Local Government Energy Audit Report

Lawton C. Johnson Summit Middle School

August 1, 2023

Prepared for:
Summit Board of Education
272 Morris Avenue
Summit, New Jersey 07901

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Disclaimer

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

TRC reviewed the energy conservation measures and estimates of energy savings 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 material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on selected products and installers. TRC and NJBPU do not guarantee cost estimates and shall in no event be held liable should actual installed costs vary from these material and labor estimates.

Incentive values provided in this report are estimated based on previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility 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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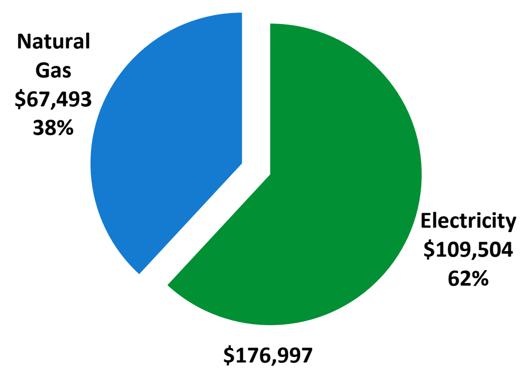
1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Lawton C. Johnson Summit 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 conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $176,997 Electricity: 960,960 kWh Natural Gas: 61,163 Therms	
ENERGY STAR® Benchmarking Score	39 *(1-100 scale)*	This building performs at below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

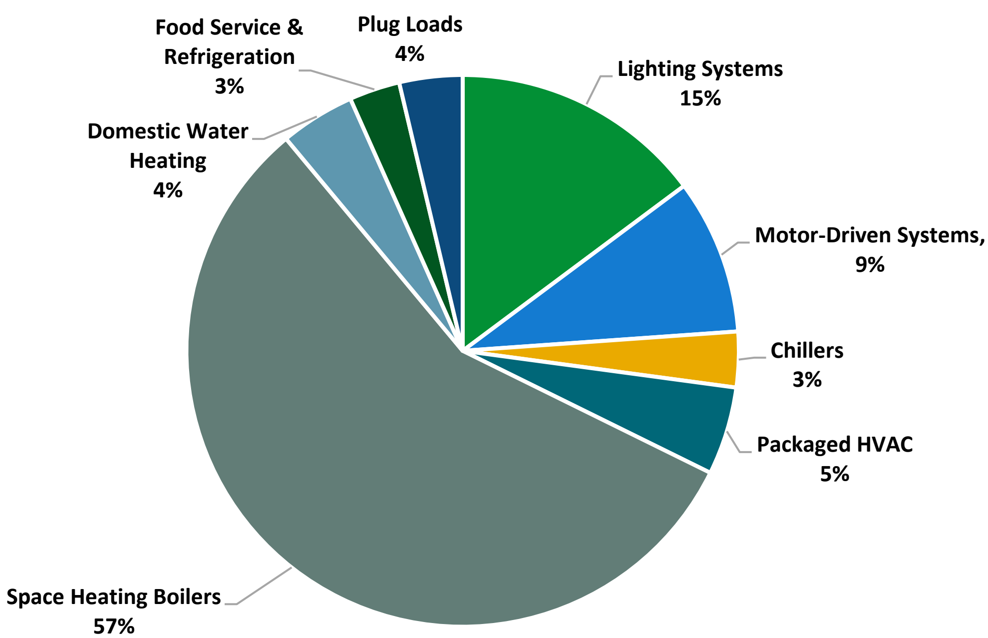


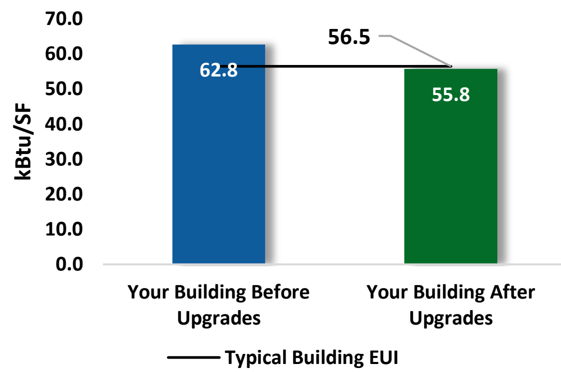
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

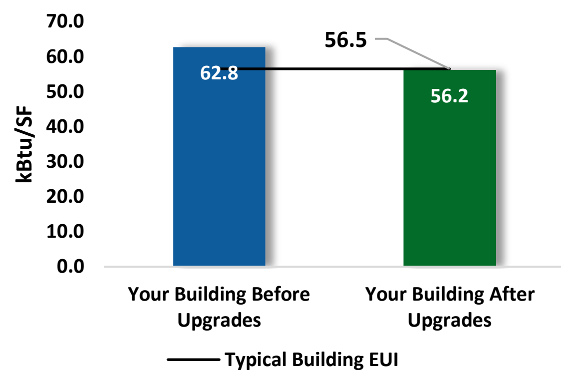
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$239,095
Potential Rebates & Incentives[1]	$40,661
Annual Cost Savings	$33,894
Annual Energy Savings	Electricity: 293,616 kWh Natural Gas: 394 Therms
Greenhouse Gas Emission Savings	150 Tons
Simple Payback	5.9 Years
Site Energy Savings (All Utilities)	11%



Scenario 2: Cost Effective Package[2]

Installation Cost	$154,706
Potential Rebates & Incentives	$37,721
Annual Cost Savings	$32,493
Annual Energy Savings	Electricity: 283,889 kWh Natural Gas: 129 Therms
Greenhouse Gas Emission Savings	143 Tons
Simple Payback	3.6 Years
Site Energy Savings (all utilities)	10%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that may apply.

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**207,422**	**46.9**	**-43**	**$23,167**	**$81,347**	**$21,295**	**$60,052**	**2.6**	**203,895**
ECM 1	Install LED Fixtures	Yes	3,793	0.0	0	$432	$1,984	$250	$1,734	4.0	3,820
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	479	0.3	0	$53	$655	$85	$570	10.7	470
ECM 3	Retrofit Fixtures with LED Lamps	Yes	203,150	46.6	-42	$22,682	$78,708	$20,960	$57,748	2.5	199,605
Lighting Control Measures			**57,852**	**12.5**	**-12**	**$6,459**	**$54,299**	**$14,345**	**$39,954**	**6.2**	**56,840**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	46,758	10.6	-10	$5,220	$41,474	$5,175	$36,299	7.0	45,940
ECM 5	Install High/Low Lighting Controls	Yes	11,094	1.9	-2	$1,239	$12,825	$9,170	$3,655	3.0	10,900
Motor Upgrades			**4,726**	**1.3**	**0**	**$538**	**$19,411**	**$0**	**$19,411**	**36.0**	**4,759**
ECM 6	Premium Efficiency Motors	No	4,726	1.3	0	$538	$19,411	$0	$19,411	36.0	4,759
Variable Frequency Drive (VFD) Measures			**6,979**	**1.9**	**0**	**$795**	**$12,043**	**$1,050**	**$10,993**	**13.8**	**7,027**
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	5,092	1.5	0	$580	$5,028	$900	$4,128	7.1	5,128
ECM 8	Install VFDs on Chilled Water Pumps	No	1,886	0.4	0	$215	$7,015	$150	$6,865	31.9	1,899
Unitary HVAC Measures			**2,541**	**2.7**	**0**	**$290**	**$29,633**	**$1,575**	**$28,058**	**96.9**	**2,559**
ECM 9	Install High Efficiency Air Conditioning Units	No	2,541	2.7	0	$290	$29,633	$1,575	$28,058	96.9	2,559
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**55**	**$610**	**$6,265**	**$500**	**$5,765**	**9.5**	**6,471**
ECM 10	Install High Efficiency Furnaces	Yes	0	0.0	55	$610	$6,265	$500	$5,765	9.5	6,471
Domestic Water Heating Upgrade			**1,946**	**0.0**	**12**	**$357**	**$158**	**$71**	**$87**	**0.2**	**3,398**
ECM 11	Install Low-Flow DHW Devices	Yes	1,946	0.0	12	$357	$158	$71	$87	0.2	3,398
Food Service & Refrigeration Measures			**9,073**	**0.8**	**27**	**$1,326**	**$33,870**	**$1,825**	**$32,045**	**24.2**	**12,239**
ECM 12	Food Service Equipment Replacement	No	0	0.0	27	$292	$18,580	$1,000	$17,580	60.1	3,103
ECM 13	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	1,049	0.1	0	$119	$1,213	$160	$1,053	8.8	1,056
ECM 14	Refrigeration Controls	Yes	2,341	0.0	0	$267	$3,867	$200	$3,667	13.7	2,357
ECM 15	Replace Refrigeration Equipment	No	2,460	0.3	0	$280	$9,750	$365	$9,385	33.5	2,477
ECM 16	Vending Machine Control	Yes	3,224	0.4	0	$367	$460	$100	$360	1.0	3,246
Custom Measures			**3,077**	**0.0**	**0**	**$351**	**$2,070**	**$0**	**$2,070**	**5.9**	**3,099**
ECM 17	Replace Electric Water Heater with Heat Pump Water Heater	Yes	3,077	0.0	0	$351	$2,070	$0	$2,070	5.9	3,099
TOTALS (COST EFFECTIVE MEASURES)			**282,003**	**61.4**	**13**	**$32,278**	**$154,706**	**$37,571**	**$117,135**	**3.6**	**285,490**
TOTALS (ALL MEASURES)			**293,616**	**66.1**	**39**	**$33,894**	**$239,095**	**$40,661**	**$198,434**	**5.9**	**300,287**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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 Prescriptive and Custom Rebates 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 may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized contractor. This program can provide incentives up to 70% or 80% of the cost of selected measures. A Direct Install contractor will assess and verify individual measure eligibility and perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions 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.

For more details on these programs please contact your utility provider.

Options from New Jersey's Clean Energy Program

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 and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., 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.

Successor Solar Incentive Program (SuSI)

New Jersey is committed to supporting solar energy. Solar projects help the state reach the renewable goals outlined in the state's Energy Master Plan. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available, but certified solar projects are able to earn one SREC II (Solar Renewable Energy Certificates II) for each megawatt-hour of solar electricity produced from a qualifying solar facility.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce electric demand during times of peak demand, the grid is made more reliable, and overall transmission costs are reduced for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

Large Energy User Program (LEUP)

LEUP is designed to promote self-investment in energy efficiency. It incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

For more details on these programs please visit New Jersey's Clean Energy Program website .

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Lawton C. Johnson Summit 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.

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 February 14, 2023, TRC performed an energy audit at Lawton C. Johnson Summit Middle School located in Summit, New Jersey. TRC met with facility staff to review the facility operations and help focus our investigation on specific energy-using systems.

The Lawton C. Johnson Summit Middle School located at 272 Morris Avenue is a public middle school serving students in sixth through eighth grade. The facility is a two-story 149,720 square foot building originally built in 1920 and expanded over the years to accommodate additional spaces. Spaces include classrooms, administrative offices, gymnasiums, locker rooms, auditorium, library, kitchen, cafeteria, conference rooms, corridors, lobbies, restrooms, storage, and basement mechanical space.

Facility lighting systems consist mainly of linear fluorescent fixtures. The school building is 100% heated by five Aerco condensing boilers and approximately 60% cooled by a mix of condensing units, window air conditioners (ACs) and two rooftop units (RTUs). Air cooled chillers provide cooling for the main office and auditorium.

Recent improvements and Facility Concerns

Facility concerns include old condensing units and high electric bills. Over the last two years, the facility has completed a partial interior lighting retrofit.

2.2 Building Occupancy

The school operates on a 12-month schedule. The gymnasiums, locker rooms, team and training rooms are used after classes for sports and other events. There are some Saturday activities in the gymnasium. The entire facility is shut down around 11:00 PM after the cleaning process.

During a typical day, the facility is occupied by approximately 950 students and 135 staff. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary based on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Lawton C. Johnson Middle School General Operating Hours	Weekday	6:00 AM-11:00 PM
	Saturday	Varies
Lawton C. Johnson Middle School Class Hours	Weekday	8:30 AM-2:45 PM
	Weekend	Closed

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are constructed of concrete masonry units (CMU) over structural steel with a brick façade, with gypsum drywall painted and CMU interior finish. The level of exterior wall insulation is unknown. The building has both flat roof areas and pitched roof sections supported by steel trusses. The original building has a pitched roof covered with slate shingles that are in aging but fair condition. The addition has a flat grey roof and small granular stone roof sections that are in fair condition.

Most of the windows are double pane and have aluminum frames with a thermal barrier. The fixed window weather seals are in good condition, showing little evidence of excessive wear. The windows were replaced in 2011 and are in good condition. Exterior doors were replaced in 2018 with FRP (fiberglass-reinforced polymer) rated doors and are in good condition. Degraded window and door seals increase drafts and outside air infiltration.

Exterior Walls

Flat Roof Elements

Pitched Roof Element

Windows

Exterior Doors

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several LED fixtures and LED lamps. Additionally, there are a small number of compact fluorescent lamps (CFL), incandescent lamps, and linear fluorescent T12 lamps. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot-long troffer, recessed, surface mounted fixtures and 2-foot fixtures with U-bend linear tube lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

The main gymnasium is lit with 235-Watt high bay LED fixtures. These fixtures are equipped with onboard occupancy sensors. The Mueller's gymnasium and other small spaces are illuminated with 2-foot by 4-foot LED panel fixtures. Linear fluorescent fixtures in the boiler room have been converted to operate LED tube lamps. Various interior spaces are lit with LED lamps. The CFLs are in spaces including old main entrance corridor, library main open area, and in small storage rooms. A small number of linear T12 and incandescent lamps are also found in smaller storage rooms and in the main office corridor. Remaining spaces are lit with linear fluorescent T8 fixtures. All exit signs are LED.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled by wall switches except some classrooms where light fixtures are controlled by occupancy sensors.

Exterior fixtures include LED lamps, wall mounted LED, high pressure, and metal halide fixtures, and two exterior wall sconces with LED lamps. Fixtures are controlled by timers and wall switches.

