Local Government Energy Audit Report

Halsted Middle School

March 12, 2019

Prepared for:

Newton Board of Education
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Newton, NJ 07860

Prepared by:

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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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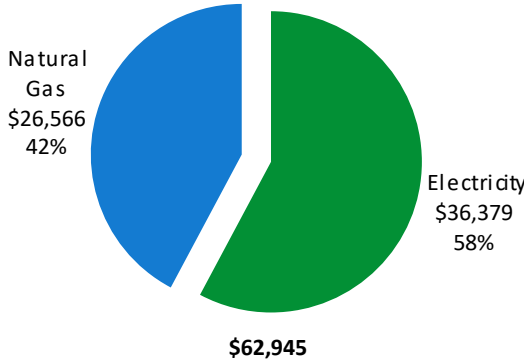
1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $62,945 Electricity: 270,419 kWh Natural Gas: 35,523 Therms	
ENERGY STAR® Benchmarking Score	59 *(1-100 scale)*	This building performs at or above the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

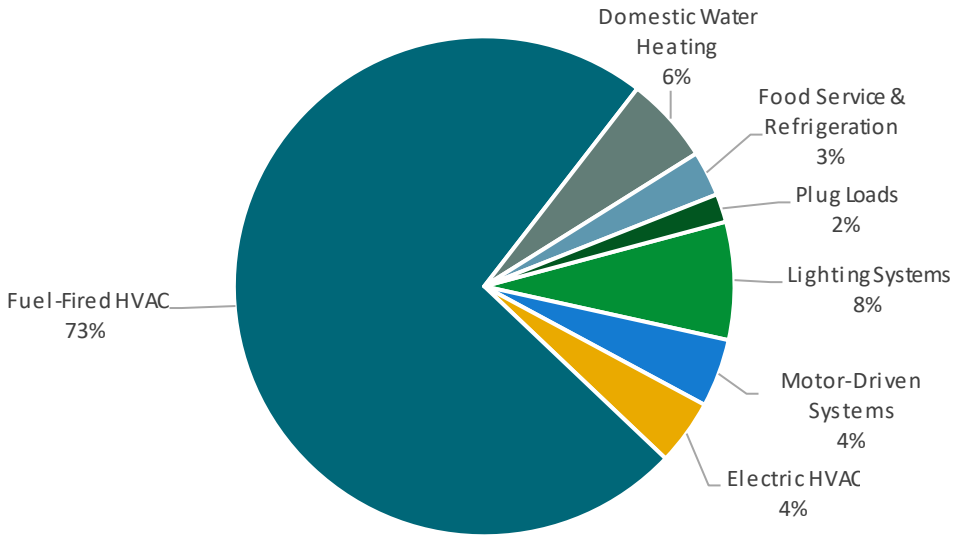


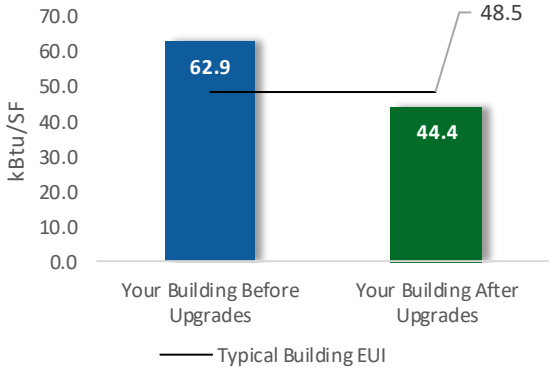
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

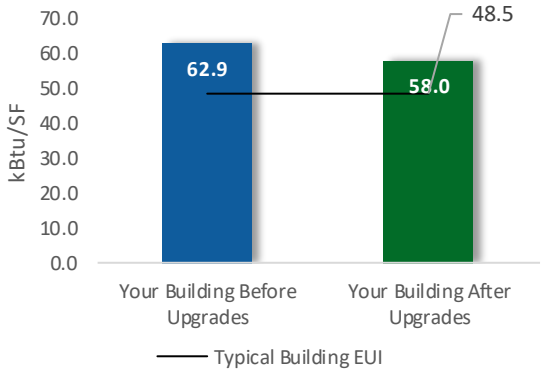
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$412,488
Potential Rebates & Incentives[1]	$10,301
Annual Cost Savings	$21,147
Annual Energy Savings	Electricity: 103,539 kWh Natural Gas: 9,651 Therms
Greenhouse Gas Emission Savings	109 Tons
Simple Payback	19.0 Years
Site Energy Savings (all utilities)	29%



Scenario 2: Cost Effective Package[2]

Installation Cost	$71,070
Potential Rebates & Incentives	$9,526
Annual Cost Savings	$11,934
Annual Energy Savings	Electricity: 85,309 kWh Natural Gas: 612 Therms
Greenhouse Gas Emission Savings	47 Tons
Simple Payback	5.2 Years
Site Energy Savings (all utilities)	8%



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		**59,057**	**19.5**	**-11**	**$7,860**	**$117,904**	**$42,642**	**$7,996**	**$34,646**	**4.4**	**58,147**
ECM 1	Install LED Fixtures	12,102	2.9	-2	$1,617	$24,248	$10,763	$885	$9,878	6.1	12,006
ECM 2	Retrofit Fixtures with LED Lamps	46,954	16.7	-10	$6,244	$93,655	$31,879	$7,111	$24,768	4.0	46,141
Lighting Control Measures		**9,467**	**3.0**	**-2**	**$1,259**	**$10,070**	**$11,750**	**$1,130**	**$10,620**	**8.4**	**9,301**
ECM 3	Install Occupancy Sensor Lighting Controls	8,030	2.5	-2	$1,068	$8,541	$8,950	$1,130	$7,820	7.3	7,889
ECM 4	Install High/Low Lighting Controls	1,437	0.5	0	$191	$1,529	$2,800	$0	$2,800	14.7	1,412
Motor Upgrades		**4,385**	**1.4**	**0**	**$590**	**$8,849**	**$30,231**	**$0**	**$30,231**	**51.2**	**4,416**
	Premium Efficiency Motors	4,385	1.4	0	$590	$8,849	$30,231	$0	$30,231	51.2	4,416
Variable Frequency Drive (VFD) Measures		**13,688**	**4.8**	**0**	**$1,841**	**$27,620**	**$21,215**	**$1,175**	**$20,040**	**10.9**	**13,783**
ECM 5	Install VFDs on Constant Volume (CV) Fans	4,388	1.4	0	$590	$8,855	$3,276	$400	$2,876	4.9	4,419
ECM 6	Install VFDs on Heating Water Pumps	5,327	0.6	0	$717	$10,749	$6,015	$0	$6,015	8.4	5,364
	Install Boiler Draft Fan VFDs	1,501	1.9	0	$202	$3,030	$5,908	$775	$5,133	25.4	1,512
	Install Air Compressors with VFDs	2,471	0.9	0	$332	$4,987	$6,015	$0	$6,015	18.1	2,489
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**253**	**$1,889**	**$37,779**	**$115,663**	**$0**	**$115,663**	**61.2**	**29,574**
	Install High Efficiency Hot Water Boilers	0	0.0	253	$1,889	$37,779	$115,663	$0	$115,663	61.2	29,574
HVAC System Improvements		**0**	**0.0**	**23**	**$169**	**$1,856**	**$132**	**$0**	**$132**	**0.8**	**2,642**
ECM 7	Install Pipe Insulation	0	0.0	23	$169	$1,856	$132	$0	$132	0.8	2,642
Domestic Water Heating Upgrade		**0**	**0.0**	**52**	**$388**	**$3,879**	**$772**	**$0**	**$772**	**2.0**	**6,073**
ECM 8	Install Low-Flow DHW Devices	0	0.0	52	$388	$3,879	$772	$0	$772	2.0	6,073
Food Service & Refrigeration Measures		**7,072**	**0.8**	**0**	**$951**	**$9,898**	**$6,483**	**$0**	**$6,483**	**6.8**	**7,121**
ECM 9	Replace Refrigeration Equipment	5,460	0.6	0	$734	$8,814	$6,253	$0	$6,253	8.5	5,498
ECM 10	Vending Machine Control	1,612	0.2	0	$217	$1,084	$230	$0	$230	1.1	1,623
Custom Measures		**9,872**	**1.8**	**651**	**$6,200**	**$0**	**$183,600**	**$0**	**$183,600**	**29.6**	**86,213**
	Install Building Automation System	9,872	1.8	651	$6,200	$0	$183,600	$0	$183,600	29.6	86,213
TOTALS		**103,539**	**31.3**	**965**	**$21,147**	**$217,854**	**$412,488**	**$10,301**	**$402,187**	**19.0**	**217,269**

