	10.9
Refrigerator	1	Incandescent: Bulb (60W) - 1L	Wall Switch	S	60	440	2	Relamp	No	1	LED Screw-In Lamps: LED Bulb - 1L	Wall Switch	9	440	0.0	25	0	$4	$17	$1	4.1
Kitchen	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.6	1,921	0	$311	$1,307	$280	3.3
Kitchen	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	58	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	58	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	1.6	4,956	-1	$802	$6,003	$2,380	4.5
Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,366	0.3	823	0	$133	$529	$290	1.8
Hallway	83	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	83	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,366	2.5	7,591	-2	$1,229	$5,831	$3,630	1.8
Hallway	12	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	S	30	1,980	2, 4	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,366	0.2	523	0	$85	$619	$460	1.9
Hallway	19	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	19	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	2	Compact Fluorescent: Curveloom Bulb (50W) - 2L	Wall Switch	S	100	1,980	2, 4	Relamp	Yes	2	LED - Fixtures: Downlight Pendant	High/Low Control	70	1,366	0.1	225	0	$36	$298	$70	6.2
Hallway	3	Compact Fluorescent: 4 Pin CFL (46W) - 2L	Wall Switch	S	92	1,980	2, 4	Relamp	Yes	3	LED - Fixtures: Other	High/Low Control	64	1,366	0.1	311	0	$50	$346	$105	4.8
Hallway	16	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 4	Relamp	Yes	16	LED - Fixtures: Other	High/Low Control	59	1,366	0.5	1,513	0	$245	$1,380	$560	3.3
Hallway	78	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 4	Relamp	Yes	78	LED - Fixtures: Other	High/Low Control	22	1,366	0.9	2,811	-1	$455	$3,868	$2,600	2.8
Girls 4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Girls 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1

	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
Girls 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Girls	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$20	5.7
Freezer	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	30	0	$5	$73	$20	10.9
Freezer	1	Incandescent: Bulb (60W) - 1L	Wall Switch	S	60	440	2	Relamp	No	1	LED Screw-In Lamps: LED Bulb - 1L	Wall Switch	9	440	0.0	25	0	$4	$17	$1	4.1
Exterior	34	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	34	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	53	4,380	2.8	24,200	0	$3,976	$32,843	$3,400	7.4
Exterior	6	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.4	3,811	0	$626	$5,796	$600	8.3
Exterior	2	Halogen Incandescent: Bulb (150W) - 1L	Photocell		150	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	23	4,380	0.1	1,117	0	$184	$1,932	$200	9.4
Exterior	12	Compact Fluorescent: 4 Pin CFL (18W) - 1L	Photocell		18	4,380	2	Relamp	No	12	LED - Fixtures: Other	Photocell	13	4,380	0.0	284	0	$47	$204	$0	4.4
Boys 4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
516 Electrical Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	32	0	$5	$73	$20	10.3
515 Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	32	0	$5	$73	$20	10.3
514 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
513 Computer Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.6	1,934	0	$313	$1,146	$275	2.8
512 Faculty restroom	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
510 Group room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
500 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
419 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
406 Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.2	122	0	$20	$335	$60	13.9
400 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
300 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
222 Computer Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.6	1,934	0	$313	$1,146	$275	2.8
221 Server room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0