Linear Fluorescent T8 Fixtures

LED Panel

High Bay Fixture

Linear T8 Fixtures

Exterior Wall Mounted LED

Metal Halide Fixture

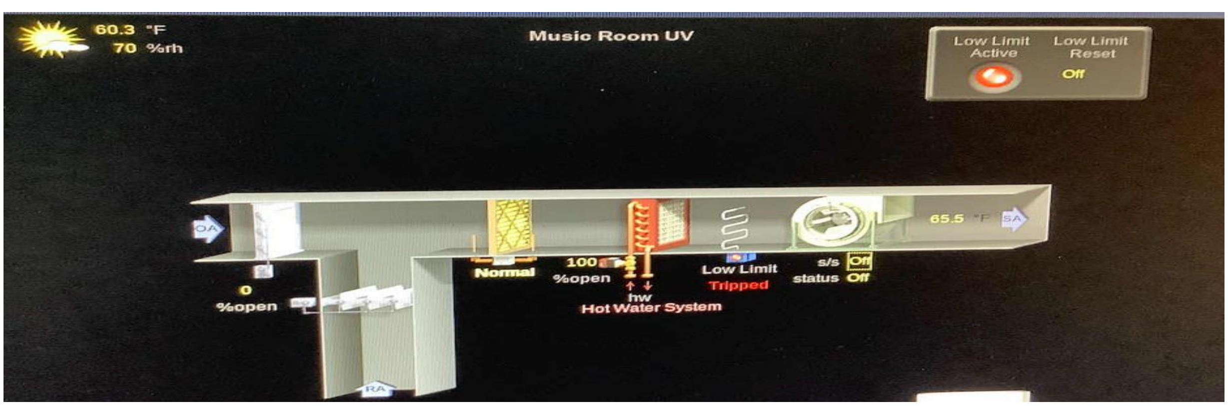
High-Pressure Sodium Fixture

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators (UVs) are equipped with supply fan motors and digitally controlled outside air dampers and fan coil valves connected to the hot water distribution system. They provide heating and ventilation to classrooms. This system appears to be in fair operating condition.

Typical Classroom Unit Ventilator



BAS Screenshot - Unit Ventilator

Unitary Electric HVAC Equipment

There are 12 window ACs and 11 outdoor condensing units that provide cooling to various classrooms. The window ACs vary in capacity between 0.67 tons and 2 tons while the condensing units vary in capacity between 1.5 tons to 5 tons. Five condensing units appear in fair and poor condition and have been evaluated for replacement. The window ACs are in good condition.

Window AC

Condensing Units

Unitary Heating Equipment

The gymnasium is heated by a Sterling roof mounted forced air furnace with a 280 MBh output heating capacity. The unit has reached the end of its useful life and appears to be in poor condition. It has been evaluated for replacement. The unit is controlled by the Building Automation System (BAS). The lockers and a storage area are heated using electric resistance heaters that are controlled by local thermostats.

Sterling Forced Air Furnace

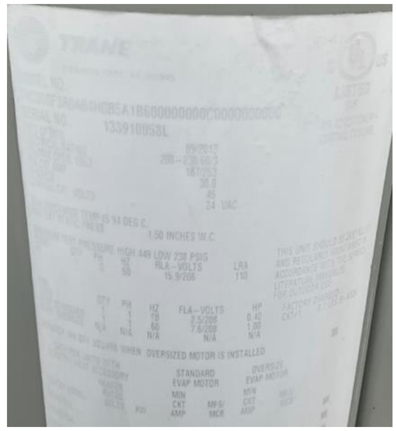
Packaged Units

The building has two rooftop units. A 5-ton Trane RTU serves the offices, and a 15-ton AAON (RTU-1) serves the stage. RTU-1 is equipped with a supply fan and an exhaust fan that are equipped with variable frequency drives and can vary the amount of air provided to the space.

Both RTUs are equipped with economizers. They are in good condition and are controlled by the BAS.

RTU-1

BAS Screenshot - RTU-1



Trane RTU - Offices

Air Handling Units (AHUs)

The auditorium is conditioned by a Temtrol® energy efficient air handing unit located in the basement. This unit is equipped with six, 5 hp supply fans (SAF-1 to SAF-6) and six, 2.5 hp return fans (RAF-1 to RAF-6), hot water heating coil, and chilled water coil for cooling. The fans are equipped with VFDs. The unit is in good working condition and is controlled by the BAS.

AHU-1 *Nameplate AHU-1*

BAS Screenshot - AHU-1

2.6 Building Exhaust Air Systems

The classrooms, restrooms, corridors, and other miscellaneous rooms are exhausted by motor driven roof mounted exhaust fans. There is a kitchen hood exhaust fan. Equipment is in good condition and is controlled variously by the BAS and manual switches.

Typical Exhaust Fan

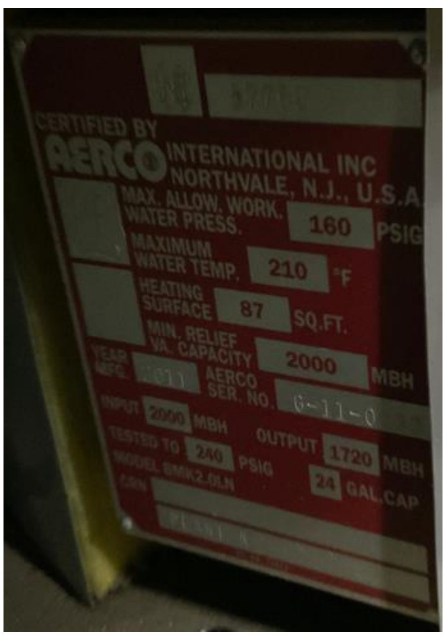
Kitchen Hood

2.7 Heating Hot Water Systems

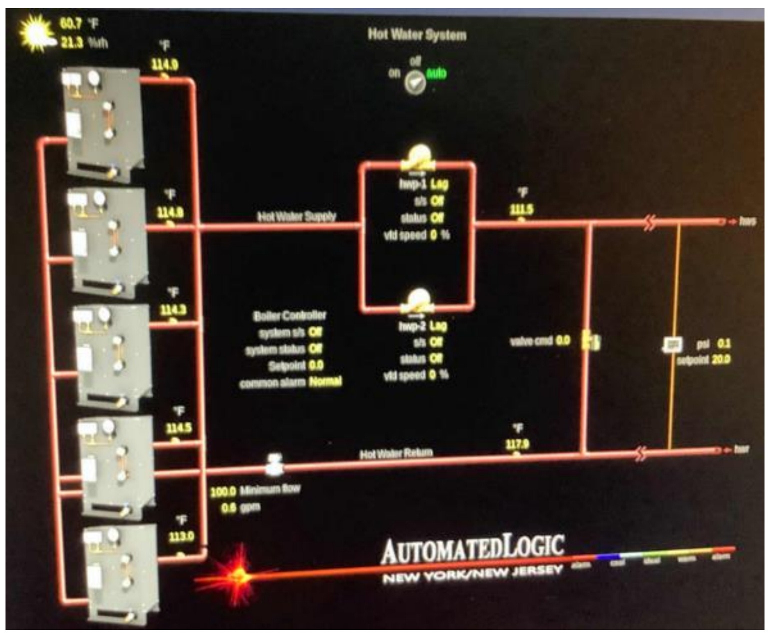
Five Aerco 1720 MBh condensing hot water boilers serve the building's heating load. The burners are fully-modulating with a nominal efficiency of 86%. Actual boiler efficiency may tend higher under favorable (low) return water temperatures. The boilers are configured to run all together to modulate the load and to stage based on the outside air temperature. Installed in 2010, they are in good condition and well maintained.

The hydronic distribution system is a two-pipe heating only system. The boilers are configured in a variable flow primary distribution with two, 25 hp VFD controlled hot water pumps operating with an automated lead-lag control scheme. They provide hot water to AHU-1, classroom unit ventilators, fan coil units, and fin tube radiators. The boilers are controlled by the BAS.

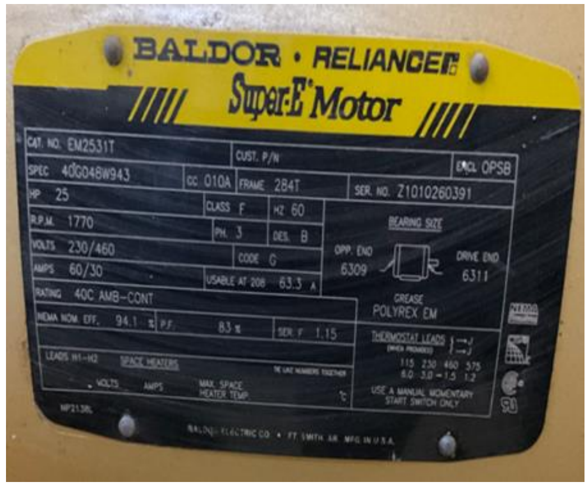
Aerco Condensing Boilers



Boilers Nameplate



BAS Hot Water Loop

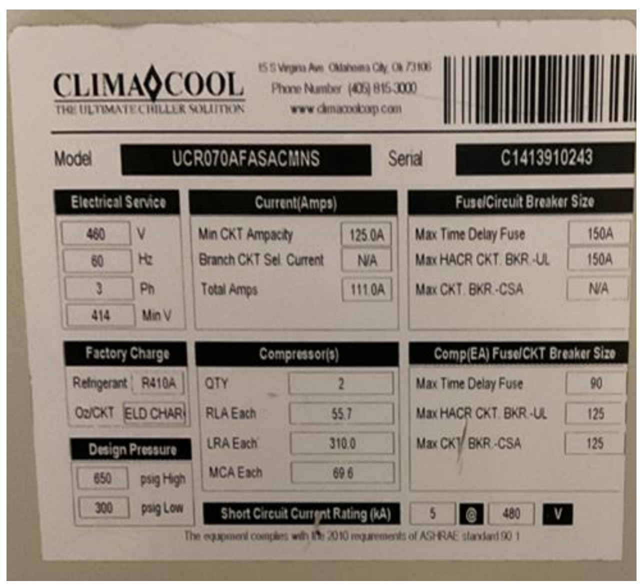


25 hp Variable Flow Pumps

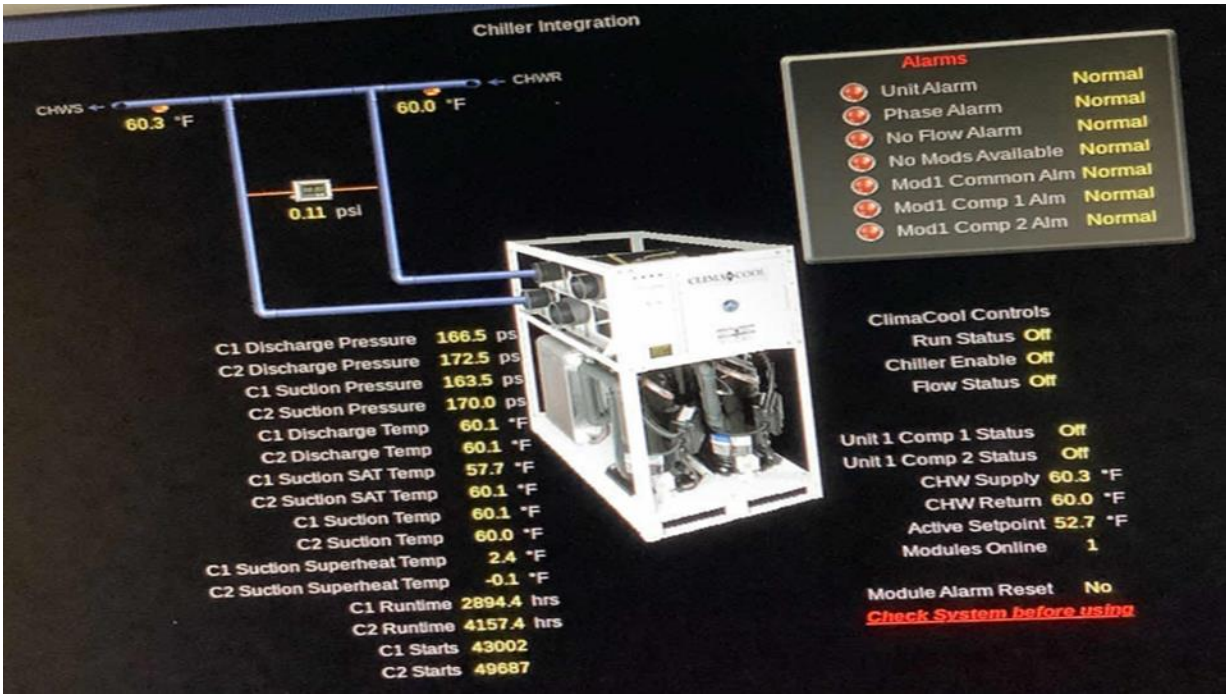
2.8 Chilled Water Systems

The building has two, R410a air-cooled scroll chillers. A 105-ton Carrier serves the main office and a 70-ton ClimaCool serves the auditorium. The chillers are located on the exterior ground floor and in the basement respectively.

The Carrier chiller supplies chilled water using two, 1 hp constant flow chilled water pumps located in the storage room that was not accessible during the audit. Chilled water is distributed to fan coil units The ClimaCool unit supplies chilled water to AHU-1 and a few fan coil units using two, 5 hp variable flow chilled water pumps located in the basement. The chilled water pumps run in automated lead-lag control scheme. The chillers are in good condition and are controlled by the BAS.



ClimaCool Chiller



BAS Screenshot - ClimaCool Chiller

5 hp Variable Flow Chilled Water Pumps

105 Tons Carrier Chiller

2.9 Building Automation System (BAS)

An Automated Logic BAS controls the HVAC equipment, boilers, chillers, air handler, package units. The BAS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures.

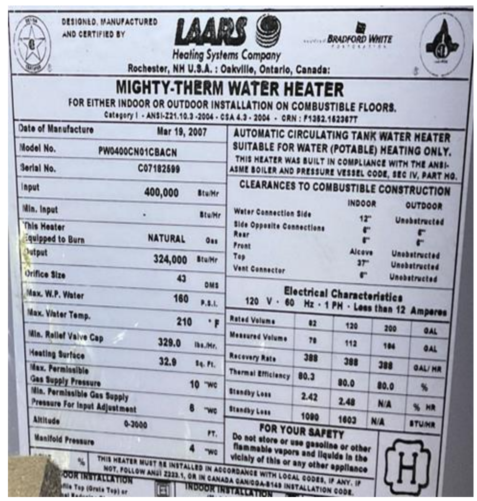
Main Page - Middle School BAS

2.10 Domestic Hot Water

A LAARS 400 MBh input boiler with a separate 119-gallon storage tank is the main source of domestic hot water. It has a combustion efficiency of 81%. Installed in 2007, the boiler is in good condition. A fractional horsepower domestic hot water pump distributes hot water to end uses.