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

** - 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 Hot Water Pumps		X	
ECM 7	Install Pipe Insulation		X	
ECM 8	Install Low-Flow Domestic Hot Water Devices		X	
ECM 9	Replace Refrigeration Equipment		X	
ECM 10	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 Halsted Middle School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

TRC 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 November 6, 2018, TRC performed an energy audit at Halsted Middle School located in Newton, NJ. TRC met with Joseph Vankirk to review the facility operations and help focus our investigation on specific energy-using systems.

Halsted Middle School is a four-story, 71,120 square foot building built in 1916. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, a commercial kitchen and basement mechanical space.

Over the last several years the facility has replaced all its existing T12 fluorescent fixtures with T8 fluorescent fixtures. The site is interested in a new energy management system (EMS) but has been unable to fund the project.

2.2 Building Occupancy

The facility is occupied year-round and school is occupied September through June. Typical weekday occupancy is 65 staff and 342 students.

Summer occupancy includes a summer day camp and continuing maintenance activities. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
Halsted Middle School	Weekday	8:00 AM - 4:00 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel. The roof is flat and covered with black membrane, and it is in good condition.

The walls are made of poured concrete with a brick veneer and gypsum drywall interior finish. Dividing walls are poured concrete with CMUs.

The flat roof is supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of PVC. Roof encloses unconditioned space. The thermal barrier is between this space and the conditioned space below at the roof.

Most of the windows are single pane glazed and original to the building. The glass-to-frame seals are in fair condition. The operable window weather seals are in fair condition, showing major evidence of excessive wear. Exterior doors have aluminum frames as well as steel frames with glass and are in good condition with undamaged door seals.

Windows typically occupy about 15% to 20% of the surface area of the walls. Single pane windows can significantly add to heating and cooling costs (15% to 25% per the US DOE). Single pane windows are responsible for the loss of more heat per square foot of area in winter and gain more heat in summer than any other surface of a building envelope. TRC observed that most of the windows at Newton High School are inefficient single pane windows. Replacing these with double pane low e-glass windows can have a significant impact on your heating and cooling energy costs.

Double paned windows have two sheets of glass in a window frame instead of just one in a single pane. Between the glass panes is a small space filled with insulating gas to provide additional insulation. Double-paned windows are often as much as 40%-50% more efficient than traditional single-pane windows.

Image 1 Building Exterior

Image 2 Building Windows

Image 3 Building Structure

Image 4 Exterior Door

2.4 Lighting Systems

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

Fixture types include 2, 3, or 4-lamp, 2 and 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 28-Watt T5 linear fluorescent lamps and are controlled by occupancy sensors.

Library and auditorium fixtures have 32-Watt T8 linear fluorescent and are controlled by occupancy sensors and wall switches. Auditorium also have 250-Watt mercury vapor fixtures. All exit signs are LED. Interior lighting levels were generally sufficient.

Image 5 Gym Lighting

Image 6 Locker room Lighting

Image 7 Classroom Lighting

Image 8 Shower Lighting

Lighting fixtures in classrooms are typically controlled by occupancy sensors.

Exterior fixtures include wall packs with 70-Watt and 150-Watt high pressure sodium fixtures as well as wall mounted LED fixtures and incandescent wall sconces. Exterior light fixtures are controlled by a photocell.

Image 9 Exterior Incandescent Fixture

Image 10 Exterior LED Fixture

Image 11 Exterior HPS Fixture

Image 12 Exterior HPS Fixture Type 2

2.5 Air Handling Systems

Unit Ventilators

There are 38-unit ventilators that have a 0.25 hp supply fan motors, and pneumatically controlled outside air dampers and valves. This system provides heat and ventilation. It is original to the building and appears to be in fair operating condition. The pneumatic control system is operated by an air compressor located in the boiler room. The air compressor has two 3 hp motors which cycle throughout the day to provide compressed air to pneumatic controls.

Image 13 Ceiling Hung Unit Ventilator

Image 14 Unit Ventilator Motor

Image 15 Classroom Unit Ventilator

Image 16 Ceiling Mounted Unit Ventilator

Packaged Units

The guidance area is served by two Lennox packaged air conditioning (AC) units controlled by zone thermostats. These 10.30 EER units have 5-ton cooling capacity.

Refer to Appendix A for detailed information about each unit.

Image 17 Lennox Outdoor Unit

Image 18 Indoor Unit Nameplate

Image 19 Trane Outdoor Unit

Image 20 Indoor Unit Nameplate

Air Conditioners

Classroom cooling is provided by 12,000 Btu window air conditioning (AC) units. The units are in good condition. They have an efficiency rating of approximately 10.70 EER. They are not ENERGY STAR® labeled.

The Principal's office and main office area are served by two Trane split system AC units. These 10.80 EER units that have 1.5-ton cooling capacity.

Image 21 Principal Office AC

Image 22 Main Office AC

Image 23 Window AC in Classroom

Image 24 Window AC nameplate

2.6 Heating Hot Water Systems

One HB Smith 6750 MBh and one Burnham Commercial 3630 MBh hot water boilers serve the building heating load needs. The boiler burner motors are 5 hp and 1.5 hp respectively. The burners are non-modulating with a nominal efficiency of 78%. The boilers are configured in a lead-lag control scheme. Only

one boiler is required under high load conditions. Installed in 1975, they are in fair condition with a service contract in place.

The boilers are configured in a constant flow primary distribution with two 3 hp constant speed hot water pumps operating with a lead-lag control scheme. The boilers provide hot water to unit ventilators throughout the building.

There is 15 feet of 8-inch supply and pipe with no insulation that should be insulated with 2-inch thick insulation.

Image 25 Boiler System

Image 26 Exposed boiler pipes

Image 27 Boiler-1

Image 28 Boiler-2

During daytime operation, hot water is supplied at 180°F when the outside air temperature is low, and the setpoint is adjusted linearly to 140°F when the outside air is above 32°F and the setpoint is adjusted to 100°F when outside air is above 65°F.

For nighttime operation, hot water is supplied at 160°F when the outside air temperature is low, and the setpoint is adjusted linearly to 120°F when the outside air is above 32°F and the setpoint is adjusted to 80°F when outside air is above 65°F. The system is locked out at an outside temperature of 50°F.

2.7 Domestic Hot Water

Hot water is produced with a 100 gallon 199 MBh Bradford White gas-fired storage water heater with an 80% efficiency. At the time of the site visit, the domestic water heater was set at 140°F.