	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
220 IT Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	412	0	$67	$434	$80	5.3
220 IT Office	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,980	2	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,980	0.0	60	0	$10	$49	$9	4.1
219 Speech Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
216 Library	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,366	2	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	298	0	$48	$219	$60	3.3
216 Library	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.9	2,744	-1	$444	$1,635	$370	2.8
216 Library	36	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Occupancy Sensor	S	54	1,366	2	Relamp	No	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,366	1.0	2,137	0	$346	$657	$180	1.4
216 Library	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
216 Library	17	Compact Fluorescent: Curveloom Bulb (50W) - 2L	Occupancy Sensor	S	100	1,366	2	Relamp	No	17	LED - Fixtures: Decorative Pendant	Occupancy Sensor	70	1,366	0.4	766	0	$124	$829	$0	6.7
216 Library	2	Compact Fluorescent: 4 Pin CFL (46W) - 2L	Wall Switch	S	92	1,980	2, 3	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	64	1,366	0.1	207	0	$34	$65	$0	1.9
216 Library	23	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 3	Relamp	Yes	23	LED - Fixtures: Ceiling Mount	Occupancy Sensor	59	1,366	0.7	2,175	0	$352	$1,662	$70	4.5
209 Closet	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	440	2	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	440	0.0	15	0	$3	$65	$12	21.2
208 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
207 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
206 Work Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$59	$416	$75	5.8
205 Health	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,280	0	$207	$781	$175	2.9
205 Conference	9	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 3	Relamp	Yes	9	LED - Fixtures: Other	Occupancy Sensor	59	1,366	0.3	851	0	$138	$709	$35	4.9
204 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
203 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
202 Principal	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,366	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	337	0	$54	$292	$80	3.9
200 Main	22	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2, 3	Relamp	Yes	22	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,366	0.3	1,019	0	$165	$1,255	$202	6.4
200 Main	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
200 Main	7	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	7	LED - Fixtures: Other	Occupancy Sensor	22	1,366	0.1	252	0	$41	$384	$35	8.5
134 Warewash	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	412	0	$67	$434	$80	5.3
133 Pot wash	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
132 Art Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.1	48	0	$8	$110	$30	10.3

	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
131 Art Room	33	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	33	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	1.0	3,018	-1	$489	$1,745	$400	2.8
129 Music Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	440	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	440	0.1	48	0	$8	$110	$30	10.3
129 Music Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.1	64	0	$10	$146	$40	10.3
128 Music Room	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.9	2,744	-1	$444	$1,365	$335	2.3
127 IT	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
126 Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
126 Vestibule	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
126 Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.2	163	0	$26	$408	$80	12.5
126 Storage	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
122 Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
121 Kitchen Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
120 Break room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
117 Custodian	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
115 Stage	31	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	31	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.9	2,835	-1	$459	$1,672	$380	2.8
115 Stage	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
115 Stage	7	Compact Fluorescent: 4 Pin CFL (42W) - 1L	Wall Switch	S	42	1,980	2, 3	Relamp	Yes	7	LED - Fixtures: Other	Occupancy Sensor	29	1,366	0.1	331	0	$54	$526	$35	9.2
114 Cafeteria	50	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	50	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	2.3	6,859	-1	$1,110	$3,549	$855	2.4
114 Cafeteria	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,366	0.1	185	0	$30	$246	$44	6.7
114 Cafeteria	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
112 Mechanical Room	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.5	335	0	$54	$767	$210	10.3
112 Mechanical Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
108 Gym	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
108 Gym	40	Compact Fluorescent: 4 Pin CFL (42W) - 8L	Wall Switch	S	336	1,980	1, 3	Fixture Replacement	Yes	40	LED - Fixtures: Low-Bay	Occupancy Sensor	235	1,366	5.0	15,134	-3	$2,450	$33,819	$1,400	13.2

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	School	3	Water Supply Pump	7.5	86.5%	No	W	1,130		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-1	1	Chilled Water Pump	40.0	94.1%	Yes	W	2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-2	1	Chilled Water Pump	40.0	94.1%	Yes	W	2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-4	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	CHW-5	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	CHW-6	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	HHWP-1	1	Heating Hot Water Pump	25.0	93.6%	Yes	W	1,676		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	HHWP-2	1	Heating Hot Water Pump	25.0	93.6%	Yes	W	1,676		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Glycol plant	1	Process Pump	1.0	82.5%	No	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-1	10	Other	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-2	10	Other	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Supply Fan	10.0	89.5%	Yes	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Return Fan	7.5	88.5%	Yes	W	1,373		No	88.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Supply Fan	10.0	89.5%	Yes	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Return Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	AHU-3	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4	1	Supply Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4	1	Return Fan	1.0	82.5%	Yes	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5	1	Supply Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5	1	Return Fan	1.0	82.5%	Yes	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	MAU-1	1	Makeup Air Fan	0.8	68.0%	Yes	W	1,373		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	MAU-2	1	Makeup Air Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Closet	FCU-1,2,3	3	Fan Coil Unit	0.3	68.0%	No	W	1,373		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-2	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-3	1	Supply Fan	5.0	87.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.8	2,282	0	$375	$4,505	$400	10.9
Roof	RTU-4	1	Supply Fan	1.5	84.0%	No	W	1,373	NR, 5	Yes	87.5%	Yes	1	0.3	735	0	$121	$3,391	$120	27.1
Roof	RTU-5	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-6	1	Supply Fan	2.0	85.5%	No	W	1,373	NR, 5	Yes	86.5%	Yes	1	0.3	917	0	$151	$3,623	$160	23.0