Two electric storage tank water heaters located in the basement and storage room respectively produce hot water for other sections of the building. The units are respectively a 4.5 kW with 40 gallons of tank capacity and 1.5 kW with 19 gallons of tank capacity. The 40-gallon storage water heater has a fractional horsepower circulation pump. It has been evaluated for replacement with a more efficient heat pump water heater.

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



Main Domestic Hot Water Boiler

119-Gallon Separate Tank

19-Gallon Electric Water Heater

2.11 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare breakfast and lunch for students. Most cooking is done using three gas-fired ovens. Bulk prepared foods are held in two electric holding cabinets. Equipment is high efficiency and is in good condition.

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

Gas Oven

Electric Food Holding Cabinet

2.12 Refrigeration

Commercial refrigeration equipment is in the cafeteria, deli bar, and kitchen. There are a total of six stand-up refrigerators with a mix of solid and glass doors. There is a freezer and a refrigerator chest. The Beverage Aire and the older Traulsen stand-up refrigerator appear in fair condition and have been evaluated for replacement.

The kitchen has a walk-in cooler and a walk-in medium temperature freezer each with two permanent split capacitor fans evaporators. The condensing unit is located on the exterior ground floor. They appear in good condition.

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

Solid Door Stand-up Refrigerators

Glass Door Stand-up Refrigerators

Walk-in Cooler Evaporator

Outdoor Condensing Unit

2.13 Plug Load and Vending Machines

There are 143 desktops throughout the facility. Plug loads include general café and office equipment. There are school typical loads such as smart boards, projectors, scanner/copier, small printer, microwaves, min-fridges, television, and laptops. The art room has two electric kilns.

There are three residential-style refrigerators, and these vary in condition and efficiency.

There are two refrigerated beverage vending machine in the cafeteria and teacher lounge. The vending machines are not equipped with occupancy-based controls.

Copier/Scanner

Residential-Style Refrigerator

Vending Machine

Art Room Kiln

2.14 Water-Using Systems

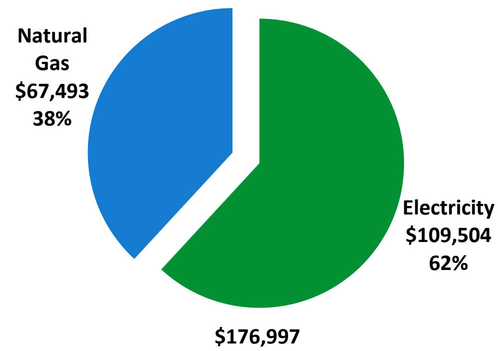
There are several restrooms with sinks, toilets and/or urinals. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Some restrooms have low-flow devices. The kitchen has five high-flow faucet aerators.

Sink Low Flow Device

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	960,960 kWh	$109,504
Natural Gas	61,163 Therms	$67,493
Total		**$176,997**



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.

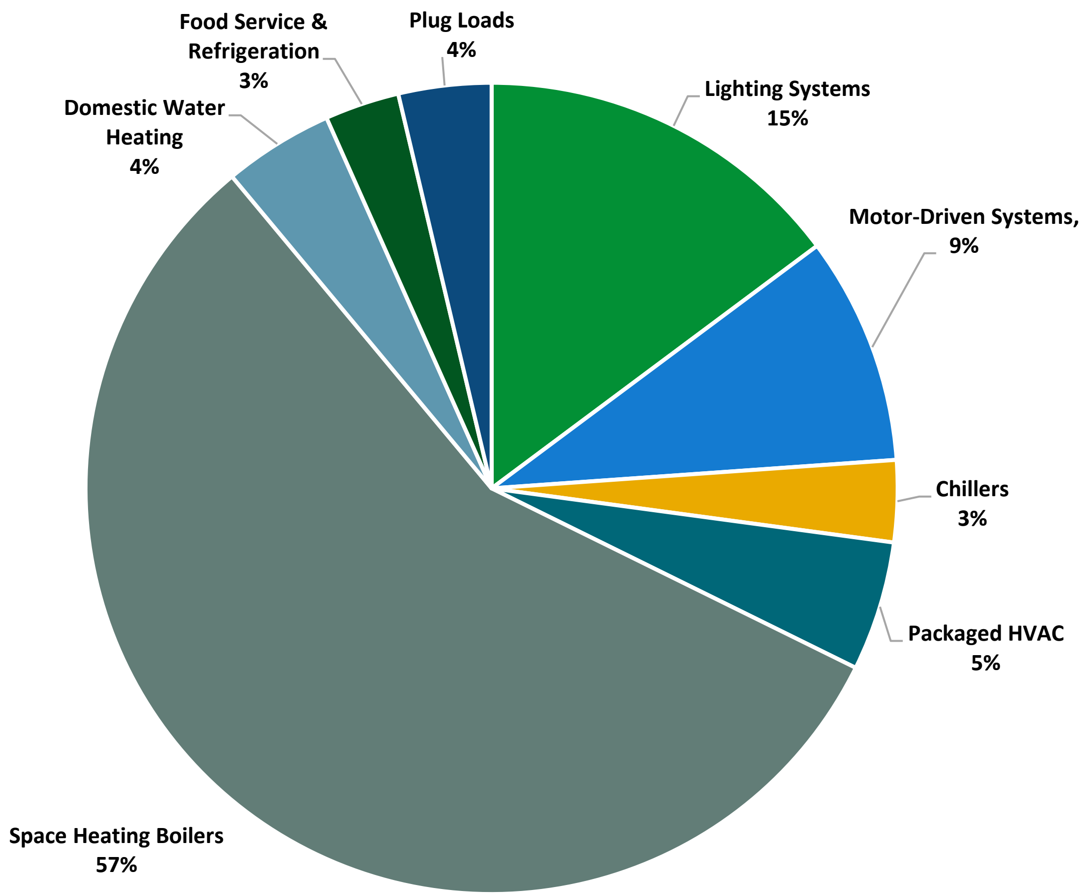
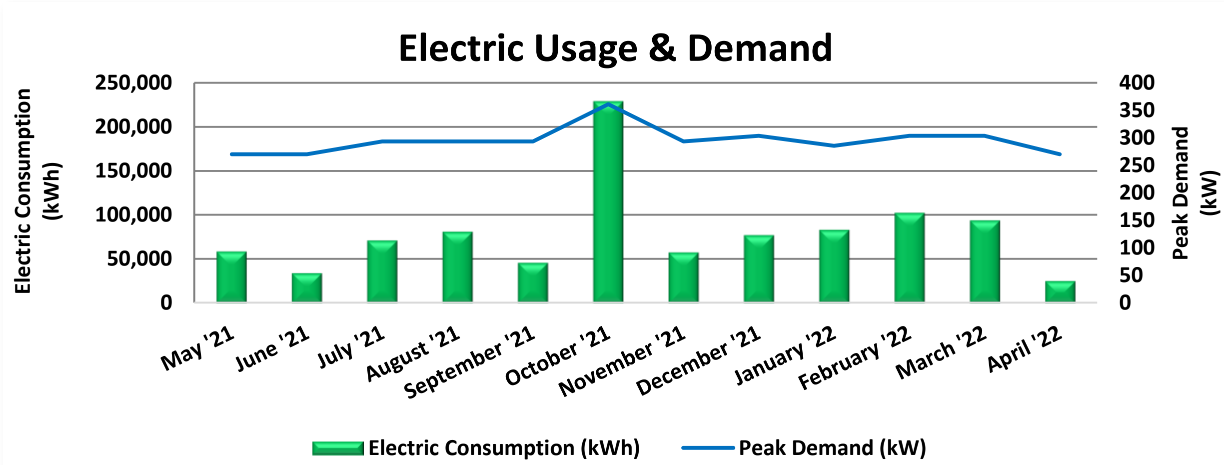


Figure 4 - Energy Balance

3.1 Electricity

JCP&L delivers electricity under General Service Secondary 3 Phase rate class.



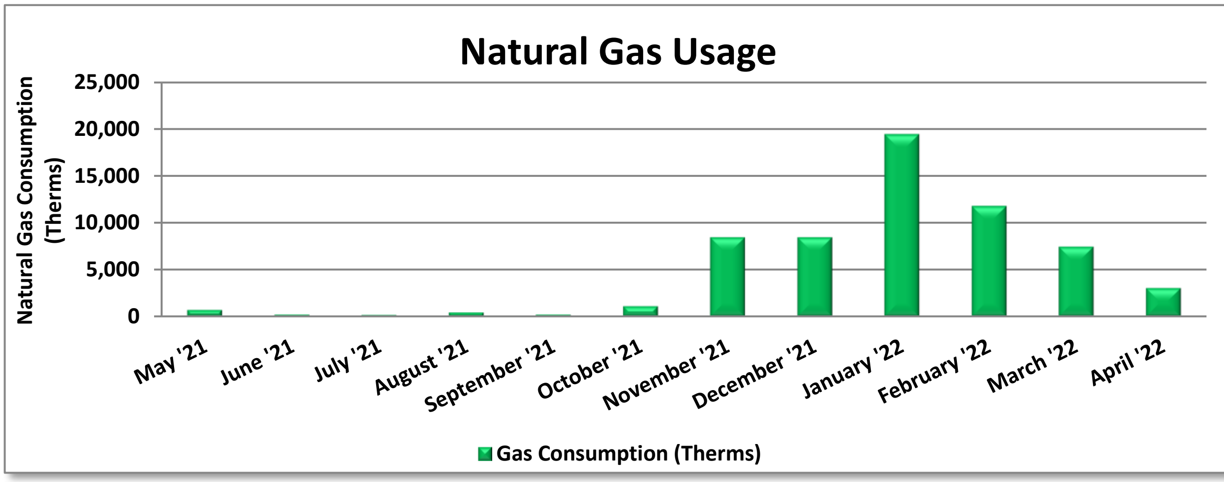
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/7/21	32	58,880	270	$1,726	$7,245
7/7/21	30	34,240	270	$1,726	$5,029
8/5/21	29	71,360	293	$1,879	$8,538
9/7/21	33	81,280	293	$1,879	$9,457
10/6/21	29	46,080	293	$1,749	$6,137
11/3/21	28	228,800	361	$2,211	$21,317
12/3/21	30	57,600	293	$2,091	$7,608
1/5/22	33	77,440	304	$2,170	$9,499
2/3/22	29	83,200	286	$2,035	$9,868
3/6/22	31	102,720	304	$2,170	$11,812
4/6/22	31	94,080	304	$2,170	$10,996
5/6/22	30	25,280	270	$1,922	$1,998
Totals	**365**	**960,960**	**361**	**$23,728**	**$109,504**
Annual	**365**	**960,960**	**361**	**$23,728**	**$109,504**

Notes:

- Peak demand of 361 kW occurred in October '21.
- Average demand over the past 12 months was 295 kW.
- The average electric cost over the past 12 months was $0.114/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

PSE&G delivers natural gas under rate class Large Volume Gas (LVG), with natural gas supply provided by Direct Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/7/21	32	684	$497
7/7/21	30	174	$245
8/5/21	29	143	$229
9/7/21	33	410	$362
10/5/21	28	187	$252
11/3/21	29	1,074	$3,139
12/7/21	34	8,417	$7,523
1/6/22	30	8,435	$10,787
2/4/22	29	19,425	$20,410
3/8/22	32	11,754	$13,737
4/6/22	29	7,439	$7,131
5/6/22	30	3,021	$3,182
Totals	**365**	**61,163**	**$67,493**
Annual	**365**	**61,163**	**$67,493**

Notes:

- The average gas cost for the past 12 months is $1.104/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	39

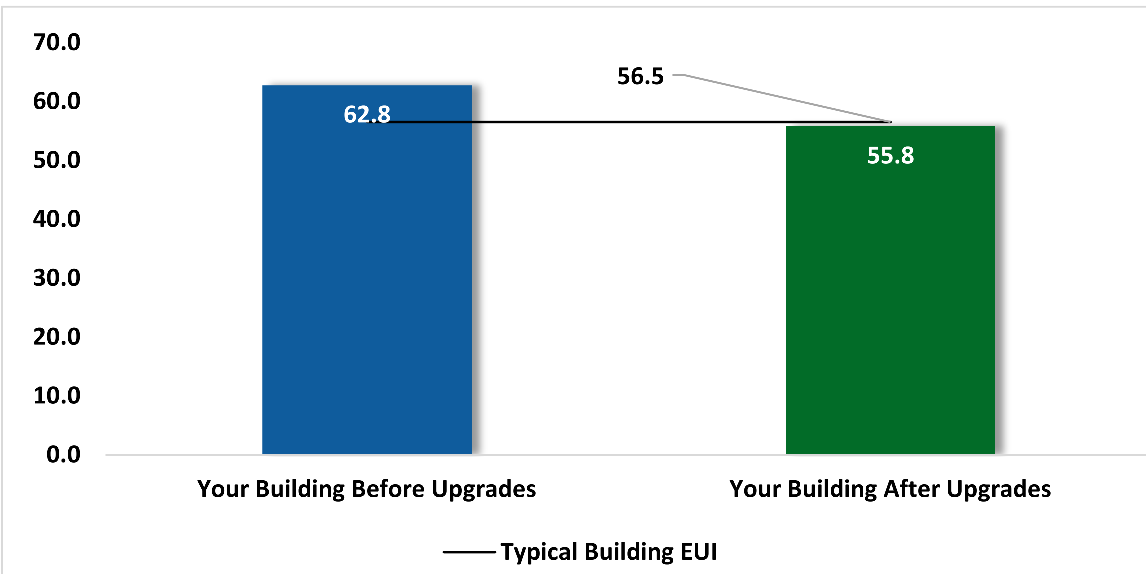


Figure 5 - Energy Use Intensity Comparison[3]

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

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. Several factors can cause a building to vary from 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.

[3] Based on all evaluated ECMs

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 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.

4 Energy Conservation Measures

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

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

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

Financial incentives in this report are based on the previously run state rebate program SmartStart, which has been retired. Now, all investor-owned gas and electric utility companies are offering complementary energy efficiency programs directly to their customers. Some measures and proposed upgrades may be eligible for higher incentives than those shown below. The incentives in the summary tables should be used for high-level planning purposes. To verify incentives, reach out to your utility provider or visit the NJCEP website for more information.