Image 29 Hot Water Heater

Image 30 DHW Heater Nameplate

2.8 Food Service Equipment

The kitchen has a mixture of gas and electric equipment that is used to store lunches for students which was originally prepared at the high school. One gas convection oven is required to heat the food and two insulated electric holding cabinets keeps food warm. Equipment is high efficiency and is in good condition.

The dishwasher is an ENERGY STAR® high temperature, single tank type Hobart 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 31 Convection Oven

Image 32 Food Holding Cabinet

Image 33 Milk Storage

Image 34 Food Table

2.9 Refrigeration

The kitchen has two stand-up refrigerators with solid doors and three stand-up refrigerators with glass doors. There is a freezer chest and two refrigerator chests to store cold beverages. All equipment is high efficiency and in good condition.

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

Image 35 Freezer Chest

Image 36 Glass door Refrigerator

2.10 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 1.8% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are approximately 52 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 lunches of staff. These vary in condition and efficiency.

There is one refrigerated beverage vending machine. The vending machine is not equipped with occupancy-based controls.

Image 37 Vending Machine

Image 38 Washer & Dryer

Image 39 Refrigerator

Image 40 Copy Machine

2.11 Water-Using Systems

There are 12 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.5 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.2 gpf.

There are several showerheads in boys' and girls' locker rooms as well.

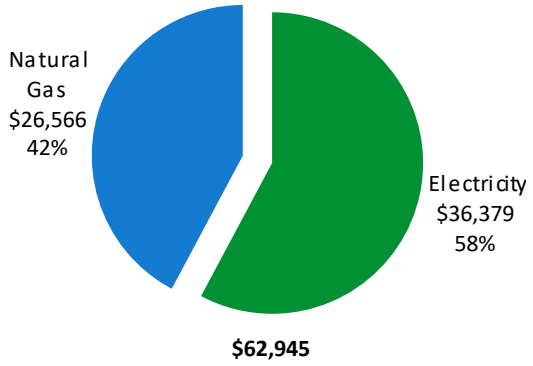
Image 41 Showerheads in Locker Room

Image 42 Kitchen Sink

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	270,419 kWh	$36,379
Natural Gas	35,523 Therms	$26,566
Total		**$62,945**



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

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

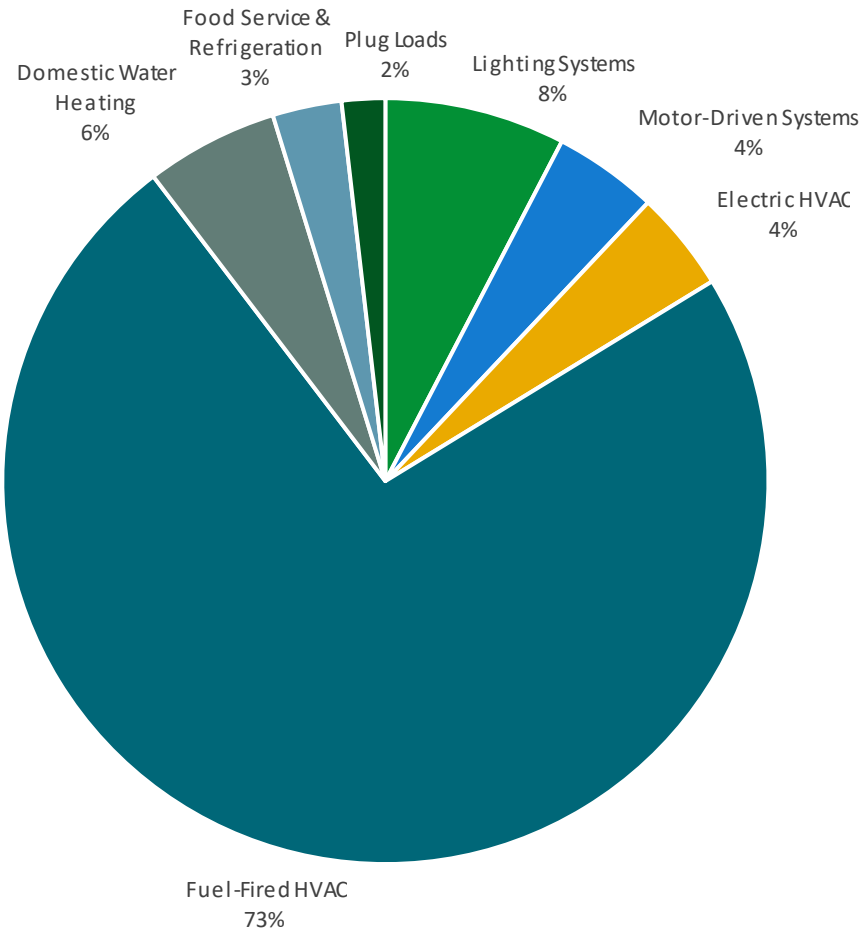
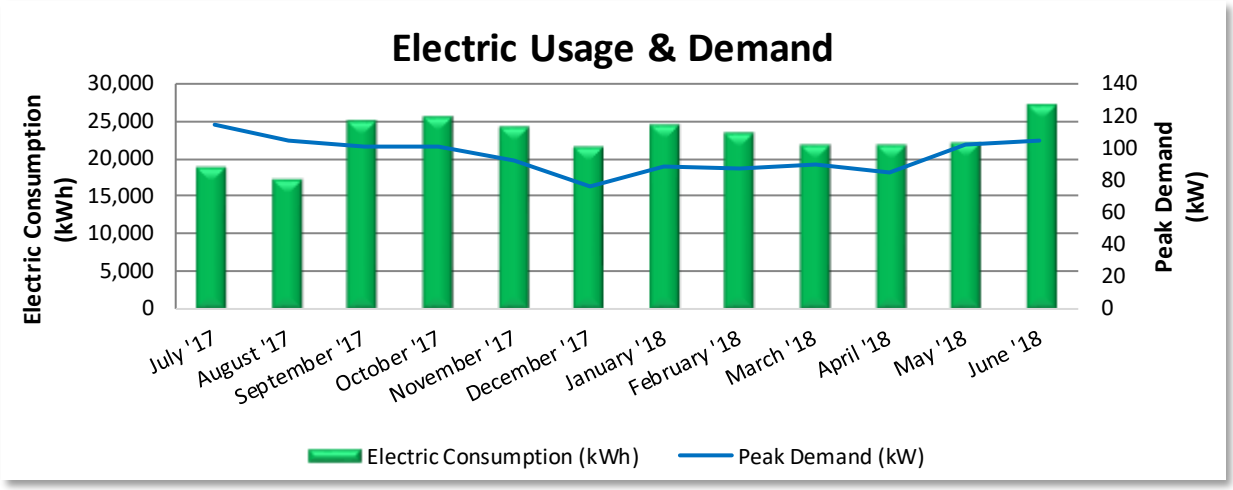