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
Roof	HRU-1	1	Packaged AC	40.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Packaged AC	25.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof/Staffroom	Staffroom	2	Ductless Mini-Split AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3	1	Packaged AC	12.50		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-6	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof/Staffroom	Staffroom	1	Ductless Mini-Split AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Chiller-1	1	Air-Cooled Screw Chiller	145.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-2	1	Air-Cooled Screw Chiller	145.00	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
Mechanical Room	B-1	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	B-2	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	B-3	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4	1	Furnace	100.60	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-6	2	Furnace	144.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Furnace	100.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Furnace	75.00	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	DWH-1 kitchen/restrooms	1	Tankless Water Heater	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation 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	7	28	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	40	$460	$201	$0	0.4

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	8	Yes	No	No	0.0	262	0	$43	$303	$0	7.0
Kitchen	1	Low Temp Freezer (-35F to -5F)	8	Yes	No	No	0.1	655	0	$108	$303	$0	2.8

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 Refrigerator, Solid Door (>50 cu. ft.)	No	NR	Yes	0.1	1,045	0	$172	$2,432	$200	13.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.1	646	0	$106	$1,632	$125	14.2
Kitchen	1	Refrigerator Chest	No	NR	Yes	0.1	1,002	0	$165	$2,314	$0	14.1
Kitchen	1	Refrigerator Chest	No	NR	Yes	0.1	1,015	0	$167	$1,759	$0	10.5
Kitchen	2	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Freezer Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.1	646	0	$106	$1,632	$125	14.2

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	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	1	Electric Convection Oven (Full Size)	Yes	NR	Yes	0.4	858	0	$141	$7,441	$350	50.3
Kitchen	2	Electric Convection Oven (Full Size)	No	NR	Yes	0.9	1,716	0	$282	$14,881	$700	50.3
Kitchen	1	Gas Steamer	No	NR	Yes	0.0	0	12	$144	$7,423	$2,000	37.7
Kitchen	1	Gas Griddle (≤2 Feet Width)	No	NR	Yes	0.0	0	4	$46	$1,362	$125	26.9

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel 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	Payback w/ Incentives in Years
Kitchen	1	Multi-Tank Conveyor (High Temp)	Electric	Electric	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	115	Computers	120.0	No
Classrooms	60	Small Printer	46.0	Yes
Staffrooms	3	Medium Printer	55.0	Yes
Copy room	6	Copy Machine	600.0	Yes
Staffrooms	1	Paper Shredder	46.0	No
Classrooms	50	Projector	120.0	Yes
Kitchen/staffrooms	8	Microwave	800.0	No
Staffrooms	4	Small Refrigerator	120.0	No
Kitchen	3	Large Refrigerator	255.0	Yes
Kitchen	2	Coffee Machine	1,500.0	No
Kitchen	1	Toaster	300.0	No
Kitchen	1	Toaster oven	550.0	No
Lobby	3	CRT TV	240.0	No
Classrooms	2	Dehumidifier	520.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Break Room	1	Refrigerated	9	Yes	0.2	1,612	0	$265	$230	$0	0.9
Break Room	1	Non-Refrigerated	9	Yes	0.0	343	0	$56	$230	$0	4.1

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

EUI is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

General Charles G. Harker School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 100,748
Built: 2008

For Year Ending: January 31, 2018
Date Generated: October 22, 2018

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
General Charles G. Harker School 1771 Oldmans Creek Rd. Woolwich Twp., New Jersey 08085	SWEDESBORO-WOOLWICH BOARD OF EDUCATION 15 Fredrick Boulevard Woolwich Twp, NJ 08085 (____)____-_____	Christopher DeStratis 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552 x 1008 cdestratis@swsdk6.com

Property ID: 6571004

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
50.1 kBtu/ft²

Source EUI
102.1 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	2,847,878 (56%)
Natural Gas (kBtu)	2,199,152 (44%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	69.6
National Median Source EUI (kBtu/ft²)	141.8
% Diff from National Median Source EUI	-28%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	405

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 financial savings. 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	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
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.
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 energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system 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.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.