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**207,422**	**46.9**	**-43**	**$23,167**	**$81,347**	**$21,295**	**$60,052**	**2.6**	**203,895**
ECM 1	Install LED Fixtures	Yes	3,793	0.0	0	$432	$1,984	$250	$1,734	4.0	3,820
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	479	0.3	0	$53	$655	$85	$570	10.7	470
ECM 3	Retrofit Fixtures with LED Lamps	Yes	203,150	46.6	-42	$22,682	$78,708	$20,960	$57,748	2.5	199,605
Lighting Control Measures			**57,852**	**12.5**	**-12**	**$6,459**	**$54,299**	**$14,345**	**$39,954**	**6.2**	**56,840**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	46,758	10.6	-10	$5,220	$41,474	$5,175	$36,299	7.0	45,940
ECM 5	Install High/Low Lighting Controls	Yes	11,094	1.9	-2	$1,239	$12,825	$9,170	$3,655	3.0	10,900
Motor Upgrades			**4,726**	**1.3**	**0**	**$538**	**$19,411**	**$0**	**$19,411**	**36.0**	**4,759**
ECM 6	Premium Efficiency Motors	No	4,726	1.3	0	$538	$19,411	$0	$19,411	36.0	4,759
Variable Frequency Drive (VFD) Measures			**6,979**	**1.9**	**0**	**$795**	**$12,043**	**$1,050**	**$10,993**	**13.8**	**7,027**
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	5,092	1.5	0	$580	$5,028	$900	$4,128	7.1	5,128
ECM 8	Install VFDs on Chilled Water Pumps	Yes	1,886	0.4	0	$215	$7,015	$150	$6,865	31.9	1,899
Unitary HVAC Measures			**2,541**	**2.7**	**0**	**$290**	**$29,633**	**$1,575**	**$28,058**	**96.9**	**2,559**
ECM 9	Install High Efficiency Air Conditioning Units	No	2,541	2.7	0	$290	$29,633	$1,575	$28,058	96.9	2,559
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**55**	**$610**	**$6,265**	**$500**	**$5,765**	**9.5**	**6,471**
ECM 10	Install High Efficiency Furnaces	Yes	0	0.0	55	$610	$6,265	$500	$5,765	9.5	6,471
Domestic Water Heating Upgrade			**1,946**	**0.0**	**12**	**$357**	**$158**	**$71**	**$87**	**0.2**	**3,398**
ECM 11	Install Low-Flow DHW Devices	Yes	1,946	0.0	12	$357	$158	$71	$87	0.2	3,398
Food Service & Refrigeration Measures			**9,073**	**0.8**	**27**	**$1,326**	**$33,870**	**$1,825**	**$32,045**	**24.2**	**12,239**
ECM 12	Food Service Equipment Replacement	No	0	0.0	27	$292	$18,580	$1,000	$17,580	60.1	3,103
ECM 13	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	1,049	0.1	0	$119	$1,213	$160	$1,053	8.8	1,056
ECM 14	Refrigeration Controls	Yes	2,341	0.0	0	$267	$3,867	$200	$3,667	13.7	2,357
ECM 15	Replace Refrigeration Equipment	No	2,460	0.3	0	$280	$9,750	$365	$9,385	33.5	2,477
ECM 16	Vending Machine Control	Yes	3,224	0.4	0	$367	$460	$100	$360	1.0	3,246
Custom Measures			**3,077**	**0.0**	**0**	**$351**	**$2,070**	**$0**	**$2,070**	**5.9**	**3,099**
ECM 17	Replace Electric Water Heater with Heat Pump Water Heater	Yes	3,077	0.0	0	$351	$2,070	$0	$2,070	5.9	3,099
TOTALS			**293,616**	**66.1**	**39**	**$33,894**	**$239,095**	**$40,661**	**$198,434**	**5.9**	**300,287**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**207,422**	**46.9**	**-43**	**$23,167**	**$81,347**	**$21,295**	**$60,052**	**2.6**	**203,895**
ECM 1	Install LED Fixtures	3,793	0.0	0	$432	$1,984	$250	$1,734	4.0	3,820
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	479	0.3	0	$53	$655	$85	$570	10.7	470
ECM 3	Retrofit Fixtures with LED Lamps	203,150	46.6	-42	$22,682	$78,708	$20,960	$57,748	2.5	199,605
Lighting Control Measures		**57,852**	**12.5**	**-12**	**$6,459**	**$54,299**	**$14,345**	**$39,954**	**6.2**	**56,840**
ECM 4	Install Occupancy Sensor Lighting Controls	46,758	10.6	-10	$5,220	$41,474	$5,175	$36,299	7.0	45,940
ECM 5	Install High/Low Lighting Controls	11,094	1.9	-2	$1,239	$12,825	$9,170	$3,655	3.0	10,900
Variable Frequency Drive (VFD) Measures		**5,092**	**1.5**	**0**	**$580**	**$5,028**	**$900**	**$4,128**	**7.1**	**5,128**
ECM 7	Install VFDs on Constant Volume (CV) Fans	5,092	1.5	0	$580	$5,028	$900	$4,128	7.1	5,128
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**55**	**$610**	**$6,265**	**$500**	**$5,765**	**9.5**	**6,471**
ECM 10	Install High Efficiency Furnaces	0	0.0	55	$610	$6,265	$500	$5,765	9.5	6,471
Domestic Water Heating Upgrade		**1,946**	**0.0**	**12**	**$357**	**$158**	**$71**	**$87**	**0.2**	**3,398**
ECM 11	Install Low-Flow DHW Devices	1,946	0.0	12	$357	$158	$71	$87	0.2	3,398
Food Service & Refrigeration Measures		**6,613**	**0.5**	**0**	**$754**	**$5,540**	**$460**	**$5,080**	**6.7**	**6,660**
ECM 13	Refrigerator/Freezer Case Electrically Commutated Motors	1,049	0.1	0	$119	$1,213	$160	$1,053	8.8	1,056
ECM 14	Refrigeration Controls	2,341	0.0	0	$267	$3,867	$200	$3,667	13.7	2,357
ECM 16	Vending Machine Control	3,224	0.4	0	$367	$460	$100	$360	1.0	3,246
Custom Measures		**3,077**	**0.0**	**0**	**$351**	**$2,070**	**$0**	**$2,070**	**5.9**	**3,099**
ECM 17	Replace Electric Water Heater with Heat Pump Water Heater	3,077	0.0	0	$351	$2,070	$0	$2,070	5.9	3,099
TOTALS		**282,003**	**61.4**	**13**	**$32,278**	**$154,706**	**$37,571**	**$117,135**	**3.6**	**285,490**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 7 – 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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**207,422**	**46.9**	**-43**	**$23,167**	**$81,347**	**$21,295**	**$60,052**	**2.6**	**203,895**
ECM 1	Install LED Fixtures	3,793	0.0	0	$432	$1,984	$250	$1,734	4.0	3,820
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	479	0.3	0	$53	$655	$85	$570	10.7	470
ECM 3	Retrofit Fixtures with LED Lamps	203,150	46.6	-42	$22,682	$78,708	$20,960	$57,748	2.5	199,605

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all 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 metal halide and high-pressure sodium lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent T12 fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

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

Affected Building Areas: basement and storage rooms

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent, CFL 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. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes, CFL and incandescent lamps in storage rooms

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**57,852**	**12.5**	**-12**	**$6,459**	**$54,299**	**$14,345**	**$39,954**	**6.2**	**56,840**
ECM 4	Install Occupancy Sensor Lighting Controls	46,758	10.6	-10	$5,220	$41,474	$5,175	$36,299	7.0	45,940
ECM 5	Install High/Low Lighting Controls	11,094	1.9	-2	$1,239	$12,825	$9,170	$3,655	3.0	10,900

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms

ECM 5: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety code requirements for egress. 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.

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

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 occupants approach the area.

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

Affected Building Areas: hallways and stairwells

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**4,726**	**1.3**	**0**	**$538**	**$19,411**	**$0**	**$19,411**	**36.0**	**4,759**
ECM 6	Premium Efficiency Motors	4,726	1.3	0	$538	$19,411	$0	$19,411	36.0	4,759

ECM 6: Premium Efficiency Motors

We evaluated replacing standard efficiency unit ventilators 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.

The school district is considering replacing most of the old fan coil units at this site. The primary savings from replacing fan coil units will be from improved fan motor efficiency; however, those savings are unlikely to justify replacing the fan coils. The next potential savings would be from installing fan coils that provide for more optimal use of outside air than the existing fan coil units.

The potential savings from installing new fan coils with electronically commutated (EC) motors was evaluated. EC motors are generally more efficient than other fractional hp motors and have the capability of operating at variable speeds. In general, replacing the fan coils should be considered a capital improvement measure that has the potential to provide energy savings and improve occupant comfort.

Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Classrooms	Unit Ventilators - Classrooms	64	Fan Coil Unit	0.2	Fan Coil 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*.

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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**6,979**	**1.9**	**0**	**$795**	**$12,043**	**$1,050**	**$10,993**	**13.8**	**7,027**
ECM 7	Install VFDs on Constant Volume (CV) Fans	5,092	1.5	0	$580	$5,028	$900	$4,128	7.1	5,128
ECM 8	Install VFDs on Chilled Water Pumps	1,886	0.4	0	$215	$7,015	$150	$6,865	31.9	1,899

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 inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

ECM 7: Install VFDs on Constant Volume (CV) Fans

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

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

VAV 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. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

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

Affected Unit: Sterling furnace

ECM 8: Install VFDs on Chilled Water Pumps

We evaluated installing VFDs to control the 1 hp chilled water pumps. Two-way valves must serve the chilled water coils being served and the chilled water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the chilled water distribution, they will need to be modified when this measure is implemented. As the chilled water valves close, the differential pressure increases, and the VFD modulates the pump speed to maintain a differential pressure setpoint.

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

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

Affected Pumps: 1 hp chilled water pumps

4.5 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**2,541**	**2.7**	**0**	**$290**	**$29,633**	**$1,575**	**$28,058**	**96.9**	**2,559**
ECM 9	Install High Efficiency Air Conditioning Units	2,541	2.7	0	$290	$29,633	$1,575	$28,058	96.9	2,559

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

ECM 9: Install High Efficiency Air Conditioning Units

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

Affected Units: five (older) condensing units

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**55**	**$610**	**$6,265**	**$500**	**$5,765**	**9.5**	**6,471**
ECM 10	Install High Efficiency Furnaces	0	0.0	55	$610	$6,265	$500	$5,765	9.5	6,471

ECM 10: Install High Efficiency Furnaces

Replace standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases, which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that require proper drainage.

Affected Units: Sterling furnace

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,946**	**0.0**	**12**	**$357**	**$158**	**$71**	**$87**	**0.2**	**3,398**
ECM 11	Install Low-Flow DHW Devices	1,946	0.0	12	$357	$158	$71	$87	0.2	3,398

ECM 11: 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. Pre-rinse spray valves (PRSVs), often used in commercial and institutional kitchens, remove food waste from dishes prior to dishwashing.

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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**9,073**	**0.8**	**27**	**$1,326**	**$33,870**	**$1,825**	**$32,045**	**24.2**	**12,239**
ECM 12	Food Service Equipment Replacement	0	0.0	27	$292	$18,580	$1,000	$17,580	60.1	3,103
ECM 13	Refrigerator/Freezer Case Electrically Commutated Motors	1,049	0.1	0	$119	$1,213	$160	$1,053	8.8	1,056
ECM 14	Refrigeration Controls	2,341	0.0	0	$267	$3,867	$200	$3,667	13.7	2,357
ECM 15	Replace Refrigeration Equipment	2,460	0.3	0	$280	$9,750	$365	$9,385	33.5	2,477
ECM 16	Vending Machine Control	3,224	0.4	0	$367	$460	$100	$360	1.0	3,246

ECM 12: Food Service Equipment Replacement

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

Location	Quantity	Equipment Type	Manufacturer	Model
Kitchen	1	Gas Convection Oven (Full Size)	Imperial	
Kitchen	1	Gas Convection Oven (Full Size)	Blodgett	Zephaire

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

ECM 13: Refrigerator/Freezer Case Electrically Commutated Motors

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

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

ECM 14: Refrigeration Controls

Install additional controls to optimize the operation of walk-in coolers and freezers.

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

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

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

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

ECM 15: Replace Refrigeration Equipment

We evaluated replacing existing two commercial refrigerators 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 16: 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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**3,077**	**0.0**	**0**	**$351**	**$2,070**	**$0**	**$2,070**	**5.9**	**3,099**
ECM 17	Replace Electric Water Heater with Heat Pump Water Heater	3,077	0.0	0	$351	$2,070	$0	$2,070	5.9	3,099

CM 17: Replace Electric Water Heater with Heat Pump Water Heater

A typical electric water heater uses electric resistance coils to heat water at a coefficient of performance (COP) of 1. Air source heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. The typical average COP for a HPWH is about 2.5, so they require significantly less electricity to produce the same amount of hot water as a traditional electric water heater. There are two types of HPWH, those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The following addresses integrated HPWH.

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room.[4] The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank in order to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

Affected Units: 4.5 kW electric resistance water heater

4.10 Measures for Future Consideration

There are additional opportunities for improvement that Summit Board of Education may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment, and/or include significant system reconfiguration. These measure(s) are therefore beyond the scope of this energy audit. These measure(s) are described here to support a whole building approach to energy efficiency and sustainability.

Summit Board of Education may wish to consider the Energy Savings Improvement Program (ESIP) or other whole building approach. With interest in implementing comprehensive, largescale and/or complex system wide projects, these measures may be pursued during development of a future energy savings plan. We recommend that you work with your energy service company (ESCO) and/or design team to:

- Evaluate these measures further.
- Develop firm costs.
- Determine measure savings.
- Prepare detailed implementation plans.

Other modernization or capital improvement funds may be leveraged for these types of refurbishments. As you plan for capital upgrades, be sure to consider the energy impact of the building systems and controls being specified.

Retro-Commissioning Study

Due to the complexity of today's HVAC systems and controls, a thorough analysis and rebalance of heating, ventilation, and cooling systems should periodically be conducted. There are indications at this

[4]https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system

site that systems may not be operating correctly or as efficiently as they could be. One important tool available to building operators to ensure proper system operation is retro-commissioning.