Figure 5 - Energy Balance

3.1 Electricity

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



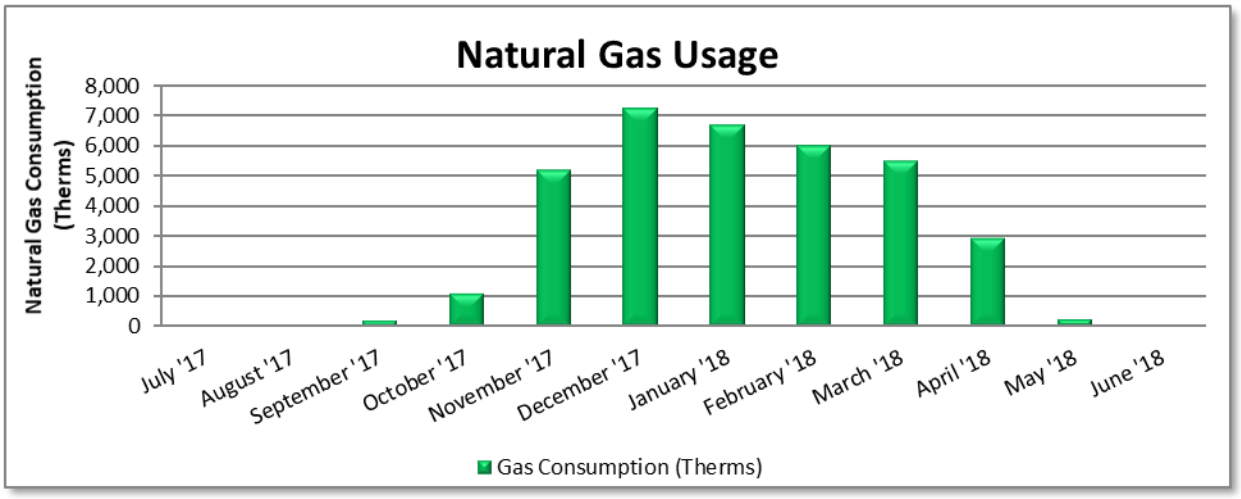
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/25/17	29	18,630	115	$746	$2,544
8/24/17	30	17,110	105	$338	$2,000
9/24/17	31	24,870	101	$338	$3,019
10/24/17	30	25,270	101	$604	$3,452
11/23/17	30	24,070	93	$546	$4,730
12/24/17	31	21,430	76	$434	$2,509
1/24/18	31	24,310	89	$520	$2,852
2/23/18	30	23,270	87	$506	$2,743
3/25/18	30	21,670	90	$529	$2,620
4/25/18	31	21,750	85	$473	$4,118
5/29/18	34	21,910	102	$575	$2,687
6/27/18	29	26,870	105	$636	$3,203
Totals	**366**	**271,160**	**115**	**$6,243**	**$36,478**
Annual	**365**	**270,419**	**115**	**$6,226**	**$36,379**

Notes:

- Peak demand of 115 kW occurred in July 2017.
- The average electric cost over the past 12 months was $0.135/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

Elizabethtown Gas delivers natural gas under rate class General Service.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
8/4/17	30	93	$349
9/4/17	31	93	$348
10/5/17	31	217	$427
11/4/17	30	1,136	$1,018
12/5/17	31	5,216	$3,634
1/5/18	31	7,262	$5,129
2/4/18	30	6,727	$4,613
3/6/18	30	6,023	$4,353
4/5/18	30	5,531	$3,883
5/6/18	31	2,961	$2,074
6/4/18	29	259	$459
7/6/18	32	103	$351
Totals	**366**	**35,620**	**$26,639**
Annual	**365**	**35,523**	**$26,566**

Notes:

- The average gas cost for the past 12 months is $0.748/therm, which is the blended rate used throughout the analysis.
- Utility graph indicates that school uses most amount of natural gas during winter season to produce heat from hot water boilers whereas summer season natural gas usage is very little or negligible.

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.