Retro-commissioning is a common practice recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to be implemented every few years. We recommend that you contact a reputable engineering firm that specializes in energy control systems and retro-commissioning. Ask them to propose a scope of work and an outline of the procedures and processes to be implemented, including a schedule and the roles of all responsible parties.

Once goals and responsibilities are established, the objective of the investigation process is to understand how the building is currently operating, identify the issues, and determine the most cost-effective way to improve performance. The retro-commissioning agent will review building documentation, interview building occupants, and inspect and test the equipment. Information is then compiled into a report and shared with facility staff, who will select which recommendations to implement after reviewing the findings.

The implementation phase puts the selected processes into place. Typical measures may include sensor calibration, equipment schedule changes, damper linkage repair and similar relatively low-cost adjustments—although more expensive sophisticated programming and building control system upgrades may be warranted. Approved measures may be implemented by the agent, the building staff, or by subcontractors. Typically, a combination of these individuals makes up the retro-commissioning team.

After the approved measures are implemented, the team will verify that the changes are working as expected. Baseline and post-case measurements will allow building staff to monitor equipment and ensure that the benefits are maintained.

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.

Operation and maintenance (O&M) plans enhance the operational efficiency of HVAC and other energy intensive systems and could save 5% –20% of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, and planned capital upgrades, and it incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and outline procedures for measuring and reporting whether goals have been achieved.

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 cannot manage what you do not 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[5]. 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. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

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.

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

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. Adjust exterior lighting time clock controls seasonally as needed to match your lighting requirements.

Motor Maintenance

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

Fans to Reduce Cooling Load

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

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.

Economizer Maintenance

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

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

Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage, and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save 5% to 10% of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

Duct maintenance has two primary goals: keep the ducts clean to avoid air quality problems and seal leaks to save energy. Check for cleanliness, obstructions that block airflow, water damage, and leaks. Ducts should be inspected at least every two years.

The biggest symptoms of clogged air ducts are differing temperatures throughout the building and areas with limited airflow from supply registers. If a particular air duct is clogged, then air flow will only be cut off to some rooms in the building—not all of them. The reduced airflow will make it more difficult for those areas to reach the temperature setpoint, which will cause the HVAC system to run longer to cool or heat that area properly. If you suspect clogged air ducts, ensure that all areas in front of supply registers are clear of items that may block or restrict air flow, and you should check for fire dampers or balancing dampers that have failed closed.

Duct leakage in commercial buildings can account for 5%–25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Check ductwork for leakage. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Distribution system losses are dependent on-air system temperature, the size of the distribution system, and the level of insulation of the ductwork. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is missing or worn, the system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

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 and efficiently. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the boiler tubes to improve heat transfer.

Furnace Maintenance

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

Label HVAC Equipment

For improved coordination in maintenance practices, we recommend labeling or re-labeling the site HVAC equipment. Maintain continuity in labeling by following labeling conventions as indicated in the facility drawings or BAS building equipment list. Use weatherproof or heatproof labeling or stickers for permanence, but do not cover over original equipment nameplates, which should be kept clean and readable whenever possible. Besides equipment, label piping for service and direction of flow when possible. Ideally, maintain a log of HVAC equipment, including nameplate information, asset tag designation, areas served, installation year, service dates, and other pertinent information.

This investment in your equipment will enhance collaboration and communication between your staff and your contracted service providers and may help you with regulatory compliance.

Optimize HVAC Equipment Schedules

Energy management systems (BAS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The BAS monitors and reports operational status, schedules equipment start and stop times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These BAS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your BAS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours in order to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the *optimal start* feature of the BAS (if available) to optimize the building warmup sequence. Most BAS scheduling programs provide for holiday schedules, which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function, which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

Water Heater Maintenance

The lower the supply water temperature that is used for hand washing sinks, the less energy is needed to heat the water. Reducing the temperature results in energy savings and the change is often unnoticeable to users. Be sure to review the domestic water temperature requirements for sterilizers and dishwashers as you investigate reducing the supply water temperature.

Also, 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.
- Reduce pressure setting to minimum needed for air operated equipment.
- Turn off compressor if not routinely needed.
- Use low pressure blower air rather than high pressure compressed air.

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

Refrigeration Equipment Maintenance

Preventative maintenance keeps commercial refrigeration equipment running reliably and efficiently. Commercial refrigerators and freezers are mission-critical equipment that can cost a fortune when they go down. Even when they appear to be working properly, refrigeration units can be consuming too much energy. Have walk-in refrigeration and freezer and other commercial systems serviced at least annually. This practice will allow systems to perform to their highest capabilities and will help identify system issues if they exist.

Maintaining your commercial refrigeration equipment can save between 5% and 10% on energy costs. When condenser coils are dirty, your commercial refrigerators and freezers work harder to maintain the temperature inside. Worn gaskets, hinges, door handles or faulty seals cause cold air to leak from the unit, forcing the unit to run longer and use more electricity.

Regular cleaning and maintenance also help your commercial refrigeration equipment to last longer.

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, 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.

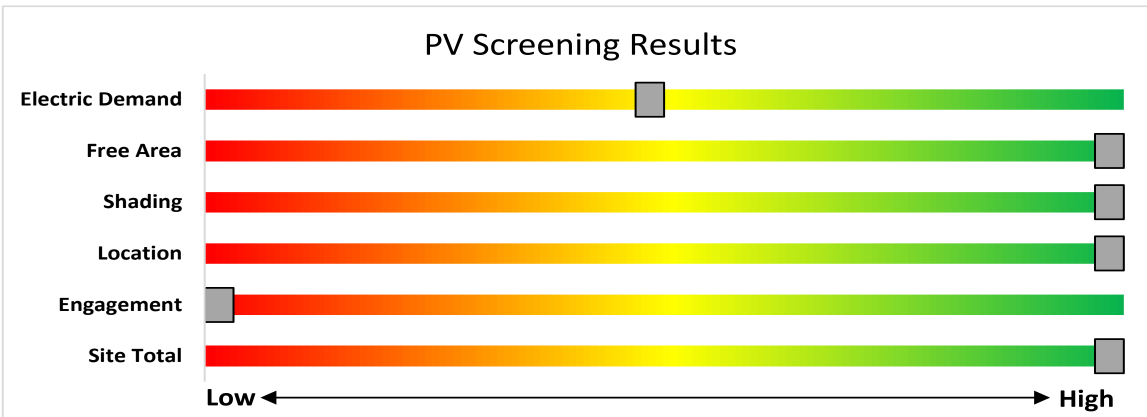
6.2 Solar Photovoltaic

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

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

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



Potential	High	
System Potential	295	kW DC STC
Electric Generation	351,454	kWh/yr
Displaced Cost	$40,050	/yr
Installed Cost	$767,000	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects. Solar projects may qualify to earn SREC- IIs (Solar Renewable Energy Certificates-II), however, the project owners *must* register their solar projects prior to the start of construction to establish the project's eligibility.

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:

Successor Solar Incentive Program (SuSI): https://www.njcleanenergy.com/renewable-energy/programs/susi-program

- **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

6.4 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

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

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has no potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The 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.

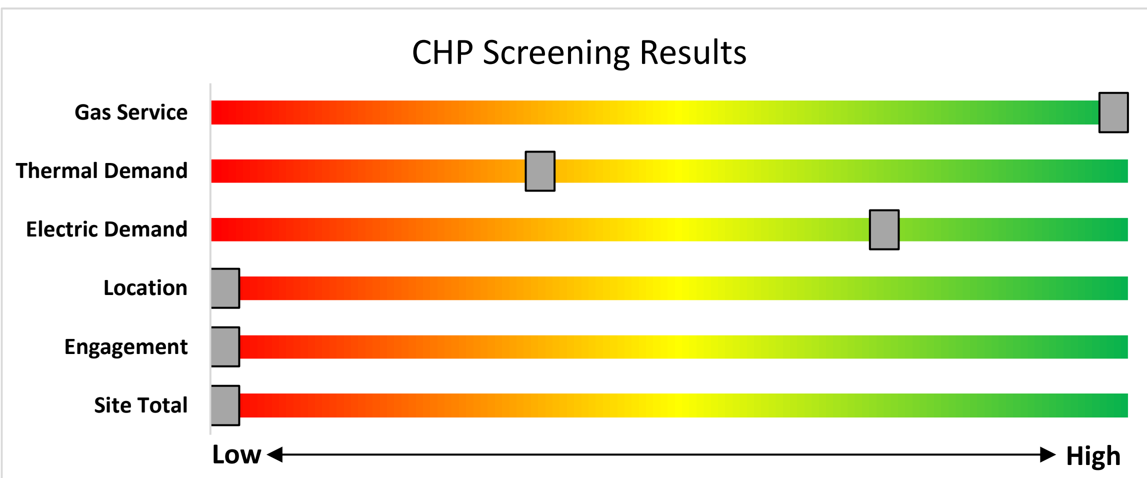


Figure 9 - Combined Heat and Power Screening

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 ELECTRIC VEHICLES (EV)

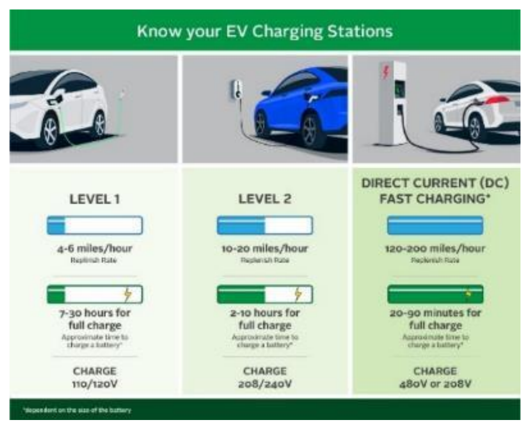
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or tailpipe emissions.

EVs are typically more expensive than similar conventional and hybrid vehicles, although some cost can be recovered through fuel savings, federal tax credit, or state incentives.

7.1 Electric Vehicle Charging

EV charging stations provide a means for electric vehicle operators to recharge their batteries at a facility. While many EV drivers charge at home, others do not have access to regular home charging, and the ability to charge at work or in public locations is critical to making EVs practical for more drivers. Charging can also be used for electric fleet vehicles, which can reduce fuel and maintenance costs for fleets that replace gas or diesel vehicles with EVs.

EV charging comes in three main types. For this assessment, the screening considers addition of Level 2 charging, which is most common at workplaces and other public locations. Depending on the site type and usage, other levels of charging power may be more appropriate.



The preliminary assessment of EV charging at the facility shows that there is medium potential for adding EV chargers to the facility's parking, based on potential costs of installation and other site factors.

The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

The type and size of the parking area impact the costs and feasibility of adding EV charging. Parking structure installations can be less costly than surface lot installations as power may be readily available, and equipment and wiring can be surface mounted. Parking lot installations often require trenching through concrete or asphalt surface. Large parking areas provide greater flexibility in charger siting than smaller lots.

The location and capacity of facility electric panels also impact charger installation costs. A Level 2 charger generally requires a dedicated 208-240V, 40 Amp circuit. The electric panel nearest the planned installation may not have available capacity and may need to be upgraded to serve new EV charging loads. Alternatively, chargers could be powered from a more distant panel. The distance from the panel to the location of charging stations ties directly to costs, as conduits, cables, and potential trenching costs all increase on a per-foot basis. The more charging stations planned, the more likely it is that additional electrical capacity will be needed.

Other factors to consider when planning for EV charging at a facility include who the intended users are, how long they park vehicles at the site, and whether they will need to pay for the electricity they use.

The graphic below displays the results of the EV charging assessment conducted as part of this audit. The position of each slider indicates the impact each factor has on the feasibility of installing EV charging at the site.

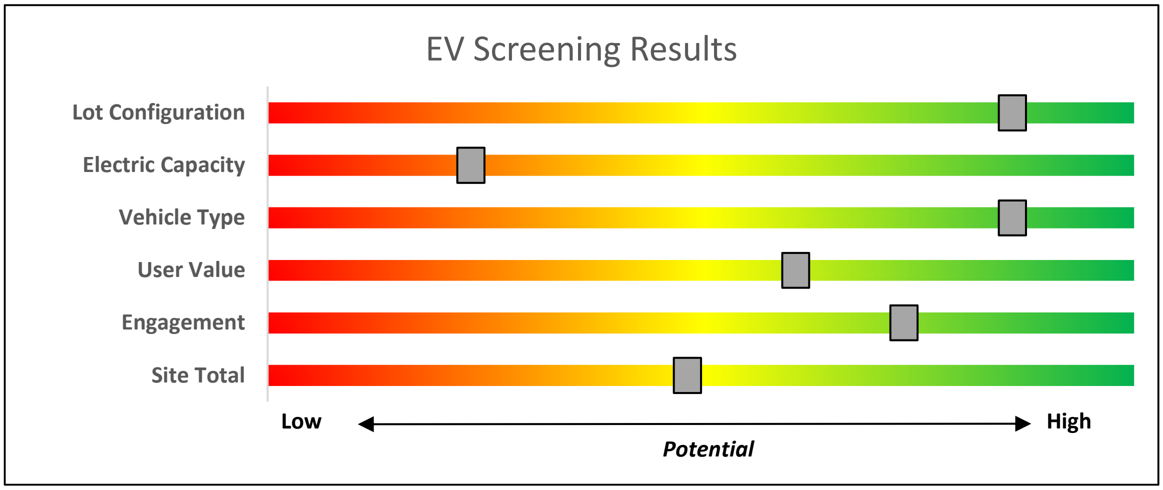


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

New Jersey is leading the way on electric vehicle (EV) adoption on the East Coast. There are several programs designed to encourage EV adoption in New Jersey, which is crucial to reaching a 100% clean energy future.

NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE) or Public Service Electric & Gas Company (PSE&G), may be eligible for additional electric vehicle charging incentives directly from the utility. Projects may be eligible for both the incentives offered by this BPU program and incentives offered by ACE or PSE&G, up to 90% of the combined charger purchase and installation costs. Please check ACE or PSE&G program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

Both Jersey Central Power & Light (JCP&L) and Rockland Electric (RECO) have filed proposals for EV charging programs. BPU staff is currently reviewing those proposals.

For more information and to keep up to date on all EV programs please visit https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs

8 Project Funding and Incentives

Ready to improve your building's performance? New Jersey's Clean Energy Programs and Utility Energy Efficiency Programs can help. Pick the program that works best for you. This section provides an overview of currently available incentive programs in.

8.1 Utility Energy Efficiency Programs

The Clean Energy Act, signed into law by Governor Murphy in 2018, requires New Jersey's investor-owned gas and electric utilities to reduce their customers' use by set percentages over time. To help reach these targets the New Jersey Board of Public Utilities approved a comprehensive suite of energy efficiency programs to be run by the utility companies.

Prescriptive and Custom

The Prescriptive and Custom rebate program through your utility provider 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.

Equipment Examples

Lighting
Lighting Controls
HVAC Equipment
Refrigeration
Gas Heating
Gas Cooling
Commercial Kitchen Equipment
Food Service Equipment
Variable Frequency Drives
Electronically Commutate Motors
Variable Frequency Drives
Plug Loads Controls
Washers and Dryers
Agricultural
Water Heating

The Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type. The Custom program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives.

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 or less 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.

How to Participate

To participate in Direct Install, you will work with a participating contractor. 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 Direct Install program, subject to program rules and eligibility, while the remaining percent of the cost is paid to the contractor by the customer.

Engineered Solutions

The Engineered Solutions Program provides tailored energy-efficiency assistance and services to municipalities, universities, schools, hospitals and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. Customers receive expert guided services, including investment-grade energy auditing, engineering design, installation assistance, construction administration, commissioning, and measurement and verification (M&V) services to support the implementation of cost-effective and comprehensive efficiency projects. Engineered Solutions is generally a good option for medium to large sized facilities with a peak demand over 200 kW looking to implement as many measures as possible under a single project to achieve deep energy savings. Engineered Solutions has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program. Incentives for this program are based on project scope and energy savings achieved.

For more information on any of these programs, contact your local utility provider or visit https://www.njcleanenergy.com/transition.

8.2 New Jersey's Clean Energy Programs

Save money while saving the planet! New Jersey's Clean Energy Program is a statewide program that offers incentives, programs, and services that benefit New Jersey residents, businesses, educational, non-profit, and government entities to help them save energy, money, and the environment.

Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers that annually contribute at least $200,000 to the NJCEP aggregate of all buildings/sites. This equates to roughly $5 million in energy costs in the prior fiscal year.

Incentives

Incentives are based on the specifications below. The maximum incentive per entity is the lesser of:

- $4 million
- 75% of the total project(s) cost
- 90% of total NJCEP fund contribution in previous year
- $0.33 per projected kWh saved; $3.75 per projected Therm saved annually

How to Participate

To participate in LEUP, you will first need submit an enrollment application. This program requires all qualified and approved applicants to submit an energy plan that outlines the proposed energy efficiency work for review and approval. Applicants may submit a Draft Energy Efficiency Plan (DEEP), or a Final Energy Efficiency Plan (FEEP). Once the FEEP is approved, the proposed work can begin.

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The program is used to register and certify 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 SREC-IIs (Solar Renewable Energy Certificates-II). SuSI consists of two sub-programs. The Administratively Determined Incentive (ADI) Program and the Competitive Solar Incentive (CSI) Program.

Administratively Determined Incentive (ADI) Program

The ADI Program provides administratively set incentives for net metered residential projects, net metered non-residential projects 5 MW or less, and all community solar projects.

After the registration is accepted, construction is complete, and a complete final as-built packet has been submitted, the project is issued a New Jersey certification number, which enables it to generate New Jersey SREC- IIs.

Market Segments	Size MW dc	Incentive Value ($/SREC II)	Public Entities Incentive Value - $20 Adder ($/SRECII)
Net Metered Residential	All types and sizes	$90	N/A
Small Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects smaller than 1 MW	$100	$120
Large Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects 1 MW to 5 MW	$90	$110
Small Net Metered Non-Residential Ground Mount	Projects smaller than 1 MW	$85	$105
Large Net Metered Non-Residential Ground Mount	Projects 1 MW to 5 MW	$80	$100
LMI Community Solar	Up to 5 MW	$90	N/A
Non-LMI Community Solar	Up to 5 MW	$70	N/A
Interim Subsection (t)	All types and sizes	$100	N/A

Eligible projects may generate SREC-IIs for 15 years following the commencement of commercial operations which is defined as permission to operate (PTO) from the Electric Distribution Company. After 15 years, projects may be eligible for a NJ Class I REC.

SREC-IIs will be purchased monthly by the SREC-II Program Administrator who will allocate the SREC-IIs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year.

The ADI Program online portal is now open to new registrations.

Competitive Solar Incentive Program

The Competitive Solar Incentive (CSI) Program will provide competitively set incentives for grid supply projects and net metered non-residential projects greater than 5MW (dc). The program is currently under development. For updates, please continue to check the Solar Proceedings page on the New Jersey's Clean Energy Program website.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan.

If you are considering installing solar photovoltaics on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program.

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 into contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the energy conservation measures (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 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.

9 Project Development

Energy conservation measures (ECMs) have been identified for your site, and their energy and economic analyses are provided within this LGEA report. Note that some of the identified projects may be mutually exclusive, such as replacing equipment versus upgrading motors or controls. The next steps with project development are to set goals and create a comprehensive project plan. The graphic below provides an overview of the process flow for a typical energy efficiency or renewable energy project. We recommend implementing as many ECMs as possible prior to undertaking a feasibility study for a renewable project. The cyclical nature of this process flow demonstrates the ongoing work required to continually improve building energy efficiency over time. If your building(s) scope of work is relatively simple to implement or small in scope, the measurement and verification (M&V) step may not be required. It should be noted through a typical project cycle, there will be changes in costs based on specific scopes of work, contractor selections, design considerations, construction, etc. The estimated costs provided throughout this LGEA report demonstrate the unburdened turn-key material and labor cost only. There will be contingencies and additional costs at the time of implementation. We recommend comprehensive project planning that includes the review of multiple bids for project work, incorporates potential operations and maintenance (O&M) cost savings, and maximizes your incentive potential.

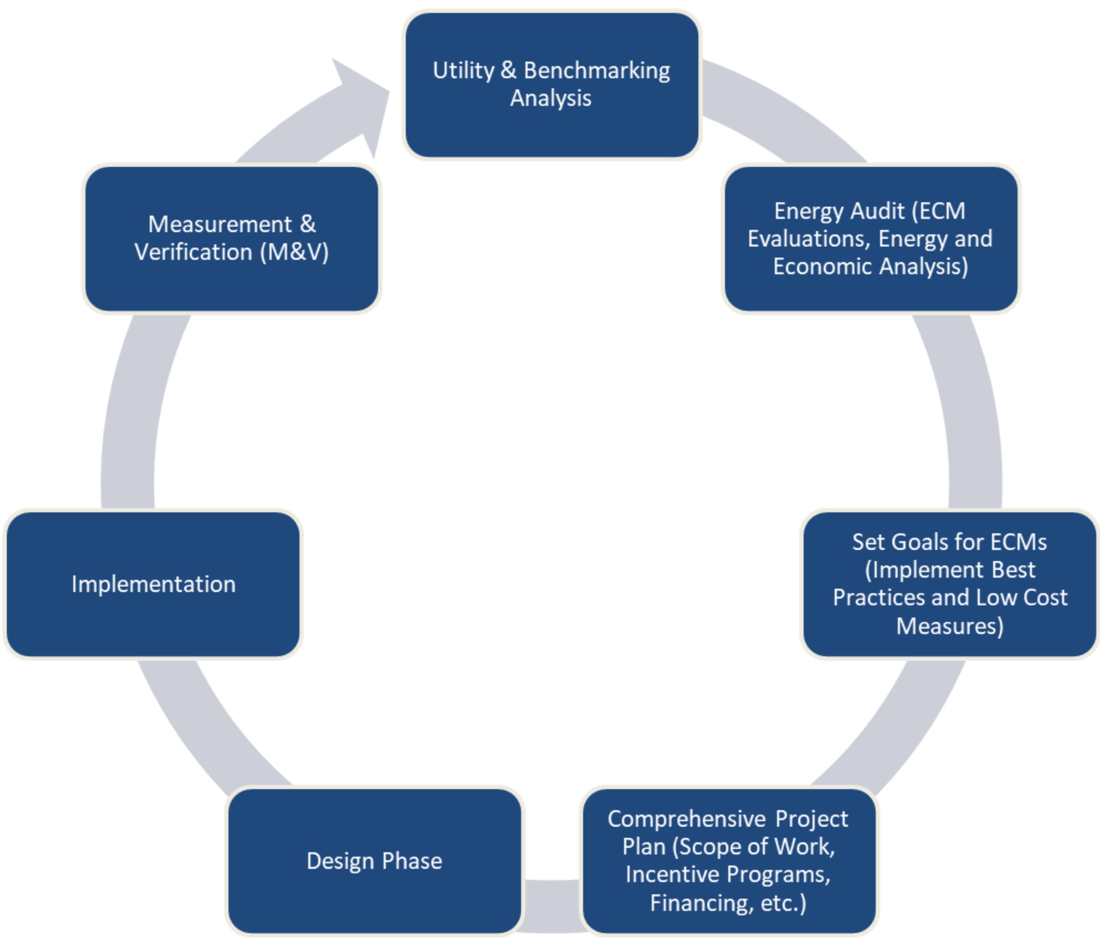


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 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. 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].

10.2 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 fluctuate monthly. The utility provides basic gas supply service 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].

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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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boys Bath By 248	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	34	3,850	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	34	2,657	0.0	134	0	$15	$270	$35	15.7
Boys Bath Exit 6 Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.2	1,253	0	$140	$562	$115	3.2
Boys Bath Science Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.2	940	0	$105	$489	$95	3.8
146 Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	759	0.1	152	0	$17	$226	$30	11.5
Assistant Principal	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,700		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	2,700	0.0	0	0	$0	$0	$0	0.0
Assistant Principal	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	50	2,700	4	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	50	1,863	0.0	92	0	$10	$116	$20	9.3
Attic	1	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	1,100	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	1,100	0.0	11	0	$1	$17	$1	13.3
Attic	1	Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	1,100	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	1,100	0.0	67	0	$7	$17	$1	2.2
Auditorium	6	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Auditorium	252	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,850	4	None	Yes	252	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,657	0.6	3,308	-1	$369	$4,590	$595	10.8
Auditorium Stage	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	2,700	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	2,700	0.0	24	0	$3	$17	$1	6.1
Auditorium Stage	2	Exit Signs: LED - 2 W Lamp	None	S	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
Auditorium Stage	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,700		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	2,700	0.0	0	0	$0	$0	$0	0.0
Auditorium Storage	3	LED - Fixtures: High-Bay	Wall Switch	S	78	1,100	4	None	Yes	3	LED - Fixtures: High-Bay	Occupancy Sensor	78	759	0.1	88	0	$10	$270	$0	27.6
Balcony 249	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	2,700	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	2,700	0.0	24	0	$3	$17	$1	6.1
Balcony 249	2	Exit Signs: LED - 2 W Lamp	None	S	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
Balcony 249	1	Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	2,700	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	2,700	0.0	163	0	$18	$17	$1	0.9
Balcony 249	18	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,700	4	None	Yes	18	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,863	0.0	166	0	$19	$540	$70	25.4
Basement AHU Room	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,100		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,100	0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	1,100	2	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,100	0.1	208	0	$23	$257	$40	9.4
Basement Chiller Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,100	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	759	0.1	203	0	$23	$416	$75	15.0
Basement Electrical Room	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,100	4	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	759	0.0	8	0	$1	$116	$20	114.6
Basement Fire Alarm room	3	LED - Fixtures: High-Bay	Wall Switch	S	50	1,100	4	None	Yes	3	LED - Fixtures: High-Bay	Occupancy Sensor	50	759	0.0	56	0	$6	$270	$35	37.4
Bathroom in coaches office	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,850		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,850	0.0	0	0	$0	$0	$0	0.0
Bathroom in coaches office	1	LED - Fixtures: Close to Ceiling Mount	Wall Switch	S	12	3,850		None	No	1	LED - Fixtures: Close to Ceiling Mount	Wall Switch	12	3,850	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	38	1,100	4	None	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	38	759	0.1	157	0	$18	$270	$35	13.4
Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,100	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,100	0.1	120	0	$13	$110	$30	5.9
Book Room	1	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	1,100	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	1,100	0.0	11	0	$1	$17	$1	13.3
Boys Bath Auditorium Hallway	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	34	3,850		None	No	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	34	3,850	0.0	0	0	$0	$0	$0	0.0
Boys Bath Cafeteria Hallway (1)	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	34	3,850	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	34	2,657	0.0	45	0	$5	$270	$35	47.2
Boys Bath Cafeteria Hallway (1)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.0	178	0	$20	$37	$10	1.3
Boys Bath Gym Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	280	0	$31	$73	$20	1.7
Boys Locker room	2	Exit Signs: LED - 2 W Lamp	None	S	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
Boys Locker room	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.5	2,120	0	$237	$1,161	$240	3.9
Boys Locker room Bath	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.1	356	0	$40	$343	$55	7.3
Cafeteria	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	13	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,850	3, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,657	0.2	1,171	0	$131	$693	$113	4.4
Cafeteria	118	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,850	3, 4	Relamp	Yes	118	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,657	1.9	10,992	-2	$1,227	$4,314	$870	2.8
Cafeteria Eating Area	12	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	3,850	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	2,657	0.3	1,799	0	$201	$855	$143	3.5
Classroom 100	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 102	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.4	1,215	0	$136	$657	$180	3.5
Classroom 106	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.1	203	0	$23	$110	$30	3.5
Classroom 108	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.2	506	0	$57	$274	$75	3.5
Classroom 121	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.8	3,296	-1	$368	$1,365	$335	2.8
Classroom 123	1	U-Bend Fluorescent - T12: U T8 (40W) - 2L	Wall Switch	S	80	2,700	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,700	0.0	140	0	$16	$105	$10	6.1
Classroom 123	13	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	13	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.5	1,489	0	$166	$949	$260	4.1
Classroom 128	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.9	3,516	-1	$392	$1,708	$390	3.4
Classroom 128 Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,700	0.0	98	0	$11	$37	$10	2.4
Classroom 128 Office 2	1	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	2,700	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	2,700	0.0	27	0	$3	$17	$1	5.4
Classroom 128 Office 3	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,700		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	2,700	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 128 Storage	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	660	0.0	6	0	$1	$17	$1	25.0
Classroom 128 upper room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Classroom 130	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 132	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 133	1	Exit Signs: LED - 2 W Lamp	None	S	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
Classroom 133	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	2,197	0	$245	$1,000	$235	3.1
Classroom 133	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,700	0.0	86	0	$10	$72	$10	6.5
Classroom 134	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 135 Band room	23	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	23	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	1.2	5,054	-1	$564	$2,220	$530	3.0
Classroom 135 Front Ent	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	374	0	$42	$380	$65	7.5
Classroom 135 office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	499	0	$56	$416	$75	6.1
Classroom 136	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 137	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 138	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.1	229	0	$26	$146	$40	4.1
Classroom 140	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.4	1,031	0	$115	$657	$180	4.1
Classroom 142	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,860	3	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,860	0.5	1,375	0	$154	$876	$240	4.1
Classroom 145	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.4	1,215	0	$136	$657	$180	3.5
Classroom 146	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.4	1,215	0	$136	$657	$180	3.5
Classroom 148	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	34	1,860		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	34	1,860	0.0	0	0	$0	$0	$0	0.0
Classroom 148	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.4	1,013	0	$113	$548	$150	3.5
Classroom 150	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.4	1,215	0	$136	$657	$180	3.5
Classroom 150	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.5	1,418	0	$158	$767	$210	3.5
Classroom 152	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,245	0	$251	$927	$215	2.8
Classroom 153	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.2	935	0	$104	$544	$110	4.2
Classroom 154	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,058	0	$230	$872	$200	2.9