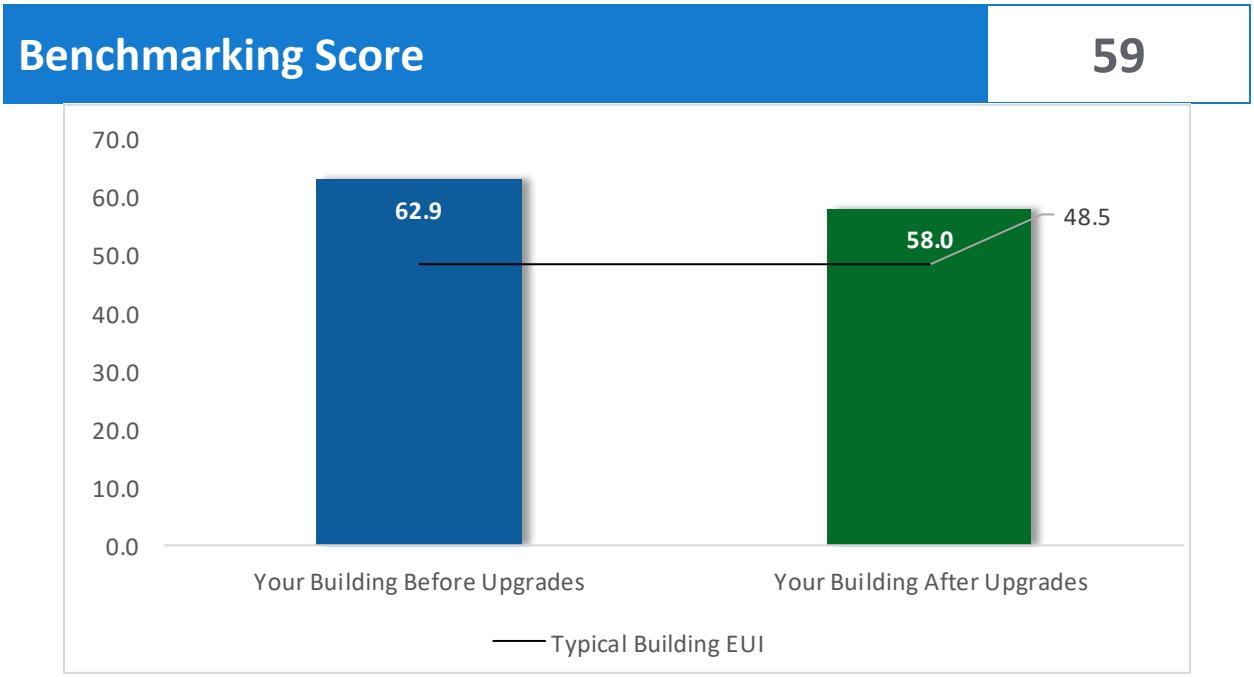


Figure 6 - Energy Use Intensity Comparison

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

Energy use intensity (EUI) measures energy consumption per square foot and 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 ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**59,057**	**19.5**	**-11**	**$7,860**	**$42,642**	**$7,996**	**$34,646**	**4.4**	**58,147**
ECM 1	Install LED Fixtures	12,102	2.9	-2	$1,617	$10,763	$885	$9,878	6.1	12,006
ECM 2	Retrofit Fixtures with LED Lamps	46,954	16.7	-10	$6,244	$31,879	$7,111	$24,768	4.0	46,141
Lighting Control Measures		**9,467**	**3.0**	**-2**	**$1,259**	**$11,750**	**$1,130**	**$10,620**	**8.4**	**9,301**
ECM 3	Install Occupancy Sensor Lighting Controls	8,030	2.5	-2	$1,068	$8,950	$1,130	$7,820	7.3	7,889
ECM 4	Install High/Low Lighting Controls	1,437	0.5	0	$191	$2,800	$0	$2,800	14.7	1,412
Motor Upgrades		**4,385**	**1.4**	**0**	**$590**	**$30,231**	**$0**	**$30,231**	**51.2**	**4,416**
	Premium Efficiency Motors	4,385	1.4	0	$590	$30,231	$0	$30,231	51.2	4,416
Variable Frequency Drive (VFD) Measures		**13,688**	**4.8**	**0**	**$1,841**	**$21,215**	**$1,175**	**$20,040**	**10.9**	**13,783**
ECM 5	Install VFDs on Constant Volume (CV) Fans	4,388	1.4	0	$590	$3,276	$400	$2,876	4.9	4,419
ECM 6	Install VFDs on Heating Water Pumps	5,327	0.6	0	$717	$6,015	$0	$6,015	8.4	5,364
	Install Boiler Draft Fan VFDs	1,501	1.9	0	$202	$5,908	$775	$5,133	25.4	1,512
	Install Air Compressors with VFDs	2,471	0.9	0	$332	$6,015	$0	$6,015	18.1	2,489
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**253**	**$1,889**	**$115,663**	**$0**	**$115,663**	**61.2**	**29,574**
	Install High Efficiency Hot Water Boilers	0	0.0	253	$1,889	$115,663	$0	$115,663	61.2	29,574
HVAC System Improvements		**0**	**0.0**	**23**	**$169**	**$132**	**$0**	**$132**	**0.8**	**2,642**
ECM 7	Install Pipe Insulation	0	0.0	23	$169	$132	$0	$132	0.8	2,642
Domestic Water Heating Upgrade		**0**	**0.0**	**52**	**$388**	**$772**	**$0**	**$772**	**2.0**	**6,073**
ECM 8	Install Low-Flow DHW Devices	0	0.0	52	$388	$772	$0	$772	2.0	6,073
Food Service & Refrigeration Measures		**7,072**	**0.8**	**0**	**$951**	**$6,483**	**$0**	**$6,483**	**6.8**	**7,121**
ECM 9	Replace Refrigeration Equipment	5,460	0.6	0	$734	$6,253	$0	$6,253	8.5	5,498
ECM 10	Vending Machine Control	1,612	0.2	0	$217	$230	$0	$230	1.1	1,623
Custom Measures		**9,872**	**1.8**	**651**	**$6,200**	**$183,600**	**$0**	**$183,600**	**29.6**	**86,213**
	Install Building Automation System	9,872	1.8	651	$6,200	$183,600	$0	$183,600	29.6	86,213
TOTALS		**103,539**	**31.3**	**965**	**$21,147**	**$412,488**	**$10,301**	**$402,187**	**19.0**	**217,269**

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

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**59,057**	**19.5**	**-11**	**$7,860**	**$42,642**	**$7,996**	**$34,646**	**4.4**	**58,147**
ECM 1	Install LED Fixtures	12,102	2.9	-2	$1,617	$10,763	$885	$9,878	6.1	12,006
ECM 2	Retrofit Fixtures with LED Lamps	46,954	16.7	-10	$6,244	$31,879	$7,111	$24,768	4.0	46,141
Lighting Control Measures		**9,467**	**3.0**	**-2**	**$1,259**	**$11,750**	**$1,130**	**$10,620**	**8.4**	**9,301**
ECM 3	Install Occupancy Sensor Lighting Controls	8,030	2.5	-2	$1,068	$8,950	$1,130	$7,820	7.3	7,889
ECM 4	Install High/Low Lighting Controls	1,437	0.5	0	$191	$2,800	$0	$2,800	14.7	1,412
Variable Frequency Drive (VFD) Measures		**9,715**	**2.0**	**0**	**$1,307**	**$9,291**	**$400**	**$8,891**	**6.8**	**9,783**
ECM 5	Install VFDs on Constant Volume (CV) Fans	4,388	1.4	0	$590	$3,276	$400	$2,876	4.9	4,419
ECM 6	Install VFDs on Heating Water Pumps	5,327	0.6	0	$717	$6,015	$0	$6,015	8.4	5,364
HVAC System Improvements		**0**	**0.0**	**23**	**$169**	**$132**	**$0**	**$132**	**0.8**	**2,642**
ECM 7	Install Pipe Insulation	0	0.0	23	$169	$132	$0	$132	0.8	2,642
Domestic Water Heating Upgrade		**0**	**0.0**	**52**	**$388**	**$772**	**$0**	**$772**	**2.0**	**6,073**
ECM 8	Install Low-Flow DHW Devices	0	0.0	52	$388	$772	$0	$772	2.0	6,073
Food Service & Refrigeration Measures		**7,072**	**0.8**	**0**	**$951**	**$6,483**	**$0**	**$6,483**	**6.8**	**7,121**
ECM 9	Replace Refrigeration Equipment	5,460	0.6	0	$734	$6,253	$0	$6,253	8.5	5,498
ECM 10	Vending Machine Control	1,612	0.2	0	$217	$230	$0	$230	1.1	1,623
TOTALS		**85,309**	**25.3**	**61**	**$11,934**	**$71,070**	**$9,526**	**$61,544**	**5.2**	**93,066**

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

** - 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		**59,057**	**19.5**	**-11**	**$7,860**	**$42,642**	**$7,996**	**$34,646**	**4.4**	**58,147**
ECM 1	Install LED Fixtures	12,102	2.9	-2	$1,617	$10,763	$885	$9,878	6.1	12,006
ECM 2	Retrofit Fixtures with LED Lamps	46,954	16.7	-10	$6,244	$31,879	$7,111	$24,768	4.0	46,141

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 high pressure sodium 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 fixtures.

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

Affected building areas: exterior fixtures and the auditorium

ECM 2: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, U-bend fluorescent and 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, library, gymnasium, offices, cafeteria

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**9,467**	**3.0**	**-2**	**$1,259**	**$11,750**	**$1,130**	**$10,620**	**8.4**	**9,301**
ECM 3	Install Occupancy Sensor Lighting Controls	8,030	2.5	-2	$1,068	$8,950	$1,130	$7,820	7.3	7,889
ECM 4	Install High/Low Lighting Controls	1,437	0.5	0	$191	$2,800	$0	$2,800	14.7	1,412

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: classrooms, library, gymnasium, offices, cafeteria, storage area

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 and corridors

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		**4,385**	**1.4**	**0**	**$590**	**$30,231**	**$0**	**$30,231**	**51.2**	**4,416**
	Premium Efficiency Motors	4,385	1.4	0	$590	$30,231	$0	$30,231	51.2	4,416

Premium Efficiency Motors

We evaluated replacement of 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.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Boiler Room	B-1	1	Combustion Air Fan	5.0	Boiler Burner
Boiler Room	B-2	1	Combustion Air Fan	1.5	Boiler Burner
Boiler Room	Air Compressor	2	Air Compressor	3.0	Air Compressor
Boiler Room	P-1	1	Heating Hot Water Pump	3.0	Pump motor
Boiler Room	P-2	1	Heating Hot Water Pump	3.0	Pump motor
Classrooms	Classrooms	38	Supply Fan	0.3	Unit Ventilators
Auditorium	Auditorium	1	Supply Fan	5.0	Ceiling Mounted Heating Unit

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*.

The simple payback of this measure is projected to exceed the expected life of the replacement equipment, however, inverter duty rated motors will be required for use with VFD's as described below. Existing motors should be evaluated for replacement on a case by case basis if the VFD measures are to be implemented.

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		**13,688**	**4.8**	**0**	**$1,841**	**$21,215**	**$1,175**	**$20,040**	**10.9**	**13,783**
ECM 5	Install VFDs on Constant Volume (CV) Fans	4,388	1.4	0	$590	$3,276	$400	$2,876	4.9	4,419
ECM 6	Install VFDs on Heating Water Pumps	5,327	0.6	0	$717	$6,015	$0	$6,015	8.4	5,364
	Install Boiler Draft Fan VFDs	1,501	1.9	0	$202	$5,908	$775	$5,133	25.4	1,512
	Install Air Compressors with VFDs	2,471	0.9	0	$332	$6,015	$0	$6,015	18.1	2,489

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.

CV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g. 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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: auditorium unit

ECM 6: Install VFDs on Heating Water Pumps

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

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

Affected pumps: P-1, P-2

Install Boiler Draft Fan VFDs

We evaluated replacement of existing volume control devices on boiler draft fans, such as inlet vanes or dampers, with VFDs. Inlet vanes or dampers are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

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

Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

The simple payback of this measure is projected to exceed the expected life of the add-on equipment.

Install Air Compressors with VFDs

We evaluated installation of VFDs on the air compressors. The VFD allows the air compressor to operate more efficiently at partial load conditions, modulating speed to match the demand for compressed air rather than mechanically unloading.

Energy saving results from reducing compressor speed (and power) when there is a reduced load. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

The simple payback of this measure is projected to exceed the expected life of the add-on equipment.

4.5 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**253**	**$1,889**	**$115,663**	**$0**	**$115,663**	**61.2**	**29,574**
	Install High Efficiency Hot Water Boilers	0	0.0	253	$1,889	$115,663	$0	$115,663	61.2	29,574

Install High Efficiency Hot Water Boilers

We evaluated replacement of the older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

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

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

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

The simple payback of this measure is projected to exceed the expected life of the replacement equipment.

4.6 HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**0**	**0.0**	**23**	**$169**	**$132**	**$0**	**$132**	**0.8**	**2,642**
ECM 7	Install Pipe Insulation	0	0.0	23	$169	$132	$0	$132	0.8	2,642

ECM 7: Install Pipe Insulation

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

4.7 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**	**52**	**$388**	**$772**	**$0**	**$772**	**2.0**	**6,073**
ECM 8	Install Low-Flow DHW Devices	0	0.0	52	$388	$772	$0	$772	2.0	6,073

ECM 8: 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.

4.8 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		**7,072**	**0.8**	**0**	**$951**	**$6,483**	**$0**	**$6,483**	**6.8**	**7,121**
ECM 9	Replace Refrigeration Equipment	5,460	0.6	0	$734	$6,253	$0	$6,253	8.5	5,498
ECM 10	Vending Machine Control	1,612	0.2	0	$217	$230	$0	$230	1.1	1,623

ECM 9: 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.

ECM 10: Vending Machine Control

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

4.9 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**9,872**	**1.8**	**651**	**$6,200**	**$183,600**	**$0**	**$183,600**	**29.6**	**86,213**
	Install Building Automation System	9,872	1.8	651	$6,200	$183,600	$0	$183,600	29.6	86,213

Install Building Automation System

We evaluated the installation of a Building Automation System, a great way to start monitoring and controlling your energy use. Replacing an existing pneumatic control system with an automated building EMS system will provide you a better overhaul for boilers, heating pumps and mechanical HVAC system. Building EMS would help you to develop and monitor HVAC schedules, operating hours and heating/cooling load management all at once.

It appears that the overhaul of building controls may not be cost effective for this facility, based on the expected useful life of 10 years for a control system.

5 Energy Efficient Best Practices

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

Energy Tracking with ENERGY STAR® Portfolio Manager®

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

Weatherization

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

Doors and Windows

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

Window Treatments/Coverings

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

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

Lighting Maintenance

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

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

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 Controls

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Whenever possible, use automatic devices such as twist timers or occupancy sensors to turn off motors when they are not needed.

Motor Maintenance

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

Thermostat Schedules and Temperature Resets

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

Boiler Maintenance

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

Water Heater Maintenance

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

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

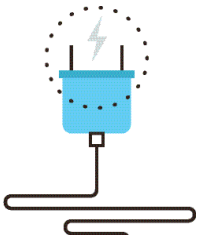
Compressed Air System Maintenance

Compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan for compressed air systems should include:

- Inspection, cleaning, and replacement of inlet filter cartridges
- Cleaning of drain traps
- Daily inspection of lubricant levels to reduce unwanted friction
- Inspection of belt condition and tension
- Check for leaks and adjust loose connections
- Overall system cleaning

Contact a qualified technician for help with setting up periodic maintenance schedule.

Plug Load Controls



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

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

Computer Monitor Replacement

ENERGY STAR® labeled computer monitors can be up to 25% more efficient than standard monitors. ENERGY STAR® rated monitors have power consumption requirements for different operating modes such as on, idle, and sleep.

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

Water Conservation

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

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

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the 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 a **high** potential for installing a PV array.

The amount of free area, ease of installation (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.

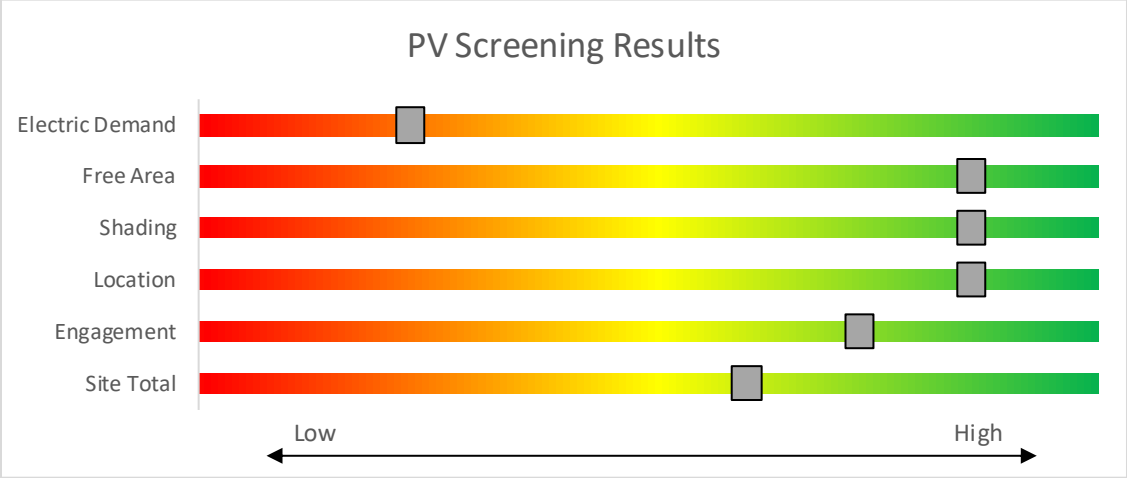


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Credit (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) generate 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 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.

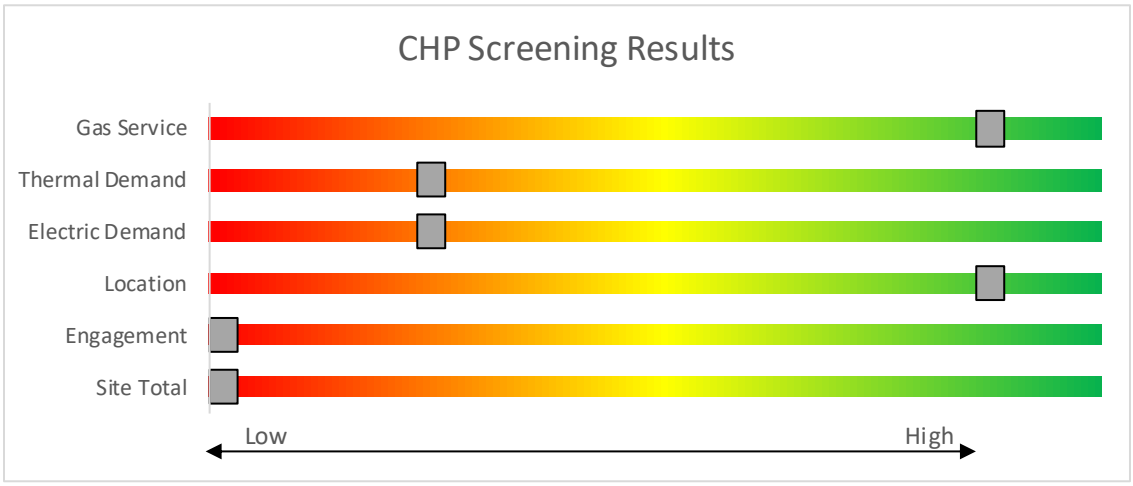


Figure 10 - Combined Heat and Power Screening

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 Direct Install

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

Incentives

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

How to Participate

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

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

7.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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

(1) Use an energy services company or "ESCO."