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 155	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,058	0	$230	$872	$200	2.9
Classroom 200	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.8	3,180	-1	$355	$1,471	$325	3.2
Classroom 203	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.7	2,993	-1	$334	$1,416	$310	3.3
Classroom 204	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 206	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 210	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 212	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.6	2,637	-1	$294	$1,146	$275	3.0
Classroom 214	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.6	2,637	-1	$294	$1,146	$275	3.0
Classroom 216	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.3	1,318	0	$147	$708	$155	3.8
Classroom 220	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	2,197	0	$245	$1,000	$235	3.1
Classroom 221	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.4	1,758	0	$196	$854	$195	3.4
Classroom 222	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.4	1,758	0	$196	$854	$195	3.4
Classroom 223	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 224	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 225	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 226	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 227	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,497	0	$167	$708	$155	3.3
Classroom 228	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.3	1,122	0	$125	$599	$125	3.8
Classroom 229	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,245	0	$251	$927	$215	2.8
Classroom 230	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 232	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 233	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.3	1,099	0	$123	$635	$135	4.1
Classroom 234	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 235	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.3	1,318	0	$147	$708	$155	3.8
Classroom 236	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2

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Classroom 237	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 238	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.4	1,538	0	$172	$781	$175	3.5
Classroom 239	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 240	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Classroom 242	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 244	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.4	1,758	0	$196	$854	$195	3.4
Classroom 244	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,700	0.0	86	0	$10	$72	$10	6.5
Classroom 246	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.6	2,619	-1	$292	$1,037	$245	2.7
Classroom 247	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.8	3,367	-1	$376	$1,526	$340	3.2
Classroom 248	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.7	2,806	-1	$313	$1,092	$260	2.7
Classroom 250	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 251	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	659	0	$74	$489	$95	5.4
Classroom 252	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,245	0	$251	$927	$215	2.8
Classroom 252	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,700	0.0	86	0	$10	$72	$10	6.5
Classroom 254	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,684	0	$188	$763	$170	3.2
Classroom 255	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 256	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.5	2,245	0	$251	$927	$215	2.8
Classroom 257/259	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.5	1,977	0	$221	$927	$215	3.2
Classroom 257/259	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,700	0.0	86	0	$10	$72	$10	6.5
Classroom 258	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.4	1,758	0	$196	$854	$195	3.4
Closet in Coaches office	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	660	0.0	6	0	$1	$17	$1	25.0
Coaches Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$189	$40	5.4
Conference Main office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	879	0	$98	$562	$115	4.6
Copy Room 104	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,860	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,860	0.1	304	0	$34	$164	$45	3.5
Corridor 200 wing	17	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	17	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor 200 wing	83	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	83	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	2.5	14,760	-3	$1,648	$6,181	$3,735	1.5
Corridor 7th -8th Grade	10	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	10	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 7th -8th Grade	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.6	3,734	-1	$417	$1,667	$945	1.7
Corridor Gym	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Gym	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	3,850	3, 5	Relamp	Yes	1	LED - Linear Tubes: (3) 2' Lamps	High/Low Control	26	2,657	0.0	150	0	$17	$49	$9	2.4
Corridor Gym	37	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	37	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	1.1	6,580	-1	$735	$2,926	$1,665	1.7
Corridor Gym	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.6	3,446	-1	$385	$1,253	$605	1.7
Corridor Gym	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,657	0.1	332	0	$37	$370	$90	7.5
Corridor Main office	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Main office	9	Incandescent: (1) 65W R30 Screw-In Lamp	Wall Switch	S	65	3,850	3, 5	Relamp	Yes	9	LED Lamps: R30 Lamps	High/Low Control	10	2,657	0.4	2,214	0	$247	$731	$342	1.6
Corridor Main office	21	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,850	3, 5	Relamp	Yes	21	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,657	0.3	1,892	0	$211	$1,583	$861	3.4
Corridor Main office	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,850	3, 5	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,657	0.2	1,304	0	$146	$931	$560	2.5
Corridor Main office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.2	1,423	0	$159	$742	$360	2.4
Corridor Old Main Entrance	9	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	3,850	3, 5	Relamp	Yes	9	LED Lamps: A19 Lamps	High/Low Control	18	2,657	0.1	518	0	$58	$605	$324	4.9
Corridor Old Main Entrance	9	LED - Fixtures: Downlight Recessed	Wall Switch	S	15	3,850	5	None	Yes	9	LED - Fixtures: Downlight Recessed	High/Low Control	15	2,657	0.0	177	0	$20	$450	$315	6.8
Corridor Old Main Entrance	6	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	S	30	2,657		None	No	6	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	30	2,657	0.0	0	0	$0	$0	$0	0.0
Corridor Old Main Entrance	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.4	2,506	-1	$280	$1,034	$440	2.1
Custodial closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	660	0.0	41	0	$5	$73	$20	11.7
Custodial closet 2	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.2	152	0	$17	$453	$85	21.6
Custodial in 203	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	660		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	660	0.0	0	0	$0	$0	$0	0.0
Custodial office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	91	0	$10	$380	$65	30.8
Custodial rear meeting room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.0	24	0	$3	$37	$10	9.9
Custodial rear meeting room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	660	0.0	41	0	$5	$73	$20	11.7
Deli Bar	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	374	0	$42	$380	$65	7.5
E 18 Stairs	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,850	3, 5	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,657	0.0	90	0	$10	$33	$6	2.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
E 18 Stairs	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	711	0	$79	$371	$180	2.4
E21 Foyer	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	280	0	$31	$73	$20	1.7
E3 Foyer	3	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	3,850	3, 4	Relamp	Yes	3	LED Lamps: A19 Lamps	Occupancy Sensor	18	2,657	0.0	173	0	$19	$168	$23	7.5
E8 Staircase	1	Exit Signs: LED - 2 W Lamp	None	S	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
E8 Staircase	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	356	0	$40	$73	$20	1.3
E8 Staircase	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Electric Custodial boys bath	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.0	24	0	$3	$37	$10	9.9
Exit 15 Foyer	2	Exit Signs: LED - 2 W Lamp	None	S	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
Exit 15 Foyer	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,657	0.1	332	0	$37	$261	$40	6.0
Exterior doors	1	Halogen Incandescent: (1) 90W PAR38 Screw-In Lamp	Timeclock	S	90	4,380	3	Relamp	No	1	LED Lamps: PAR38 Lamps	Timeclock	14	4,380	0.0	333	0	$38	$30	$3	0.7
Exterior doors	16	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,850		None	No	16	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,850	0.0	0	0	$0	$0	$0	0.0
Exterior Flood Lights	4	LED Lamps: (1) 15W PAR30 Screw-In Lamp	Wall Switch	S	15	3,850		None	No	4	LED Lamps: (1) 15W PAR30 Screw-In Lamp	Wall Switch	15	3,850	0.0	0	0	$0	$0	$0	0.0
Exterior pole lights	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock	S	10	4,380		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock	10	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall packs	2	High-Pressure Sodium: (1) 200W Lamp	Timeclock	S	250	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	60	4,380	0.0	1,664	0	$190	$830	$100	3.9
Exterior wall packs	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	S	54	4,380		None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	54	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall packs	3	Metal Halide: (1) 175W Lamp	Timeclock	S	215	4,380	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	53	4,380	0.0	2,129	0	$243	$1,154	$150	4.1
Faculty Bath Auditorium hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	140	0	$16	$37	$10	1.7
Faculty Girls Bath Auditorium hallway (1)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.1	356	0	$40	$343	$55	7.3
Faculty Girls Bath Auditorium hallway (1)	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,657	0.0	166	0	$19	$72	$10	3.4
Fish Bowl Library	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,850	3, 4	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,657	0.4	2,401	-1	$268	$763	$170	2.2
Girls Bath 237	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.1	533	0	$60	$380	$65	5.3
Girls Bath Cafeteria Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	280	0	$31	$73	$20	1.7
Girls Bath Main office Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	280	0	$31	$73	$20	1.7
Girls Bath Science 203	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.1	627	0	$70	$416	$75	4.9
Girls Gym Hallway office Hallway (1)	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$335	$135	3.4

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Girls Team Room	2	Exit Signs: LED - 2 W Lamp	None	S	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
Girls Team Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$73	$20	1.9
Girls Team Room	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.6	2,637	-1	$294	$1,146	$275	3.0
Girls Team Room Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,850	0.0	237	0	$26	$73	$20	2.0
Girls Team Room Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Girls Team Room Office Bath	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	140	0	$16	$37	$10	1.7
Guidance Counselor Area	5	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,700	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,863	0.1	316	0	$35	$433	$65	10.4
Guidance Counselor Area	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.3	1,099	0	$123	$635	$135	4.1
Guidance office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Guidance office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Guidance office 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Guidance office 5	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	659	0	$74	$489	$95	5.4
Guidance office 6	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Gym Teachers Closet Mullers	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	660	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.0	43	0	$5	$69	$10	12.3
Handicapped Bath	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.1	627	0	$70	$416	$75	4.9
Kiln Room in 121	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	759	0.1	102	0	$11	$189	$40	13.1
Kitchen office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Library Main open area	4	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	3,850	3, 4	Relamp	Yes	4	LED Lamps: A19 Lamps	Occupancy Sensor	18	2,657	0.0	230	0	$26	$339	$39	11.7
Library Main open area	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library Main open area	2	Exit Signs: LED - 2 W Lamp	None	S	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
Library Main open area	31	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,850	3, 4	Relamp	Yes	31	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,657	1.4	8,269	-2	$923	$2,508	$570	2.1
Library Main open area	29	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	29	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	1.5	9,086	-2	$1,014	$2,658	$650	2.0
Library Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.4	1,497	0	$167	$708	$155	3.3
Library Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	879	0	$98	$562	$115	4.6
Library Rear Section	2	Exit Signs: LED - 2 W Lamp	None	S	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

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Library Rear Section	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.8	4,700	-1	$525	$1,365	$335	2.0
Library Rear Section	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,850	0.0	123	0	$14	$72	$10	4.6
Library rear storage	1	U-Bend Fluorescent - T12: U T8 (40W) - 2L	Wall Switch	S	80	660	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	660	0.0	34	0	$4	$105	$10	24.9
Library rear storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	455	0.1	107	0	$12	$262	$60	16.8
Mail Room	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	2,700	4	None	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.0	80	0	$9	$116	$20	10.7
Mail room 2	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,700	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,700	0.0	48	0	$5	$33	$6	5.0
Main Gym	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Gym	30	LED - Fixtures: High-Bay	Occupancy Sensor	S	235	2,657		None	No	30	LED - Fixtures: High-Bay	Occupancy Sensor	235	2,657	0.0	0	0	$0	$0	$0	0.0
Main Kitchen	4	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Wall Switch	S	48	3,850	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 3' Lamps	Occupancy Sensor	21	2,657	0.1	568	0	$63	$416	$75	5.4
Main Kitchen	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.9	5,335	-1	$596	$1,635	$370	2.1
Main office	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,700	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.0	107	0	$12	$270	$35	19.7
Main office	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.3	1,099	0	$123	$635	$135	4.1
Main office Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.2	889	0	$99	$408	$225	1.8
Main office Kitchen lunch room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,700	0.0	166	0	$19	$73	$20	2.9
Mens Bath Cafeteria Hallway (1)	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,850	4	None	Yes	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,657	0.0	13	0	$1	$0	$0	0.0
Mens Bath Cafeteria Hallway (1)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.1	356	0	$40	$343	$55	7.3
Mens Staff	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,850	0.0	140	0	$16	$37	$10	1.7
Meter Room in Boiler room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	61	0	$7	$189	$40	21.9
Mrs Casani office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Mullers Gym	1	Exit Signs: LED - 2 W Lamp	None	S	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
Mullers Gym	15	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	38	3,850	4	None	Yes	15	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	38	2,657	0.1	748	0	$84	$270	$35	2.8
Nurses Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,700	0.0	147	0	$16	$55	$15	2.4
Nurses Office	9	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,863	0.3	1,049	0	$117	$922	$125	6.8
Nurses office Side room	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,863	0.1	350	0	$39	$487	$65	10.8
Office in wood shop	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.1	374	0	$42	$226	$50	4.2