(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.

(3) Use a hybrid approach of the two options described above where the ESCO is used for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

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

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

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

7.4 SREC Registration Program

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

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

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

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

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for 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
Boys Locker Room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	180	0	$24	$261	$40	9.3
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	66	0	$9	$72	$10	7.1
Staffroom	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.2	539	0	$72	$705	$95	8.5
Cafeteria	20	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	20	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.6	1,795	0	$239	$1,989	$270	7.2
Band Office	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	66	0	$9	$72	$10	7.1
Girls	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	66	0	$9	$72	$10	7.1
Staff bathroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	66	0	$9	$72	$10	7.1
Main Office	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	180	0	$24	$261	$40	9.3
Principal	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	359	0	$48	$560	$75	10.2
Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	269	0	$36	$487	$65	11.8
Copy Room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	180	0	$24	$261	$40	9.3
Bathroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	66	0	$9	$72	$10	7.1
Child Study Room	24	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.7	2,154	0	$286	$2,009	$275	6.1
Women	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.0	92	0	$12	$145	$20	10.3
B Level	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,435	0.1	359	0	$48	$490	$40	9.4
Stairs 1	12	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	12	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.3	796	0	$106	$870	$120	7.1
Stairs 2	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	8	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.2	531	0	$71	$580	$80	7.1
Ground Level	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,435	0.1	269	0	$36	$417	$30	10.8
Stairs 3	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.1	199	0	$26	$217	$30	7.1
1st Fl Hallway	9	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,435	0.3	808	0	$107	$1,052	$90	9.0
Vestibule	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.1	359	0	$48	$406	$40	7.7
Stairs 4	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	133	0	$18	$145	$20	7.1
Guidance 108	24	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.7	2,154	0	$286	$2,279	$310	6.9
Stairs 5	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	133	0	$18	$145	$20	7.1
2nd Fl Hallway	12	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch		62	2,080	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,435	0.3	1,077	0	$143	$1,270	$120	8.0

	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
Stairs 6	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch		62	2,080	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.0	133	0	$18	$145	$20	7.1
Auditorium	15	Mercury Vapor: (1) 250W Lamp	Wall Switch	S	290	2,080	1, 3	Fixture Replacement	Yes	15	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	75	1,435	2.6	8,177	-2	$1,087	$3,270	$110	2.9
Boiler Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch		114	800	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	800	0.0	49	0	$7	$73	$20	8.1
Basement	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.0	128	0	$17	$73	$20	3.1
Boys Locker Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	2, 3	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.4	1,185	0	$158	$781	$175	3.8
Gym Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.0	113	0	$15	$55	$15	2.6
Classroom G5	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.5	1,729	0	$230	$927	$215	3.1
Classroom G4	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.5	1,585	0	$211	$872	$200	3.2
Classroom G3	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.6	1,873	0	$249	$982	$230	3.0
Music G25	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.5	1,585	0	$211	$872	$200	3.2
Band Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	432	0	$57	$434	$80	6.2
Custodian	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	432	0	$57	$434	$80	6.2
Main Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.4	1,153	0	$153	$708	$155	3.6
Boiler Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.1	174	0	$23	$219	$60	6.9
Basement	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.1	384	0	$51	$416	$75	6.7
Art Room B1	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.6	1,825	0	$243	$964	$225	3.0
Weight Room	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.5	1,729	0	$230	$927	$215	3.1
Heatlth Room B2	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.5	1,537	0	$204	$854	$195	3.2
Classroom G6	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.4	1,153	0	$153	$708	$155	3.6
Classroom G7	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	576	0	$77	$489	$95	5.1
Classsroom G8	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.5	1,537	0	$204	$854	$195	3.2
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	552	0.1	111	0	$15	$380	$30	23.7
Kitchen	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.5	1,435	0	$191	$694	$190	2.6
Auditorium	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.8	2,498	-1	$332	$1,489	$330	3.5
Child Study Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.1	384	0	$51	$416	$75	6.7

	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
Library	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.7	1,459	0	$194	$1,022	$280	3.8
Library	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	104	0	$14	$73	$20	3.8
Classroom 131	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
IT room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	104	0	$14	$73	$20	3.8
Classroom 233	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.4	834	0	$111	$584	$160	3.8
Classroom 232	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.1	156	0	$21	$110	$30	3.8
Classroom 231	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Classroom 229	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Classroom 235	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	521	0	$69	$365	$100	3.8
Classrooom 227	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Classroom 225	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Nurse	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	365	0	$48	$256	$70	3.8
Classroom 201	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.4	938	0	$125	$657	$180	3.8
Copy 226	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	104	0	$14	$73	$20	3.8
Classroom 202	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.4	834	0	$111	$584	$160	3.8
Girls 2nd Fl	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	104	0	$14	$73	$20	3.8
Classroom 209	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	521	0	$69	$365	$100	3.8
Classroom 203	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	729	0	$97	$511	$140	3.8
Classroom 208	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	521	0	$69	$365	$100	3.8
Classroom 204	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Classroom 205	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.2	521	0	$69	$365	$100	3.8
Classroom 207	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.3	625	0	$83	$438	$120	3.8
Classroom 206	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	104	0	$14	$73	$20	3.8
B Level	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,435	0.1	384	0	$51	$346	$40	6.0
Ground Level	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,435	0.3	1,057	0	$141	$802	$110	4.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Ground Level	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,435	0.2	480	0	$64	$383	$50	5.2
1st Fl Hallway	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,435	0.3	865	0	$115	$729	$90	5.6
Guidance 108	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.1	384	0	$51	$416	$75	6.7
Stairs 5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	76	0	$10	$37	$10	2.6
Room 210	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	76	0	$10	$37	$10	2.6
2nd Fl Hallway	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,435	0.3	865	0	$115	$729	$90	5.6
Stairs 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,080	2	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,080	0.0	40	0	$5	$18	$5	2.5
Gym	6	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	S	120	2,080	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.3	1,098	0	$146	$708	$155	3.8
Case Light	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	2,080	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	142	0	$19	$73	$20	2.8
Storage	1	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	S	9	800		None	No	1	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	9	800	0.0	0	0	$0	$0	$0	0.0
Stage	2	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	S	13	2,080		None	No	2	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	13	2,080	0.0	0	0	$0	$0	$0	0.0
Stairs 3	1	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	S	26	2,080		None	No	1	LED - Fixtures: Porch (Wall Mounted)	Wall Switch	26	2,080	0.0	0	0	$0	$0	$0	0.0
Exterior	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		9	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	9	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		45	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.0	0	0	$0	$0	$0	0.0
Cycle Room	3	LED - Fixtures: Ceiling Mount	Wall Switch	S	13	2,080		None	No	3	LED - Fixtures: Ceiling Mount	Wall Switch	13	2,080	0.0	0	0	$0	$0	$0	0.0
Vestibule	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	9	2,080		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	9	2,080	0.0	0	0	$0	$0	$0	0.0
1st Fl Hallway	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	13	2,080		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	13	2,080	0.0	0	0	$0	$0	$0	0.0
Vestibule	2	LED - Fixtures: Ceiling Mount	Wall Switch	S	9	2,080		None	No	2	LED - Fixtures: Ceiling Mount	Wall Switch	9	2,080	0.0	0	0	$0	$0	$0	0.0
Vestibule	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	9	2,080		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	9	2,080	0.0	0	0	$0	$0	$0	0.0
Exterior	3	Incandescent: Wall Sconces (60W) - 1L	Wall Switch		60	2,080	2	Relamp	No	3	LED Screw-In Lamps: Bulb (9W) - 1L	Wall Switch	9	2,080	0.1	318	0	$43	$52	$3	1.1
Boys Locker Room	4	Incandescent: Bulb (60W) - 1L	Wall Switch		60	2,080	2, 3	Relamp	Yes	4	LED Screw-In Lamps: Bulb (9W) - 1L	Occupancy Sensor	9	1,435	0.2	492	0	$65	$339	$39	4.6
Gym Office	1	Incandescent: Bulb (60W) - 1L	Wall Switch		60	2,080	2	Relamp	No	1	LED Screw-In Lamps: Bulb (9W) - 1L	Wall Switch	9	2,080	0.0	117	0	$16	$17	$1	1.0
140 Custodian	1	Incandescent: Bulb (60W) - 1L	Wall Switch	S	60	2,080	2	Relamp	No	1	LED Screw-In Lamps: Bulb (9W) - 1L	Wall Switch	9	2,080	0.0	117	0	$16	$17	$1	1.0
Exterior	1	High-Pressure Sodium: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	21	4,380	0.0	324	0	$44	$966	$100	19.9
Exterior	7	High-Pressure Sodium: (1) 150W Lamp	Photocell		188	4,380	1	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.5	4,384	0	$590	$6,762	$700	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
Boiler Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Weight Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Heatlth Room B2	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
Auditorium	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
Ground Level	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
Ground Level	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
1st Fl Hallway	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
1st Fl Hallway	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Fl Hallway	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Fl Hallway	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basement	1	Compact Fluorescent: Spiral Bulb (13W) - 1L	Wall Switch	S	13	2,080	2	Relamp	No	1	LED Screw-In Lamps: Bulb (9W) - 1L	Wall Switch	9	2,080	0.0	9	0	$1	$17	$1	13.7
Girls 2nd Fl	1	Compact Fluorescent: Circleline (32W) - 1L	Occupancy Sensor	S	32	1,435	1	Fixture Replacement	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	22	1,435	0.0	15	0	$2	$35	$10	12.5
Guidance 108	5	Compact Fluorescent: Cane bulb (26W) - 1L	Wall Switch	S	26	2,080	2, 3	Relamp	Yes	5	LED Screw-In Lamps: Bulb (18W) - 1L	Occupancy Sensor	18	1,435	0.0	154	0	$20	$292	$25	13.1
Stairs 4	1	Compact Fluorescent: Bulb (13W) - 1L	Wall Switch	S	13	2,080	2	Relamp	No	1	LED Screw-In Lamps: Bulb (9W) - 1L	Wall Switch	9	2,080	0.0	9	0	$1	$17	$1	13.7
Storage	1	Compact Fluorescent: 4 Pin (13W) - 2L	Wall Switch	S	26	800	2	Relamp	No	1	LED Screw-In Lamps: Bulb (9W) - 2L	Wall Switch	18	800	0.0	7	0	$1	$34	$0	37.7

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	B-1	1	Combustion Air Fan	5.0	87.5%	No	B	716	NR, NR	Yes	89.5%	Yes	1	1.5	1,190	0	$160	$4,076	$775	20.6
Boiler Room	B-2	1	Combustion Air Fan	1.5	84.0%	No	W	716	NR, NR	Yes	86.5%	Yes	1	0.5	376	0	$51	$3,391	$0	67.0
Boiler Room	Air Compressor	2	Air Compressor	3.0	81.5%	No	W	1,200	NR, NR	Yes	89.5%	Yes	2	1.1	2,869	0	$386	$7,768	$0	20.1
Boiler Room	P-1	1	Heating Hot Water Pump	3.0	86.5%	No	B	2,745	NR, 6	Yes	89.5%	Yes	1	0.3	2,824	0	$380	$3,812	$0	10.0
Boiler Room	P-2	1	Heating Hot Water Pump	3.0	86.5%	No	B	2,745	NR, 6	Yes	89.5%	Yes	1	0.3	2,824	0	$380	$3,812	$0	10.0
Classrooms	Classrooms	38	Supply Fan	0.3	65.0%	No	B	2,745	NR	Yes	73.4%	No		0.9	3,425	0	$461	$24,510	$0	53.2
Auditorium	Auditorium	1	Supply Fan	5.0	87.5%	No	B	2,745	NR, 5	Yes	89.5%	Yes	1	1.5	4,565	0	$614	$4,076	$400	6.0

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
Closet	Office	2	Split-System AC	1.50		W		No							0.0	0	0	$0	$0	$0	0.0
Guidance Closet	Guidance	2	Packaged AC	5.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classrroms	Classrooms	20	Window AC	1.26		W		No							0.0	0	0	$0	$0	$0	0.0
Classrroms	Classrooms	20	Window AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	B-1	1	Non-Condensing Hot Water Boiler	######	B	NR	Yes	1	Non-Condensing Hot Water Boiler	######	85.00%	Ec	0.0	0	253	$1,889	$115,663	$0	61.2
Boiler Room	B-2	1	Non-Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	B-1	7	15	4.00	0.0	0	23	$169	$132	$0	0.8

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	School	1	Storage Tank Water Heater (> 50 Gal)	N		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	8	8	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	27	$200	$57	$0	0.3
Locker Rooms	8	8	Showerhead	3.00	2.00	0.0	0	25	$188	$714	$0	3.8

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	2	Refrigerator Chest	No	9	Yes	0.2	2,013	0	$271	$4,233	$0	15.6
Kitchen	1	Freezer Chest	No	9	Yes	0.4	3,446	0	$464	$2,020	$0	4.4
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Convection Oven (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0

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	Single 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	52	Computer	120.0	Yes
Classrooms	32	Projectors	120.0	Yes
Classrooms	15	Small Printer	46.0	Yes
Staffrooms	5	Medium Printer	55.0	Yes
Copy rooms	6	Copy Machine	600.0	Yes
Classrooms	32	Smart Boards	2.0	No
Lobby	5	TV	120.0	Yes
Classrooms	1	Dehumidifier	280.0	Yes
Special Ed room	1	Washer & Dryer	800.0	No
Staffrooms	3	Regular Refrigerator	255.0	No
Staffrooms	2	Miecrowave	800.0	No
Special Ed room	9	Electric Stove	1,000.0	Yes
Break room	1	Toaster Oven	300.0	No
Break room	5	Medium Refrigerator	150.0	No
Kitchen	3	Food Table	120.0	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
Staffroom	1	Refrigerated	10	Yes	0.2	1,612	0	$217	$230	$0	1.1

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]

Halsted Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 71,120
Built: 1916

For Year Ending: May 31, 2018
Date Generated: December 03, 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
Halsted Middle School 59 Halsted Street Newton, New Jersey 07860	_____ . (___)___-_____	____ _____ . (___)___-_____ _____

Property ID: 6622930

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
62.9 kBtu/ft²

Source EUI
88.4 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	908,507 (20%)
Natural Gas (kBtu)	3,566,242 (80%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	69.4
National Median Source EUI (kBtu/ft²)	97.5
% Diff from National Median Source EUI	-9%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	282

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

____ _____
,
(___)___-_____
_____

Professional Engineer Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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