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Room 151 office 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	879	0	$98	$562	$115	4.6
Room 151 office 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,700	0.0	166	0	$19	$73	$20	2.9
Room 151 office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Room 151 SS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.1	439	0	$49	$262	$60	4.1
Room in 257	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	659	0	$74	$489	$95	5.4
Sound Room 2 in 135 (1)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$189	$40	5.4
Sound Room 3 in 135	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$189	$40	5.4
Sound Room 1 in 135	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$189	$40	5.4
Staff women's Bath	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,657	0.1	356	0	$40	$343	$55	7.3
Staircase E-1	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-1	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-10	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-10	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	356	0	$40	$73	$20	1.3
Staircase E-10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-13	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-13	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-13	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-2	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-2	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-4	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-4	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-5	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Staircase E-5	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-5	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Staircase E-7	1	Exit Signs: LED - 2 W Lamp	None	S	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
Staircase E-7	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	533	0	$60	$110	$30	1.3
Staircase E-7	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,657	0.1	627	0	$70	$371	$110	3.7
Stairs Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,850	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,657	0.1	356	0	$40	$298	$90	5.2
Storage 1 In mullers Gym	1	Incandescent: (1) 150W A19 Screw-In Lamp	Wall Switch	S	150	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	660	0.1	92	0	$10	$17	$1	1.6
Storage 1 In mullers Gym	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	S	46	660	2	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.0	23	0	$3	$51	$5	17.8
Storage 1 In mullers Gym	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	61	0	$7	$189	$20	24.8
Storage 1 In mullers Gym	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	660	0.0	41	0	$5	$73	$20	11.7
Storage 213	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	91	0	$10	$380	$30	34.2
Storage 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	61	0	$7	$189	$20	24.8
Storage Behind mullers gym	1	Exit Signs: LED - 2 W Lamp	None	S	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
Storage Behind mullers gym	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	455	0.2	215	0	$24	$562	$80	20.1
Storage closet in 257	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.0	24	0	$3	$37	$10	9.9
Storage in 108	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	660		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	660	0.0	0	0	$0	$0	$0	0.0
Storage in 203	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	660	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	455	0.2	183	0	$20	$489	$60	21.0
Storage in 233	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	660	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.0	13	0	$1	$18	$5	9.3
Storage in 238	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	660	0.0	41	0	$5	$73	$20	11.7
Storage in 240	2	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	18	455	0.0	20	0	$2	$150	$2	67.4
Storage in Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	660	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	455	0.1	61	0	$7	$189	$20	24.8
Storage in Boys Bath	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	660	0.0	6	0	$1	$17	$1	25.0
Storage in mullers storage	1	Linear Fluorescent - EST12: 4' T12 (34W) - 2L	Wall Switch	S	72	660	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.0	31	0	$3	$69	$10	16.9
Storage Main Gym Wing	1	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	660	0.0	7	0	$1	$17	$1	22.2
Storage Next 210	2	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	18	455	0.0	20	0	$2	$150	$2	67.4

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Storage next 249	1	Compact Fluorescent: (1) 26W A19 Screw-In Lamp	Wall Switch	S	26	660	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	660	0.0	6	0	$1	$17	$1	25.0
Storage next to 248	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	660	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	455	0.1	137	0	$15	$434	$45	25.4
Teachers Bathroom 2nd floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,850	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,657	0.2	940	0	$105	$489	$95	3.8
Teachers Lounge	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,700	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,863	0.1	249	0	$28	$189	$40	5.4
Teachers Lounge	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,700	3, 4	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,863	0.3	1,309	0	$146	$653	$140	3.5
Tech Storage	2	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	660	3, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	23	455	0.0	23	0	$3	$150	$2	56.8
Tech Storage	2	Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	660	3, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	10	455	0.1	84	0	$9	$150	$2	15.8
Tech Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	660	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	455	0.2	161	0	$18	$489	$60	23.9
Technology Support	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	0.2	659	0	$74	$489	$95	5.4
Womens Staff	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,850	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,657	0.1	533	0	$60	$226	$50	2.9
Womens Staff	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,850	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,850	0.0	123	0	$14	$72	$10	4.6
Wood Shop	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,700	3, 4	Relamp	Yes	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,863	1.4	5,932	-1	$662	$2,512	$610	2.9

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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Various Spaces	26	Exhaust Fan	0.3	65.0%	No			W	2,970		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	DHW Circulation Pump	1	DHW Circulation Pump	0.2	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Heating Hot Water Pumps P1P2	2	Heating Hot Water Pump	25.0	94.1%	Yes			W	2,190		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Pneumatic Control System	2	Air Compressor	2.0	84.0%	No			W	800		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Office in wood shop	Woodshop Tools	1	Air Compressor	0.2	65.0%	No			W	1,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fan - Kitchen Hood	1	Kitchen Hood Exhaust Fan	0.8	70.0%	No			W	2,000		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	Freight Elevator	1	Other	3.0	80.0%	No			W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Sum Pump	1	Other	2.0	86.5%	No			W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Sum Pump	1	Other	2.0	76.5%	Yes			W	2,745		No	76.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement AHU Room	AHU-1 - Auditorium	6	Supply Fan	5.0	90.2%	Yes			W	2,970		No	90.2%	No		0.0	0	0	$0	$0	$0	0.0
Basement AHU Room	AHU-1 - Auditorium	6	Return Fan	2.5	85.5%	Yes			W	2,970		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Classrooms	Unit Ventilators - Classrooms	64	Fan Coil Unit	0.2	65.0%	No			B	2,745	6	Yes	80.0%	No		1.3	4,726	0	$538	$19,411	$0	36.0
Bolier Room	HW Pump - Unit Heaters	1	Heating Hot Water Pump	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	CHW Pumps - CHWP-1 & 2	2	Chilled Water Pump	5.0	89.5%	Yes			W	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	DHW Circulation Pump	1	DHW Circulation Pump	0.2	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Stage	1	Supply Fan	5.0	89.5%	Yes			W	2,970		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Stage	1	Exhaust Fan	3.0	89.5%	Yes			W	2,970		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Furnace - Gymnasium	1	Supply Fan	5.0	86.5%	No	Sterling	E1B-PV35A2C01	B	2,970	7	No	89.5%	Yes	1	1.5	5,092	0	$580	$5,028	$900	7.1
Roof	RTU - Middle School	1	Supply Fan	0.8	70.0%	No			W	2,970		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Various Spaces	Hydronic Unit Heaters	13	Fan Coil Unit	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Above Ceiling	FCUs Tied to Outdoor Condensing Units	11	Supply Fan	0.3	65.0%	No			W	2,970		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Various Spaces	Classrooms	10	Supply Fan	0.5	75.0%	No			W	2,970		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Back Art Room	CHW Pumps - Main Office	2	Chilled Water Pump	1.0	84.0%	No			W	2,745	8	No	85.5%	Yes	2	0.4	1,886	0	$215	$7,015	$150	31.9

Packaged HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	Proposed Conditions: ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Court Yard	Classrooms	2	Split-System	3.50		12.00		Trane	4TTA3042D300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Court Yard	Classrooms	1	Split-System	3.50		12.00		Coleman	TCD42B32SA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Ground Floor	Classrooms	1	Split-System	3.50		12.00		Goodman	GSC130421BB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classrooms	1	Split-System	3.50		12.00		Goodman	GSC130421BB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classrooms	1	Split-System	1.50		9.70		York	AC018X102	B	9	Yes	1	Split-System	1.50		16.00		0.4	340	0	$39	$3,734	$158	92.2
Girls & Boys Restroom	Girls & Boys Restroom	3	Electric Resistance Heat		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage Room	Storage Room	1	Electric Resistance Heat		17.06		2 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU - Middle School	1	Package Unit	5.00		12.00		Trane	THC060F3R	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms & Offices	Classrooms & Offices	9	Window AC	1.00		10.80				W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 128	Classroom 128	1	Window AC	0.67		10.50				W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 138	Classroom 138	1	Window AC	1.50		10.30				W		No							0.0	0	0	$0	$0	$0	0.0
Teachers Lounge	Teachers Lounge	1	Window AC	2.00		10.70				W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Stage	1	Package Unit	15.00		12.00		AAON	RN-015-3-0	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Furnace - Gymnasium	1	Forced Air Furnace		280.00		0.8 AFUE	Sterling	E1B-PV35A2C01	B	10	Yes	1	Forced Air Furnace		280.00		0.97 AFUE	0.0	0	55	$610	$6,265	$500	9.5
Roof	Classroom	1	Split-System	3.50		12.00		Trane	4TTB0030A100	B	9	Yes	1	Split-System	3.50		16.00		0.4	408	0	$46	$6,399	$368	129.8
Roof	Classroom	1	Split-System	3.00		9.70		York	AC036X102	B	9	Yes	1	Split-System	3.00		16.00		0.7	681	0	$78	$5,517	$315	67.0
Roof	Classroom	1	Split-System	2.50		12.00		Guardian	GCGD30S21S2B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom	1	Split-System	5.00		11.00		Goodman	GSC130603BB	B	9	Yes	1	Split-System	5.00		16.00		0.9	794	0	$91	$9,943	$525	104.1
Exterior Court Yard	Classroom	1	Split-System	2.00		11.00		Luxaire	HABA-T024SE	B	9	Yes	1	Split-System	2.00		16.00		0.3	318	0	$36	$4,040	$210	105.8

Electric Chiller Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Manufacturer	Model	Remaining Useful Life	Proposed Conditions: ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Ground	Main Office	1	Air-Cooled Scroll Chiller	105.00	Carrier	30RAP0105DA06100	W		No							0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	Auditorium	1	Air-Cooled Scroll Chiller	70.00	ClimaCOOL	UCR070AFASA	B		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler 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)	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler	Hydronic Heating System	5	Condensing Hot Water Boiler	1,720	Aerco	Benchmark 2.0 LN	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Domestic Hot Water	1	Boiler	LAARS	PW0400CN01C	W		No						0.0	0	0	$0	$0	$0	0.0
Basement Chiller Room	Domestic Hot Water	1	Storage Tank Water Heater (≤ 50 Gal)	Rheem	82V40-2	W		No						0.0	0	0	$0	$0	$0	0.0
Storage Room	Domestic Hot Water	1	Storage Tank Water Heater (≤ 50 Gal)	Bardford White	RE120U6-1NAL	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommendation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	11	5	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	3	$31	$36	$10	0.8
Restrooms	11	10	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	9	$105	$72	$36	0.3
Restrooms	11	7	Faucet Aerator (Lavatory)	2.20	0.50	0.0	1,946	0	$222	$50	$25	0.1

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	Bohn	ADT090	13, 14	Yes	No	Yes	0.1	1,251	0	$143	$2,281	$155	14.9
Kitchen	1	Medium Temp Freezer (0F to 30F)	Bohn	LET120	13, 14	Yes	Yes	Yes	0.1	2,139	0	$244	$2,799	$205	10.6

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Federal Industries	RSSM478SC-5	No		No	0.0	0	0	$0	$0	$0	0.0
Deli Bar	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	TRUE	T-23-2	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	Beverage Air	MT45	No	15	Yes	0.2	1,573	0	$179	$7,638	$240	41.3
Kitchen	1	Refrigerator Chest	Ower		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	GHT 3-32NPUT	No	15	Yes	0.1	887	0	$101	$2,112	$125	19.7
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	G20010	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Freezer Chest	Avanti	CFC83Q0WG	No		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	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Metro	C5	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	FWE	TS-1826-18	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Vulcan		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (3 Feet Width)	StarMax		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Convection Oven (Full Size)	Imperial		No	12	Yes	0.0	0	13	$146	$9,290	$500	60.1
Kitchen	1	Gas Convection Oven (Full Size)	Blodgett	Zephaire	No	12	Yes	0.0	0	13	$146	$9,290	$500	60.1

Plug Load Inventory

	Existing Conditions					
Location	**Quantity**	**Equipment Description**	**Energy Rate (W)**	**ENERGY STAR Qualified?**	**Manufacturer**	**Model**
Woodshop	22	Various Plug Load Equipment	1,000	No		
Lawton C.J Middle School	10	Coffee Machine	800	No		
Lawton C.J Middle School	3	Dehumidifier	240	No		
Lawton C.J Middle School	143	Desktop	270	No		
Lawton C.J Middle School	2	Electric Space Heater	200	No		
Lawton C.J Middle School	58	Fan (Large)	600	No		
Lawton C.J Middle School	8	Fan (Portable)	80	No		
Classroom 148	1	Kiln	9,900	No		
Kiln Room in 121	1	Kiln	11,000	No		
Lawton C.J Middle School	10	Microwave	1,000	No		
Lawton C.J Middle School	1	Washing Machine	1,500	No		
Various Spaces	32	Misc Plug Load	250	No		
Lawton C.J Middle School	3	Paper Shredder	125	No		
Lawton C.J Middle School	14	Printer (Medium/Small)	144	No		
Lawton C.J Middle School	8	Printer/Copier (Large)	600	No		
Lawton C.J Middle School	67	Projector	244	No		
Lawton C.J Middle School	13	Refrigerator (Mini)	212	No		
Lawton C.J Middle School	3	Refrigerator (Residential)	440	No		
Lawton C.J Middle School	70	Speakers (Large)	250	No		
Lawton C.J Middle School	3	Television	144	No		
Lawton C.J Middle School	3	Toaster	800	No		
Lawton C.J Middle School	1	Water Cooler	192	No		
Basement Chiller Room	1	Dehumidifier	612	No		
Main Kitchen	9	Misc Plug Load	300	No		

TRC

New Jersey's cleanenergy program

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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	1	Refrigerated	16	Yes	0.2	1,612	0	$184	$230	$50	1.0
Teachers Lounge	1	Refrigerated	16	Yes	0.2	1,612	0	$184	$230	$50	1.0

Custom (High Level) Measure Analysis

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (kW)	Tank Capacity per Unit (Gal)	Description	COP	Tank Capacity per Unit (Gal)	Estimated Unit Cost	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Payback w/ Incentives in Years
Storage Tank Water Heater (≤50 Gal)	Middle School	2,500	Electric	4.5	40	Heat Pump Water Heater	2.5	40	$2,069.90	0.00	3,077	0	$351	$2,070	$0	$0	$0	$2,070	5.90	5.90

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

Energy use intensity (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]

Lawton C. Johnson Summit Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 149,720
Built: 1920

For Year Ending: April 30, 2022
Date Generated: March 30, 2023

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
Lawton C. Johnson Summit Middle School 272 Morris Avenue Summit, New Jersey 07901	Summit Public Schools 14 Beekman Terrace Summit, NJ 07901-1702 (908) 918-2100	Summit Schools 14 Beekman Terrace Summit, NJ 07901-1702 (908) 918-2100 rrodri81@asu.edu

Property ID: 21889707

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
62.6 kBtu/ft²

Source EUI
104 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	3,275,286 (35%)
Natural Gas (kBtu)	6,102,104 (65%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	56.5
National Median Source EUI (kBtu/ft²)	93.8
% Diff from National Median Source EUI	11%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	610

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________Date: __________

Licensed Professional

____ ________
,
(___)____-______
____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR Portfolio Manager.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC (II)	*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.